Energy Price Implications for Food Security in Developing Countries

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Concerns over recent oil price hikes are not new. They echo the concerns over the price shocks of 1974 and 1979. Chief among these concerns regarding low-income countries is the financial burden that the higher energy import bill will place on low-income countries and the constraints that might ensue in importing necessities like food and raw materials. The current economic climate is different, however, from the climate of the past in that current conditions could limit the food security vulnerability of the low-income countries. According to a World Bank report *(Global Development and Finance Report,* 2006*)*, the rise in oil prices since 2002 has had little impact on the global economy because of its minimal impact on inflation especially in the higher income countries where interest rates are determined. In addition, the reform policies adopted by many developing countries since the 1980s have facilitated adjustments in relative prices to contain inflationary pressures of the oil price shocks.

For some of the lower income countries, growth in the global economy led to increased prices for their key export commodities, such as metals and some agricultural commodities, thus improving their ability to finance higher oil bills. According to an International Monetary Fund (IMF) report (*Regional Economic Outlook Report: Sub-Saharan Africa,* 2006), 13 of 33 Sub-Saharan African countries gained from these commodity price booms during 2002-05; the remaining 20 countries lost in terms of trade that averaged 1.7 percent of gross domestic product (GDP). During the same period, terms of trade deteriorated by 4 percent in Central America despite the Latin American region's improvement in terms of trade (*Regional Economic Outlook Report: Western Hemisphere,* 2006). Deteriorating terms of trade means that a smaller quantity of imports can be purchased for a given quantity of exports, thereby essentially reducing the import purchasing power of domestic earnings.

The changes in import capacity have direct implications on food security of low-income countries. The baseline food security assessment of 70 lower income countries (see app. table 2 for the list of countries) projects a slight increase in food availability during the next decade mainly because of expected improvements in food security in Asia. This increase in availability is projected to lead to a 5-percent drop in the number of hungry people. The projections of food availability have two main components: domestic production and food imports. In the low-income countries, food import dependency has grown over time because of a combination of demand growth stemming from income and population growth and slow domestic production growth. For the highly import-dependent countries as well as those that are highly food insecure, any decline in import capacity and food imports can have challenging food security implications.

In the following sections, we review the magnitude of the oil and food price hikes and examine their implications for import budgets of lower income countries (70 countries). We also discuss future market uncertainties, examine domestic energy policy options, and review safety net options available to low-income countries.

Energy Price Increase Impact on Income and Imports

Energy is a key input for a growing economy and limited access to and use of energy tends to dampen economic growth, a critical factor behind food insecurity. According to IMF estimates (*World Outlook Report*, 2006), GDP losses relative to their baseline level following a sustained $25-per-barrel oil price increase (from 2003 to 2005) were about 0.8 percent in Asia, but only 0.2 percent in Latin America because of its lower dependence on oil imports. The impact on the economies of lower income countries in general was 1.6 percent. The greatest estimated impact was for Sub-Saharan Africa, more than 3 percent. The reason for this relatively large impact can be attributed to the high value of the region's fuel imports relative to GDP, 14 percent, which is much higher than the other regions' shares.

The increases in fuel prices put pressure on the financial situation of importing countries. For example, from 2002 to 2004 when the oil price jumped from $25 to $37 per barrel, Nicaragua's energy import bill rose by $186 million. This amount was about 50 percent higher than its earnings from exports of coffee—its number one export crop—for the year. During the same period, Kenya's energy import bill increased by $564 million, about equal to the total value received from tea and coffee exports, the country's top two export earners. In the same period, Togo's energy import bill rose by $152 million, equivalent to about 2.6 times the value of its cotton exports for that year.

One concern about increasing oil import costs in lower income countries is related to the potential impacts on other imports, including essential items like food. The of oil import share of total imports varies by country, but in some low-income countries, such as Ghana, Pakistan, and Madagascar, it exceeded 20 percent in 2004. If the price of energy imports rises and countries are faced with import budget constraints, imports of other goods, such as food or essential raw materials, are likely to fall. In Kenya, for example, as the share of oil imports rose between 2002 and 2004, food import shares declined. The 2004 drought led to a 20-percent decline in domestic grain production, but commercial food imports did not increase, leading to a 6-percent decline in per capita consumption. This decline is critical in that grains contribute to more than 50 percent of daily per capita calorie intake in Kenya, a country that barely meets the minimum nutritional requirement of 2,100 calories per capita per day.

For countries that maintain food and oil imports, there is a concern over forgoing imports of essential inputs that are crucial for their economic growth. In Tanzania, for example, the food and oil share of total imports increased 6 percentage points from 2002 to 2004. As a result, in 2004, Tanzania spent more than half of its export earnings on those two import groups. Tanzania is faced with a high trade deficit and relies heavily on external assistance for financial

support. Tanzania is among the lowest income countries in the world with average per capita income at about $300 (in constant U.S. dollars) in 2002-04 and per capita daily calorie consumption of close to the nutritional requirement (2,131). When consumption disparity due to unequal income distribution is taken into account, almost 60 percent of people consume less than the nutritional requirement (2,100 calories per day).

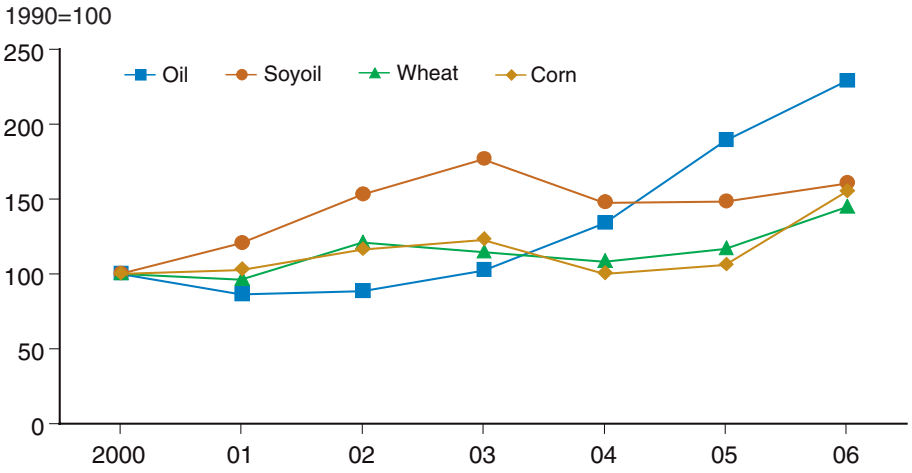
Food and Oil Price Shocks

The higher oil prices have sparked global energy security concerns. This concern, along with growing interest in the environmental benefits associated with the use of renewable energy relative to oil have resulted in wide-ranging government policies promoting biofuel production. The use of food crops for producing biofuels, the subsequent substitution among food crops to higher priced commodities, and the food demand growth fueled by high-income growth in the most populous countries, China and India, has altered the path of declining price trends for several commodities (fig. A-1). According to a Food and Agriculture Organization (FAO) report (*Food Outlook: Global Market Analysis,* 2006), ethanol production derived from starch and sugar increased by 53 percent between 2000 and 2005. For 2006, a preliminary FAO estimate (FAO Newsroom, 10/2006) indicated that the food import bill at the global level had increased by more than 2 percent over 2005 levels. For the developing countries, the import bill is estimated to have grown even more, 3.5 percent; for the low-income countries, this increase was even more dramatic, 7 percent.

During 2002-06, corn prices increased by 50 percent; wheat, 45 percent; and soybean oil, 60 percent. These commodities constitute a large share of the diets in low-income countries, and therefore, rising prices and their subsequent inflationary effects are likely to further constrain consumers' budgets (fig. A-2). In low-income Asian countries, cereals account for 63 percent of the diet, on average. In North African and Commonwealth of Independent States (CIS) countries, cereals contribute to about 60 percent of diets. In Sub-

Figure A-1

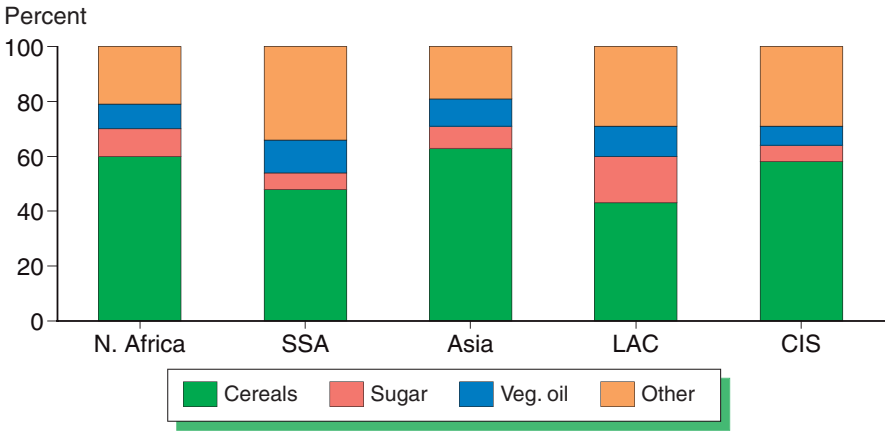
Price indices



Source: USDA baseline.

Figure A-2

Diet shares of low-income countries by region



Note: SSA = Sub-Saharan Africa; LAC = Latin America and the Caribbean; CIS = Commonwealth of Independent States.

Source: USDA, Economic Research Service, using data from FAOSTAT.

Saharan Africa, the most vulnerable region to food insecurity, cereals account for nearly half of the calories consumed. In lower income Latin America, the share of cereals in the diet is the lowest, 43 percent. In all regions, the situation varies by country; for example, in Bangladesh, the share is even higher, 80 percent, and in, Eritrea and Ethiopia, both among the most food-insecure countries in the world, the share is around 70 percent.

For the highly import-dependent countries, the higher prices are an issue in terms of the larger import bill, particularly for those countries with limited foreign exchange availability and high vulnerability to food insecurity. The ranking of the 70 low-income countries by grain import dependency and daily calorie consumption identifies countries that are highly sensitive to increases in grain prices. Table 1 shows that six countries (Eritrea, Liberia, Haiti, Georgia, Burundi, and Zimbabwe) depend on grain imports for more than 40 percent of their consumption and also have very low levels of food consumption (less than 2,200 calories per day, on average). Eritrea, for example, is highly dependent on food imports: 87 percent of grains, 51 percent of vegetable oils, and 100 percent of sugar. In terms of foreign exchange availability, however, Eritrea's export earnings cover only 25 percent of its import bill as the remainder is filled by external assistance. Eritrea's food insecurity is deep: Daily calorie availability of 1,465 in 2005 was among the lowest consumption levels in the world. Therefore, higher prices and the possibility of a cut in imports could result in a food crisis in the country.

Note that not all countries are equally affected by the higher food prices. In fact, some countries that are highly import dependent and, therefore, are paying higher food import bills, but they are able to adjust without significant food security implications. One example in this group is Egypt. The country is highly dependent on food imports, with food accounting for 25 percent of total imports in 2002-04. While the increase in food import prices puts pressure on Egyptian consumer budgets, the country has a balance of payments surplus (5 percent of GDP in 2004) and, therefore is able to maintain imports and keep food supplies stable. In addition, because of Egypt's high daily caloric intake, 3,330 in 2005, some decline in food

Table A-1
Import dependency

	Cereal import dependency	Calorie intake
Eritrea	0.87	1,465
Liberia	0.71	1,942
Haiti	0.69	1,944
Georgia	0.52	1,797
Burundi	0.46	1,693
Zimbabwe	0.46	1,869

Source: USDA, Economic Research Service, using data from FAOSTAT.

consumption does not result in pervasive hunger or deterioration in the food security situation of the country.

Another set of low-income countries vulnerable to food import price increases are those that have low commercial import dependency simply because they cannot afford to import. Countries such as Ethiopia, Sierra Leone, Malawi, and Niger fall in this group. These countries rely heavily on food aid to augment their food supplies. The United States, the major donor of food aid, sets a budget for food aid allocations and therefore when prices rise, quantities fall. For these countries, a reduction in food aid is as or more important than changes in food import prices.

Uncertainty in Outlook

The growing interest in production of biofuels along with increased investment in new technology to efficiently convert agricultural products into energy provides opportunities and challenges for the lower income countries. In most of these countries population and income growth increase demand for energy and food, and the challenge is how to allocate limited resources (capital, land, and labor) among the two competing needs. However, the benefit from the higher prices is that countries can expand their own production of food. Because many factors are unresolved in this area, the following section discusses the uncertainty in future price trends, examines domestic energy policy options, and reviews safety net options available to low-income countries.

Expected Price Trends

Volatility in oil prices is not a new phenomenon. The first significant spike in oil prices, between 1973 and 1974, followed the Arab oil embargo when prices jumped from about $3 per barrel to $12. The next big increase was spurred by the Iranian revolution and prices increased threefold between 1978 and 1979. From that point, prices held fairly steady until 1986 when they fell to $14 per barrel with moderate fluctuation through the remainder of the 1980s and 1990s. In 2000, as political tensions in the Middle East rose, fuel prices soared to more than $28 per barrel. Price growth has been quite strong since the 2003 U.S.-led invasion of Iraq, with prices rising to nearly $38 in 2004 and exceeding $53 per barrel in 2005. In 2006, prices were volatile, reaching a record nominal level of $73 in July, but declining afterward.

The future impacts of oil prices first depend on their trend. Based on USDA baseline projections (USDA, 2007), oil prices are expected to drop modestly (less than the global inflation rate) between 2007 and 2011. However, after 2011, prices are expected to slightly outpace the general inflation rate. This longer term price increase is due to the expected strong demand in highly energy-dependent economies in Asia. Factors expected to constrain longer term oil price increases include oil discoveries, increasing energy efficiency, and continued expansion in renewable energy sources including biofuels. The growth in production of biofuels, so far, has largely been policy driven, and how governments will meet their commitments to increase biofuel output is not clear. According to the *World Ethanol and Bio-fuels Report*, ethanol production (all types) increased by 49 percent between 2002 and 2006, with the majority of the production concentrated in about 10 countries. The United States is the world market leader, followed by Brazil (F.O.Lichts, 2003).

The *USDA Agricultural Projections to 2016* report argues that, during the next 3-4 years, the rapid expansion in global production of biofuels will change the price relationships among agricultural commodities (USDA, 2007). Increased demand for corn (ethanol) relative to prices of other grains and soybeans (biodiesel) will influence prices of other grain and vegetable oil crops because of crop area substitution and/or their feed value. Based on USDA's projections, grain prices (weighted average based on import composition of developing countries) will increase in 2007 but decline steadily in the following years, retaining less than one-third of the price spike of 2006-07 by 2016.

IMF estimates indicate that most of the expected impact of higher oil and food prices in 2006 on food security was offset by favorable weather leading to record or good crops, and higher commodity prices leading to increases in export earnings of the countries (*World Outlook Report,* 2006). The prices of primary commodities, including agricultural products that are the key sources of foreign exchange earnings for some low-income developing countries, increased at the same or higher rates than oil and food prices. Increases in prices of copper and aluminum stemming from economic growth in emerging markets brought significant financial gains to some of the poorest countries, such as Zambia, Tajikistan, Guinea, and Mozambique. According to the IMF report, the rise in metal prices was due to construction growth in China, which accounted for 50 percent of the growth in consumption for copper and aluminum metals.

Strong demand growth for labor in industrial countries and emerging markets also reduced the impact of food and fuel import price increases in several countries. In Central America, remittances grew to the point where they accounted for about 10-20 percent of GDP in 2005, providing support for growth in consumption. Asia is the largest recipient of remittances, accounting for 45 percent of the world total; they contributed to about 10 percent of GDP in the Philippines and Nepal (*IMF, Regional Economic Outlook: Asia and Pacific,* 2006). Sri Lanka benefited from the economic boom in oil exporting countries because more than 80 percent of its migrant workers were working in the oil-exporting Gulf States.

A question of interest to these countries is whether non-oil prices will continue to grow in the medium term, preventing a decline in the terms of trade of low-income countries. The IMF's *2006 World Outlook Report* argues

that the future price path depends on demand for industrial products in emerging markets and the speed and cost of bringing additional supplies onto the market. The report, however, projects that prices of metals will decline because the reserves of metals are unlimited and unlike oil, the metal market structure is competitive. As for agricultural raw materials, because demand for these commodities is income inelastic, price growth is influenced little by global demand growth. Therefore, their price trend is less predictable because of weather-related price shocks that will continue to create annual price volatility. Increase in input prices, particularly fertilizer, and ensuing higher production costs may not have much impact on production because of expected technological progress. Cotton is a clear example of this situation, where, despite the growth in cotton demand, international prices declined by more than 20 percent between 2003 and 2005 because of the adoption of new cotton varieties by producers.

Overall, the long-term food security impact of commodity price trends is difficult to generalize because of the differences in commodity composition and price prospects of exports and imports of the countries. In the longterm, as the following section discusses, high food prices could boost domestic production and improve food security because domestic production accounts for most of the food consumed in the lowest income countries. However, the net results depend on the magnitude of the supply response to the price increase and the supporting economic policies in the areas of technology adoption and other services to improve the functioning of markets.

Domestic Energy Policy Options

The increases in the prices of energy and food create opportunities and challenges for low-income developing countries. Currently, energy consumption in the low-income countries is very low compared with higher income countries, but access to adequate energy is essential for economic growth, which, in turn, facilitates food security. Per capita energy consumption (as measured by kilograms of use, oil equivalent) in high-income countries is 10 times that of low-income countries (World Bank, 2006). Average per capita income in the lower income countries is less than 5 percent of that of higher income countries and their per capita daily calorie consumption is less than half the level consumed by the high-income countries.

The energy price hike, despite its negative impact on the budget of importing countries, has created an opportunity for advancement in biofuel technology with the potential to fill the growing energy needs of the developing countries. Biofuels include traditional sources of energy, such as wood fuel, which accounts for about one-third of all energy consumed in developing countries. These fuel sources are inefficiently used, however. For example, a kilogram of wood generates only about one-tenth of the heat of a kilogram of liquid petroleum gas. However, the newer sources of biofuels, such as ethanol, are more competitive with petroleum in terms of efficiency and under the assumption of continued oil price growth. This efficiency means that, with the growing investment in new technology, the production of biofuels in low-income countries can provide multiple benefits: increasing the supply of energy by converting crop residues, producing energy crops for ethanol, and increasing farm incomes and rural employment where poverty is deep.

Energy crops also can grow in marginal and degraded lands where the use of wood fuels has contributed to deforestation, soil erosion, and reduced soil fertility in many parts of the world, particularly in Africa (Hazel, 2006). Deforestation and soil erosion, in turn, reduce potential crop yields, thereby increasing vulnerability to food insecurity.

The success of this outlook depends on increasing investment in the development of new technology that is consistent with the structure of the agricultural sectors of low-income countries. However, in low-income countries, financial capacity for investment is limited and increasing investment in producing biofuel energy could compete with food production, thereby intensifying food insecurity vulnerability. To minimize such substitution, policies to promote small-scale investment to enhance agricultural productivity, along with complementary policies to improve the functioning of markets, as well as access to credit, extension, and other services, are essential.

Overall, satisfying the growing energy demand that stems from expanding populations and incomes remains a major concern even without any future oil price pressure. In low-income countries, bioenergy, such as burning wood and dung, will continue to be the principal source of energy, which, in turn, makes increasing bioenergy production and improving the efficiency of the use of resources a high priority.

Safety Net Options

Low-income countries generally do not have domestic safety net programs to deal with economic shocks and often rely on external assistance for support. For oil-importing developing countries, the $137 billion increase in the energy import bill in 2005 far exceeded the $84 billion of official development assistance (World Bank, 2006). Looking ahead, lower income countries may not have much adjustment capacity to absorb a reduction in oil imports without some negative impact on their growth (IMF, *World Outlook Report*, 2007). So far the responses of low-income countries to the oil price hike have not been uniform. Countries such as Madagascar, Malawi, and Sierra Leone have been forced to ration electricity consumption to conserve energy and reduce oil imports. Swaziland and Namibia have drawn down their cash reserves to levels that would cover about 2 months of imports, which is unsustainably low, according to the World Bank. Overall, for most countries, alternatives to oil are limited because of the high production costs associated with most modern, non-oil energy sources. Such options as wind, hydropower, and solar-powered systems are highly capital intensive and require ongoing maintenance.

Food aid plays a critical role in reducing the impact of financial constraints and declines in food availability in low-income countries. However, the global quantity of food aid has fluctuated during the last two decades, and its share has declined relative to both total agricultural exports from food aid suppliers and total food imports of low-income countries. During 1990-2005, food aid received by the 70 low-income countries declined by 2 percent annually. The average quantity of grain food aid received by countries during 2002-05 was about 6.5 million tons. Nongrain aid accounted for about 20 percent of the total food aid, or about 1.2 million tons in grain equivalent.

In 2002-05, the food aid share of total grain imports for the 70 countries was about 9 percent. The highest share was in Sub-Saharan Africa at 17 percent, followed by lower income Asian countries at 10 percent, CIS at 6 percent, and low-income Latin American countries at 3 percent.

Based on the USDA baseline price projections, costs of food aid will increase. In fact, to keep the quantity of food aid constant at the 2002-05 level until 2016, the food aid budget must increase by 9 percent. Under the scenario of a constant share of food aid in total imports of the 70 countries, food aid costs will be much higher, an increase of about 40 percent. However, if the quantity of food aid continues to decline at the historical rate of 2 percent per year, thereby falling by about 20 percent by 2016, the cost of food aid will be obviously lower at that point than it was in 2005. Such a cutback on food aid, in the absence of a careful targeting program, could have significant implications for food security of low-income countries. According to ERS (*Food Security Assessment*, 2005), the gap between recommended nutritional requirements and purchasing power of populations in the world's poorest countries was more than 25 million tons in 2005, about three times larger than the supply of food aid in 2005. Some countries are highly dependent on food aid and some are highly food insecure. In Sub-Saharan Africa, for example, 23 of the 37 countries, on average, consumed at or below minimum daily nutritional requirement in 2005. In such countries as Ethiopia, Eritrea, Afghanistan, and North Korea, food aid was equal to or more than double the level of commercial imports in countries during 2003-05.

In summary, food security of most low-income countries has thus far shown resilience in coping with the oil and food price shocks. Continuation of strong economic growth in the emerging and industrial countries could lead to further oil price increases that could intensify interest in increasing biofuel production. The resource-rich low-income countries with flexible economies can benefit from this scenario. For others, however, the ability to absorb these higher import prices is quite limited without any increase in external assistance. According to a World Bank report (*Prospects for the Global Economy*, 2006), many African countries are imposing blackouts to ration energy and some are depleting their cash reserve at alarming rates. The report argues that, in these countries, either growth will slow down gradually through tightening macroeconomic policies or it will happen abruptly as constraints continue to grow. For countries with high food insecurity at the outset, this scenario will lead to a bleak outcome.

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