

**TRADITIONAL AGRICULTURAL EXPORTS,
EXTERNAL DEPENDENCY AND
DOMESTIC PRICE POLICIES**
**African Coffee Exports in a
Comparative Perspective**

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CONTENTS

Chapter	Page
I. THEORETICAL BACKGROUND	3
II. THE COFFEE SECTOR AND ITS CENTRAL ROLE IN SSA	6
III. THE ROLE OF PRICE POLICIES: AN ECONOMETRIC INVESTIGATION	17
IV. FURTHER REMARKS	21
V. CONCLUSIONS	22
APPENDIX: Equilibrium exchange rate	24
REFERENCES	26

TRADITIONAL AGRICULTURAL EXPORTS, EXTERNAL DEPENDENCY AND DOMESTIC PRICE POLICIES

African coffee exports in a comparative perspective

*M. Branchi, A. Gabriele and V. Spiezia**

The paper analyses the impact of price variables on coffee production and exports in a selected group of developing countries, with particular focus on a subgroup of Sub-Saharan countries. Due to the dependency of coffee producers on the vagaries of the international market, direct crop taxation and exchange rate policies in these countries are found to be only partially endogenous. The long-run impact of policies on producers' behaviour is then tested by means of a cross-country linear regression model. About one third of cross-country variability in planted areas is found to be attributable to exchange rate and, to a lesser extent, taxation policies. However, price policies do not appear to exert any significant impact on yields. No parametrically significant difference between sub-Saharan Africa and the rest of the world emerges from the analysis.

The results show that, in the case of coffee, the weight of domestic price policies in determining production and exports is relevant, but should not be exaggerated, as most of the cross-country variability in performance in the coffee sector is in fact related to non-price factors, some of which can be modified by strategic non-price policy interventions.

INTRODUCTION

Many developing countries have been and still are constrained by an export structure heavily dependent on one or a few agricultural exports. Among them, virtually all those in sub-Saharan Africa (SSA) did not manage to industrialize or to diversify significantly their exports structure during the post-independence period. Moreover, the performance of SSA¹ countries in traditional agricultural exports began to falter in the late 1970s, and has only very recently started to show some partial symptoms of recovery. Such an unsatisfactory export performance, in turn, has been a major factor in contributing to the progressive deterioration of the balance of payments position and, more generally, to the overall severe economic and social crisis of the subcontinent.

The interpretations of the causes of the dismal performance of African agricultural exports are not uniform and may be viewed as lying in a sort of continuum. On one pole of this continuum there are

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¹ All the African countries covered in this study are sub-Saharan. Thus, the terms Africa and SSA are used interchangeably here.

those who attribute most of Africa's plight to structural and exogenous factors; on the other pole those who put the blame essentially on wrong domestic economic policies, such as the overvaluation of real exchange rates and the taxation of agricultural exporters.

Central to this debate is the question of the intrinsic ability of farmers to respond to price incentives, both from a static and a dynamic point of view. Most econometric studies have found the supply elasticity of African agriculture to be positive, but low, especially in the short term, owing *inter alia* to the paucity and rigidity of available productive techniques and to high transaction costs.² However, other observers have argued that, if the concept of elasticity is widened in such a way as to allow the supply response to embody the overall impact of comprehensive market-oriented reforms over a prolonged period of time, the results are likely to be more favourable (Shiff and Montenegro, 1997).

The aim of this paper is to contribute to the current debate by analysing the determinants of exports of one major crop – coffee – for a selected group of developing countries. In order to evaluate the importance of price variables relative to more structural factors, the paper focuses on two specific issues. The first one refers to the effects of changes in the international price of coffee on the level of exports from each country, with particular emphasis to the behaviour of SSA countries. Looking at the time series of price and exports, such effects seem to operate either directly by affecting the supply of coffee and indirectly by inducing modifications in the trade policy of each country (mainly in the exchange rate and in the degree of producers' taxation).

The importance of trade policy in determining export performances is the second issue investigated in this paper. With this respect, the cross-countries regression analysis presented here offers new empirical evidence to evaluate to what extent international differences in the growth of production and exports may be explained by differences in the exchange rate and in the degree of producers' taxation or rather by structural, country-specific, factors.

The analysis is carried out on a sample of 26 countries, 12 of which are African, over a period of over 20 years, from the early 1970s to the mid-1990s. A broad small country assumption is maintained in the analysis, according to which the coffee exports of each of the countries selected had a negligible weight in the world market.³ Until 1989, the patterns of trade in coffee remained relatively stable; however, when the International Coffee Agreement broke down, the rapid and persistent fall in the international price of coffee caused a sharp redistribution of market shares.

² See, for instance, Binswanger (1989), Binswanger and McIntire (1987), Chhibber (1989), de Janvry and Sadoulet (1992). The results of a major study carried out by the World Bank on agricultural pricing policies in developing countries are published in Shiff and Valdes (1992).

³ This assumption is quite realistic for most countries in our sample, although an exception could be made for Colombia, presently the world's main coffee exporter. During the period in which the ICA was in vigour, most countries were bounded by quotas and smuggling, and secondary markets were widespread. However, as international prices were jointly determined by the interplay of demand and supply and by bargaining agreements reached in a centralized way between producers and buyers, the international price was basically exogenous for every single country.

The paper is organized as follows. Chapter I outlines a simple theoretical model to analyse the impact of different price factors on the supply and exports of coffee. Chapter II presents some descriptive evidence on the evolution of coffee exports, international price, exchange rates and taxation policy. In chapter III we carry out a simple econometric analysis of the effects of price policy on the supply and export of coffee. Finally, chapters IV and V discuss some policy implications and summarize the main conclusions of the analysis.

I. THEORETICAL BACKGROUND

Coffee is a tree crop, usually cultivated in specially suitable mountainous areas where the land could not, under “normal” circumstances, be utilized productively for alternative crops or for grazing purposes with a comparable level of rentability. Quality and yields are very different from one area to another, even with the same production technique, but – again, under “normal” circumstances – they usually imply a fair amount of “rent” with respect also to alternative uses of farm labour, if the overall production cycle is considered. For “normal” circumstances we refer to situations in which cultivation is not carried out on marginal lands (by definition), and catastrophic downturns of the international price and/or extraordinary unfavourable domestic policy-induced distortions are barred. Unfortunately, the latter are not unknown in the recent history of many African countries, not only as a result of excessive sectoral taxation, but sometimes owing to overall disruption of the formal sector of the economy, with the concomitant drying up of the supply of manufactured goods to the countryside, which nullify the purchasing power of cash, thus inducing the rural population to revert to subsistence farming or migration (Berthelemy and Morrison, 1997).

Coffee trees start bearing fruits several years after plantation (normally five), and their productive life can last up to more than 20 years. The main annual production cost is that of harvesting, which is highly labour-intensive and often implies the hiring of labour outside the farmer’s household, even for relatively small plots. Other annual production costs include pruning, fertilization and other activities, some of which normally need cash disbursements on the part of the producer (for fertilizer, pesticides and the like). The amount of these labour and non-labour investments has, of course, an impact on the productivity of the trees, both in the short and in the longer term. Thus, under favourable circumstances, high short- and medium-term price expectations can lead to higher production from existing trees and vice-versa, while the plantation of new trees – provided land is not a binding constraint – and/or the rehabilitation/substitution of existing ones is related to long-term price expectations. Conversely, periods of very low prices can induce cash-stripped small producers to forego even basic maintenance investments, thus jeopardizing future production potentials. The same outcome can be the product of non-price factors, such as the disarray or non-existence of markets or other

institutional arrangements for the availability of inputs and the disposal of output, lack of financing, transportation, etc. These effects may be magnified by the existence of a set of productive techniques – albeit limited – the most advanced of which require a certain non-labour investment and some additional skills on the part of the producer, as well as a suitable market, infrastructure, and technological and informational environment, and hence are not available altogether in the more backward areas and countries.

The relevant price for the producers' decision to increase or decrease their supply of coffee is the real price they receive, that is the purchasing power that can be obtained by the sale of one unit of coffee. Denoting as RPP the real producers' price in any country, it can be written as (World Bank, 1994):

$$RPP = Pf/CPI = (Pb/WPI) (e * WPI/CPI) (Pf/Pb) \quad (1)$$

where Pf is the farmgate producer price in national currency, Pb the international price of coffee in dollars, e the nominal exchange rate; while CPI and WPI stand for the domestic and the world price index, respectively.

Rearranging equation (1), we obtain:

$$RPP = pb * RER * NPC \quad (2)$$

The first variable, pb is defined as the real international price, i.e. as the ratio of the nominal international price of coffee over the world price index (Pb/WPI). According to the small country assumption, pb can be taken as exogenously given. The second variable is the real exchange rate (RER), which reflects the average competitiveness⁴ of the country vis-à-vis the rest of the world ($e*WPI/CPI$). Any rise in the value of RER corresponds to a real depreciation of the domestic currency. Under the absence of supply constraints, this improvement in the country's competitiveness tends to translate into an increase in the supply of all exportable commodities, including coffee.

Finally, the ratio between the farmgate and the international price (Pf/Pb) represents the nominal protection coefficient (NPC), which is an indicator of the degree of taxation imposed by the national government on the local producers in the coffee sector. A value of NPC lower than one indicates that coffee producers are being taxed, while a value of NPC above unity implies a subsidy to the coffee

⁴ In fact, as Krugman (1994) polemically pointed out in a popular essay, there is not such a thing as the "competitiveness of a country" *strictu sensu*, as prices (including wages) can in principle be flexible enough to allow balanced international trade to take place in some specific sectors, whatever the respective international productivity differentials. Actually, the exchange rate is but one of these prices. Here we use the expression in the commonly accepted sense of competitiveness of the tradable sectors of the country, under *ceteris paribus* conditions.

sector.⁵ Therefore, the higher the degree of protection, the higher the real price perceived by producers and the economic incentive to increase the production of coffee.

RER and *NPC* are key indicators of the impact of the economic policy pursued by the national governments in the realm of prices.⁶ *NPC* can be considered as an indicator of the influence of direct, sectoral price policies, and *RER* as an indicator of the indirect effect of the exchange rate policy, which is passed down to farmers through its impact on the real producer price.

It is worth emphasizing that both indicators, while policy-related, cannot be considered fully policy-determined by each government in a free, autonomous fashion, at least in the sense of being set as arguments of a one-dimensional, one-goal maximization exercise, especially taking into account the multiple array of structural constraints faced by developing countries.

This is obvious in the case of the real exchange rate, but even the degrees of freedom in setting the level of direct commodity-specific export taxation should not be overestimated in countries which can count on few, if any, alternative sources to finance the state budget. As a matter of fact, the ability on the part of each government to enact competitive exchange rate and sector-specific price policies should also be seen, at least in part, as the outcome of a more general effort to overcome the constraints stemming from external dependency and underdevelopment.

Finally, it is worth referring briefly to the domestic demand for coffee. For the countries included in our sample it is a reasonable approximation to assume that the changes in domestic consumption are quite small in relation to the changes in production, so that variations in coffee exports are determined exclusively by the supply side.

The analytical framework outlined above is useful in distinguishing the influence of national policy on coffee exports, as embedded in *NPC* and *RER*, from the effects of changing economic opportunities in the world market, which are reflected in the evolution of *Pb*. Of course, given its highly stylized character, the model fails to account for other important distribution factors, stemming from functional relationships of production among the various economic agents, including private traders and financial intermediaries.

The short-term price elasticity of the coffee supply (like that of most tree crops) tends to be low. On the other hand, the long-term supply elasticity, besides being harder to estimate owing to the scarcity

⁵ This indicator taken alone is, however, a very rough one. Among other factors, it abstracts from the value added by any transportation or transformation process which might take place between the farm gate and the shipping stage of crop production and the trading chain, as well as from the role of national traders, which might be able to capture significant rents. Other analysts, utilizing country-specific detailed information on in-land transport and other domestic costs, were able to produce a more accurate measure of the *NPC* in which the denominator was the border price adjusted for such estimated marketing costs (see Krueger et al., 1988; Jaeger, 1992). However, the unadjusted measure of the *NPC* can also be meaningfully utilized in a comparative manner, across different periods and/or countries, as is done in this paper.

⁶ The two indicators do not fully capture all the impact of price related policies (for instance, other types of taxes might be imposed on producers, or inputs such as fertilizer might be subsidized). Moreover, government policies in the field of infrastructure, research, extension, education, environment conservation, and many others, can also have an impact on agricultural production.

and limited reliability of data, is influenced by the variation over time of a number of non-price factors which are usually not easily quantifiable. As a consequence, most of the econometric studies carried out on time series often fail to find robust estimates.

For example, Jaeger (1992) carried out an ambitious econometric study on 21 SSA countries in order to estimate the price responsiveness of total agricultural supply and of a few key crops taken individually. In the case of coffee, he found a positive short-run elasticity of 0.23⁷ for SSA producers as a whole, but almost no significant results when examining each country separately. In addition, some of the other variables included in the regressions turned out to have the wrong sign (e.g. the real exchange rate had a negative coefficient) and no information on the statistical robustness of the regressions were reported (such as the R_2 or some test of stationarity of the time series).

Another study (Gabriele, 1994) tried to estimate the price elasticity of traditional primary exports in four Central American countries over the 1960-1990 period. Short-term price elasticity varied between 0.08 and 0.19, but none of the long-term estimates turned out to be statistically significant.

II. THE COFFEE SECTOR AND ITS CENTRAL ROLE IN SSA

This chapter examines some descriptive evidence on the evolution of coffee exports, international price, exchange rates and taxation policy for a sample of 26 producer countries. The sample is meant to include all major coffee producers in the developing world and is composed of two groups. The first is constituted by those African countries for which coffee is one of the main exported goods (for many of them, virtually the only one).⁸ The second group comprises the major non-African (Latin American and Asian) coffee exporters.⁹ Some countries, such as Zaire¹⁰ and Brazil, had to be excluded because of the lack of data. The latter country was excluded also on the ground that during most of the period under study it was the first producer in the world, with sizeable market power, and thus it did not fit the small-country, price-taker assumption which underlines the present analysis.¹¹

⁷ Jaeger also found positive and significant producer price elasticities for cocoa and cotton, but not for tea.

⁸ Burundi, Cameroon, Central African Republic, Côte d'Ivoire, Ethiopia, Kenya, Madagascar, Rwanda, Sierra Leone, Togo, United Republic of Tanzania, and Zimbabwe.

⁹ Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Haiti, Honduras and Mexico; India, Indonesia, New Guinea, Philippines and Thailand.

¹⁰ Since 1997 this country has officially taken back its previous name of Congo.

¹¹ We realize that the latter argument applies to a lesser extent to other major producers also, notably Colombia. However, during most of the period under study, many of the major producers were (albeit not fully) constrained by the quotas imposed by the International Coffee Agreement, so that their power to influence the international price of coffee was quite low.

With the exception of nominal exchange rates (which, as usual, are those officially published by the IMF), all data series have been taken from UNCTAD and FAO data bases. We have used the unit value index of manufactured goods exports elaborated by UNCTAD as the international deflator (*WPI*).¹²

The largest coffee producers in the world are Latin American economies (Colombia, Mexico and Brazil). In Asia, Indonesia and India are also major exporters, and the world market share of Thailand has been increasing dramatically since the mid-1980s. However, with the exception of Colombia, coffee plays a minor role in the export structure of semi-industrialized countries. On the other hand, apart from oil-producing countries, coffee is Africa's most relevant export product. Millions of farmers, as well as several countries' fiscal budget, depend mainly or largely on coffee exports. Four African countries obtained more than 50 per cent of their export earnings from coffee in the period 1987-1989, and nine others more than 10 per cent. Since the collapse of the International Coffee Agreement (July 1989), coffee prices have plummeted dramatically, causing an estimated \$10 billions loss to world producers between 1989 and early 1993. For Uganda alone, this loss was in the order of \$200 million – a third of its export revenue.¹³ Since 1994 international coffee prices have been experiencing a strong recovery, and this is possibly the single main factor underlying the good growth performance of several SSA countries in the last two or three years.

To evaluate the impact of the international price on the coffee exports, figures 1.1 to 1.6 show the evolution of *net gains* as a percentage of total exports and GDP, for a sample constituted by six countries (Ivory Coast, Kenya, Uganda, Tanzania, Mexico, and El Salvador). This sample includes African and non-African producers with varying degrees of dependence on coffee exports. The net gain is defined as the actual value of coffee exports minus the value which would have been gained by exporting the same quantity of coffee if the coffee price (in real term) had been the same as in a reference year. We took 1980 as a base, since in that year the price of coffee was at a "normal" level, i.e. one which was neither exceptionally high nor low.

¹² As is common practice in UNCTAD statistical publications, we chose this deflator in order to approximate the evolution of the purchasing power of coffee exports, which are largely used by producer countries to finance imports of manufactures.

¹³ See Matringe (1993). Data on producer losses have been taken from the Public Ledger and Commodity Week (April 1993).

[Figures 1.1 to 1.3]

For technical reasons, these figures cannot be included here.

[Figures 1.4 to 1.6]

For technical reasons, these figures cannot be included here.

The vagaries of the international price provoked in all exporter countries a very strong positive shock in the late 1970s, peaking in 1977, and severe losses since 1987. The relative impact of these shocks, however, was proportional to the concentration on coffee of each country's export structure, and thus dramatic (of the magnitude of up to more than 50 per cent of total exports and 2 to 3 per cent of GDP) in most SSAs,¹⁴ and negligible in semi-industrialized countries such as Mexico and Thailand.¹⁵

Figure 2 shows the evolution of world production and of the international coffee price, as well as their simple correlation index, which is negative and high. No further statistical analysis is required to see that production hikes are matched by price falls in the world market. The correlation analysis per se does not infer the direction, nor in principle the existence, of a causality linkage between the two phenomena. However, as it is well known that the volatility of world supply is far higher than that of world demand, it is fair (and far from original) to argue that as a general rule changes in world production induce changes in the world price of the opposite sign.¹⁶ On the other hand, considering the political economy of the various producers taken individually, it is to be expected that both automatic market-based mechanisms (such as lags in adjusting the nominal producer price and the impact of the relative abundance/scarcity of foreign exchange on the domestic currency) and the attempts on the part of governments to smooth the impact of exogenous shocks on farmers through adjustments in their taxation and exchange rate policies¹⁷ lead to counter-cyclical movements in RERs and NPCs.

To test this common-sense assumption, we calculated the average for each indicator in the 26 countries for every year of the period. Figures 3 and 4, along with the corresponding correlation indexes, clearly confirm the existence of a negative correlation between the international price, on one hand, and the 26 country averages of *NPC* and *RER*, on the other hand.¹⁸ Figures 5 and 6, which present the evolution of the (simple arithmetic) average of *NPC* and *RER* indicators by region, show that, in broad terms, these counter-cyclical trends are common to all the developing areas. The

¹⁴ The impact of price shocks was also particularly severe for Central American and Caribbean coffee exporters.

¹⁵ The graph for Thailand was omitted because, in the same scale, it did not show sizeable variations.

¹⁶ This observation, which is not new, often applies to many primary products exported by developing countries. The well-known phenomenon of the "fallacy of composition" has led many development economists to suggest that orthodox policy prescriptions pushing each primary exporter to rely exclusively on its static comparative advantage may lead to a redistribution of market shares, but are likely to be Pareto-inefficient and ultimately self-defeating for the group of primary exporters taken as a whole.

¹⁷ In times of good prices, governments might as well use the same policies rather to extract the surplus from producers than to protect them from market insecurity, thus leading to identical outcomes.

¹⁸ The sharp increase in average NPC in the early 1990s, in correspondence with the record low levels reached by the international price, is particularly striking. The partial recovery of the latter in 1994 conversely brought about an almost 50 per cent drop in the net protection indicator (figure 3).

[Figures 2, 3 and 4]

For technical reasons, these figures cannot be included here.

[Figures 5 and 6]

For technical reasons, these figures cannot be included here.

resemblance in the evolution of the RER is particularly striking, and shows to which extent diverse countries, which nevertheless occupy a similar, highly dependent position in the international division of labour, enjoy in fact limited degrees of freedom, even in setting a key domestic policy variable. The movements in the real exchange rate of coffee exporters have been determined to a large extent by exogenous forces¹⁹ having a common impact on all of them, leading to a progressive overvaluation of currencies up to the mid-1980s, followed by a sharp depreciation afterwards.

¹⁹ Besides the price of coffee, it is likely that other exogenous changes, especially in the sphere of the international financial environment, may have contributed to depreciating the currencies of most developing countries since the early 1970s. The analysis of these long-term changes, however, is beyond the scope of this paper.

Governments in coffee-exporting countries, therefore, appear to react to declines in world prices decreasing the level of sectoral taxation and depreciating their currencies. Conversely, increases in world prices make it easier for governments to increase farmers' taxation and to let their currencies appreciate, although the correspondence is less than symmetric, as in this latter case the degree of freedom enjoyed by policy makers is of course higher. The inverse relationship between world price and NPC reflects an attempt to defend real producer prices during periods of unfavourable trends in international markets, while higher surplus extraction is feasible when world prices are good. The countercyclical effect on the exchange rate, when international prices are low, might in part be due to a similar goal of defending real producer prices, pursued by means of nominal devaluation, and in part to the emergence of unsustainable external deficits which would render inevitable a real depreciation of the currency. On the contrary, positive exogenous shocks are often associated with currency appreciations. We conclude that the weight of exogenous factors in determining the economic performance of coffee-dependent developing countries is not only direct but also indirect via their impact on policies, and thus particularly relevant.²⁰

The presence of common trends among all coffee exporters does not, however, imply total policy uniformity. If the levels, rather than the trends, of NPC and RER are considered, the graphic analysis also shows that direct taxation of coffee exports has on average been higher in Africa²¹ than in Asia since the mid-1970s, although it decreased drastically during the period of very low international prices triggered by the crisis and the final collapse of the ICA (see figures 5 and 6).²² The exchange rate policy appears to have been relatively less favourable in Africa than elsewhere during most of the period, although in the 1990s this trend has been reversed, and by 1994 the average RER for the SSA coffee exporters was the most depreciated with respect to the base year 1970.

²⁰ The "countercyclicity hypothesis" is not a necessary condition to point towards the strong influence of world commodity prices on exporters' taxation policies. A poor country can in fact be so hard hit by a fall in the international price of its main export that it is in no position to diminish the level of nominal taxation, and it might on the contrary be forced to increase it in order to preserve a minimum vital level of fiscal receipts. On the other hand, the case is at least in part different for exchange rate policies. In times of boom, an exogenous upward pressure on the real exchange rate can be resisted more or less successfully by different governments depending, at least in part, on their respective ability and will, although structural domestic constraints play a role as well. When, on the contrary, world prices fall, a misplaced resistance to adjust the nominal exchange rate in order to avoid the emergence of an unsustainable external deficit is often imputable mainly to the government's myopia or to domestic constraints, although there are cases (like that of the CFA zone in Africa up to 1994) in which the culprit is in fact an international constraint which is - apart from the very long term - essentially exogenous.

²¹ The average NPC for Latin American countries was higher than the African one from the mid-1970s to the mid-1980s, but lower afterwards.

²² In comparing average levels of NPC in different developing areas, however, it should be taken into account that the difference between border price and producer price is owing not only to the impact of net taxation, but also to that of various costs incurred domestically in the producing country, namely in-land transportation, basic processing, packaging, marketing and administrative costs (see note 4). These costs tend to be particularly high in Africa, due to its low population density, to the lack of infrastructure, and to other structural factors. Thus, it is likely that the level of net direct taxation of coffee in Africa vis-à-vis Asia and Latin America was actually lower than implied by comparison of the respective average NPC levels.

Figure 7 and the extremely high positive correlation index between the real international price and the 26-country average for the real producer price RPP²³ clearly show that, in spite of these attempts, the evolution of producer prices in the coffee exporting countries is basically a hostage of the international price, although the potential effectiveness of each countries' counter-cyclical policy response is not homogeneous and is essentially a function of the relative strength of the non-coffee sector of the economy.

Figure 8 shows production trends (figure 8.2, constructed like figures 5 and 6, shows the evolution of a rough production index calculated as the arithmetic regional average by region²⁴). The production trend in the African group of countries points towards a decline since the early 1980s, while it is increasing in the other regions.

Figures 9.1 to 9.3 refer to export trends in selected countries. It is apparent that, especially since the mid-1980s, in spite of the unfavourable trends in the international price, some producer countries, and notably many Asian coffee exporters (and Costa Rica in Latin America), did much better than others.²⁵

These findings confirm that, generally speaking, coffee exporters are highly dependent on the vagaries of an international market which is intrinsically unstable and has recorded a pronounced downward trend since the late 1970s, and as a result they are often vulnerable to severe exogenous shocks. Taking coffee exporters as a group, and looking at the data in an intertemporal dimension, it is also plain that domestic price policies tend to be reactive with respect to the stimuli stemming from the international market, and their impact tends to be overshadowed by that of the latter. If trends in exchange rate and taxation policies are very similar across the whole country sample, differences in the levels of NPC and RER respectively do emerge from the analysis as well, and there is *prima facie* evidence of a relatively less favourable price policy stand for coffee exporters in Africa than in other regions, especially Asia.

²³ Like the other two variables, each country's RPP was previously normalized as an index 1970 = 100.

²⁴ However, as in the preceding tables, the average – besides being arithmetic and not weighted – was calculated only among the sample countries. It is thus just an indicative performance indicator and should not be confused with a comprehensive index of coffee production by continent.

²⁵ Among the factors which help to explain this successful performance, might be mentioned the availability of new land the introduction of more productive varieties and other technological innovations, the upgrading of transport, processing, and marketing infrastructure, and the implementation of support policies (see further chapters III and IV).

[Figures 7, 8.1 and 8.2]

For technical reasons, these figures cannot be included here.

[Figures 9.1 to 9.3]

III. THE ROLE OF PRICE POLICIES: AN ECONOMETRIC INVESTIGATION

The aim of this chapter is to investigate the role of price policies in explaining international differences in coffee exports. As discussed in the previous chapter, national policies cannot be taken as completely independent of the level of the international price. However, it is likely that differences in the domestic price policy might have had a recognizable impact on the long-run production and export trends of the various producers. In fact, variations in the real exchange rate are expected to influence coffee exports via their impact on the average competitiveness of each country, while the level of protection captures the effect of the taxation policy on the domestic supply of coffee.

Given the basic characteristics of coffee production and trade, farmers may be assumed to respond to price-related incentives consistently with the structure of the risk-weighted returns that can be expected to stem from every specific type of investment. The degree of lumpiness and the time lags after which benefits can be expected to materialize are evidently important elements to be considered by producers in the evaluation of different investment possibilities. Thus, while short-term investments (in pruning, fertilization and the like) are related to short-term price expectations,²⁶ long-term investments, such as the planting of new trees, are related to long-term price expectations. Given the length of the productive life of coffee trees, decisions about planting imply, in principle, some kind of assumption on the level of prices decades ahead. On the other hand, apart from the exogenous volatility of the international price, policy-related price incentives are likely to be taken into account for long-term investment decisions only as far as they are perceived to be permanent, with farmers basing their expectations on future price policies on their entire past and present experience.

Taking into account the combined influence of all these factors, it is clear that the full impact of price policies on the producers' economic behaviour can only be evaluated over quite a long period of time. As our data series cover about a quarter of a century, they would be insufficient to carry out an econometric analysis based on time series, because such an analysis would only be meaningful if it were possible to compare the long-run effects on production and exports of different price policy regimes, and that would require data covering at least four or five decades. On the other hand, a period of 25 years is long enough to analyse data in a comparative fashion, as it can be assumed, *ceteris paribus*, that different policy orientations contribute to explain differences in the performance of the coffee sector from one country to another.

To test this hypothesis, we have carried out a cross-country regression analysis of the impact of the exchange rate and of the level of protection over the volume of coffee supply and exports.²⁷ The

²⁶ The degree of freedom of farmers in formulating investment decisions is also uneven among short-term investments. For instance, under relatively normal circumstances, harvesting costs (which make up a large share of annual production costs) are practically fixed costs that do not change, whatever the price of the crop. It may happen, however, that coffee prices fall so much that they do not even justify the cost of harvesting, especially if it involves the use of non-family labour.

²⁷ As this cross-country analysis was carried out to explore the impact of price policies on the different performance of the various coffee producers, all exogenous factors impinging on each country in the same way were not taken into account. Among them, of course, there was the evolution of the international price.

sample includes all countries listed in chapter I but Thailand, which may be considered as an outlier because of the extraordinary changes in its supply and exports of coffee.

To make explicit the effect of taxation policies, we defined a new variable $TAX = (NPC-1) * 100 = (Pb-Pf)/Pb * 100$, which indicates the amount of tax as a percentage of the international price. All variables considered in the analysis are expressed as exponential *growth* rates over the period 1970-1994, with the only exception of TAX which represents the *average* degree of taxation over the same period. This choice is motivated on the ground that only persistent taxation policies may affect producers' incentives, while short-term variations in the degree of taxation are likely to have a negligible effect. In any case, the growth rate of TAX never turned out to be significant in any of the regressions performed.

Table 1 reports the main results of the regression analysis. Consider first the determinants of the coffee supply. By definition, the growth rate of production in each country is the sum of the growth of planted areas and of the increase in yields. To assess the effects of the price policies of each of this component, we performed two separate regressions, reported in rows 1 and 2 of table 1.

Both the taxation policy and the variations in the real exchange rate turned out to exert a positive effect on the cultivated areas, even if the estimated coefficient for RER is statistically significant only at the 93 per cent level. The regression explains about 35 per cent of the sample variance, meaning that two thirds of the cross-countries differences in the growth rate of cultivated areas are due to other non-price factors. Some of these factors can be considered at least in part as policy-determined (such as the availability of infrastructure, inputs, marketing and extension services), while some others are purely exogenous, among them the availability of land or the vagaries of the weather.

On the contrary, the dynamics of productivity (which is reflected in the variations of yields) appear to be largely independent of the price policies and of the growth of cultivated areas, as shown by the fact that regression 2 does not generate any significant results.

These results show that the impact of policy-related price factors was felt quite strongly on planted areas (a variable largely under the control of producers as independent economic agents) but not on yields, the dynamic of which may be regarded as depending mainly on a number of non-price systemic factors.²⁸

²⁸ This could be the case, in particular, for Thailand, the country with the best relative performance. This finding suggests that country-specific domestic factors, unrelated to price policies, strongly contributed to increased yields in Thailand. On the other hand, yields also increased in countries with a mediocre production performance, some of which recorded a declining trend in the harvested area (for instance, Ethiopia). This might be due, besides obvious data reliability problems, to the fact that farmers were progressively abandoning relatively marginal lands, thus increasing average yields in the absence of technical progress, in a purely Ricardian fashion.

Table 1

Determinants of coffee production and exports (1970-94: 25 countries)

1)	AREA	3.57 (4.14)***	.39 (1.90)*	.06 (2.96)*		.35	6.01***
2)	YLD	<i>Constant</i> 1.22 (.94)	<i>RER</i> .31 (1.21)	<i>TAX</i> -.002 (-.072)	<i>AREA</i> -.36 (-1.49)	R^2 .15	1.27
3)	Q	<i>Constant</i> 3.55 (4.28)***	<i>RER</i> .43 (2.15)**	<i>TAX</i> .05 (2.66)**	<i>YLD</i> .73 (4.14)***	R^2 .57	9.28***
4)	EXP	<i>Constant</i> .03 (.97)	<i>Q</i> .84*** (3.69)			R^2 .37	13.61***
	Variance	<i>Area</i> 4.82	<i>YLD</i> 4.56	<i>RER</i> 3.31	<i>TAX</i> 338.08	<i>Q</i> 6.56	<i>EXP</i> 12.51

Note: t-statistics are reported in brackets. One, two or three stars indicate, respectively, a 90 per cent, 95 per cent or 99 per cent significance level.

To account for the total effect on supply, we regressed the growth rate of coffee production on the variations of the exchange rate, the taxation coefficient and the yield (regression 3).²⁹ All the explanatory variables considered proved to be significant at a conventional level (95 per cent or more). However, the effects of price policies on the supply of coffee appear to be quite small. On the one side, since the regression explains about 57 per cent of the sample variance, the remaining 43 per cent of the observed differences in the growth rates of the coffee supply seems to be caused by changes in cultivated areas which are independent of price policies. On the other side, the estimated coefficients imply that 60 per

²⁹ The latter variable is now taken as exogenous, as the results of regression 2 show that its evolution is not significantly correlated with that of price policies.

cent of the explained variance is due to the growth of yields, whereas price policies account only for the remaining 40 per cent (24 per cent and 16 per cent for TAX and RER, respectively).³⁰

According to these findings, the causes of the observed differences in the growth of coffee supply across countries seem to lie mainly in non-price factors (included productivity growth) rather than in different propensities to tax/subsidize producers or to preserve favourable terms of trade. Therefore, although the effectiveness of price policies in supporting production is confirmed by the present analysis, the importance accorded to such policies by many observers appears to some degree to be exaggerated.

Consider now coffee exports. In regression 4, the growth rates of exports (*EXP*) are regressed on the growth rates of production (*Q*). On the basis of a t-test, we find that the estimated elasticity of coffee exports with respect to coffee production is not statistically different from 1, implying that increases in the coffee supply are almost completely translated into increased exports. However, more than 60 per cent of the cross-country variance in exports is not explained by differences in the growth rate of supply. Since variations in the domestic consumption of coffee are likely to be very small, such a high proportion of unexplained variance must be ascribed to other factors. A first possibility is clearly the existence of some statistical discrepancies between the data on production and those on exports. A second and more economically meaningful explanation is international smuggling, carried out by producers, private traders, or state-controlled marketing and trading boards. To avoid tax payment and circumvent the system of quotas, producers can smuggle coffee to border countries. Consequently, part of the production of one country figures in the trade statistics as exports from other countries. Such illegal flows used to be quite substantial, especially up to 1989, when the International Coffee Agreement broke down, and may explain a considerable proportion of the observed differences between the series of coffee production and exports (Matringe, 1993).³¹

Finally, an attempt was made to investigate whether the response of African countries to price policies appeared to be statistically different from that of coffee producers in other regions. To this purpose, an "Africa dummy" was added as an additional explanatory variable to the regressions, with value 1 for African countries and 0 for the others. The dummy variables did not turn out to be significant in any regression.

³⁰ By definition, the sample variance ($Var(Q)$) is the sum of the explained variance ($eVar(Q)$) plus the unexplained variance ($uVar(Q)$). From regression 3 the sample variance was decomposed as follows: $Var(Q) = eVar(Q) + uVar(Q) = (.43)^2 \cdot Var(RER) + (.06)^2 \cdot Var(TAX) + (.73)^2 \cdot Var(YLD) + uVar(Q)$.

³¹ To test whether this effect was stronger in countries with higher taxes, we regressed the residuals of regressions 4 (i.e. the growth in exports which is not explained by production increases) on the degree of taxation, but this variable did not turn out to be statistically significant. This negative result appears to show that, even if excessive taxation on agriculture might affect directly the balance of payments via smuggling, for a given level of production of exportables this effect is unlikely to be very strong.

IV. FURTHER REMARKS

The preceding chapter shows that, once production variations are disembodied into those stemming from changes in the harvested area, on one hand, and those stemming from changes in yield, on the other, differences in performances can meaningfully be related to the price-related explanatory variables only in the case of the former. This finding suggests that domestic price policies play a relevant, albeit not overwhelming, role in influencing farmers' rational choices on the allocation of resources (mainly land and labour) between coffee and other (productive or non-productive) alternative uses. This role is, however, basically static, as no significant causal relationship could be established between changes in the explanatory variables and those in yields (which can be considered as proxies for productivity and, broadly speaking, technical progress).³² We tentatively interpret this result as a confirmation that, on one hand, in very general terms, the coffee sector is still quite traditional and hardly amenable to technical progress. More interestingly, on the other hand, the little technical progress which has been taking place in the sector appears to be attributable mainly to non-price domestic factors, among which crop-specific and wider R&D and diffusion policies have probably played a major role, along with infrastructural and institutional development and the growth of intersectoral linkages. Conversely, the analysis has shown that the most clearly recognizable impact of price policies is that of the level of taxation on planted areas. As any future expansion of harvested areas is obviously constrained by the availability of suitable land, this finding points towards a further weakening of the potential benefits which can be expected from purely price-focused policies in order to foster overall economic development.

The econometric results outlined above are to be evaluated along with those of the analysis carried out in chapter II with the help of graphics and descriptive statistics. Besides confirming and quantifying the dramatic dependence of the whole economy of most coffee producing countries on the vagaries of the international price of grain, the devastating impact of the collapse of ICA on many of them, and the reactive nature of taxation and exchange rate policies in most countries, the analysis allows for a comparison between two strikingly different experiences, that of Thailand and other semi-industrialized Asian exporters, on one hand, and that of most SSA countries, on the other, especially in the post-1989 period. For most SSA producers the coffee sector is extremely important, but it is isolated and cannot count on the support of other more advanced domestic sectors. These countries, lacking other sources of surplus extraction, taxed the coffee sector more heavily than other exporters, especially between the mid-1970s and the mid-1980s, thus jeopardizing producer incentives, and failed to engineer a virtuous parallel resource transfer from other sectors. Thus, producer incentives were jeopardized in a static environment, while no dynamic intersectoral synergy could materialize. Since the second half of the 1980s, many of these countries have tried, sometimes desperately, to sustain producer prices, but

³² Conversely, if no technical progress is assumed, the inverse relationship between harvested areas and yields referred to in notes 26 and 28 may be presumed to prevail.

have suffered severe losses, and could not even maintain a quantitative and qualitative level of production. Many Asian producers, on the other hand, were in a position to sustain the coffee sector, thanks to their more diversified economies and their previous accumulation of social capital in terms of policy-making institutions. They managed to develop the infrastructure and improve the techniques used by producers, and were thus able to gain market shares and increase production, even under very unfavourable international circumstances. More specifically, according to a recent study on the coffee sector in India, Indonesia and Viet Nam³³ (Kohler, 1998), the key factor determining successful performance in the coffee sector has been the implementation of effective government-led development programmes for coffee and other cash crops, along with the mutual learning effects and reinforcing dynamics made possible by the existence of scale economies in the diffusion of technical progress, both within agriculture and through the linkages between the former and a rapidly growing industrial sector. Government programmes have selected coffee as a suitable cash crop, also with an eye to social, demographic, ecological and, ultimately, to political goals, and have offered farmers attractive incentives in the form of good producer prices and favourable credit schemes. Finally, in all three countries, the development of the sector has been fostered by strong coffee authorities, financially supported by their government, which have been not only in charge of research, marketing upgrading, quality control and other services, but have also acted as a lobby and focal point for corporate pro-coffee interests in the institutional arena.

V. CONCLUSIONS

The main analytical result of this paper is a cross-country linear regression model aimed at testing the long-term role of semi-endogenous, policy-related price factors (the real exchange rate and the net level of protection) in determining the differential production and export performance of 26 coffee producers, 12 of them African. The model turned out to fit the data relatively well, showing that about one third of the cross-country variability in planted areas can be attributed to the impact of exchange rate and/or crop-specific net protection policies. On the other hand, no significant correlation could be established between the price policy indicators and the growth in yields. No parametrically significant difference between SSA and the rest of the coffee-producing world could be established, suggesting that – taking for granted the large weight of non-price factors – the supply response of African exporters to strictly price-related factors is not very different from that of their counterparts on other continents, and thus that attempts at excessive surplus extraction did contribute by themselves to the relative and absolute decline of the coffee sector precisely in that part of the world most dependent on this crop.

³³ Viet Nam has emerged as a major coffee exporter only in the 1990s, and hence has not been included in our long-term econometric analysis covering the 1970-1994 period.

However, we also found that most of the cross-country variability in exports is to be attributed to non-price factors, acting both on the dynamic of planted areas and on that of productivity.

In sum, this analysis has shown that, at least in the case of coffee, the weight of domestic price policies in determining the performance of traditional export sectors is relevant, but should not be overrated. Exogenous events, like the vagaries of world markets, on one hand, and of weather, on the other, still play a major role in influencing the evolution of coffee exports, as they did in the past. Moreover, there are several non-price related factors, in part policy-related, which do have a strong impact on the coffee sector, especially in the long run: among them the structures, institutions and policies which jointly determine the availability of inputs, technology, credit, transportation, information, extension, and the existence and reliability of marketing networks, agents, and organizations.

In the past, many African exporters have been penalized by wrong price policies, but this is only part of the story. It is thus likely that one-sided policy advice aimed exclusively at increasing producers' private rentability by means of fiscally painful price policies – unless needed to redress overly blatant and incentive-killing distortions – might be of limited usefulness for African coffee producers, and more in general for those developing countries heavily dependent on the exports of traditional agricultural primary products. An adequate incentive structure at the level of primary producers is a necessary, but not sufficient, condition for a steady improvement in agricultural performance. More balanced economic strategies aimed at the parallel development of the industrial and agricultural sectors, focused *inter alia* on the fostering of productivity-boosting return transfers to the latter (which are feasible, of course, only if the former has been given sufficient resources and policy attention to grow beyond a minimum critical stage) embody a higher long-term potential, provided they are institutionally, administratively and politically enforceable and are accompanied by the preservation of a basically sound macroeconomic setting.

APPENDIX

Equilibrium exchange rate

Referring to the theoretical concept of equilibrium exchange rate (E), it would be possible to obtain the real protection coefficient (RPC):

$$RPC = NPC (e/E)$$

However, the definition of equilibrium exchange rate is complex and controversial, both in theory and in practice.

In their influential study on agricultural price policy in sub-Saharan Africa, Schiff and Valdes (1992) argue that the level of direct (negative) net protection of agriculture in that region was comparable to that of other developing countries, but indirect taxation was particularly high, via “unsustainably” overvalued exchange rates. However, the concept of “sustainable exchange rate” has been criticized, for instance by Karshenas (1996), who questioned the very concept of sustainability.

According to Schiff and Valdes, it is “unsustainable”, in principle, for any country to run any deficit on the balance of current account, and the equilibrium exchange rate is one that would bring it down to zero (according to estimates on import and export elasticities). This methodology leads to very high estimates of the level of exchange rate overvaluation, and hence of industry protection and tradables (and agriculture) taxation.

As Karshenas’ critique correctly points out, referring for instance to the well-known example of the Republic of Korea in the early years of its development, it is in fact very difficult, both in theory and in practice, to quantify a sustainable exchange rate.³⁴ It is a fact that, in certain countries and periods, exchange rate policies implying large current account deficits have proved historically to be sustainable and conducive to rapid development, even if they always entail the risk of provoking balance-of-payment crises. If foreign savings are effectively used to create additional productive capacity along learning curves exhibiting increasing returns, the point is made stronger. Moreover, as has been pointed

³⁴ To measure a sustainable level for the exchange rate is not altogether impossible, although such an exercise inevitably relies on some kind of subjective evaluation. Krueger, Schiff and Valdes (1988) largely base their conclusions, pointing to a very high degree of taxation of agriculture in developing countries on a series of estimates of sustainable exchange rates, obtained through the elaboration of a wide array of country-specific macroeconomic data.

out, among others, by Hayami and Platteau (1996), that SSA countries were not unique in having overvalued exchange rates.³⁵

In this paper, we do not attempt to calculate a “sustainable” or “equilibrium” exchange rate, both for the reasons outlined above and because we expect variations over time in the real exchange rate to be more relevant than their absolute levels in shaping the behaviour of producers. Thus, all RER series are in fact presented as indices, with the initial year (1970) as the base year.³⁶ An increase in the index above the initial level of 1 indicates real depreciation, and thus – if it could be demonstrated that the real exchange rate was in fact overvalued in the base year – decreasing overvaluation, and vice versa.

³⁵ On these very debated issues see also De Janvry (1986) and Valdes (1989). For a more sophisticated attempt to determine equilibrium exchange rates and thus real overvaluation levels in several SSA countries, see also Elbadawi (1997).

³⁶ According to Jaeger (1992), who relies on country-specific studies carried out previously by the World Bank, most SSA currencies were not macroscopically overvalued in 1971, according to the rough criterion of calculating the ratio between the parallel and the official exchange rate. Among those included in our sample, the only countries which presented a major level of (real) overvaluation (over 20 per cent) were Kenya (with a 1.35 ratio) and Tanzania (1.62).

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