

Commodity Prices and Growth in Africa

Angus Deaton

African economies export primary commodities, and most export little else. Policymakers as well as economists and historians of African economic development have seen these exports as both a hope and a curse. The following parable tells the story:

Once upon a time, a servant of the ruler discovered a miraculous plant, which grew readily in that country, and whose seeds could be woven into fine cloth. So desirable was this fabric that it became prized all over the world and fetched a high price. After two-score years, the plant accounted for most of the country's trade with the world. The ruler ordered the peasants to grow the plant, paid them only a fraction of its price, and he and his nobles became fabulously wealthy. Because the ruler wished to be remembered as a great ruler, and as the father of his country, he used his wealth to build a great army, and brought machines from foreign countries to make the fine goods that previously could only be obtained from foreign merchants. But the machines often broke down, and the goods that they made were of poor quality, and after the ruler died, they were left to rust. Under the ruler's successor, there was a war in a foreign land where the plant also grew, so that there was a great shortage, and its price increased threefold in only three seasons. The new ruler spent his newfound riches on "fantastic extravagance" while "immense sums were expended on public works after the manner of the East, and on productive works carried out in the wrong way or too soon." Not even the threefold increase in prices could support these expenditures, and the country soon found itself deeply in debt. When the war ended, and the price fell, the country could no longer pay the interest on its debt, or borrow more money, even after it had sold its only useful public work to a foreign power. So that power sent a mission to the country, the publication of whose report (from which the above

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quotes are taken) led to riots, and indirectly to the fall of the ruler, to armed intervention and eventually to foreign occupation.

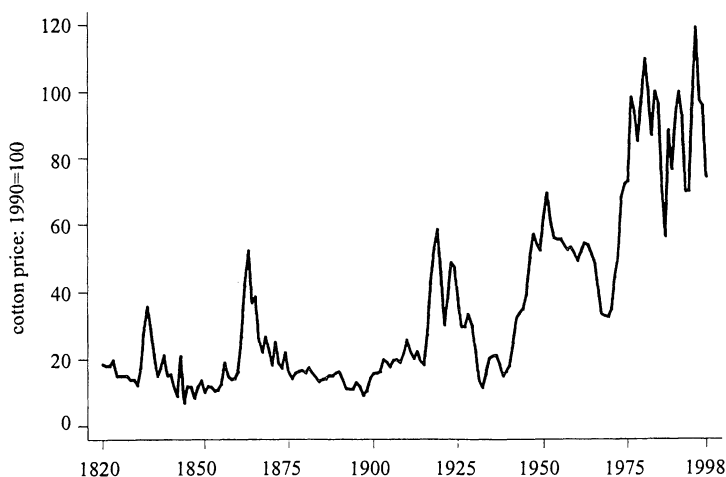
This tale, which might have been constructed as a collage of events from modern African commodity stories comes, not from modern Ghana, Uganda, Kenya, or Zimbabwe, but from the Egypt of a century and a half ago. The first ruler was Muhammad Ali, the “Founder of Modern Egypt,” who attempted (and failed) to industrialize his country on the proceeds of cotton exports grown by the *fellaheen*. His successor was Ismail, who benefited from the cotton price boom in the “cotton famine” generated by the American Civil War and whose public works included the Suez canal, run by the Suez canal company, 44 percent of which was sold to the British government under Disraeli. The visiting mission came, not from the World Bank or the IMF, but from Britain. The story is told in Chapters 1, 4, 6, 8, and 9 of Part VI of Issawi (1966), in Owen (1969), and Landes (1998). Figure 1 shows an index of nominal cotton prices from 1820 to 1995, and shows the effects of the American civil war (as well as those of the First World War and the Korean War). The price, which averaged only \$9.00 per qantar (112 pounds) in 1853, and was \$14.00 in 1860, reached a peak of \$33.25 in 1865. By 1870, it had returned to \$15.75.

In this paper, I briefly review the literature on commodity prices as it touches on African economic development; fuller accounts are given in Gersovitz and Paxson (1990), Deaton and Miller (1995) and Collier and Gunning (forthcoming). In the next section, I provide some data that documents who exports what, and what has happened to the world prices of the relevant commodities. Why these prices behave as they do, what determines their trends and variability around trend, are central questions for policymakers in Africa. I then summarize the leading explanations for the behavior of primary commodity prices, as well as the empirical evidence. Though there has been progress, the understanding of commodity prices and the ability to forecast them remains seriously inadequate. Without such understanding, it is difficult to construct good policy rules. There are various accounts and interpretations of African countries’ political and economic responses to commodity price fluctuations. In particular, I discuss arguments that the difficulties of handling price fluctuations are so severe, and policy-making in African countries so dysfunctional, that price booms and price slumps are equally to be feared. I present empirical evidence that shows a close positive relationship between commodity price movements and growth. While this evidence is hardly exculpatory for all African governments, some of whom have undoubtedly been guilty of egregiously inappropriate policies, it is consistent with the commonsense (economic) view that it is better to receive than to give. Additional income from commodity price booms helps the economies of African producing countries, just as they are hurt by the loss of income during slumps.

African Commodity Exports and Commodity Prices

Table 1 provides information on the structure of sub-Saharan African commodity exports in 1990. It shows those commodities that account for more than 10

Figure 1
Nominal cotton prices, 1820–1998



Source: El Darwish (1939), Owen (1969), and World Bank data.

percent of the value of total exports in each country, together with the share of exports accounted for by the 25 commodities listed in the notes to the table and the share of all exports in GDP. (The numbers in the table, like much economic data for Africa, should be treated with a great deal of caution.) Because a few commodities that are important for a few countries are not included in the table (see the notes for details), the third column occasionally *understates* the dependence of African economies on primary commodity exports. There is also room for debate on the definition of a primary commodity, and on how much processing is required to disqualify it. But the degree of processing in Africa's exports is generally low, and I have included a number of doubtful cases, such as aluminum. These exports have in common a relatively small share of labor in their value and, as we shall see, their prices behave differently from the prices of manufactured exports. With only a few exceptions (such as Guinea in bauxite or Senegal in groundnut oil), African countries' exports of these commodities are too small a share of world exports to permit individual countries to have much effect on world prices.

Note the diversity of experience across the continent. Although several commodities are important for a number of countries, such as cotton, coffee, diamonds, oil, and gold, the mix varies greatly from country to country, and some commodities are important only to one or two countries, such as uranium in Niger, phosphates in Togo, or iron ore in Mauritania. The diversity is important because prices of different commodities do not move in parallel. Although fluctuations in world demand impart common components to many price series, supply conditions differ across goods, and relative prices are far from constant. In consequence, the use of commodity price indexes makes more sense for industrialized importers than for the exporters, whose individual experiences are different.

Conditions of production are also heterogeneous across countries, as are the

Table 1
African Countries and Their Main Exports, 1990

<i>Country</i>	<i>Commodities with 10 Percent or More of Total Exports</i>	<i>Total Share of 25</i>	<i>Share of All Exports in GDP</i>
Angola	Oil, 93	93	39
Benin	Cotton, 42, Oil, 22	65	22
Botswana	Diamonds, 80, Nickel, 10	93	56
Burkina Faso	Cotton, 57, Gold, 20	78	13
Burundi	Coffee, 75, Tea, 10	85	8
Cameroon	Oil, 50	88	20
Central Af. Rep.	Coffee 11, Diamonds, 56	81	15
Chad	Cotton, 85	85	19
Congo	Oil, 85	85	51
Côte d'Ivoire	Cocoa, 26, Wood, 11	54	32
Equatorial Guinea	Cocoa, 10, Wood, 21	35	28
Ethiopia	Coffee, 45	57	8
Gabon	Oil, 75, Wood, 11	48	46
Gambia	Groundnut Oil, 14, Groundnuts, 20	48	69
Ghana	Aluminum, 18, Cocoa, 29, Diamonds, 10, Gold, 13, Wood 11	85	17
Guinea	Bauxite, 76, Diamonds, 13	93	31
Guinea Bissau	Fish, 14, Oil, 28	56	11
Kenya	Coffee, 14, Oil 13, Tea, 19	51	26
Liberia	Diamonds, 18	33	43
Madagascar	Coffee, 13, Fish, 14	38	16
Malawi	Tea 11, Tobacco, 68	90	24
Mali	Cotton, 62	64	17
Mauritania	Fish, 35, Iron, 55	91	46
Mauritius	Sugar, 29	34	65
Mozambique	Fish, 36	57	16
Niger	Uranium, 83	87	17
Nigeria	Oil, 96	98	43
Rwanda	Coffee, 61, Gold, 20	88	6
Senegal	Fish, 28, Groundnut Oil, 17, Oil, 12	67	27
Sierra Leone	Aluminum, 19	38	24
Sudan	Cotton, 42	44	7
Swaziland	Sugar, 22	27	83
Tanzania	Coffee, 19, Cotton, 18, Sugar 13	71	13
Togo	Cotton, 21, Phosphates, 44	78	33
Uganda	Coffee, 74	83	72
Zaire	Copper, 46, Diamonds, 14, Oil, 10	84	9
Zambia	Copper, 88	89	36
Zimbabwe	Tobacco, 24	49	32

Notes: Share of 25 is the total share in 1990 export value of the following 25 commodities: aluminum, bauxite, cocoa, coffee, copper, cotton, diamonds, fish, gold, groundnut oil, groundnuts, iron, manganese, nickel, oil, phosphates, palm oil, palm kernels, rubber, sisal, sugar, tea, tobacco, uranium, wood and wood products. Important omissions for individual countries are hides, skins, and furs (29 percent of exports in Ethiopia), spices (28 percent of exports in Madagascar), rutile (titanium oxide, TiO₂, 57 percent of exports in Sierra Leone), and gums, resins, etc. (21 percent of exports in Sudan). Adequate data are not available for Lesotho, Namibia, Somalia, or South Africa. Share of all exports in GDP is for 1986 for Liberia, 1990 for other countries. According to the World Bank's *World Development Indicators* (WDI), 1992 exports in South Africa were 11 percent food and agricultural raw materials, 16 percent fuels, ores, and metals, as opposed to 36 percent manufactures. Zaire is now known as the Democratic Republic of Congo; the older name is retained to avoid confusion with Congo. Data from United Nations, *Yearbook of International Statistics*, Statistics Canada, *World Trade Database*, and World Bank, *African Development Indicators*; share of exports in GDP from WDI (1998).

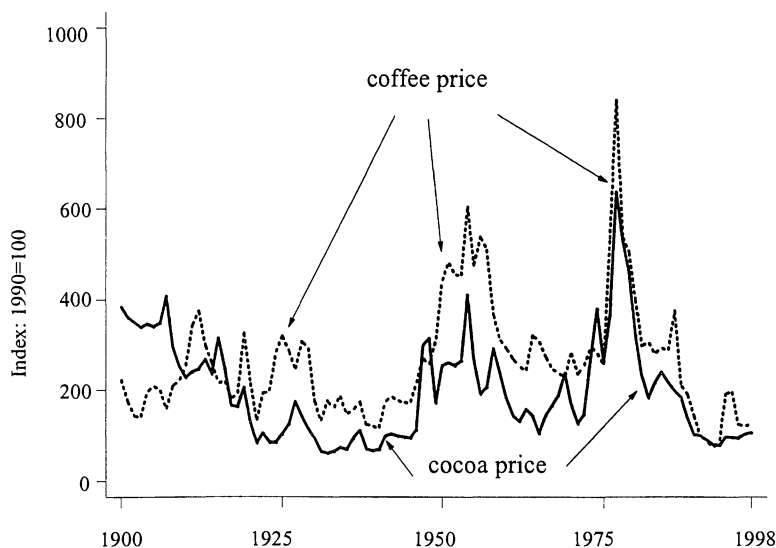
social and economic characteristics of producers. Minerals (except sometimes diamonds) are usually produced in “enclaves,” are owned or mined by foreign interests or by the state, and are readily subjected to high taxes or royalties. As a result, fluctuations in mineral revenues typically accrue directly to the state. Some agricultural crops are grown by smallholders (coffee and cocoa), and some are produced on plantations (bananas, tea and sugar), and the distinction helps determine the distributional consequences of income fluctuations. Some agricultural crops are annuals (cotton, groundnuts, sugar and tobacco), some are tree-crops (cocoa, coffee, tea and rubber), and the dynamic structure of supply fluctuations depends on such differences. A single year’s cotton harvest can be lost without adverse consequences for the next, but the destruction of an orchard by pests, frosts or fires reduces supply until new trees come on line, which usually requires several years. The political identity of the producers sometimes affects rates of taxation levied by export taxes, or through mandatory purchasing by parastatal “stabilization” boards (Bates, 1981, 1983, 1989; Lofchie, 1989). Kenyan political leaders have been drawn from those who grow coffee, and coffee is not directly taxed in Kenya. The same was true with cocoa producers in Côte d’Ivoire. But Ghana’s first leader, Nkrumah, like Muhammad Ali in Egypt a century before, saw cocoa producers merely as a resource to be exploited, and in Nigeria, the oil in the south of the country has funded governments (and kleptocrats) drawn from northern tribes.

Figures 1 and 2 show long runs of data on prices for three important African crops—cotton, coffee, and cocoa—and Figure 3 shows the prices of two important metals—copper and gold. Figure 1 shows the *nominal* annual cotton price for nearly 180 years. (The use of nominal prices avoids the need to select a deflator and here and in Figure 3 provides dramatic illustrations of the failure of prices to rise, even in the face of inflation.) Figure 2 shows indexes (1990=100) of *real* annual coffee and cocoa prices from 1900 to 1998; these were constructed by deflating world prices in U.S. dollars by the U.S. Consumer Price Index (CPI) and rescaling, so that the graphs show the potential command over American resources of a fixed quantity of cocoa or coffee. Figure 3 illustrates the shorter term dynamics and shows gold and copper prices on a monthly basis from 1970; once again, these are *nominal* (undeflated) series. These figures illustrate a number of features of commodity prices that have been important both in the history of Africa, as well as for the commodity price literature in economics.

Putting the matter conservatively, real commodity prices show a distinct lack of a positive upward trend; owners of a constant flow of primary commodity would not have seen much growth in their real income. For further evidence as well as econometric characterizations of trends, see Grilli and Yang (1988), Cuddington and Urzúa (1989), Cuddington (1992), Spraos (1990), and Ardeni and Wright (1992). Cocoa and coffee prices are lower relative to the U.S. CPI than they were a century ago. The cotton price shows no trend for a century from 1820, and the rise since then has been less than the rise in the CPI, as have been the nominal increases in gold and copper prices.

What commodity prices lack in trend, they make up for in variance. For

Figure 2

Real coffee and cocoa prices 1900–1998

Source: World Bank data.

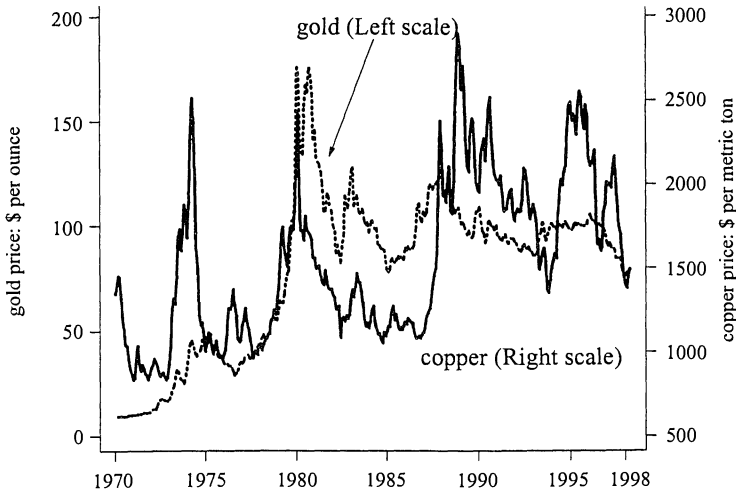
example, the coffee price in April 1977 was more than six times its June 1975 level and, in only eight months in 1994, it increased by a factor of three. These enormous swings generate equally enormous swings in exporters' revenue and, like other economic "cycles," tend to persist for several years at a time. Commodity price movements are positively autocorrelated even at annual frequencies; for most commodities, the first order autocorrelation coefficients are in excess of 0.8 (Cuddington, 1992; Deaton and Laroque, 1992). Unlike cycles in consumption or income, these cycles are not ultimately persistent; shocks do not appear to have long-run effects and, in the long run, real primary commodity prices revert to trend or, in most cases, to a long-run unchanging average. The cocoa and coffee prices in Figure 2 show the classic picture of an essentially trendless series punctuated by sharp *upward* spikes that last for several years; this asymmetry, with upward peaks but few or no matching troughs, characterizes many primary commodity prices, and generates a marked *positive skewness* in the prices. Note finally, again as illustrated in Figure 2, that the prices of different commodities tend to move together, though the correlations are much closer for some pairs (coffee and cocoa) than for others (copper and gold).

Why Do Commodity Prices Move as They Do?

Sensible development and macroeconomic policy rules for commodity-exporting countries must be grounded in an understanding of the behavior of

Figure 3

Nominal monthly gold and copper prices, 1970–98



Source: Authors' calculations from Datastream.

commodity prices. The urgency and attractiveness of export diversification depend greatly on whether real prices can be expected to trend up or down in the future. Intertemporal smoothing—how much of revenues should be spent and how much saved—requires that governments and private individuals understand what drives price swings, and how long they are likely to be prolonged. Much of the discussion on trends has been dominated by the Prebisch (1959)–Singer (1950) thesis that, in the long run, commodity prices fall relative to the prices of the manufactures that the exporting countries must import. The argument is in part that the income elasticities for primary commodities are lower than those for manufactures, so that the demand for the latter grows more rapidly than the former, and in part that manufacturing industries at the “center” have market power that enables them to exploit the countries at the “periphery.” In the long run, according to this theory, the market will complete the task that colonialism left unfinished. These not very well worked out theoretical arguments (Why do demand elasticities determine prices? What, precisely, is the source of the market power in the center?) have attracted a great deal of empirical work on individual commodity series and on price aggregates. As might be supposed from the figures, there are two main conclusions: a) what sort of trend is found depends on which period is selected—for example, Singer (1984) claims that 1950 is an appropriate date, because that is when he wrote his article!—and b) trends are small relative to variance, which is of course why (a) is true.

A much better theoretical account—which gets much less attention—is contained in the last (and apparently little read) section of Arthur Lewis’s famous (1954) paper on unlimited supplies of labor. Lewis asks why, in spite of well-documented productivity growth, the real wages of sugar workers in the West Indies failed to grow. His answer is that wages cannot grow in the presence of unlimited

supplies of labor at the subsistence wage. As a result, the benefits of technical progress in sugar plantations and sugar refining accrue, not to the workers, but to consumers in the industrialized countries. He contrasted this outcome with that for a wheat farmer in Canada, whose wage is set in the industrial labor markets of North America where the aggregate supply of labor is limited, and where real wages can therefore rise in response to technological change. For African producers of tropical crops, the implication is that, in the long run, the price of coffee or cocoa cannot rise above the costs of growing it in the lowest real wage country where coffee and cocoa can be grown. Although it is hard to find the data to test such a proposition formally, it is broadly in accord with the long-run behavior of the prices of tropical commodities. There is no trend, because the poorest workers in the tropics remain as poor as ever. Prices always eventually revert to base because, while short-run events can increase prices, sometimes for many years, long-run marginal cost is set by the poverty of the tropics and supply will eventually be forthcoming.

In comments on an earlier version of this paper, Christina Paxson noted that, in possible contradiction to the Lewis model, the long-run trend in wheat prices, where the marginal producer is in the north, is not obviously different from the long-run trends of prices for commodities whose marginal producers are in the tropics. At the same time, industrialized countries compete successfully with low-wage producers in some tropical crops, for example the United States in rice and Australia in sugar, and Africa's share of world commodity exports is falling. The rich countries make up in productivity what they lose in wages. Indeed, yields have risen more rapidly for non-African than for African crops, while for crops that are grown in both Africa and elsewhere, African yields have grown more slowly. These facts are consistent with a Lewis model in which technical progress in agriculture is in part induced by factor prices. Because Africa is poor and comparatively well-endowed in natural resources, it can compete in world markets against technically more sophisticated, but richer producers, and can do so without need for induced technical progress in agriculture, which in any case is limited by the low levels of education in Africa. But the basic story for primary commodity prices remains unchanged; real prices cannot rise as long as there are unlimited supplied of labor at the subsistence wage, and will fall in response to (local) technical progress.

The short-run dynamics of commodity prices are less well understood though parts of the story are clear. Supply shocks are typically thought to be large; wars, pestilence, disease, weather, and political upheaval are all capable of causing large, albeit usually temporary, shortfalls in production. If the demand functions for foods and minerals are price inelastic, the variance of price can be several times the variance of the fundamental supply shocks. But the role of supply shocks is not straightforward; the 1975 Brazilian frost that is inevitably identified as the cause of the coffee boom in the late 1970s was preceded three years earlier by an almost equally destructive frost (40 percent crop loss, as opposed to 50 percent in 1975) which had no perceptible influence on the price. Supply shocks are also implausible sources of the autocorrelation in commodity price, obviously enough for annual crops since weather itself is not serially correlated. But even for tree crops, destructive shocks will have an effect for only a limited number of periods—in most

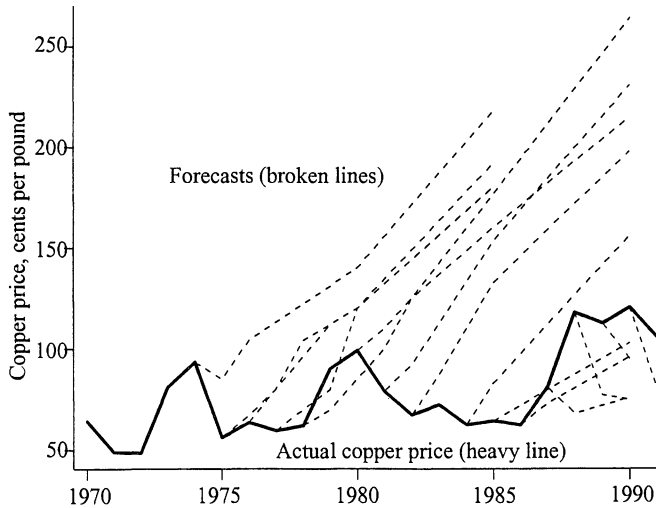
cases new trees will produce after a few years—so that weather induces a low order moving average process that is not consistent with the autocorrelations in the range that we observe. Storage by speculators can be expected to move commodity from periods of low prices to periods of high prices, thus inducing autocorrelation, and simulations of prices where independent supply shocks are modified by speculative storage do indeed reproduce some of the characteristics of actual prices, including long periods of “doldrums” punctuated by sharp upward spikes (Deaton and Laroque, 1992, Figure 2). But speculative storage cannot by itself generate enough autocorrelation to be consistent with the data (Deaton and Laroque, 1996). Since rational speculators must cover the costs of holding commodity stocks, they would not choose to hold stocks continuously in the face of the historical failure of commodity prices to trend upward in real terms. Of course, this does not mean that speculation is not important from time to time.

Fluctuations on the demand side are clearly part of the explanation both for the correlation of individual prices with their own past history and for the correlation across different prices at a moment of time. So are fluctuations in world interest rates, which affect demand through the costs of storage. Nevertheless, allowing for such factors leaves many episodes unexplained. Some multi-year swings in prices are commodity-specific, and thus not readily attributable to demand conditions, while other price swings are correlated across pairs of commodities where there is no obvious link (Pindyck and Rotemberg, 1990).

In view of these difficulties, empirical analysts have had great difficulty in building satisfactory models of commodity prices and, in consequence, African exporting countries have been provided with advice that was often not useful, and occasionally downright misleading. The application of standard time-series analysis to prices is fraught with dangers. Such models typically search for parsimonious, low-order, moving-average or autoregressive representations which, while adequately capturing the first few (high positive) autocorrelations, do not incorporate the long-run reversion to trend. For example, it is possible for a skilled investigator using these methods to come to the conclusion that the price of maize—an annual crop, whose long-run marginal cost changes only slowly if at all—follows a random walk (Cuddington, 1992).

Policy prescriptions from well-fitting but inappropriate models are potentially catastrophic: income from a commodity boom, instead of being seen as a long-lived but ultimately temporary windfall, is misdiagnosed as permanent (the random walk case) or as the first installment of an even larger windfall in the offing (when price changes are positively autocorrelated) so that consumption should rise by even more than current windfall income. That some African countries appeared to follow such prescriptions, facilitated (and encouraged) by international bankers, should not disguise the absurdity of the analysis. Models with more economic content also have a poor track record. For many years the World Bank prepared its own commodity price forecasts for use in assessing economic prospects, for advising their clients, and for evaluating projects involving commodities, almost all of which would have appeared more

Figure 4

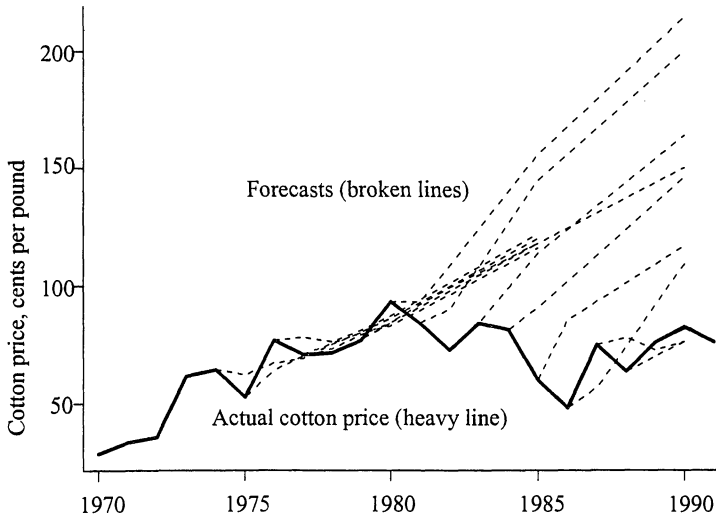
Actual and forecast prices for copper

profitable, and thus more loan-worthy, the higher were expected commodity prices. Some of these forecasts were wildly incorrect; two of the most spectacular cases, copper and cotton, are shown in Figures 4 and 5, reproduced from Deaton and Miller (1995, Figure 4; see also Powell, 1991). The solid lines near the bottom of both figures are the actual prices, and the broken lines show the World Bank's forecasts starting from the actual price at the date when the forecast was made. Figure 4 is consistent with Figure 3, and looks different only because plotting the forecasts requires a smaller scale. As the copper price fell from its 1980 peak, the Bank was projecting that, by 1985, prices would be twice their 1980 peak, and as prices continued to tumble, the Bank revised its forecasts *upward*. The Bank appears to have done better—but still not well—when it constructed large-scale econometric models of each commodity than when, as with copper and cotton, it based commodity price projections on its forecasts of inflation, exchange rates, and the growth in world demand.

A simple summary is as follows. Over the long term, the real prices of primary commodities produced by African countries either have been without trend or have trended gently down. There are good reasons—the Lewis analysis—to expect this behavior to continue. Rising commodity prices will not solve Africa's poverty; rather, only an end to tropical poverty will bring increases in commodity prices. Commodity price booms are only partly understood, and good short-term forecasts are typically not available either to African policy-makers or to other market participants who might choose to bear some of the commodity price risk.

Variable commodity prices are beneficial for producers, because they provide the opportunity to supply more when prices are high, and to withhold supply when prices are low, so that variability around an unchanged mean

Figure 5

Actual and forecast cotton prices

increases expected revenue. But consumption should not follow the variability of income, and it can be difficult for policymakers to handle large fluctuations in private and public revenues without an understanding of how long each boom or slump is likely to last. Smoothing an uncorrelated or negatively correlated income stream is relatively straightforward because it calls for minimal action. Handling positive autocorrelation is much harder, especially if, as is the case for most African countries for most of the time, there is limited or no access to international capital markets. The accumulation of large reserves over many years may not be politically feasible for a regime where spending opportunities are rare, and if the ensuing slump lasts longer than the boom, such accumulations may in any case have minimal effect on consumption after the boom. When autocorrelation is large, the accumulation of buffer stocks is both expensive and ineffective (Deaton, 1991). Nor is international price variability the only source of income fluctuations. To the extent that prices are driven by quantities (harvests, for example), income may be less variable than are prices. But there have been quantity booms and slumps that have had little to do with prices, such as the discovery of oil in Cameroon in 1978. So how have African countries managed?

Commodity Prices and Economic Performance: Is There a Curse?

As Muhammad Ali realized long ago in Egypt, the revenue from commodity exports provides a potential source of investment funds. Even temporary price booms provide windfalls that, if wisely invested, can enhance future growth and

development. Yet it has been argued that countries rich in resources are not blessed, but cursed; that they grow more slowly than resource-poor economies; and that commodity price booms are so mishandled that it would be better for prices to stay low (Gelb, 1988; Auty, 1993). Cotton, the American Civil War, and the occupation of Egypt by the British is a more dramatic chain of events than any in modern Africa, but it is easy to write modern tragedies based on the stories of oil in Nigeria, coffee in Kenya, cocoa in Ghana, or copper in Zaire (now the Democratic Republic of the Congo).

Attempts to industrialize on the proceeds of commodity exports have been hampered by a number of factors beyond the lack of growth in real prices. "Dutch disease," named after the disappointing economic experience of the Netherlands following the discovery of North Sea oil in the 1970s, raises the prices of locally produced non-tradeables relative to locally produced tradeables, typically manufacturing, and diverts production from the latter to the former. This reallocation can be a problem if diversification towards manufacturing is regarded as desirable in itself, or if manufacturing displays increasing returns that are not available elsewhere. In Africa, where states have played a large part in investment projects, a more endemic problem has been the low quality of investment and a general absence of project evaluation for what is often political and pork-barrel spending. A strategy of industrialization aimed at having domestic production displace imports, financed by commodity exports, has not been a successful strategy for growth, in part because of the absence of complementary factors, particularly education, so that Africa's comparative advantage has remained in the production of primary commodities. In many cases, especially when the producers of the commodity are without political power or representation, taxation and overvalued exchange rates have eroded the incentives to produce, and seriously eroded production and revenues, with cocoa in Ghana (Newbery, 1990) and coffee in Côte d'Ivoire being two examples. In the worst cases, remnants of the revenue are used to support the aging "father of the country" and his retainers (Nkrumah, Houphouët-Boigny, Amin Dada, Bokassa, or Mobutu). Mineral wealth is often seen as particularly subject to this commodity curse. Ownership of minerals is often concentrated, so that the benefits of the export income are not widely spread and mining results in a particularly unequal distribution of income—South Africa being only the most dramatic example (Simkins, 1998). The "enclave" production typical of mining lacks the forward and backward linkages that can drive broad-based development (Hirschman, 1958; 1977). As Issawi (1961) put it, writing on the Egyptian history with which I began: "[F]oreign trade is the engine that provides the motive power, but this engine cannot move the economy unless it is provided with adequate transmission lines." Sachs and Warner (1995) cite these (and many of the other) arguments as mechanisms behind their finding that countries with high shares of resources in their exports in 1971 tended to have slower growth from 1971 to 1989.

The workings of the commodity curse are particularly apparent during price booms, those periods of several years during which prices rise from their long-run floors, often to multiples of their long-run values. I have already argued that these

episodes would provide serious challenges for the best-informed and most adept of benevolent social planners, a description that is not usually applied to African governments. Early (including colonial) accounts of price booms in the largely middle-class smallholder sector, often producing coffee or cocoa, laid the blame on the private sector, and particularly on the supposed inability of rural farmers to make sensible saving, consumption, and investment decisions in the face of prolonged but ultimately temporary windfalls in their incomes. The policy prescription was for the government to assume a custodial role through “stabilization” boards that would pay farmers a less variable price, accumulating surpluses in good years and running them down when prices were becalmed in the doldrums. Even ideal versions of such schemes face serious theoretical problems; for example, in the most straightforward case where incomes without the board are independent random draws from a distribution with constant mean and variance, the board’s stabilization fund follows a random walk. In consequence, any upper limit on its reserves, or lower limit on its debts, will be exceeded in finite time. In fact, these boards became instruments of taxation as well as of stabilization; farmers were paid fixed prices (subject to only occasional changes, usually downward when falling world prices threatened to turn tax into subsidy) leaving the government to deal with the income fluctuations. Indeed, because the farmers’ part of the income was relatively constant, the variability of the incremental government revenues was an amplified version of the original variation.

A more recent literature reverses the early analysis and emphasizes not the faults of the private sector but the ineptitude of governments, both in handling the intertemporal allocations on their own account, and in setting the macroeconomic environment in which others may do so (Bevan, Collier and Gunning, 1989; 1990). According to these accounts, it is almost impossible for governments to retain control of public expenditures during episodes when public revenues greatly exceed normal commitments. Projects are begun and expenditure commitments made, none of which are easy to reverse when the tide turns. At the same time, international credit restrictions are suddenly eased, so that it is possible for governments to spend even more than the windfall income, adding potential international debt repayment difficulties to the menu of issues to be dealt with after the boom (Krueger, 1987; Sachs, 1988). Even when governments share the responsibility of smoothing with the private sector—for example in Kenya, where coffee is not taxed—governments receive taxation revenues from the multiplier effects of boom-driven private spending, with more or less the same consequences. In addition, governments restrict private individuals’ options for making intertemporal choices, most notably by preventing them from holding foreign assets. This “construction boom” scenario is at the heart of the analysis in Bevan, Collier and Gunning (1990) and Collier and Gunning (1999). Although the private sector saves to smooth consumption as it ought, it cannot smooth investment by temporarily placing funds abroad and slowly repatriating. The attempt to invest in physical capital domestically leads to bottlenecks and inflation and pulls down the quality of investment.

It is important to subject these various accounts of the effects of commodity

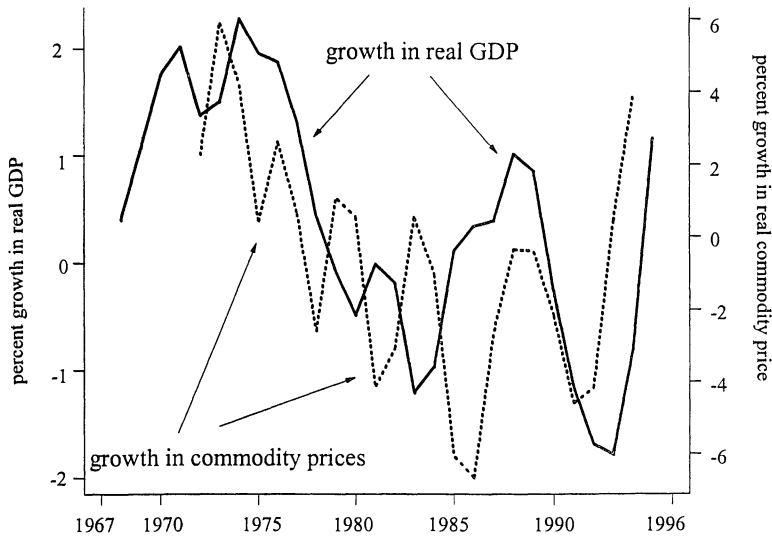
prices to a systematic examination of the evidence, and in particular to look across all African countries simultaneously. Country studies have been a productive source of hypotheses about responses to commodity price shocks, but it is dangerous to extrapolate from a few cases to the whole without more formal examination. Indeed, countries with the most remarkable histories have probably drawn the most attention, which may bias commentary and analysis towards the worst cases. The original analysis by Bevan, Collier and Gunning of government responses to the coffee boom in Kenya inspired much subsequent work whose main conclusion has been the *diversity* of experience across countries (Collier and Gunning, 1999). For example, although many African countries ran up foreign debt during the commodity price booms of the late 1970s, there was no systematic relationship between the increase in indebtedness and terms-of-trade improvements. Debts increased just as much for African countries that had not experienced commodity booms (Deaton and Miller, 1995).

In the World Bank's 1998 *Global Economic Prospects*, commodity prices, and particularly oil prices, are identified as the main channels through which the economic slowdown in east Asia is likely to be transmitted to Africa. Such predictions are based on the conventional ("no curse") view that commodity price increases are, despite the difficulties they may bring, good for the economies of Africa. Deaton and Miller (1995) examine the relationship between commodity prices and growth in Africa by constructing, for each sub-Saharan African country, a country-specific index of commodity prices that weighted together the world prices of the commodities that each country exports, using common prices but fixed individual country weights, deflated by a (common) index of prices of manufactured imports. They then used vector autoregressions supplemented by the price indexes to examine the relationship between GDP, its components and commodity price fluctuations. These calculations used national income information from the Penn World Tables, and covered the period from 1981 to 1986. An important feature of their analysis is the tailoring of the price indexes to each country. As Table 1 shows, the composition of exports is different from one country to another so that when, as now, oil prices are moving downward and beverage prices upward, it is inappropriate to work with a single commodity price index that is supposed to apply to all countries.

I have recalculated the price indexes from price data on a list of 26 primary commodities, the most important omission from which is diamonds, for which no useful price is available. I have used as weights the value of exports of each commodity by each country in 1990; more precisely, I calculated the weighted average of logarithms of commodity prices using as weights the shares of each commodity in the value of exports in 1990. Because the weights do not vary over time, they are not contaminated by the countries' responses to price changes, as is required if the commodity price indexes are to be exogenous to each country. Exogeneity is plausible in most cases, though there are a few commodities where individual African countries have some market power. Note that the use of fixed weights precludes the examination of commodity shocks that work through quantity effects rather than through prices, like the discovery of a new mineral deposit.

Figure 6

Economic and commodity price growth in sub-Saharan Africa, 3-year moving averages



The weighted indexes are deflated by the World Bank's index of the unit value of manufactures imported by developing countries. For national income data, I have used the figures on per capita GDP at factor cost in constant 1987 dollars from the World Bank's *World Development Indicators*. These data are generally available up to 1996.

Figure 6 shows the relationship between, on the left-hand scale, the growth of real per capita GDP and, on the right hand scale, the growth in the commodity price indexes, averaged over all sub-Saharan Africa, shown as three-year moving averages. The figure shows a strong correlation between GDP growth and commodity price growth, most particularly over the long swings, but also over shorter periods, with commodity price growth leading economic growth. The picture is potentially misleading for a variety of reasons, but none of the obvious qualifications seems to overturn the conclusion. The units averaged are (the up to 40) countries and I have not weighted for the sizes of the economies or of their populations. Weighting by GDP gives a similar growth series, but is more variable because the outcome depends much more on what happened in the few large economies. Africa's growth performance was better up to 1975 than it has been subsequently, though there was a brief recovery in the late 1980s, followed by a slump into the early 1990s, with a resumption of growth in the mid-1990s (World Bank, 1998).

Another potential problem with the figure is that the countries in the average vary from year to year, depending on the availability of data. But regression analysis tells the same story. When I drop the 15 countries with fewer than 20 annual observations, using the remaining 26 countries for analysis, and regressing the

growth of per capita GDP on the growth of the commodity price and its lags, the pooled ordinary least squared regression coefficients are 0.008 on the contemporaneous rate of growth of price, 0.064 on the once lagged growth of price, 0.073 on the twice lagged growth price, and 0.007 on the thrice-lagged price growth. The first and last of these coefficients are not significantly different from zero, while the other two have *t*-values of 2.2 and 2.5 respectively. The sum of the coefficients over the four values is 0.152. These coefficients are not changed by using the data as available from the full sample of countries, or by omitting the zero-order and third lag (which also changes the sample size), or by using random or fixed effect estimation. As always with panel data, there is a concern that the responses might be heterogeneous across countries, which in the current case is particularly pertinent in view of Collier and Gunning's (1999) results on the diversity of policy responses to commodity price booms. To meet the concern, I estimated the equations country by country for the same 26 countries, and averaged the coefficients on commodity prices. The coefficients on the four lags are now -0.019 , 0.090 , 0.075 , and 0.031 , with a sum of 0.177 , close to the results obtained from all the other methods. For a country whose commodity exports are a third of GDP, a commodity price increase of 1 percent of GDP will directly increase national income by 1 percent plus another half of 1 percent (3 times 0.177) from the induced increase in GDP.

These estimates offer a basis for calculating the contribution of commodity price fluctuations to African growth. As can be seen from Figure 4, the range of commodity price growth is from plus 6 percent a year (mid-1970s) to minus 6 percent a year (mid-1980s), though it is of course much larger for individual countries. If we take the sum of the coefficients to be 0.15, a 12 percentage point swing in commodity price growth will eventually lead to a change of 1.8 percentage points in the growth rate. Comparing with the actual outcomes in Figure 4, this is about 45 percent of the change in growth from the best years to the worst. Of course, these calculations make no allowance for other determinants of growth in Africa, but they are roughly consistent (though somewhat larger) than the much more comprehensive estimates based on the earlier data in Deaton and Miller (1995), where the mechanism (which works largely through investment) is explored in detail. As with the earlier results, there is no obvious sign that high commodity prices are more of a curse than a blessing. African economies remain heavily dependent on exports of primary commodities and, as one might have expected from first principles, those economies do better when the prices of commodities are rising than when they are falling.

Is it possible to draw useful policy lessons from these arguments and results? There are some obvious (and by now well-known) points, that import-substituting industrialization works no better when financed by commodity exports than by other means, and that farmers can probably smooth their consumption as well or better than can governments acting on their behalf (or not). But those seeking a grand strategy of African development based on avoiding primary commodities are likely to be no more successful than was Muhammad Ali by espousing them. Natural resources are as abundant in Africa as human capital is scarce, and Africa is likely to have a comparative

advantage in exports of primary commodities for many years to come (Wood and Mayer, 1998). The volatility of export incomes makes life difficult for policymakers, but not by enough so that they should consider abandoning the enterprise. African economies would be better off if commodity prices were higher, but there is surely little prospect that future cartels will be any more successful than those that have tried and failed in the past. The roots of Africa's slow development almost certainly lie elsewhere, in poor investment appraisal—whether financed from commodity exports or not—and in the quality of governance.

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