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Commodity Price Volatility: Causes, Policy Options and Prospects for African Economies

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5.1 Introduction: What Are the Causes of Commodity Price Volatility?

The economics literature on commodity price volatility has a long history going back to the seminal work of Keynes (1942), Newbery and Stiglitz (1981) and Deaton and Laroque (1992) among many others. Causes of commodity price volatility involve a combination of structural factors that are inherent in the very life cycle of the commodity itself (e.g., in the cases of coffee and cocoa, the length of the average production cycle including planting of trees). It is also explained by the cyclical nature of supply and demand relationships for a number of commodities, which suffer from a combination of low elasticity of supply and low price and income elasticity of demand. This phenomenon was of course captured

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in the celebrated Singer–Prebisch hypothesis dating back to the 1950s, which predicted a future of declining terms of trade for such exports.[1] The consensus view thereafter was that unless less developed countries move up and along the global value chains (GVCs) for these commodities and raw materials and/or diversify their economies away from an over-reliance on primary commodities, they will continue to suffer from low growth rates, high levels of poverty and deteriorating terms of trade. The hypothesis has led to a vast number of empirical studies, especially on African economies in order to test it.[2]

Since its founding more than 50 years ago in Geneva, the United Nations Conference on Trade and Development (UNCTAD) has always championed the plight of Commodity Dependent Developing Countries (CDDCs); those countries that rely on at least 60% of their total export revenue coming just a small number of key non-oil commodities. Many of these countries are in Africa. UNCTAD has commissioned a vast amount of research on this topic and has contributed greatly to an enlightened debate on the subject matter (see the many UNCTAD references at the end of this chapter). This literature, along with that of academics and other stakeholders (for example, the Common Fund for Commodities (CFC) based in Amsterdam and the Food and Agricultural Organisation (FAO) based in Rome) recognises that the risks faced by producers vary greatly between different commodities. These risks also vary from country to country depending on how important a particular commodity or group of commodities is to each country internally as well as according to the size of the producer within global markets for these commodities.

In a 2006 publication, the Common Fund for Commodities highlighted four main challenges that CDDCs faced in earlier years, and that still may apply today. These were: a structural over-supply of an undifferentiated product; erosion of trade preferences; proliferation of standards; and restructuring of GVCs. Not only are these factors still at work at the current time, the combination of all these factors operating simultaneously, though with differing individual impacts, represent a "perfect storm" for CDDCs. Although some of these changes may be desirable for other reasons, for example the development of product standards, coming during the same period as the other changes helps analysts of com-

modity markets understand and appreciate the endemic challenges that commodity producers face. Perhaps of critical importance is the impact of structural over-supply of the basic undifferentiated product. For many agricultural and raw material commodities, this factor represents an inherent obstacle that prevents them from moving up a particular GVC. In other words, the very nature of the product itself may be self-limiting. This applies particularly to tropical beverages such as tea and coffee, the production of which takes place in a large number of African countries. This point, and the need for African economies to diversify away from such commodities, is highlighted in this chapter, especially in the concluding section.

The research carried out by international organisations and individual researchers on commodities includes important work commissioned through UNCTAD's highly respected Special Unit on Commodities. This research has covered the following topics, inter alia: causes and consequences of commodity price volatility; commodity super-cycles; the role of smallholders; the emergence of commodity exchanges within some countries, including a number in Africa; market and regulatory reforms; and the financialisation of commodity markets, among other topics. The structural or inherent nature of the risks facing commodity producers includes the fact that small-scale producers (smallholders) will face greater challenges than larger producers. This is especially in terms of coping with "natural" or "catastrophic risks", for example due to weather and other causes such as pestilences. Knowledge and know-how are often lacking on the part of smallholders to be able to utilise the full range of market-based risk management instruments available to help them to cope with such risks. Since producers are prone to production risk as well as price risk from these natural events, the cost of insuring against adverse events can be prohibitive for many of them.[3]

A recent innovative development has been the creation of weather index-based crop insurance to help small producers. Through the use of weather stations and satellite technology, which avoids the need for assessments at the field level, producers are compensated whenever rainfall or temperature are too high or too low (in relation to a certain predetermined threshold) and crop yields are unduly affected. Such innovations are not without their drawbacks. For example, it must be possible to insure against

the risks themselves, and the index that is actually adopted has to be closely correlated with the underlying local yields. Moreover, the costs of setting up the appropriate infrastructure to assess the weather have to be shared between the producers, with possible support from government.[4]

Later in this chapter we provide a review of the different types of interventions within commodity markets in Africa and beyond. Some of these interventions have been market-based, others have been non-market-based. In the next section we review some of the official data on commodity price volatility from such organisations as UNCTAD, especially data that has special relevance to African countries.

5.2 What Does the Evidence on Commodity Price Volatility Tell Us?

A recent UNCTAD (2017) publication, indicates the diverse patterns of price movements (all domestic prices) for a variety of different commodity groupings, ranging from the so-called "soft" commodities such as cotton, to "hard" commodities like nickel, iron ore and zinc, the "tropical beverages" (tea, coffee and cocoa), and finally "liquid commodities" such as oil.[5] What is clear from this UNCTAD publication is that some commodities are subject to greater volatility than others (see Figs. 1, 2, 3, 6, 9 and 11 in the UNCTAD publication).

As already mentioned above, the factors explaining these price movements are complex and varied, and are often commodity specific. Leading commentators such as Nissanke (2017) have rightly suggested that most types of commodities have exhibited significant co-movements in their prices. In particular, Nissanke argues that recent movements in the commodity price cycle over many types of commodities were caused by a huge increase in the demand for some commodities such as oil and metals (and also for certain agricultural commodities) from fast growing countries such as China and India. Such co-movements can be seen in Figs. 1–3 in the UNCTAD publication. Nissanke (2017) also argues that low investment levels within commodity sectors in the 1980s and 1990s, along with falling commodity prices, may have contributed to what has become known as the "commodity super-cycle". This could have lasted

for almost 10 years and affected African economies in particular due to the nature of their commodity structure and only came to an end from the peak of 2011–2012. Since 2014 the prices of many commodities have fallen dramatically as a result of the slowdown in world growth (especially in such countries as China) and the major fall in oil prices in 2014–2015. African economies have been particularly badly affected, Zambia being a stark example, having experienced a dramatic decline in its principal export commodity, copper, during this period.

5.3 Commodity Dependence in Africa

The UNCTAD (2016a) publication "The least developed countries report 2016. The path to graduation and beyond: making the most of the process", highlights the particular plight of many African countries, which unlike other less developed regions of the world, remain locked into a high degree of commodity dependence. The report charts primary commodities as a share of merchandise exports by comparing the periods 2000–2002 with 2013–2015. Out of the 47 countries covered in the report, 32 are African. Some 15 of these 32 African countries have actually increased their dependency on primary commodities over this period, some of which significantly so (Sierra Leone, Madagascar, Liberia, Lesotho, Eritrea and Djiboui). The report also shows the share of primary commodities within merchandise exports by different commodity groups for the period 2013–2015. Once again, in a number of African countries, the shares of food items and agricultural raw materials still predominate (in Tanzania, Uganda, Somalia, Malawi, Guinea-Bissau, Gambia, Ethiopia, Eritrea, Comoros, Central African Republic and Benin).

As the report says, "Commodity dependence is driven mainly by agricultural produce in nearly half of the LDCs, and by minerals and fuels in many African LDCs" (UNCTAD 2016b, p. 20). According to the report, the African countries that relied heavily on minerals and fuels during the period 2013–2015 include: Angola, Burundi, Chad, Democratic Republic of Congo, Equatorial Guinea, Guinea, Liberia, Madagascar, Mali, Mauritania, Mozambique, Niger, Rwanda, Senegal, Sierra Leone, Sudan, Togo and Zambia.

The UNCTAD report also suggests that although during the 2000s increasing commodity prices stimulated high economic growth in a number of less developed countries (LDCs) including many in Africa, this was due more to an increase in prices rather than an increase in export volumes. Moreover, any growth in export volume tended to be outstripped by growth in imports, especially of food and fuel, which led to declining terms of trade for many of these countries and increased vulnerability to external shocks. Following the 2008–2009 financial crisis and the subsequent dramatic falls in many commodity prices, it is clear that many of these African CDDCs are extremely vulnerable to shocks out of their control. In essence this means that they can suffer twice. Firstly from the underlying volatility of their commodity prices. Secondly, from their inability to participate fully in the GVC for their commodities (see below).

A key question raised by these types of commodity dependencies is: What is best for these countries in terms of them being able to participate fully in the GVCs for their produce? Is a producer country that depends heavily on minerals and fuels more or less likely to participate fully in the GVCs for their commodities? Or is this more likely for a producer country whose dependency is based on food items and agricultural raw materials?

5.4 The Impact of GVCs: Impacts on African Producers

As the UNCTAD report points out, since GVCs have emerged in recent years, their impact on the countries that produce the commodities on which the GVCs ultimately depend, will vary from country to country and from commodity to commodity. The potential for CDDCs to "graduate" up and along the GVC will not be simple, inevitable, or automatic. As the report says, "The process of upgrading along a GVC is far from automatic and depends on a number of factors, including the input–output structure, geographic features and governance of the supply chain, and the interaction of these factors with the socio-economic and

institutional context of the host country" (UNCTAD 2016b, p. 24, based on Gereffi et al. 2005).

This list of constraints is a demanding one, especially for African countries. Of crucial importance are the socio-economic and institutional contexts of the host (producing) country, along with the governance structure of each particular commodity supply chain. The report goes on to say that where a producer country can provide an enabling and supportive governance and institutional environment, there may grounds for optimism. The report provides two specific examples of commodity sectors in Africa where such progress seems to have been achieved. These are: the apparel sector in Lesotho and Madagascar, which has benefited from the impact of regional or diaspora-owned firms—which have become more embedded than is the case in other countries that specialise in that sector. This has facilitated a higher level of upgrading along the GVC than if the sector had relied solely on foreign owned processing firms. Another good example highlighted in the report is the work of the international branch of the Diamond Trading Company in Botswana, which has been fostered and supported by the government of Botswana (e.g., in offering training programmes in gem-cutting and polishing of diamonds).

These two examples, one from the apparel sector and the other from the minerals sector, highlight the key point in our discussion of GVCs, that any progress made in the commodity's "graduation" process has tended to be country specific and commodity specific. It is quite a different story in, for example the fuel and mineral commodity sectors generally where, as the report says, "Fuel and mineral commodity value chains tend to be capital intensive, and LDCs are mostly confined to low-end activities" (UNCTAD 2016b, p. 24). Although a number of these producer countries have been able to exploit forward linkages in intermediate goods in relevant sectors of their economies, bottlenecks in the supply of engineering and chemical skills/activities, allied with, somewhat ironically, unreliable energy sources, have hampered progress for many countries in Africa.[6]

At the other end of the commodity spectrum, within agricultural sectors, there is a different bottleneck, as the report brings out. This is the dominant role played by smallholder farmers, especially in Africa who

cannot compete within these typically buyer-driven markets, which are often controlled by oligopolistic market structures. Such structures prevent the commodity producers/farmers from connecting to agricultural GVCs. The report gives the examples of the coffee and tea sectors (very important markets to a number of African countries such as Ethiopia, Kenya, Rwanda, Uganda and Tanzania), which are controlled by four transnational corporations for up to 60% of the total world market in coffee; and three companies that control as much as 85% of the world market for tea (UNCTAD 2015a).

Ponte (2002) uses a GVC approach to highlight the potential complexity of the chain in the coffee market. The more stages there are in the chain the more opportunities there are for inefficiencies and rent seeking. Ponte (2002) also refers to Gereffi and Korzeniewicz' 1994 classification of the four dimensions of global commodity chain (GCC) analysis, namely: the input–output structure; the geographic coverage; the governance structure; and the institutional framework. These are the ubiquitous frameworks through which national and international commodities policies tend to be shaped by globalisation. Ponte (2002) identifies the complex nature of the global supply chain (for coffee in his case) especially in light of market changes between the international coffee agreement (ICA) period (1962–1989) and the post-ICA regime period (1989-on).

5.5 A Brief Review of Market Interventions in Commodities and Their Relevance to African Countries

For many years economists and policy-makers have attempted to stabilise primary commodity prices through a variety of instruments. Varangis and Larson (1996) in a seminal paper divided them into three different types: (a) instruments that make commodity prices more stable; (b) instruments that make commodity prices (and revenues from commodities) more predictable; and (c) instruments that attempt to align expenditure on commodities with income from commodities.

In the first case, government price support schemes and ICAs were geared to reduce price volatility. Commodity derivatives instruments, which may include futures, options, swaps, and commodity-linked notes and bonds, are all examples of hedging instruments designed to make revenues more predictable. While the third group of instruments are the various compensatory financing schemes such as the IMF's Contingency Compensatory Finance Facility, as well as individual credit markets and savings mechanisms (including insurance schemes), which are actually designed to smooth the consumption expenditures of the commodity producers.

The third category of instruments, compensatory financing schemes, which try to deal with short-term declines in commodity revenues, tended to be ex-post interventions instead of being based on a system of ex ante price risk management. It is for this reason that commodity derivative instruments are now the preferred form of intervention to deal with primary commodity price volatility. They enjoy a number of advantages over the more traditional instruments discussed above.

Varangis and Larson (1996) set out these intervention advantages as follows: (a) they are based on market-determined prices rather than administratively based prices; (b) they have the potential to shift risk to third parties (e.g., brokers) which, because of their size and importance in the marketplace, are more able than producers or individual countries to bear the necessary risks; (c) it is possible to link them to specific financial instruments which reduces transaction costs and; (d) they are less costly than the traditional governmental price intervention schemes.[7]

For example, futures and options contracts are now available for a wide range of commodities, but they are not without their disadvantages. The main one is basis risk, where a risk remains that the locked-in price will not always completely cover the cost of the delivered product. For example, with food imports, the futures contracts are not always sold at a price that includes actual delivery of the product to the importing country. Call option contracts are preferable because, although they also lock in a maximum price, they do not carry the obligation to buy at the actual price. Rather, the government is still able to benefit from lower prices should that situation pertain. Call options effectively combine a price ceiling with price flexibility (downwards). Governments, of course, will have to pay non-refundable fixed premia for these options. In Africa, as

in other emerging markets of the world, there is a significant need for capacity building in the use of these market-based instruments. A crucial element of this is to support initiatives by organisations such as the UNCTAD and others to spread the good practice that has already been built up in countries where these facilities already operate more effectively (for example in Asia and Latin America).

At one level, it would seem that a greater reliance on the market mechanism would pass on more risk and uncertainty to producers and away from governments. Certainly, an outcome of market liberalisation within commodity markets and the development of these financial instruments may be that commodity price risks pass from government to the private sector generally. For many primary commodities, investment decisions have to be made long ahead of any actual production being realised. This is especially true for tropical products such as the beverage crops of coffee, tea and cocoa. However as Gemech et al. (2011) argue, the existence of a futures price for their product that they can know in advance should in principle improve the resource allocation of producers of these commodities. Without the availability of such derivative instruments, their profit margins would need to be much higher to protect them in the event of adverse price movements.

Alternatively, this intermediation role can be performed by governments on behalf of producers. In many countries the use of commodity derivatives instruments such as commodity bonds have been tried with some beneficial effects. In general there is now an increased momentum for producers, intermediaries, governments and exporters to participate in these derivatives markets. Now that domestic and international prices for many primary commodities are interlinked as markets become more integrated as a result of the creation of locally based commodity exchanges, the use of derivatives instruments, because they are based on a market-based risk management approach, can potentially benefit all market participants (see Sect. 5.10).

A crucial difference between the ICAs (and compensatory financing schemes) and commodity derivatives instruments such as futures, options and swaps, is that the latter are not designed to offer a mechanism to stabilise the national income of the country concerned. In essence, they reallocate risk between the various stakeholders, especially between trad-

ers, either within the country itself or overseas, and the producers. In theory, no risk is transferred to the governments in the producing countries, which is a major advantage in itself. Not least, does it prevent governments from rent seeking to exploit the complex interactions that can determine commodity transactions?

5.6 Financialisation of Commodities Markets

It has been argued by a number of economists that much of the recent volatility in commodity prices can be attributed to the increasing financialisation of commodities. Of course, this is not a new phenomenon, as Keynes highlighted in his 1942 work. However, as a consequence of a combination of such factors as: the growth in liquid commodity derivatives, which have allowed investors to hold commodities within their overall portfolios as a distinct asset class; and the effect of the 2008 financial crisis, which forced many financial institutions to diversify their portfolios away from equity and bond markets and into commodities, the negative impacts of financialisation may have become more acute.

Increasingly commodities as an asset class began to be viewed as "safe havens" for investment companies with surplus liquidity. This in turn led to the creation of a range of complex commodity-based financial instruments, an example being the development of commodity index funds which are aimed at providing a vehicle to facilitate speculation on price changes in commodity futures. Since these new financial instruments tend not to be based on the market fundamentals of supply and demand for individual commodities, their increased usage has contributed to even greater correlation in the prices of many commodities. Futures prices for commodities are often strong determinants of spot prices and they may no longer assist with price discovery and hedging of risk. As a consequence, especially as the process of financial innovation continues, the resultant effect on price volatility leads many stakeholders within commodity markets, including many small-scale producers, to no longer depend on the price signals that come from futures markets since they may bear little relation to the market fundamentals of supply and demand for individual commodities.

As already mentioned, a consequence of recent increases in price volatility for a range of commodities is that the policy option that is now increasingly favoured is to use financial derivatives markets. Within this context there has been much debate on whether financial speculation, as exemplified by non-commercial actors such as hedge funds, index funds and swap dealers, accentuates or diminishes the underlying volatility. In essence, this will depend on whether the derivatives markets are well functioning or not. Efficient futures or options markets can be expected to have a dampening effect on underlying volatility rather than an accentuating effect. Futures markets themselves carry out several different functions. They supply financial instruments to the market that can transfer price risk. But they also encourage a degree of price discovery by the various stakeholders among whom we now include those who supply commodities as a separate asset class for purely financial investors (e.g., fund managers).

In general, market participants can be classified as commercial or non-commercial (i.e., speculative). The former will use futures contracts to hedge their output against the risk of volatile prices. Their strategy tends to be defensive in nature. The latter, whose approach we may call offensive, are agents who buy and sell futures contracts with a view to taking on future price fluctuations in order to gain a risk premium. They are different from the commercial participants in these markets, such as the farmers, traders and processors, because they have no involvement or interest in the physical aspects of the trade. Often participants such as index and hedge funds will hold large futures positions in a range of primary commodities. Cocoa, coffee, sugar and tea are popular choices for such speculators.

A crucial role for such participants is that of price discovery, which involves the continuous reassessment of futures prices by buyers and sellers in response to new information that may become available. A key aspect of this role is that speculators provide market liquidity which otherwise might not be available. This allows commercial participants to locate counterparties at a lower cost than would otherwise be the case. The aim therefore is to achieve optimal levels of such speculative or "non-commercial" activity. Too much activity may lead to frequent and excessive price movements, such as may occur when speculators assume

that past price movements carry full information on future price movements—a process known as trend chasing, that is, buying after prices rise and selling after prices fall. Too little speculative activity may lead to low liquidity levels and excessive seasonal price movements. As a consequence of such possible effects, the need for appropriate levels of regulation across these markets—or at the very least greater transparency (e.g., in over the counter (OTC) markets)—is widely acknowledged.

At both international and national levels there is much on-going debate in organisations such as UNCTAD as to whether "regulators" can achieve greater transparency within markets.[8] UNCTAD, in a report published in 2009, highlighted how best to manage the financialisation of commodity futures trading, especially in light of the 2008 financial crisis. The report indicated that the substantial price hike that took place in 2007–2008, especially in food prices, and then the dramatic slump that took place in late 2008, suggested that financial investors (especially hedge funds) were increasingly using commodities as an asset class in their own right. This was particularly in evidence with regard to exchange-traded commodities. As the UNCTAD report argues, financial investors have in fact been active in commodity markets since the early 1990s, mainly through the use of swap agreements, which allow investors to adopt long-term positions in commodity indexes.[9]

The UNCTAD report shows that the trading volumes on commodity exchanges increased substantially during the above mentioned period of price increases, as indicated by a more than fourfold increase in the number of futures and options contracts between 2002 and the middle of 2008. The nominal value of OTC commodity derivatives increased in excess of 20-fold to USD13 trillion over the same period, only to go into serious decline from mid-2008. Such trends suggest strongly that large-scale speculation played a significant role in contributing to commodity price volatility during this period (Nissanke 2012; Mayer 2012).

Debate among economists on the impact of speculation on commodity prices has centred on the efficient market hypothesis (EMH), which states that prices in a free market will perfectly and instantaneously reflect all relevant and available information.[10] The UNCTAD 2009(a) report posits two reasons why this may not hold for commodity markets. Firstly, due to the fact that many of these products have low short-run price

elasticities of supply and demand means that in a rising market the absence of substitutes will cause consumers to accept higher prices. The market is cleared without the build-up of inventories since the number of counterparties with sufficient positions is insufficient (less than perfectly elastic). Unexpected large orders for the commodity may encounter liquidity problems with resultant price changes—sometimes called the weight of money effect.

The second reason why the EMH may not apply in commodity markets relates to the behaviour of different actors or groups in these markets. The finance literature makes a distinction between three types of traders: informed traders; uninformed traders; and noise traders. The second category, the uninformed traders, represents those market participants who collectively may be large enough and who can respond to information unrelated to market fundamentals. As a consequence they may misinterpret market signals significantly. Through their use of trend extraction techniques, they may end up generating the very market signals that as individual traders they respond to and follow.

Uninformed trading can be reinforced by other examples of herd behaviour, which is manifested by the involvement of managed funds in commodity markets. Such funds use a variety of technical analysis techniques (e.g., trend identification and extrapolation and algorithmic trading), which can accentuate the degree of short-run price volatility and can ultimately lead to overshooting of prices in these markets. There may even be a degree of spillover effects from other asset markets, since these traders will view commodity and other financial asset markets as part of a spectrum. The UNCTAD report provides graphical evidence of strong correlations between speculative activity across different asset markets that would not normally be correlated (for example between exchange rates and selected commodity indexes) for the years 2000–2008.[11] See also Tang and Xiong 2012.

Another consequence of such activities is that other traders may misinterpret short-term price effects. This has led commodity experts such as Gilbert (2008: 21) to suggest, "that the efficient markets view that uninformed speculation has no effect on market prices and volatility should be rejected". Therefore, the future is uncertain as far as the role of financial investors in commodity markets is concerned. It will depend on how active are the positions that these various types of actors take within these

markets. For index investors, the trading strategy has usually been determined heavily by specific market conditions (for example the existence, or otherwise, of a rising market). Other financial investors in commodities can often trade profitably against index investors, but with increased volatility this is likely to become more active than passive. This might lead to more rolling over of contracts or a greater focus on commodity exchange traded funds (ETFs), which are listed securities that are backed by either a physical commodity or a commodity futures contract.[12,13]

5.7 Alternative Derivatives Instruments: Policies to Reduce Commodity Price Volatility or Policies to Mitigate Commodity Price Volatility?

There are some key differences between the various derivatives instruments that can be used. Futures—swaps and commodity indexed bonds, which are contracts in which the principal or the interest payment or both are indexed to a particular commodity price—are different from options contracts, which provide the holder with the right but not the obligation to buy or sell a commodity at a particular price. Page and Hewitt (2001) present a useful overview of the various types of commodity derivative instruments and their various advantages.[14] It is important to distinguish between policy options that aim to reduce price volatility from those that aim to mitigate the effects of such volatility. From the producers' perspective, excessive volatility may not actually be as bad as permanently low prices, which can threaten household livelihoods. In general, uncertainty or excessive volatility can lead to below optimal production and investment decisions on the part of farmers and producers, especially when producers are highly risk averse (Gemech et al. 2011). However, the net outcome of such volatility and uncertainty also depends on the extent to which producers are themselves consumers of these commodities (as is the case with coffee in Ethiopia), as well as the percentage of household income that derives from particular commodities.

As Dercon (2004) and Dercon et al. (2005) have shown in studies on Ethiopia using a behavioural/experimental economics methodology, the

outcome will depend on how local producers respond to such shocks. Based on the seminal work of Kahneman and Tversky (1979), which highlighted the importance of framing, prospect theory and loss aversion (as opposed to risk aversion) within these various scenarios, it is important to adopt such an approach as a tool for understanding such decision-making under uncertainty. There is now a large empirical body of research, much of which is on African countries, which adopts this approach. Moreover, extra complexity is added in order to distinguish volatility in international prices from variations in domestic price movements. The transmission of global price movements to domestic markets (which is also affected by currency pass-through) is another factor to consider in this context.

The latter will also depend on whether production is protected in African countries via measures such as import duties, export taxes, as well as other non-tariff barriers/measures (NTBs and NTMs) and domestic price support mechanisms. It will also be influenced by market structure. For example, a monopolistic producer country may inadvertently insulate its domestic producers from the beneficial effects of higher international prices that are not transmitted to domestic producers, especially if the monopoly supplier (whether government or private sector) wishes to protect domestic producers from export instability. This is relatively common in a number of African countries, often for political or socio-economic reasons rather than purely economic ones. Other factors that can limit price transmission are the level of processing (or value-added within the supply chain) of some final consumption goods, and poor domestic infrastructures that can inhibit effective price transmission as a result of high transport and other transaction costs.

5.8 The Importance of Governance in Global Commodity Chains: How Can African Commodity Smallholders Survive?

As Kaplinsky and Morris (2000), Fitter and Kaplinsky (2001), Kaplinsky and Kimmis (2006), Gereffi et al. (2005), Keane (2012, 2017a, b), South Centre (2013) and Nissanke (2012, 2017) have argued, the response of

the various stakeholders within commodities markets to commodity price volatility (farmers, producers, regulators and governments) will ultimately depend on the governance and marketing structures of commodity GVCs. This is true within the producing countries themselves and, as the pace of globalisation continues, within the transnational companies (TNCs) who control and dominate the various links within these GVCs—from basic production to processing and on to the marketing of the commodities. (See Chap. 6 by Banini and Ghai on Africa's potential to upgrade within GVCs in this book.)

Within the producing countries too, many institutional and governance changes have occurred over recent decades. For example, market liberalisation, trade liberalisation and de-regulation, have radically altered the production and governance arrangements for many commodity producers, especially in Africa. This has been particularly true for a number of agricultural commodities such as tea, coffee, cocoa, rubber and cotton, among others. In particular, the joint impact of the scrapping of many of the ICAs (and income-stabilisation funds at the international level), along with the abolition of marketing boards in many commodity producing developing countries has meant that the producers as well as the traders of commodities have become more and more disconnected from their GVCs. Their places have been taken by TNCs.[15] Moreover, there is some empirical evidence that the combination of market reforms along with these institutional and governance changes may also have contributed to the increase in commodity price volatility. Gemech and Struthers (2007) found some empirical econometric evidence for this in their study of market reforms in Ethiopia in the 1990s and their impact on coffee price volatility.

Nissanke (2017) argues that these changes, internationally and at domestic levels, have combined to shift the balance of power away from suppliers to buyers of commodities in a form of "captive" or "hierarchical" form of governance in which rent seeking and capture is dominated by the large TNCs. One effect of this, as Nissanke (2017) points out, is a widening gap between producer prices and retail prices for commodities with many TNCs exploiting their informational advantages even to the extent of reducing producer prices to levels that barely cover production costs. Smallholder farmers or producers may have

been particular victims of these changes as highlighted in UNCTAD (2015b; 2016b).

Many of these small producers have been caught in the vacuum left by the scrapping of the ICAs and, due to their size, are often not able to benefit from the range of market-based risk management instruments discussed above. This includes those set up by international financial institutions and UN agencies such as the International Task Force on Commodity Risk Management (ITFCRM). As we have already highlighted, even if derivatives and futures markets can be called "efficient" (in the strict EMH sense), which is itself highly debatable, the high transactions costs and liquidity margins required to effect a market intervention hinder the participation of many small producers. There is also the problem that derivatives markets especially in futures and options, require strict standardisation of volume of commodities traded, along with very strict quality standards, some of which cannot be achieved by smallholders. Such restrictions and limitations often mean that small farmers and traders are only able to use these derivatives through branches and subsidiaries of the large dominant TNCs. Nissanke and Kuleshov (2013), for example, found in their study of a pilot risk-management facility for cocoa farmer cooperatives in Ivory Coast that their ability to hedge risk by using derivatives instruments was limited both in terms of cost and operational complexity.

In a recent UNCTAD study, "Cocoa industry: integrating small farmers into the global value chains" (2016b), the authors present detailed and convincing evidence of the obstacles faced by small farmers in this crucial sector for a number of African countries (especially West Africa). In addition to a number of recommendations at the macro and meso levels including: greater transparency in cocoa markets; more opportunities for small producers; and better competition law and policy at both national and international levels, the report also makes interesting recommendations at the micro level, where, after all, the key players—the farmers—operate from. These include: encouraging the creation of commercially oriented cocoa farmer-based organisations; improving farmers' ability to access price risk management instruments, some of which we have discussed above;

and crucially, encouraging more product differentiation by farmers so that they can receive higher prices. Such a granular approach is welcome and requires promotion by governments and other commodity stakeholders. Indeed, although this report is specifically about the cocoa sector, many of the recommendations could equally apply across other commodity sectors in Africa.

Fundamentally, the crucial choice that will have to be made by commodity stakeholders is whether to rely on such market-based risk instruments or to return to the type of non-market interventions carried out within the ICA's structure (buffer stocks and export quotas). As Mohan et al. (2014, 2016) have shown in studies of the coffee sectors in India and Ethiopia, the benefits of such non-market forms of intervention have to be offset against their costs (including regulatory), in a strict "welfare" calculation. Often, as found in these studies, the benefits from eliminating the volatility can be less than the costs of doing so using non-market interventions.

5.9 Commodity Price Volatility: A Principal–Agent Perspective

Struthers and Mohan (2013) and Struthers (2017) have argued that it may be appropriate to evaluate the various categories of interventions in commodity markets in terms of their efficacy in minimising the negative effects of the so-called principal–agent problem (see Jensen and Meckling 1976) The ICAs (especially commodity stabilisation funds and buffer stocks) were mechanisms used up until the late 1980s to stabilise commodity prices, as well as to increase their average (mean) price levels. These interventions were not only inflexible—due to the fact that many primary commodity prices are subject to long and variable swings—but also costly to implement, involving high transaction and other financial costs. Invariably the costs of such interventions were borne by the producers and governments. No ICAs currently still exist, despite the fact that in their heyday they were numerous and covered most, if not all, of the primary commodities (Gilbert 1996).

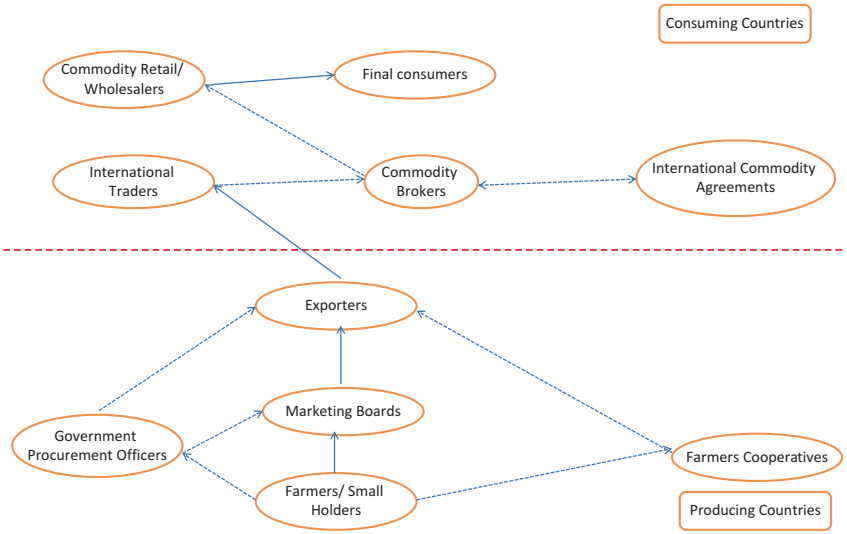

Fig. 5.1 Principle–agent relationships (before market liberalisation). (Source: Author)

The demise of the ICAs can be analysed in terms of the principal-agent problem. Indeed, this perspective, since it is based inherently on issues of governance, asymmetric power and information asymmetries, may be viewed as a further insight into the challenges and obstacles that lie at the centre of the GVC approach, in the work of Gereffi et al. (2005) and Ponte (2002)—see Figs. 5.1 and 5.2. The conflicts between producing and consuming countries within complex supply/value chain issues, which can hinder agreements between the parties, can be analysed within a principal-agent paradigm.

For example, prior to the market reforms in the commodity markets we have mentioned above, within producing countries marketing boards played a significant role in these markets. We can refer to the boards as the principal, and the producer (farmer) as the agent. Since marketing boards no longer play such a dominant or indeed (for many commodities) any role, it is likely that the international trader (exporter) will be the principal and the producer (farmer) will be the agent. However it is more complex than this. principal–agent relationships can change and evolve over time. It is possible, indeed likely, that individual market

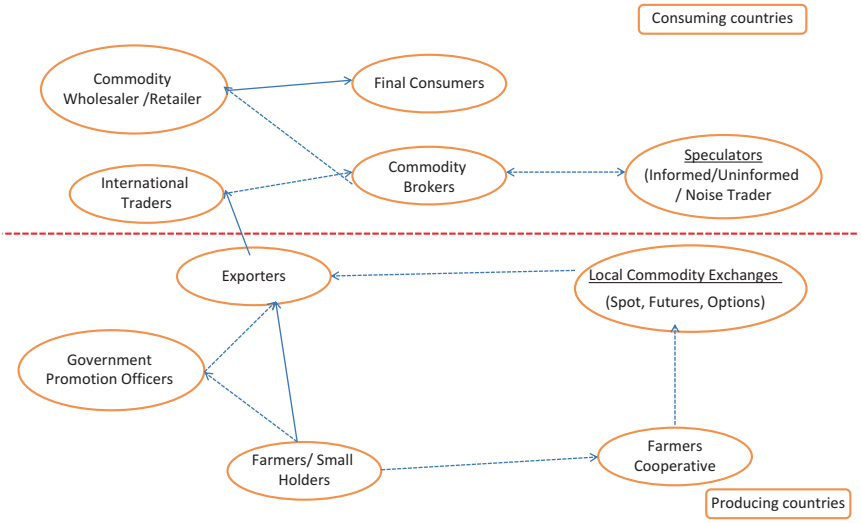

Fig. 5.2 Principle–agent relationships (after market liberalisation). (Source: Author)

participants can be both principals and agents according to their different roles and position in any particular GVC. Moreover, these changing and overlapping roles will be influenced by market liberalisation and the development of price-risk management instruments (including formal commodity exchanges). It is possible, as Struthers and Mohan (2013) and Struthers (2017) have argued, that the principal–agent problem may have become more complex after market liberalisation (see Figs. 5.1 and 5.2).

Pre-market liberalisation, the principal–agent problem is complex enough, as shown in Fig. 5.1, and applies within the producing countries (see the bottom half of the figure) as well as in the consuming countries (see the top half of the figure). The potential for multiple (overlapping) principal–agent relationships exists, for example between importer, market brokers and final consumers. Pre-market liberalisation, the ICAs were the international equivalent of the domestic marketing boards since they operated as physical market trading entities (for example within the ICA). It could be argued that commodity markets during the pre-liberalisation period were controlled by a type of bilateral monopoly, with marketing boards exercising dominant control in the

producing countries and the bodies involved in the various ICAs doing the same within the consuming countries, albeit with potentially greater power than the domestic marketing boards.

Post market-liberalisation, the principal–agent problem arguably becomes more complex, as can be seen in Fig. 5.2. The domestic context for commodity producers became less complex due to the disappearance of the marketing boards, which acted as intermediaries between the producers and the exporters. However if this is combined with the demise of the ICAs at the international level, there is now the impact of speculators to consider. As a consequence of market liberalisation, it can be argued that domestic intermediaries have simply been replaced by new (international) intermediaries in the form of brokers and speculators.[16]

The complexity of all of these principal–agent inter-relationships will be compounded by the inherent supply/value chain complexities that exist in particular commodity markets and which will vary from commodity to commodity and from country to country. It would seem that there is now greater potential for the negative effects of the principal–agent problem to stem from the consuming countries rather than the producing countries compared with the situation when commodity markets were regulated by ICAs. In the consuming country it may be the international buyer who now plays the role of principal. The development of well organised local commodity exchanges might mitigate this shift of power away from the producing countries to the consuming countries. Struthers (2017) argues this is possible within a principal–agent context and has developed a taxonomy to calibrate the costs and benefits of different governance arrangements within a principal–agent framework using indicators such as risk aversion and transaction costs, among others.

5.10 From ICAs to Commodity Exchanges: An Example from Africa

It is clear from the discussion above that derivatives commodity instruments will not eliminate all obstacles facing various stakeholders in commodities markets. This is one reason why an increasing

number of producing countries have established their own commodity exchanges with the aim of providing local participants (especially the producers/farmers) with improved access to these instruments. One effect of this is that basis risk and exchange risk can be lowered, providing there is sufficient liquidity in these markets to also lower transactions costs. Such local provision of commodity exchanges requires not only an efficient spot market for the commodity, but also effective infrastructural provision, including transportation, communication and information. Most important of all is the provision of sufficient capital to enable a viable clearing house to deal with counterparty risk.

In recent years agricultural commodity futures exchanges have been established in a growing number of emerging and developing economies such as Brazil, China, India and South Africa, as well as an increasing number in African economies. Originally, prices within these exchanges simply mirrored those in developed country exchanges. More recently, however, there has been increased trading in locally based exchanges, which facilitates the avoidance of exchange rate risk as well as basis risk. Commodity exchanges in developing countries (for example in India, Ethiopia and Malawi) may have reduced the negative outcomes of some of the principal–agent problems discussed earlier. For example, to the extent that long-term relationships can be more easily developed between the producers and these exchanges, this can be expected to reduce goal conflict (increase incentive compatibility) between principal and agent. However, this will also depend on the extent to which the local commodity exchanges are able to convince the producers to adopt a more output (targets)-based approach to production and move away from a behaviour-based approach.

This favourable outcome will depend on whether the local commodity exchanges can develop a sufficient presence in producing countries to avoid the problem of markets that are too thin and as a result are hindered by low levels of liquidity. The crucial role of information dissemination has been well documented by academics and international organisations such as UNCTAD (2009b). The hope is that effective commodities exchanges will be able to play an increasingly significant role to help producers for example in price discovery. For a discussion of

a commodity exchange in Africa, which has been held up as an example of good practice, see the Appendix to this chapter which outlines the operation of the Ethiopian Commodity Exchange (ECX).

5.11 Conclusions and Future Commodity Prospects for African Economies

The role of price-risk management instruments as a solution to commodity price volatility has rightly received much attention from academics and international organisations such as UNCTAD. While these instruments are not without their limitations, they do offer a way forward for producing countries to at least mitigate the effects of price volatility. The evidence suggests that they do very little to suppress the underlying price volatility for primary commodities. Rather, they should be viewed as tools for alleviating the uncertainty of the revenues that derive from these commodities. After all, futures prices themselves have been shown to be as volatile as the underlying spot prices, as we discussed above in relation to the EMH. Moreover, no matter how efficient these instruments might be (in an EMH sense) their short (a maximum of two years) time horizons make them less suitable for primary commodities with gestation periods of longer than two years (for example some of the tropical beverages among African producers such as coffee, tea, and cocoa). However, the key message from this chapter is that these instruments, especially properly managed and funded commodity exchanges such as that in Ethiopia, may achieve a level of incentives compatibility. This is quite different from the effects of the traditional stabilisation instruments discussed in this chapter, which were often beset by goal conflicts between the agents and the principals. Effective and efficient commodity exchanges will not eliminate principal–agent goal conflicts, but they will at least mitigate the worst effects of these conflicts, especially in minimising rent-seeking behaviour. This principal–agent perspective should be considered a complementary approach to the market efficiency approach, which has traditionally dominated research on commodities and perhaps deserves to receive more attention from academics and policy-makers alike.

There remains of course a dilemma for academics and international organisations to resolve in their analyses of potential solutions to the endemic problem of commodity price volatility faced by developing countries, especially in Africa. While on the one hand it is appropriate to develop new and innovative instruments such as commodity derivatives and commodity exchanges to mitigate the effects of price volatility, it is equally important for producing countries to seek to diversify their economies away from commodity dependence (as defined earlier in this chapter by UNCTAD). This requires such countries (and many in Africa are now achieving some success in doing this) to move up the supply chain or GVCs for their commodities—to achieve graduation in the words of the UNCTAD report referred to in this chapter—but at the same time reduce their dependency on just a few commodities. Achieving this is not easy and requires judicious choice and utilisation of the relevant economic policy tools open to governments, including those at the macroeconomic level. This is especially difficult if we recall the discussion in the very first section of this chapter, which outlined the many different types of risks faced by CDDCs, including severe weather conditions. However the example of Ethiopia is perhaps illustrative here if we realise how effective the country has been in reducing its dependence on a single commodity—coffee—which in the 1980s and 1990s accounted for as much as 60% of all of its export revenues. That figure is now down to around 40% and the economy has been able to diversify significantly. This is perhaps a lesson that other CDDCs in Africa might be able to learn from.

Appendix: Case Study, Ethiopian Commodity Exchange (ECX): Source: Adapted from ECX Website (http://www.ecx.com.et)

The ECX was established in 2008 as a public–private partnership enterprise. The government of Ethiopia owns the ECX. The ECX issues membership seats for sale. These are privately owned and can be freely transferred against any earnings derived from trading on the exchange. The commodities traded on the exchange are: coffee, sesame, haricot beans, wheat and maize.

One of the key strengths of the ECX is that it is structured as a demutualised corporate entity with a clear separation of ownership, membership and management. In principle, owners cannot have trading rights and members cannot have ownership rights. The management cannot be drawn from the owners or from the members.

Membership

Membership is acquired through the purchase of a membership seat, and gives a transferable right to trade on the exchange.

Trading Procedure and the Role of Warehouse Receipts

Commodities are deposited in warehouses operated by ECX in major surplus regions of the country.

At the ECX warehouses, commodities are sampled, weighed, graded and certified. The ECX guarantees the grading of the commodities and maintains a central registry of warehouse receipts. The ECX provides standardised ECX commodity-based contracts, which specify grade, delivery location, lot size and other contract terms. The contracts can be either for immediate delivery or at a pre-specified date in the future. In 2012, ECX introduced electronic warehouse receipts, which help members to secure collateral finance.

ECX Trading System

The ECX trading system uses a physical trading floor located in Addis Ababa. Here buyers and sellers engage in "open outcry" bidding for commodities. Market prices can change throughout trading hours. These prices are transmitted in real time to producers and consumers by electronic price tickers, which were initially located in 21 locations around the country, although the ECX's aim is to increase these to 200. The prices also appear on the ECX website (http://www.ecx.com.et) and via a mobile phone service.

ECX Mechanisms of Reduction of Transaction Costs and Co-ordination Risks

A clear aim of the ECX is to reduce transaction costs and other risks for those who participate in commodity markets in Ethiopia. The ECX website says that this is achieved through the following.

Market order is enhanced via an organised trading platform, formal rules and procedures. Contracts are standardised, as are the commodities. Along with the system of membership-based participation, this facilitates monitoring and enforcement of compliance to the rules, and helps to mitigate risks in the market.

Market integrity is achieved through grading and certification of the quality and quantity of commodities, along with warehouse receipting of commodities traded. A touchstone of the ECX is to achieve fair competition, ethical business and efficient clearing of all payments between buyers and sellers.

Market transparency is achieved via a system of industry-accepted product grades and standards, dissemination of market information that is speedy and reliable to all participants, as well as effective disclosure and audit reporting requirements for members.

Market efficiency is enhanced through effective use of information technology to facilitate the end-to-end system, that is, from warehousing, trading, clearing and settlement of payments to delivery of the commodity.

The essence of the ECX is that it is a centralised low-cost trading platform where warehouse receipts along with quality and standards play key roles. There are also other benefits.

- Since the physical transfer of the product is made only after the commodity is sold, this reduces transportation costs.
- A market information system also exists within the ECX in order to increase accessibility to different markets and also to the general public through different media.

In summary, the whole framework is designed to assist in the process of price discovery for farmers and producers through the key roles of members.

A number of empirical papers have been written with the aim of assessing the performance of the ECX against its own objectives. For example, Andersson, Bezabih and Mannberg (2015) studied the impact of the ECX on market efficiency in Ethiopia, specifically whether regional warehouses that are connected to the national commodity exchange in Addis Ababa reduce transaction cost and price dispersion between regions. For the period 2007–2012, they found that the average price spread was reduced significantly as more regional warehouses were established across the country. In another study, albeit over a more limited time period and only with reference to sesame production, Alemu and Meijerink (2010) did not find similar reductions in transaction costs. Similarly, Worku et al. (2016) found in a survey of exporters that the grading and sampling system of the ECX suffered from bias, lack of technical knowledge and equipment. They also found that some distrust existed between the seller, buyer and the ECX. This was attributed to the high penalty cost imposed by the exchange for delaying or withdrawing commodities as well as the perceived high membership fee. There is a need for further empirical studies to assess the performance of the ECX, in particular a time series analysis, as relevant data builds up going forward.

Notes

1. The Singer–Prebisch hypothesis became the capstone in these early years to highlight the endemic problem that less developed countries faced with declining terms of trade as long as they continued to rely heavily on primary commodities for their export markets (Prebisch 1950, 1959, 1964; Singer 1950, 1958, 1975, 1982).
2. *Economies of scale (*and *scope*) are vital in commodities markets. Commodity producers are either characterised as *latifundia* (a small number of very large-scale producers); or *minifundia* (a very large number of extremely small producers). *Minifundia* are more common in

African economies. A relevant example is the very large number (in the hundreds of thousands) of small coffee farmers/producers in Ethiopia.

3. Papers by Dercon (2004); Dercon et al. (2005); Morduch (1995) analyse a range of different shocks that can adversely affect vulnerable countries (e.g., Ethiopia) as well as the necessary consumption and income smoothing aspects of these shocks.
4. The Food and Agricultural Organisation (the FAO) has been active in developing "*early warning systems"* to be able to anticipate and respond to severe weather disturbances such as drought, famine and hurricanes, which can of course threaten life on a huge scale. The FAO has also facilitated the setting up of an effective *agricultural management information system* (*AMIS),* which tracks food outputs and yields across the world. It is an inter-agency platform aimed at enhancing food market transparency and security. It was set up in 2011 by the G20 ministers of agriculture after the major increases in global food prices in 2007–2008 and 2010. It incorporates the main producing countries of agricultural commodities and monitors global food supplies. It concentrates on wheat, maize, rice and soybeans and is effectively a platform to co-ordinate policy responses during periods of market uncertainty and volatility. According to the FAO website, its coverage of global production, consumption and trade volumes in the above crops may be as much as 80–90%. Although its main function is to ensure better global food security, it can also help to anticipate and hopefully mitigate agricultural commodity price increases, especially in these vital food crops.
5. "*Commodity Dependence and the Sustainable Development Goals: Note by the UNCTAD Secretariat"* prepared for the multi-year expert meeting, ninth session, in Geneva on 12–13 October 2017.
6. Two other examples from a recent Commonwealth Secretariat publication edited by Keane and Baimbill-Johnson (2017) are also illustrative of the potential to move up the value chain (see Keane's article on the cut-flower sector in Kenya and Ethiopia, where some upgrading was discernible, especially in the context of Kenyan firms entering the Ethiopian supply chain; and the paper by Nana Asante-Poku in her analysis of Ghana's participation in the pineapple GVC). In the former case, the upgrading that took place was largely based on the different tiers of suppliers prevailing within the Kenyan market and to some extent within Ethiopia, as well as Kenyan lead firms who are active in Ethiopia. In the paper it is referred to as a "flying geese" model. In the latter case, progress has been more erratic, which the author attributes to a combination of

institutional changes and an inconsistent response on the part of producers to significant events such as the development and introduction of new product varieties.

7. We suggest in Sect 5.9 of this chapter further advantages of these derivatives instruments in terms of a *principal–agent* approach. These derivative instruments achieve a *better incentives compatibility (avoidance of goal conflict)* for farmers, intermediaries, distributors, large retailers and consumers alike. They achieve this by reducing the potential for *rent-seeking* behaviour on the part of these various stakeholders. A practical example of this incentives compatibility is the provision of a credit line to producers, which can then be drawn down in line with what happens to underlying commodity prices. When prices rise (fall) interest payments on the loan will rise (fall). A symmetry can therefore be established between the underlying economic activity, the production of the commodity itself and the financial means (in the form of credit facilities) that will assist in the production of the commodity which, in turn, can assist in the purchase of needy fertilisers, replanting of crops, etc.
8. Some possibilities are: the setting of speculative position limits on commodity futures contracts to minimise the potentially volatile effects of excessive speculation (for example, arising from short-trading); the setting of maximum limits on daily price changes and on inventories held by non-commercial participants to reduce excessive volatility; the introduction of volume and frequency trading limits; and attempts to ensure international consistency across exchanges in order to prevent regulatory arbitrage. However, it is still early days as to whether such initiatives have been effective, especially in Africa (UNCTAD 2009a).
9. Two prominent examples of these indexes are: the *Standard and Poor's Goldman Sachs Commodity Index (S&P GSCI)* and the *Dow Jones American International Group Commodity Index (DJ-AIGCI).* These are composite indexes of weighted prices of a range of commodities, which includes energy products, agricultural products and metals.
10. See Mananyi and Struthers (1997) for an econometric study of the EMH in the market for cocoa futures.
11. See Table 6 of the UNCTAD (2009a) report.
12. A contrary position on the efficacy of financial derivatives markets is presented by Breger-Bush (2010) in her study of the use of price-risk management instruments for coffee farmers with specific reference to Mexico and the 1998–2002 coffee crisis. Her argument is that it is ambitious of international organisations such as the World Bank and

UNCTAD to recommend such instruments for small-scale producers. The basis for her argument is that the use of derivatives for hedging can create *direct* and *indirect costs* for small farmers in terms of actually contributing (as opposed to offsetting) the destabilisation and reduction of farmers' incomes. She also argues that support for such instruments carries *high opportunity costs* in terms of other more relevant and effective risk management schemes that will support small coffee producers who face volatile commodity prices. Her argument is that futures hedging can lead to small coffee farmers' incomes becoming more unstable, because they are less well capitalised to be able to meet the required margin calls with their low level of reserves. Moreover, she argues that they may cause chronic oversupply in these markets, which can accentuate the plight of small farmers. This may be due to the incentives provided to producers to increase output. A crucial element in her argument is that the required combination of "*initial margin*" along with the subsequent "*maintenance margin*" in the context of a daily "*mark to market*" accounting mechanism will put undue pressure on small farmers to keep their positions open. In essence, a futures hedge that may be profitable over relatively long periods, such as a year or two, might be unprofitable day to day, week to week or month to month. The opportunity cost that Breger-Bush (2010) refers to is the lost opportunity that an excessive focus on futures hedging may produce in terms of foregoing alternative approaches such as: more *effective supply management* and *Fairtrade*. However, a fuller discussion of these alternatives is beyond the scope of this chapter.

13. One study by Benavides and Snowden (2006) has suggested that the use of futures markets may not be taken up by farmers or producers as extensively as may be thought. In a study of the Mexican corn scheme, Benavides and Snowden discovered that low take up of corn futures and options in the late 1990s was due to rational calculations on the part of farmers rather than inertia. This was seen in terms of the benefits to them from participating in the scheme sponsored by the Mexican government to facilitate access by farmers to futures and options contracts traded on various US commodity boards such as the New York Board of Trade (NYBOT) and the Chicago Mercantile Exchange (CME). Within a cost-benefit and break-even framework, the authors discovered that the hedging costs (implicit in the subsidy given by the government) were very similar to the farmers own estimates of their "*price of risk bearing*", which meant it was not worthwhile for them to participate, at least on the scale that was hoped for.

14. See Table 5 in Page and Hewitt (2001).
15. One exception to this general trend is the continuing role of the Ghana Cocoa Board in Ghana, which effectively acts as a marketing board for the production, processing and marketing of cocoa in that country.
16. Rashid et al. (2010) have suggested that the development of domestic commodity exchanges in many African countries is impeded by the small size of their domestic commodity markets, poor physical infrastructure and inadequate legal and regulatory environments. For these reasons, they argue that the development of regional exchanges might be a better option for such countries, alongside a focus on improving investment in transportation and other physical infrastructure (for example, warehousing and improved information services). (See Chap. 9 by Eba and Struthers in this book for a discussion of the potential for establishing a regional commodity exchange in West Africa).

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