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## Managing commodity price volatility in commodity- dependent developing countries

### Note by the UNCTAD secretariat

#### *Summary*

In this note, recent trends and drivers of commodity price volatility are highlighted, the potential impacts are reviewed and ways to manage and reduce associated risks in commodity-dependent developing countries and net food-importing developing countries are discussed.

Commodity price volatility is a key source of socioeconomic volatility and stress in these country groups. The volatility of prices for commodities such as food, fuels and fertilizers directly and immediately impacts government policies, businesses and consumers. Volatility can also have longer-term implications for growth and development in these country groups. There are thus many links between commodity price volatility and the achievement of the Sustainable Development Goals.

Tools and strategies for managing volatility in these country groups are examined in this note. In addition to an effective risk management strategy, economic diversification remains crucial in increasing resilience and reducing economic and social risks related to commodities sectors. By adding value on site and upgrading the participation of domestic firms in commodity value chains, these country groups can reduce vulnerability to commodity price volatility and foster sustainable growth.



## Introduction

1. In this note, recent trends and drivers of commodity price volatility and the potential impacts are highlighted, and ways to manage and mitigate volatility in commodity-dependent developing countries and net food-importing developing countries are discussed. The volatility of prices for commodities such as food, fuels and fertilizers has direct and immediate impacts on government policies, businesses and consumers, and can also have longer-term implications for growth and development in these country groups. There are thus many direct and indirect links between commodity price volatility and the achievement of the Sustainable Development Goals. Tools and strategies for managing volatility are examined in this note.

### I. Commodity price volatility

#### A. Characterizing commodity price volatility

2. Commodity prices change over time, as do the prices of most goods and services in a market economy. In principle, commodity price fluctuations are neither unnatural nor harmful. On the contrary, in principle, changes in relative prices transmit market signals that contain information on changes in the fundamental economic forces of supply and demand on all market participants. These price changes allow producers and consumers to allocate resources more efficiently and contribute to the proper functioning of markets. However, if commodity prices fluctuate by significant amounts and are driven by non-fundamental forces, price signals get distorted, which can cause uncertainty and inefficiency. The potential consequences of market failure and uncertainty include a number of adverse effects impacting the real economy and people's livelihoods.

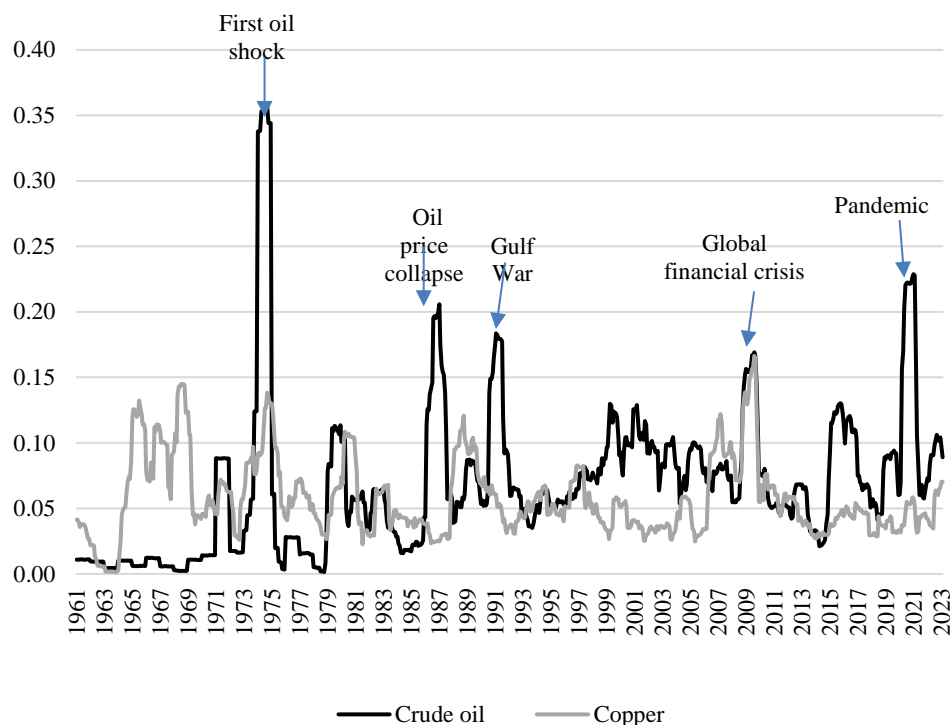
3. Volatility is a measure of fluctuation within a given period. Consequently, the level of commodity price volatility can and does vary over time. In addition, price volatility varies across individual commodities and groups of commodities, and the prevailing commodity prices and their volatility measures can vary across markets due to a range of factors, such as transport costs and trade tariffs, or due to market fragmentation because of physical constraints (such as, to a certain extent, in the natural gas market, where a significant share of traded volumes is distributed through pipelines). Finally, the price levels and volatility that consumers face in different markets can vary due to the incomplete pass through of commodity price changes, differences in exchange rate dynamics, different tax regimes and other policies that affect retail prices.

4. A comparison of the volatility of the prices of selected commodities within four commodity groups (food; agricultural raw materials; minerals, ores and metals; energy) shows that the price of oil is usually more volatile than the price of copper, wheat or cotton (figures 1 and 2).<sup>1</sup>

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<sup>1</sup> There are different ways to calculate the volatility of commodity prices. For example, volatility can be calculated based on price levels or price changes; based on real or nominal prices. In the context of this note, the standard deviation of logarithmic price changes is used since it is an easily interpretable and widely used measure of volatility. Since long time series are analysed, real prices rather than nominal prices are used. Other indices of volatility include the coefficient of variation of price levels. On diversification and value addition, see TD/B/C.I/MEM.2/42.

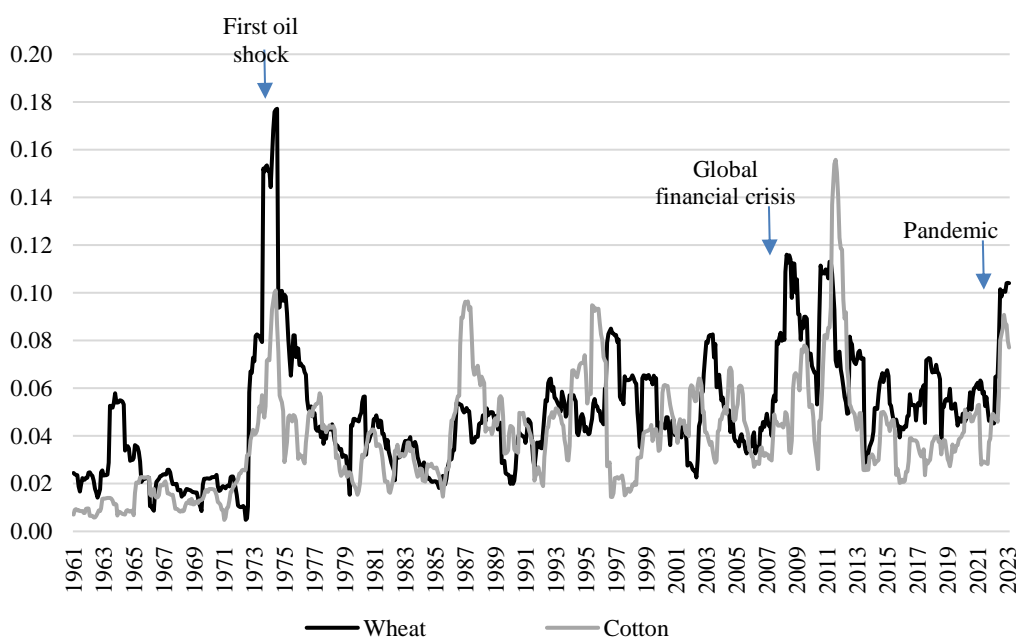
Figure 1  
Volatility of crude oil and copper prices



Source: UNCTAD calculations, based on data from the Federal Reserve Bank of St. Louis, United States of America (consumer price index) and the World Bank (commodity prices).

Notes: Nominal price series have been deflated by the seasonally adjusted United States consumer price index. Crude oil corresponds to United Kingdom of Great Britain and Northern Ireland Brent and copper corresponds to grade A cathodes (London Metal Exchange).

Figure 2  
Volatility of wheat and cotton prices



Source: UNCTAD calculations, based on data from the Federal Reserve Bank of St. Louis, United States (consumer price index) and the World Bank (commodity prices).

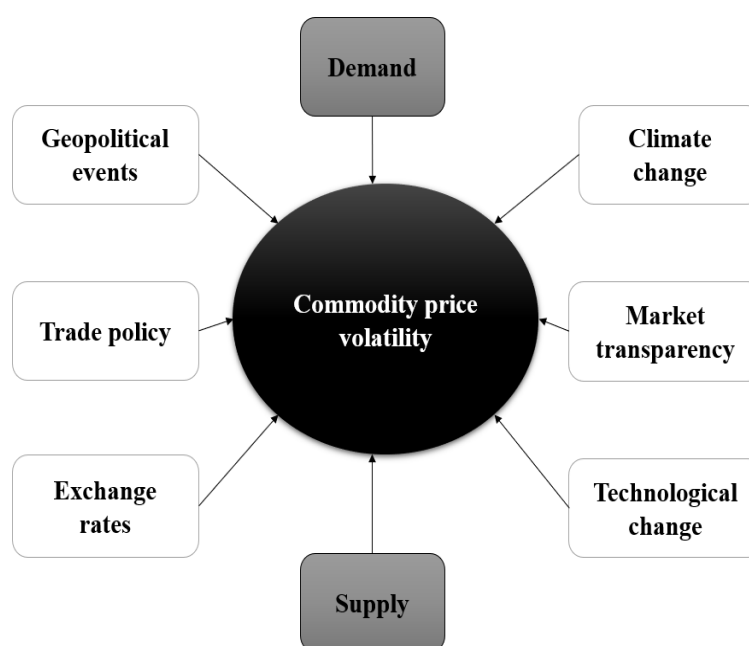
Notes: Nominal price series have been deflated by the seasonally adjusted United States consumer price index. Cotton corresponds to the A index and wheat to United States hard red winter No. 2.

5. Since the 1960s, there have been various periods in which commodity price volatility has been particularly high, including during the first oil shock in 1973–1974; the second oil shock in 1979; the collapse of the oil price in 1986; the Gulf War in 1990–1991; the global financial and food crisis of 2007/08; and, most recently, the period since the outbreak of the pandemic in early 2020, which includes the start of the war in Ukraine in February 2022. For example, crude oil prices reached a 30-year high in the aftermath of the pandemic. In the past 40 years, the oil price shock in 1973–1974 has been the only period in which the price of crude oil has been higher. In level terms, in January 2020–January 2023, the average spot price of crude oil (Brent) fluctuated between \$23.3 per barrel (April 2020) and \$120.1 per barrel (June 2022). In the same period, the average monthly price of wheat (United States hard red winter No. 2) fluctuated between \$198.4 per ton (June 2020) and \$522.3 per ton (May 2022).

## B. Drivers of commodity price volatility

6. Commodity price changes can be driven by various factors directly affecting supply and demand and by geopolitical and economic developments that indirectly impact commodity markets (figure 3). As the supply and demand of many commodities, such as food and fuels, are inelastic in the short term, relatively small supply or demand shifts can lead to significant price changes. For example, the average lead time from discovery to production of new copper mines was 17 years for production that started between 2010 and 2019.<sup>2</sup>

Figure 3  
Drivers of commodity price volatility



Source: UNCTAD.

7. A distinction can be made between idiosyncratic factors that originate in or affect individual commodity markets and broad-based or global factors that simultaneously affect a wide range of commodity prices. Idiosyncratic factors often affect the supply of commodities, while global factors, particularly global economic activity, tend to affect demand. However, the interaction between

<sup>2</sup> See <https://www.iea.org/data-and-statistics/charts/average-observed-lead-times-from-discovery-to-production-for-selected-minerals-2010-2019>.

Note: All websites referred to in footnotes were accessed in July 2023.

shocks and volatility is usually complex. For example, idiosyncratic or sector-specific shocks affecting domestic markets can also have global consequences that, in turn, can affect other domestic markets, creating a chain of impacts. This interconnectedness and the circularity of some shocks underscore the global nature of commodity markets and the potential for local events to have far-reaching consequences. For example, in 2010, severe flooding in Pakistan and a heat wave in the Russian Federation, coupled with the financialization of commodity markets (see paragraph 19), increased the global price of wheat and affected food security in many countries.<sup>3</sup> In addition, global crises, such as the pandemic, can affect supply through impacts on transport and logistics along value chains. Global (or common) factors have been shown to be drivers of commodity prices and there is empirical evidence of a significant co-movement in commodity prices.<sup>4</sup> However, in general, agricultural commodities prices are more influenced by idiosyncratic factors related to their production and demand, while metals prices are more susceptible to global economic and geopolitical factors.<sup>5</sup>

### 1. *Supply-side shocks*

8. On the supply side, commodity price volatility can be driven by cyclical or periodical factors, such as seasonality in agricultural markets and unexpected production shortfalls, often called supply shocks.

9. Extreme weather events are difficult to predict and can often trigger supply shocks in commodity markets, particularly in the agricultural sector. Crop yields are sensitive to weather conditions, including temperature and precipitation patterns, and to impacts from extreme weather events. For example, in Australia, a major wheat exporter, the drought in 2018–2019 caused a significant shortfall in wheat production; and in Thailand, the largest rice exporter in the world at the time, floods severely reduced the rice crop in 2011.<sup>6</sup> In addition, local supply shocks due to inclement weather conditions can cause retail food prices to rise suddenly (even if international prices remain unaffected). Extreme weather events can also impact mining supply. For example, in Australia, floods in Queensland in 2010–2011 led to significant disruptions in coal mining operations, including at Goonyella Riverside Mine, one of the world's largest coal mines, and contributed to a 22 per cent increase in unit costs of thermal coal mines in Australia in the first half of 2022.<sup>7</sup>

10. Climate change can increase the frequency and severity of extreme weather events, impacting commodity price volatility, in particular through extreme temperatures, increased heavy rainfall, including that linked with tropical cyclones, and intensified droughts.<sup>8</sup> Projections of cereal prices based on scenarios prepared by the Intergovernmental Panel on Climate Change indicate a median increase of 7.6 per cent (with a range of 1–23 per cent) by 2050 due to the impacts of climate change.<sup>9</sup> Mining and energy supply chains can also be affected by climate change through disruptions due to extreme weather events or changes in temperature and precipitation patterns that can affect the availability of water and other resources required for mining operations; the latter can result in increased resource competition, higher costs and reduced efficiency.<sup>10</sup>

11. Pests and disease outbreaks can also cause supply shocks by reducing yield and quality or by increasing production costs in agricultural markets. Estimates show that, each year, up to 40 per cent of global agricultural production is lost due to pests and that plant diseases result in around \$220 billion per year in costs to the world economy and invasive insects, around \$70 billion.<sup>11</sup> In addition to the direct impact on supply, pests and diseases

<sup>3</sup> See <https://www.unescap.org/publications/theme-study-sixty-ninth-session-commission-building-resilience-natural-disasters-and>.

<sup>4</sup> Byrne JP, Fazio G and Fiess N, 2013, Primary commodity prices: Co-movements, common factors and fundamentals, *Journal of Development Economics*, 101:16–26.

<sup>5</sup> Nkurunziza JD and Tsowou K, 2015, Volatility in global commodities markets and implications for diversification policies, *Journal of Emerging Markets*, 20(1–2):79–98.

<sup>6</sup> See <https://www.reuters.com/article/australia-wheat-idUSL3N20D1U5> and <https://www.reuters.com/article/us-thailand-rice-idUSTRE79R0QF20111028>.

<sup>7</sup> See <https://www.reuters.com/article/idINIndia-54270120110120> and <https://ieefa.org/resources/coal-cost-trends-climate-impacts-coal-mining-likely-long-term>.

<sup>8</sup> See <https://www.ipcc.ch/report/ar6/wg1/>.

<sup>9</sup> See <https://www.ipcc.ch/srccl/>.

<sup>10</sup> UNCTAD, 2019, *Commodities and Development Report 2019: Commodity Dependence, Climate Change and the Paris Agreement* (United Nations publication, Sales No. E.19.II.D.18, Geneva).

<sup>11</sup> See <https://www.fao.org/news/story/en/item/1402920/icode/>.

can also trigger second-round effects, as countries may impose trade restrictions on imports of crops from countries experiencing pest or disease outbreaks, leading to further supply reductions.

12. Strikes and labour-related conflicts can lead to production delays and disruptions and, thereby, supply shocks. For example, in Chile, a strike took place in 2019 at Chuquicamata Mine, one of the world's largest copper mines, and in South Africa, the platinum mining strike in 2014 affected the global hub of platinum production and led to the rise of platinum prices from around \$1,400 to \$1,500 per ounce and to reductions in the supply of platinum by around 1.2 million ounces, equivalent to 25 per cent of global supply.<sup>12</sup>

13. Geopolitical crises, such as restrictions enacted during the pandemic, can affect commodity production, transport and trade and thereby lead to supply shocks in affected markets. For example, the war in Ukraine has led to supply shocks across commodity markets in which the Russian Federation and Ukraine are major exporters, including natural gas, wheat, maize, sunflower oil and fertilizers. In March 2022, the food price index reached a record level, up by 12.6 per cent compared with in February 2022 and by 33.6 per cent compared with in 2021, representing an increase of 15.8 per cent from the peak in February 2011.<sup>13</sup>

14. Actions taken by the Organization of the Petroleum Exporting Countries have a significant impact on commodity price volatility, particularly in the oil market.<sup>14</sup> As it is the main organization regulating the global oil supply, its decisions on production levels have a direct effect on oil prices. When oil production is cut, in order to maintain higher prices, reduce surplus stocks or stabilize markets, it restricts supply to the market, leading to higher prices or keeping them relatively high. By contrast, when oil production is increased, in order to increase oil revenue or take market share from other fuel sources, it increases supply, exerting a downward pressure on prices. In 2014–2016, the Organization of the Petroleum Exporting Countries decided not to reduce oil production, to maintain market share given the shale oil revolution in the United States and, as a result, the price of oil fell by 70 per cent during this period.<sup>15</sup>

15. Global commodity markets are also susceptible to shocks due to concentrated production in certain regions. For example, dominance in oil production by countries in the Middle East implies that regional political instability could significantly impact global oil prices. For example, in Saudi Arabia in 2019, attacks on the Abqaiq oil processing facility and the Khurais oil field halted over half the daily national exports, representing approximately 5 per cent of global crude oil production; benchmark crude oil (Brent and West Texas Intermediate, United States) futures increased by approximately 15 per cent.<sup>16</sup>

## 2. Demand-side shocks

16. On the demand side, shocks generally take the form of sudden global economic contractions, depressing demand, or of pronounced phases of increasing global demand often caused by economic growth spurts in major importer or consumer countries. For example,

<sup>12</sup> Bohlmann HR, Van Heerden JH, Dixon PB and Rimmer MT, 2015, The impact of the 2014 platinum mining strike in South Africa: An economy-wide analysis, *Economic Modelling*, 51:403–411. See <https://www.reuters.com/article/us-safrica-mining-idUSKBN0F00DC20140625> and <https://www.bloomberg.com/news/articles/2019-06-24/strike-at-top-copper-miner-seen-wiping-10-000-tons-from-market>.

<sup>13</sup> See <https://www.fao.org/3/njl64en/njl64en.pdf>.

<sup>14</sup> Schmidbauer H and Rösch A, 2012, Organization of the Petroleum Exporting Countries news announcements: Effects on oil price expectation and volatility, *Energy Economics*, 34(5):1656–1663. The member countries are Algeria, Angola, Congo, Equatorial Guinea, Gabon, the Islamic Republic of Iran, Iraq, Kuwait, Libya, Nigeria, Saudi Arabia, the United Arab Emirates and the Bolivarian Republic of Venezuela.

<sup>15</sup> World Bank, 2018, Special focus 1: With the benefit of hindsight – The impact of the 2014–2016 oil price collapse, available at [https://elibrary.worldbank.org/doi/epdf/10.1596/978-1-4648-1163-0\\_Focus1](https://elibrary.worldbank.org/doi/epdf/10.1596/978-1-4648-1163-0_Focus1).

<sup>16</sup> See <https://www.reuters.com/article/us-global-oil/oil-prices-surge-15-after-attack-on-saudi-facilities-hits-global-supply-idUSKBN1W00UG>.

the commodity price boom in the 2000s has been associated with economic growth in emerging economies, particularly China.<sup>17</sup>

17. The pandemic had a significant impact on global commodity price volatility, with effects varying over time. Containment measures, travel restrictions and supply chain disruptions reduced demand in many economic sectors, leading to lower prices for commodities such as oil, metals and agricultural products. For example, in January–April 2020, the UNCTAD fuel price index fell by 56 per cent.<sup>18</sup> The subsequent easing of containment measures and increasing global demand pushed commodity prices up, and food prices rose significantly between the fourth quarter of 2020 and February 2022, including as a result of the rise in input costs caused by the rise in the price of oil and gas.<sup>19</sup>

18. Changes in the monetary policy of major economies such as the United States and the European Union influence commodity price volatility in several ways. Interest rate decisions taken by central banks affect demand and economic growth. An expansionary monetary policy, characterized by low interest rates, can stimulate aggregate demand and support economic growth, which may lead to increased demand for commodities and, potentially, a rise in their prices. By contrast, a restrictive monetary policy, with high interest rates, can reduce aggregate demand and put downward pressure on commodity prices. Monetary policy also influences exchange rates, impacting commodity import and export prices.

19. Financialization also affects commodity price volatility, but empirical evidence is mixed on the magnitude and direction of the effect. The term “financialization of commodity markets” indicates the increasing role of financial motives, financial markets and financial actors in the operation of commodity markets.

20. Some researchers state that the shorter time horizon of investors outside commodity sectors, particularly institutional investors such as hedge funds or pension funds, can lead to bubbles, amplify volatility and destabilize markets. Speculators also play a role in commodity price volatility, whereby investors may speculate on commodity prices using futures, options and other financial instruments, thereby amplifying price movements and increasing volatility. For example, in 2022, the world’s leading producer of nickel and stainless steel speculated on the fall of the price of nickel and sold its production short. Thereafter, as the drop did not materialize, the producer had to buy back significant amounts of nickel, prompting the London Metal Exchange to suspend nickel trading for one week. The price jumped from \$30,000 to \$100,000 per ton in one day.<sup>20</sup>

21. Other researchers highlight the role of financial investors in providing market liquidity and facilitating futures price discovery and, thereby, the efficient functioning of derivatives markets that are important vehicles for risk-sharing among commodity market participants. The period from 2004 to the global financial crisis of 2007/08 is generally viewed as the main period of the financialization of commodity markets.

### 3. *Other drivers*

22. Additional factors, not directly related to commodity supply and demand, can cause, absorb or amplify commodity price volatility.

23. Trade restrictions such as food export restrictions or bans can contribute to volatility in times of crisis. For example, during the food price crisis of 2007/08, Argentina, a major wheat producer, temporarily raised export taxes on wheat and other agricultural products; and India and Viet Nam, two key rice exporters, limited rice exports.<sup>21</sup> In 2010, key exporters temporarily restricted wheat, maize and barley exports.<sup>22</sup> More recently, in the context of the pandemic and the war in Ukraine, many countries have implemented food and fertiliser export restrictions.<sup>23</sup>

<sup>17</sup> World Bank, 2014, *The contribution of the mining sector to socioeconomic and human development, Extractive Industries for Development Series No. 30*.

<sup>18</sup> See <https://unctad.org/publication/impact-covid-19-pandemic-trade-and-development-lessons-learned>.

<sup>19</sup> See <https://news.un.org/en/story/2022/01/1109212>.

<sup>20</sup> See <https://www.mining.com/web/the-18-minutes-of-trading-chaos-that-broke-the-nickel-market/>.

<sup>21</sup> See <https://www.nytimes.com/2008/03/29/business/worldbusiness/29rice.html> and <https://www.nytimes.com/2008/06/09/business/worldbusiness/09iht-farm.1.13565893.html>.

<sup>22</sup> See <https://www.fao.org/policy-support/tools-and-publications/resources-details/en/c/1268745/>.

<sup>23</sup> See <https://public.tableau.com/app/profile/ifpri.food.security.portal/viz/shared/2CPYTB4G8>.

24. As trade in commodities is largely denominated in United States dollars, exchange rates directly affect access to these commodities by net commodity-importing countries.<sup>24</sup> Traditionally, there has been a predictable pattern, whereby commodity price booms are accompanied by a depreciation of the dollar and, when commodity prices fall, the value of the dollar tends to rise. However, this relationship has changed since the pandemic whereby, instead of weakening, the dollar has appreciated against almost all major currencies, contributing to domestic price volatility.<sup>25</sup> With this shift in the relationship between commodity prices and the strength of the dollar, the exchange rate shifted from being a shock absorber to a shock amplifier in many net commodity-importing developing countries.

25. Technology and innovation can also have an impact on commodity price volatility. Technological change can create new sources of demand for commodities, such as the growing demand for the lithium-ion batteries used in electric vehicles.<sup>26</sup> This can increase the price of critical battery materials and create price volatility if supply cannot keep up with demand. On the supply side, new technologies can facilitate the discovery and exploitation of new oil, gas and mineral deposits, by reducing operating costs. For example, the development of new technical processes to extract shale oil and gas led to a significant increase in oil production in the United States, one of the main factors in the fall in oil prices in 2014–2016.<sup>27</sup>

26. A lack of market transparency and informational frictions regarding the global supply, demand and inventory of commodities can create uncertainty and result in less stable markets, significantly impacting commodity price volatility. Price fluctuations then become more frequent and intense. Lack of information can lead to the misallocation of resources, market distortions, increased speculation or even panic buying. In addition, a lack of transparency in the commodity supply chain can encourage unethical practices such as price fixing, market manipulation and fraud.

### C. Impacts of commodity price volatility

27. The cyclical pattern of commodity price cycles is relatively well understood, yet consumers and producers are less prepared to manage unexpected or excess volatility, which has various detrimental effects. For example, excess commodity price volatility significantly impacts the achievement of the Sustainable Development Goals. Sudden rises in commodity prices can, in several ways, undermine the achievement of the Goals on poverty, hunger, health, responsible consumption and production and climate action. Rising food prices can lead to increased hunger and malnutrition, thwarting efforts to eradicate poverty and achieve food security. For example, the rise in food and fertiliser prices due to the war in Ukraine may hinder the achievement of Goals 1 and 2, with 71 million people being pushed into poverty and 345 million people facing food insecurity.<sup>28</sup>

28. There are multiple channels through which commodity price volatility is linked to macroeconomic variables, particularly economic growth (figure 4). For example, fluctuations in commodity prices imply fluctuations in the terms of trade, exchange rates, capital flows, firm profitability and public revenue. This creates uncertainty and is detrimental to investment, capital accumulation and growth. For example, the volatility of commodity prices results in the volatility of gross domestic product (GDP) growth in commodity-dependent countries, and this is associated with lower average economic growth.<sup>29</sup> Fluctuating commodity prices also pose major problems for business, which has to deal with

<sup>24</sup> Boz E, Casas C, Georgiadis G, Gopinath G, Le Mezo H, Mehl A and Nguyen T, 2022, Patterns of invoicing currency in global trade: New evidence, *Journal of International Economics*, 136; UNCTAD, 2022, A double burden: The effects of food price increases and currency depreciations on food import bills, available at <https://unctad.org/publication/double-burden-effects-food-price-increases-and-currency-depreciations-food-import-bills>.

<sup>25</sup> See <https://www.bis.org/publ/work1083.htm> and [https://www.bis.org/publ/qtrpdf/r\\_qt2303f.htm](https://www.bis.org/publ/qtrpdf/r_qt2303f.htm).

<sup>26</sup> See <https://unctad.org/publication/commodities-glance-special-issue-strategic-battery-raw-materials>.

<sup>27</sup> See <https://blogs.worldbank.org/developmenttalk/what-triggered-oil-price-plunge-2014-2016-and-why-it-failed-deliver-economic-impetus-eight-charts>.

<sup>28</sup> See <https://www.undp.org/publications/addressing-cost-living-crisis-developing-countries-poverty-and-vulnerability-projections-and-policy-responses> and <https://www.wfp.org/global-hunger-crisis>.

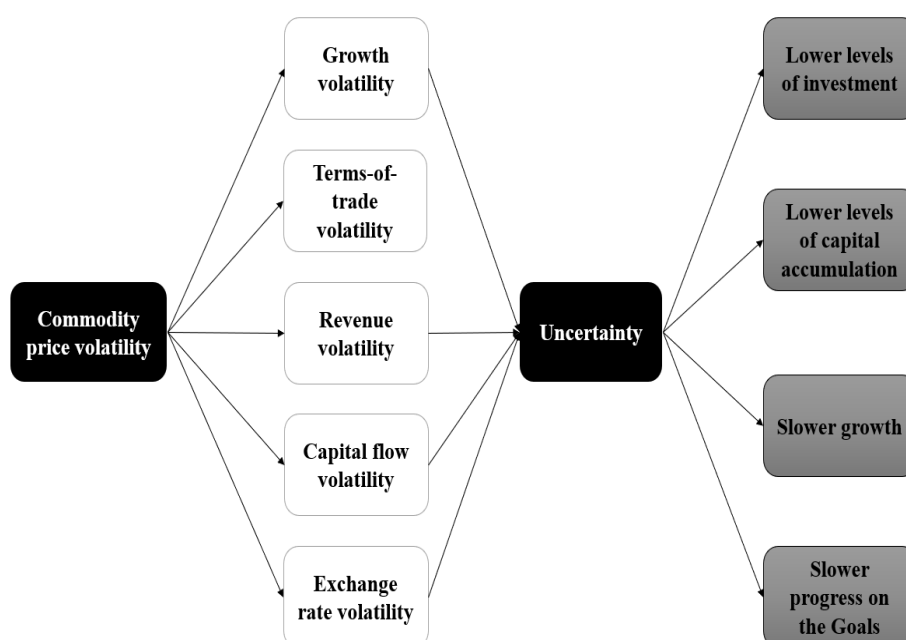
<sup>29</sup> Ramey G and Ramey VA, 1995, Cross-country evidence on the link between volatility and growth, *The American Economic Review*, 85(5):1138–1151.



uncertainty about production costs and the price of end products and, ultimately, about profits. In addition, poorer countries tend to specialize in more volatile sectors such as agriculture and mining.<sup>30</sup> In particular, higher volatility in commodity prices is negatively associated with economic growth, particularly in low-income countries, with the negative effect of commodity price volatility on growth being primarily due to the impact on investment and productivity.<sup>31</sup> Higher volatility in commodity prices may induce greater volatility in government finances and lead to stop-start public investment, which weighs on both physical and human capital investment.<sup>32</sup> Commodity price volatility can also cause greater volatility in government revenue and, consequently, lead to instability in public spending in social services, infrastructure and other critical areas. Such instability can have significant consequences for the welfare of citizens, particularly the most vulnerable. For example, declining government revenue due to a drop in commodity prices leads to less funding for health and education and for infrastructure projects, such as road and bridge construction, thus hindering economic growth and development.

Figure 4

#### Transmission channels of volatility in commodity-dependent developing countries



Source: UNCTAD.

29. When commodity prices rise, the export revenues of producing countries also rise, which can lead to the appreciation of exchange rates. By contrast, when commodity prices fall, export revenues in producing countries fall, which can cause exchange rates to depreciate. Commodity price volatility can create uncertainty about income flows and economic prospects, which can influence the decisions of foreign investors and speculators in the foreign exchange market. Erratic movements in commodity prices can prompt investors to adjust their portfolios and seek more stable opportunities elsewhere, leading to volatile capital flows and affecting exchange rates. Volatile capital flows negatively affect commodity-dependent economies by destabilizing the financial sector and forming asset bubbles. These effects are accentuated in times of financial crisis.<sup>33</sup>

<sup>30</sup> Koren M and Tenreyro S, 2007, Volatility and development, *The Quarterly Journal of Economics*, 122(1):243–287.

<sup>31</sup> Van der Ploeg F and Poelhekke S, 2009, Volatility and the natural resource curse, *Oxford Economic Papers*, 61:727–760.

<sup>32</sup> See <https://www.imf.org/en/Blogs/Articles/2023/03/28/volatile-commodity-prices-reduce-growth-and-amplify-swings-in-inflation>.

<sup>33</sup> Katusiime L, 2019, Investigating spillover effects between foreign exchange rate volatility and commodity price volatility in Uganda, *Economies*, 7(1).

30. Volatility in commodity terms-of-trade growth can be associated with increased volatility in the prices of imported goods, leading to greater price volatility in the domestic market. Fluctuations in commodity prices can directly impact production costs, the price of consumer goods and overall inflation. When commodity prices rise significantly, production costs also increase, leading to higher prices for goods and services. Net commodity-importing developing countries are particularly vulnerable to such price shocks. The International Monetary Fund estimates that a 1 per cent increase in international food prices is associated with a 0.3 per cent increase in domestic food prices.<sup>34</sup> On the other hand, a sharp fall in commodity prices can also impact inflation. Revenues in developing countries that are net exporters of raw materials fall, which can lead to an economic contraction and the depreciation of exchange rates, resulting in higher prices.

31. Commodity price volatility can significantly impact food imports, putting food security at risk. The war in Ukraine has led to a rise in the price of wheat, given that the Russian Federation and Ukraine accounted for 34 per cent of the global wheat trade before 2022.<sup>35</sup> As a result, food import bills in developing countries have risen. For example, in 2022, to import the same quantity of wheat as in 2020, Egypt would have had to pay \$3 billion more, representing a 20 per cent increase in the cost of food imports.<sup>36</sup> Such cost increases can make it difficult for low-income populations, particularly in food import-dependent developing countries, to access adequate food. These countries may be forced to reduce imports, seek cheaper alternatives or adapt to changing supply conditions, which can affect the stability of the food supply chain and jeopardize the availability of essential commodities for populations. At present, given the crisis due to the war in Ukraine, the number of undernourished people is expected to increase by 8 million to 13 million in 2022–2023.<sup>37</sup> These figures are in addition to the 720 million–811 million people already facing hunger in 2020.<sup>38</sup>

32. Sudden drops in commodity prices may cause debt distress in highly indebted commodity-dependent developing countries, including many of the least developed countries. When commodity prices decline sharply, this directly impacts export earnings in these countries, significantly reducing revenue streams and, as a result, compromising the ability to generate sufficient revenues to meet debt obligations. Falling commodity prices also reduce foreign exchange reserves, making it more difficult to service external debt. In addition, due to falling revenues, these countries must borrow more to refinance existing debt, which can lead to unsustainable debt levels.

33. When commodity prices rise, Governments may take on more debt to finance infrastructure projects, social programmes or other development initiatives, in the expectation that commodity-related revenues will remain high. This contributes to a significant increase in debt, which risks becoming unsustainable if commodity prices fall. Debt distress may lead to reduced access to international financial markets, decreased investment and reduced government spending in critical areas such as health and education. For example, in the 1980s, many developing countries experienced debt distress following a decline in commodity prices, which led to a sharp increase in debt-to-GDP ratios.<sup>39</sup> This debt crisis led to a lost decade of economic growth and development in many low-income countries. In 2014–2016, the fall in oil prices led to an increase in the public debt of several oil-exporting countries, including Nigeria and the Bolivarian Republic of Venezuela.<sup>40</sup> At present, the pandemic, the cost-of-living crisis and the rise in global interest rates have placed developing countries in a complicated debt situation.<sup>41</sup> The pandemic increased the debt burden of developing countries by reducing incomes and increasing spending on health and social protection. At the same time, the cost-of-living crisis has eroded the purchasing power of households and increased poverty and vulnerability. In addition, rising global interest rates have made debt servicing and access to new financing more difficult. For example, according to Standard and Poor's sovereign

<sup>34</sup> See <https://www.imf.org/external/np/g20/032823.htm>.

<sup>35</sup> See <https://www.ifpri.org/blog/russia-ukraine-wars-impact-global-food-markets-historical-perspective>.

<sup>36</sup> UNCTAD, 2022.

<sup>37</sup> See <https://www.fao.org/3/cb9236en/cb9236en.pdf>.

<sup>38</sup> See <https://www.fao.org/state-of-food-security-nutrition/2021/en/>.

<sup>39</sup> Fischer S, 1988, Economic development and the debt crisis, Policy Research Working Paper Series 17, World Bank.

<sup>40</sup> World Bank, 2018.

<sup>41</sup> See <https://unctad.org/news/blog-world-lacks-effective-global-system-deal-debt>.

risk indicators estimates, in 2023, some commodity-dependent developing countries have faced high levels of sovereign risk and debt distress, such as Ghana and Zambia.<sup>42</sup>

34. Sudden increases in commodity prices can also impact the risk of social unrest since, when the prices of essential commodities such as food and fuel fluctuate suddenly or drastically, existing social and economic inequalities may be exacerbated. Food accounts for 43 per cent of total household expenditure in low-income countries, compared with 8 per cent in high-income countries.<sup>43</sup> Rapid rises in food prices can therefore lead to increased poverty levels, food insecurity and inequality in low-income countries. Lack of access to affordable food and other basic commodities can fuel public discontent, protests and civil unrest. For example, rising food prices in 2007–2008 contributed to political tensions in the Middle East and North Africa that led to the Arab Spring.<sup>44</sup>

35. Uncertainty is also a burden for commodity producers, particularly small farmers, as it makes investments riskier, reducing the ability to benefit from higher prices and increasing exposure to hardship in the event of declining-price shocks. Such effects can be exacerbated by underdeveloped financial markets, which limit access by farmers to credit and insurance. Farmers exposed to uninsured risks often apply coping strategies that can damage assets, well-being and future income in the event of a shock, such as selling productive assets, reducing food consumption and neglecting soil and conservation practices.<sup>45</sup> This can trap farmers in a cycle of poverty and vulnerability, making it difficult for them to invest in farms or diversify sources of income. For example, in Togo, the fall in cotton prices following the pandemic has had significant negative impacts on producers.<sup>46</sup>

## D. How to manage the risks associated with commodity price volatility

### 1. Short-term actions

36. Market-based instruments, such as options, futures and forward and swap contracts, can play a crucial role in helping commodity-dependent developing countries manage the risks associated with commodity price volatility, as follows:

(a) Options are an effective way of managing commodity price risk. An option gives the holder the right, but not the obligation, to buy (call) or sell (put) a given quantity of a commodity at a predetermined price (strike price) within a given period. By using options, market participants can hedge against adverse price movements while benefiting from favourable market conditions;

(b) Futures contracts are legal agreements to buy or sell a commodity, asset or security at a predetermined price and specified date in the future. They are traded on a futures exchange and standardized for quality and quantity. Such contracts allow producers and buyers to lock in commodity prices, reducing the uncertainty and volatility associated with spot market prices. By providing a predictable price environment, futures markets can help producers manage risks and make more informed investment decisions;

(c) Forward contracts are customizable derivative contracts between two parties to buy or sell an asset at a predetermined price and specified date in the future. They do not trade on a centralized exchange and are considered an over-the-counter instrument. Using forward contracts allows market participants to hedge exposure to price volatility, providing greater stability and predictability in operations;

(d) Swap contracts allow two parties to exchange cash flows based on the price movements of a particular commodity, enabling them to effectively manage the associated risks. Such contracts provide flexibility and allow market participants to tailor risk management strategies to particular needs.

37. In commodity-dependent developing countries, options can help manage price risk by allowing prices for exports to be locked in, thereby reducing exposure to price fluctuations.

<sup>42</sup> See <https://disclosure.spglobal.com/sri>.

<sup>43</sup> See [https://www.oecd-ilibrary.org/agriculture-and-food/food-as-a-share-of-household-expenditures-by-income-group\\_a92626ac-en](https://www.oecd-ilibrary.org/agriculture-and-food/food-as-a-share-of-household-expenditures-by-income-group_a92626ac-en).

<sup>44</sup> See <http://arxiv.org/abs/1108.2455>.

<sup>45</sup> See <https://www.ipcc.ch/srccl/chapter/chapter-5/>.

<sup>46</sup> See <https://unctad.org/fr/publication/etude-de-faisabilite-pour-le-developpement-des-coproduits-du-coton-au-togo>.

For example, Mexico, to protect public finances from unexpected declines in oil prices, purchased put options, a programme that cost 0.1 per cent of annual GDP in 2001–2017 and proved beneficial in 2009, 2015 and 2016, when there were significant declines in oil prices.<sup>47</sup> In Uruguay, in 2016, the World Bank assisted in dealing with oil price volatility by partnering with the national oil company to develop a hedging programme that covered about half of the total annual oil imports for 12 months and reduced the impact of rising oil prices on the budget and economy.<sup>48</sup>

38. Commodity exchanges are markets designed for trading contracts that allow the purchase of a fixed quantity of commodities for delivery in future. In doing so, traders can reduce the risk levels of commodity price changes. Commodity exchanges are thus considered a tool for managing price volatility. Several commodity-dependent developing countries have implemented commodity exchanges, including Ethiopia and Nigeria. In this type of market, commodity trading companies are key players, using a variety of trading strategies to take advantage of periods of high commodity volatility to boost profits.<sup>49</sup>

39. Commodity-linked bonds are another valuable tool with which to help commodity-dependent developing countries manage commodity price volatility. The bonds are structured so that returns or payments are linked to fluctuations in the prices of certain commodities. By issuing commodity-linked bonds, countries can effectively protect against the risks of commodity price volatility. Such bonds can help increase capital flows and access to international financial markets for commodity-dependent developing countries. By integrating commodity-linked bonds into debt management strategies, developing countries can improve the ability to deal with price fluctuations, reduce fiscal vulnerabilities and promote long-term economic stability and sustainable development. However, the success of commodity-linked bonds relies on sound risk management practices, accurate commodity price indexation methodologies and transparent governance frameworks, to ensure effectiveness in managing volatility.

40. Information and communications technology (ICT) can be a useful tool in commodity-dependent developing countries with which to manage risks associated with commodity price volatility. By helping to improve market transparency and providing timely and accurate information, the use of ICT can help reduce information asymmetries and promote greater market efficiency. For example, online commodity information and trading platforms such as the Agricultural Market Information System can provide producers and buyers with real-time information on prices, market trends and supply and demand conditions, which can help reduce uncertainty and promote greater market access for small and medium-sized producers that may not have access to traditional trading channels. In addition to online information and trading platforms, ICT can also be used to improve supply chain management and reduce transaction costs. By automating processes such as inventory management and payment systems, the use of ICT can help streamline operations and reduce inefficiencies. By leveraging ICT, commodity-dependent developing countries can enhance competitiveness and reduce vulnerability to external shocks.

41. Multilateral efforts and commitments to keep trade open can help mitigate the volatility of commodity markets in times of high uncertainty, such as geopolitical crises. The Black Sea Grain Initiative, signed by the Russian Federation, Türkiye and Ukraine, with the support of the United Nations, to allow the safe export of grains, fertilisers and other foodstuffs from Black Sea ports, is a concrete example of the role multilateralism can play in reducing commodity price volatility.<sup>50</sup> By 11 May 2023, the initiative had enabled the export of over 30 million tons of cereals, of which 50 per cent was maize and 28 per cent was wheat.<sup>51</sup> The initiative helped decrease food prices and stabilize markets and keep them open.

<sup>47</sup> See <https://www.imf.org/external/np/blog/dialogo/032618.pdf>.

<sup>48</sup> See <https://www.worldbank.org/en/news/press-release/2016/06/15/uruguay-se-asocia-con-banco-mundial-para-reducir-su-exposicion-a-volatilidad-del-precio-del-petroleo>.

<sup>49</sup> See <https://www.publiceye.ch/en/topics/soft-commodity-trading/war-and-crises-and-commodity-traders-are-making-record-profits>.

<sup>50</sup> See <https://unctad.org/publication/trade-hope-impact-black-sea-grain-initiative>.

<sup>51</sup> See <https://news.un.org/en/story/2023/05/1136587>.

## 2. *Medium to long-term instruments for resilience*

42. Overall, diversification is an important strategy in commodity-dependent developing countries, to reduce the risk of the negative effects of commodity price volatility and promote long-term economic growth and development. In addition, export diversification often requires developing new industries and sectors, expanding a country's productive capacity and creating new job opportunities, which in turn can help promote long-term economic growth and development. For example, with regard to critical minerals-exporting commodity-dependent developing countries, adding value on site could catalyse economic diversification. In the early stages of the value chain, diversification can take the form of the adoption of different extraction methods and mining technologies. As countries move into the processing of minerals, there may be spillovers through the development of industries related to chemical processing and material sciences, leading to a broader industrial base. The manufacturing stage presents opportunities for diversification into various subsectors linked with domestic or regional value chains. For example, the Democratic Republic of the Congo and Zambia have signed a cooperation agreement to jointly develop a battery industry.<sup>52</sup> If the activities in an economy are expanded, volatility with regard to one export has a limited effect on export revenues. Diversification can also help net commodity-importing developing countries manage risks associated with commodity price volatility. In this context, diversification includes both the expansion of domestic production, that is, the reduction of import dependence, and the diversification of import sources. For example, investing in renewable energy infrastructure can reduce a country's dependence on imported oil and gas, while investing in domestic agriculture can reduce dependence on imported food.

43. Sovereign wealth funds are valuable in addressing the risk of commodity price volatility in developing countries.<sup>53</sup> Precautionary saving, such as through the establishment of commodity funds, can help commodity-dependent developing countries manage the risks associated with commodity price volatility and implement a countercyclical rather than a procyclical fiscal policy. Commodity funds accumulate revenue generated from commodity exports during periods of high prices and offset revenue shortfalls during periods of low prices, thereby providing a cushion against fluctuations in commodity prices and helping countries maintain fiscal stability and avoid procyclical policies that could exacerbate economic downturns. These commodity-financed funds can be divided into two main categories, with different objectives, namely, stabilization funds, which aim to stabilize public spending in the event of economic shocks, and savings funds, which aim to accumulate wealth and transfer it to the future.<sup>54</sup>

44. Stabilization funds are created to cope with economic fluctuations and the risks associated with volatile revenues from natural resources, particularly commodities. Budget surpluses or commodity export revenues generally finance such funds. Their purpose is to stabilize the national economy in times of crisis by offsetting variations in income and protecting a country against external shocks. Stabilization funds can finance budgetary expenditures and strategic investments or build up financial reserves. For example, in Botswana, the Pula Fund enables the Government to implement countercyclical economic policies using revenues from the diamond sector and, in Chile, the Economic and Social Stabilization Fund, based on copper revenues, operates with a structural equilibrium rule that protects the budget from fluctuations in copper prices while imposing restrictions on withdrawals from the fund.<sup>55</sup>

45. Savings funds are created to manage the long-term financial surpluses from natural resources, mainly commodities. Their purpose is to diversify a country's income and create a sustainable source of wealth for future generations. Savings funds invest in assets such as equities, bonds, property and infrastructure, to maximize long-term returns. They can also support a country's economic development by investing in strategic projects and promoting innovation and growth and can also help promote greater transparency and accountability in managing commodity revenues. By establishing clear rules and guidelines for using funds,

<sup>52</sup> See <https://uneca.org/stories/zambia-and-drc-sign-cooperation-agreement-to-manufacture-electric-batteries>.

<sup>53</sup> Mohaddes K and Raissi M, 2017, Do sovereign wealth funds dampen the negative effects of commodity price volatility? *Journal of Commodity Markets*, 8:18–27.

<sup>54</sup> See <https://www.ifswf.org/santiago-principles-landing/santiago-principles>.

<sup>55</sup> See <https://namibia.un.org/sites/default/files/2020-09/Africa%20%80%99s%20Sovereign%20Wealth%20Funds%20are%20a%20Source%20of%20Development%20Finance%20.pdf> and TD/B/C.I/MEM.2/46.

countries can ensure that these resources are used to promote long-term development and reduce dependence on commodity exports. For example, in Saudi Arabia, the Public Investment Fund, which is the sixth largest sovereign wealth fund in the world, with nearly \$777 billion under management at mid-2023, aims to support the diversification of the national economy and the development of strategic sectors, to move away from dependence on fossil fuels in the context of Vision 2030.<sup>56</sup>

46. Climate change is likely to result in negative impacts on crop yields.<sup>57</sup> This will affect agricultural market volatility, and climate change adaptation is therefore an important risk management tool. In this context, it is important for commodity-dependent developing countries and net commodity-importing developing countries to be able to count on support from development partners, to ensure that financing and technical capacity needs for climate change adaptation are fully met.

## II. Summary and policy considerations

47. Commodity price volatility is a recurrent issue that has a significant impact on commodity-dependent developing countries and net commodity-importing developing countries. There are multiple channels through which this volatility affects these countries, causing uncertainty that leads to lower levels of investment and to macroeconomic instability. Direct effects on poverty, food security and energy security emphasize how this volatility can impede progress in achieving the Sustainable Development Goals.

48. The historical context of commodity price volatility, as well as the unprecedented spikes caused by the pandemic and the war in Ukraine, underscore the susceptibility of commodity prices to global events. In addition, climate change is projected to exacerbate commodity price volatility, adding another layer of complexity to the issue. The link between commodity prices and global economic activity also suggests that increased global growth volatility could further amplify commodity price fluctuations.

49. Policy responses to mitigate the adverse effects of commodity price volatility in commodity-dependent developing countries and net commodity-importing developing countries could consider the following areas:

(a) Immediate and short-term responses. Such responses include improving market transparency and providing timely information through ICT, using market-based instruments such as futures, options and commodity swaps to manage commodity price risks. Multilateral efforts and commitments to keep trade open are also critical, and can help mitigate the volatility of commodity markets in times of high uncertainty, such as during geopolitical crises;

(b) Long-term resilience. A key strategy is economic diversification, which can protect commodity-dependent developing countries from overreliance on a single or a small group of commodities, thereby reducing vulnerability to shocks. In the case of critical minerals, commodity-dependent developing countries should add value on site, to diversify economies beyond the mere extraction of raw materials. Net food-importing countries can reduce dependence on commodity imports by expanding domestic production and diversifying import sources. Other instruments with which to increase resilience in the long term are sovereign wealth funds that provide a financial buffer against commodity price volatility; accurate and timely information about market conditions; and commodity exchanges that promote price discovery and market transparency;

(c) Global cooperation and coordination. Commodity prices are influenced by global economic activity; therefore, international cooperation and coordination are crucial in managing volatility. This could involve greater policy coordination, improved information-sharing and joint initiatives to stabilize commodity markets.

<sup>56</sup> See <https://www.swfinstitute.org/fund-rankings/sovereign-wealth-fund> and <https://www.vision2030.gov.sa/v2030/overview/>.

<sup>57</sup> See <https://www.ipcc.ch/report/ar5/syr/>.