

Commodity Prices, Biofuels and Development Strategies*

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Introduction

Biofuels have entered the agenda of economic development in poor developing countries. In 2008, the Food and Agriculture Organization (FAO) of the U.N. devoted its *State of Food and Agriculture Report* (SOFA) to biofuels (FAO, 2008). While noting some reservations, the general reception given to these new energy sources by FAO and developing countries has been positive, promising an engine of economic development, energy independence, and employment. In this respect, the advanced biofuels industries of Brazil, the European Union and the United States provide lessons for these developing economies.

Biofuels can affect the development strategies of poor countries in at least two ways: indirectly, through the transmission of effects of wealthier countries' biofuels policies to poor countries; and directly, through the implementation by poor countries of biofuels initiatives. It is our view that the indirect effects in recent years have been large, disruptive and mainly negative. The direct effects are still mainly hypothetical, requiring an analysis of how development strategies, based on experience in the U.S., Europe, or Brazil, will affect developing countries'

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initiatives, and the opportunities foregone if these initiatives consume land, labor and capital that might have been employed elsewhere.

Indirect Effects

Poor countries' development strategies can be affected indirectly by rich countries' biofuels policies with respect to commodity prices, marketing patterns and supplies of staples. In recent years these biofuels policies have increased volatility in prices of commodity staples such as grains and vegetable oils used to produce biofuels. They also appear to threaten food prices long term.

There has been some disagreement about the effects of rich countries' biofuels policies on commodity price volatility. As the FAO's "*State of Food and Agriculture 2008*" notes, "The degree to which biofuel demand has influenced recent food and commodity price trends is a matter of debate, with estimates ranging from 3 percent to 30 percent and higher" (p. 101). World Bank agricultural economist Don Mitchell attributed 70 percent of food price increases to biofuels and the related consequences of low grain stocks, large land use shifts, speculative activity and export bans (Mitchell, 2008).

What is undeniable is that global expenditures on imported foodstuffs in 2007-2008 rose by about 29 percent above the record of the previous year. The bulk of the increase was accounted for by rising prices of imported cereals and vegetable oils—commodity groups that figure heavily in biofuel production" (FAO, 2008a). In other words, the brunt of the price run-up—which continued well into 2008—was in commodities for which biofuel demand was a significant factor. In mid-2009, despite declines in price from the records of 2008, prices remain above trend. In early June, 2009 the *Financial Times* noted that "Almost unnoticed, agricultural commodities prices have returned to levels last seen at the start of the 2007-2008 food crisis,

prompting concerns about a fresh rise in food costs.” The International Grains Council forecast that global grain supplies would fall in 2009-10 by 3.4 percent, from 1782 metric tons in 2008-09 to 1721 in the year to follow (*Financial Times*, June 10, 2008).

What changes in the market for biofuels might be responsible for these price shifts? Over the last decade, U.S. biofuels policy changed dramatically. Passage of the Energy Independence and Security Act (EISA) in 2007 raised the overall ethanol mandate from 15 to 36 billion gallons by 2022. This increased the corn-based ethanol mandate from 7.5 to 13 billion gallons by 2012, which in turn drove the “ramp up” rate for increased ethanol use of corn from roughly 200 million bushels per year through 2005 to about 800 million bushels per year for 2005 through 2009. President Obama has proposed raising the mandate to 60 billion gallons by 2030 (Koplow, 2009, p. 6).

How will such mandates be met? The growth in U.S. trend yields for corn adds about 120 million bushels per year to production, on average. The increased mandate for 2012 pushed the ramp up rate to 6-7 times trend yield gains, forcing corn prices up to bid acres away from other crops and to divert corn from domestic feeding and exports to fuel uses. Corn prices increased more than threefold by mid-2008 to take about 1.3 billion bushels from traditional export or domestic feed uses in crop year 2008-09, even with the second largest corn crop ever. Ethanol’s share of the U.S. corn crop leapt from 10 percent in 2005 to 35 percent in 2009, an unprecedented realignment.

Future effects are less clear. EISA caps corn-based ethanol mandates at 15 billion gallons, with the additional 21 billion gallons of renewable fuel to be achieved by 2022 from “advanced” biofuels (4 billion gallons) and cellulosic sources (16 billion gallons). One billion gallons must be biomass-based diesel. Some of the raw materials for these alternatives,

however, may compete with food and feed uses of current U.S. cropland, such as soybeans for biodiesel. Moreover, nearly \$800 million of funds from the American Recovery and Reinvestment Act (the stimulus package) are earmarked for biofuels research. The structure of that funding and the continued presence of the 54-cent-per-gallon ethanol import fee strongly suggest that the biofuels market mandates are intended to benefit U.S.-sourced ethanol, not imports from developing countries.

This “national/local” sourcing requirement seems characteristic of most countries’ biofuels initiatives. For example, the Ukraine is proposing “a state-owned ethanol production company” (Reidy, 2009a, p. 18). Argentina passed a biofuels law in 2006 that explicitly contemplates three distinct markets: domestic, exports, and agricultural uses. In “the domestic market, the law created tax incentives including accelerated depreciation or accelerated reimbursement of VAT, and shareholder restrictions which included a guarantee that the Argentine government will buy 100 percent of production for 15 years.” On exports, “soy oil used in Argentina is exempt from [a 41 percent] export tax, so producers making biodiesel from soy oil pay one-fifth less for soy oil than international producers” (Reidy, 2009b, p. 32). Poor countries not only are excluded from serving this market but also face Argentine government-supported competition in third-country markets.

A similar pattern recurs in other countries. The Canadian national government, for example, “has committed to requiring 5 percent renewable content in gasoline and diesel fuel by 2010. Several provinces also have adopted mandates including British Columbia (5 percent in 2010), Alberta (2 percent in 2010), Saskatchewan (2.5 percent) and Manitoba (5 percent in 2009).... Most provinces have exemptions from provincial road taxes and/or producer incentives.” (Reidy, 2009b, p. 33). As an energy exporter, Canada is not creating these

incentives in biodiesel's version of "bringing coals to Newcastle" but simply to shower benefits on Canadian farmers.

Asian governments "are not giving much financial support for biodiesel consumption, but mandates are being adopted. The Philippines have [sic] required 2 percent usage since 2007; Thailand 5 percent since 2007; Taiwan 1 percent since 2008; Indonesia 2.5 percent since 2009; and Malaysia 5 percent since 2009" (Reidy, 2009b, p. 34). The Philippines and Thailand, interestingly, had price controls on rice in 2008 at the same time they were mandating biodiesel. Indonesia and Malaysia are the principal regional producers of biodiesel (from palm oil), and their recently imposed mandates are in part an attempt to cope with problems of idled capacity and concerns about their ability to meet sustainability criteria in the European biodiesel market, which also is currently suffering from overcapacity and depressed margins.

A similar pattern can be seen in ethanol. For example, Argentina approved four new policy initiatives in November 2008 to promote its own sugar-based ethanol production. Their approach establishes "a compulsory 5 percent ethanol mix for all gasoline by 2010," and implementing resolutions "to attract investments for ethanol, increasing Argentina's energy production and diversifying the country's energy mix" (Kroll, 2009, p. 40). Poor countries aiming to compete in the ethanol and biodiesel markets clearly face a playing field that is tilted against them.

The emergence of usage mandates rather than market demand as the driver of the biofuels industry also promises increased price volatility going forward. First, such mandates link corn and vegetable oil prices more directly to gasoline and diesel prices, which themselves are extremely volatile. Oil prices reached an inflation-adjusted high above \$80 per barrel in 1981 before falling to below \$30 per barrel in 1986; they climbed to nearly \$60 per barrel in 1991

before falling to less than \$20 per barrel in 1999; and in 2008 they rose above \$140 per barrel before plummeting to less than \$40 per barrel.

Second, this effect will be aggravated by the interaction of the mandate with local corn supplies. Mandates make ethanol and biodiesel largely unresponsive to shifts in corn and vegetable oil prices. In the case of the United States (the world's largest corn exporter), this takes more than one-third of U.S. corn utilization out of the normal interplay of supply and demand forces. Going forward, only two-thirds of U.S. corn usage can respond to cyclical swings in corn production, greatly amplifying the price movements needed to bring supply and demand back into balance. As other exporters commit more of their surplus output to biofuels, supply uncertainty and price volatility in world markets will be exacerbated.

This increased volatility and shifting of the burdens of adjustment onto global markets has particularly disturbing implications for the development prospects of countries with a high prevalence of undernourishment and heavy dependence on both imported oil and grain. There are some 22 countries, predominantly in Africa, "considered especially vulnerable owing to a combination of high levels of chronic hunger (above 30 percent undernourishment), high dependency on imports of petroleum products (100 percent in most countries) and, in many cases, high dependency on imports of major cereals (rice, wheat and maize) for domestic consumption" (FAO, p. 74). The structure of biofuels policies in developed countries has thus indirectly but dramatically worsened the development prospects of these poor countries.

Beyond the short-term effects of rich countries' biofuels policies on price volatility and supply uncertainty are the long-term implications for food insecurity. The FAO reports "that the projected growth in biofuel demand over the next decade is likely to push commodity prices 12-15 percent above the levels that would have prevailed in 2017 if biofuels were held at 2007

levels” (FAO, 2008, p. 101). An estimate by the International Food Policy Research Institute – IFPRI-- suggests that aggressive biofuels policies could push grain prices 20 to 40 percent higher by 2020 than they would otherwise be (Rosegrant, 2008).

Higher world prices do not always mean higher internal prices in poor countries, because many take measures—border restraints, price controls and the like—to dampen the transmission of global to local prices. These strategies, however, can do little to offset long-term price trends, exposing the poor, who may spend 50 percent or more of their incomes on food, to serious food security risks. This is certainly true of the urban poor, “but even in rural areas, where agriculture and staple food production is an important occupation for the majority of the poor, a vast share of the poor are net food buyers and thus stand to lose, or at least not gain, from an increase in the price of staple foods” (FAO, 2008, p. 75).

While most of the poor are made worse off by food prices driven up over time by artificial demand for biofuels, certain vulnerable groups are particularly exposed to hunger and malnutrition. Poorer farmers are likely to be hurt more than the better-off; those poor in urban areas suffer more than the middle classes; female-headed households suffer more than male-headed households; and landless laborers suffer more than landholders.

There are some potential offsets from higher staple prices. One is that increased incomes for larger and more prosperous farmers can bid up wage rates for unskilled workers. But that effect seems to be weakening. “Rashid (2002) found that rice prices in Bangladesh ceased to have a significant effect on agricultural wages after the mid-1970s. If higher rice prices no longer induce higher rural wages in Bangladesh, where agriculture represents a larger share of the economy and rice dominates the agriculture sector to a greater extent than in most other Asian countries, it seems unlikely that higher cereal prices will provide a significant stimulus to rural

labour markets in economies with a more diversified range of employment opportunities” (p. 78).

So, the upward pressure on staple food prices from developed countries’ biofuels policies also will have negative indirect effects on the development prospects of poor countries.

“Senauer and Sur estimated that a 20 percent increase in food prices in 2025 relative to a baseline will lead to an increase of 440 million in the number of undernourished people in the world (195 million of whom live in sub-Saharan Africa and 158 million in South and East Asia).” (2001, p. 79). Since falling real grain prices throughout the 20th century were the largest single factor in reducing hunger and malnutrition, it is not surprising that biofuels policies pushing grain prices up will cause us to surrender many of these gains.

Direct Effects

The direct effects of biofuels policies on the development prospects of poor countries center on whether biofuels will accelerate their development. Little of this has happened to date except in Brazil and Indonesia, which may be special cases. Both had large areas of undeveloped or underutilized land and desires to encourage their cultivation and settlement. Both were low-cost producers of sugar and palm oil, respectively, so that the economics of biofuels production did not rely on subsidizing the cost of feedstocks such as corn or soybeans.

Both also were large enough producers of sugar and oil palm that the price-enhancing effects of diverting sugar into ethanol and palm oil into biodiesel helped recoup some or all of any subsidy costs involved in setting up biofuel production. Brazil under a military dictatorship was able to compel creation of a domestic ethanol distribution system, and Indonesia (also with highly authoritarian rule) was able to move its biodiesel into a European Community market forced to grow by escalating usage targets. These were singular enough situations so that it

could be misleading to generalize from their experiences into a broad strategy for biofuels in development.

The result is to force the discussion into analysis, analogy and conjecture. On the analytical front, one frequently encounters a “two-edged” discussion. On the one hand, biofuels could be helpful in making productive use of crop residues or marginal lands to generate affordable energy while reducing greenhouse gas emissions, create income opportunities for low-income farmers and spur public-private partnerships in support of needed research, development and infrastructure investments in developing countries. The FAO summarized this view: “The emergence of biofuels as a major new source of demand for agricultural commodities could thus help revitalize agriculture in developing countries, with potentially positive implications for economic growth, poverty reduction and food security” (FAO, 2008, p. 79).

On the other hand, biofuels pose a number of challenges for pro-poor development. They can aggravate socioeconomic inequalities by concentrating their benefits among the already well-off. They can lead to environmental deterioration and degradation through their effects on deforestation, biodiversity, excessive use of fertilizers and chemicals and abuse of land and water resources. And they can make food prices more unstable and push them higher. Biofuels, in a word, can contribute as easily to increased social, environmental and food insecurity as to development.

The escape from this ambiguity often requires a resort to an analogy with cash-cropping.

As the FAO noted:

“At least in the early years, when biofuel crop production is gaining momentum, investors ready to inject the necessary capital are likely to look for some security of supply. One way to achieve this is by establishing a plantation of the crop on which production is based. However, smallholder participation in the form of contract farming (also referred to as “outgrower schemes”) is perhaps the most obvious approach to building the necessary market while safeguarding staple-food production and ensuring

pro-poor growth. Contract farming implies the availability of credit, timely supply of inputs, knowledge transfer, provision of extension services and access to a ready market....

The impact on inequality will depend on the crop and technology employed, with a scale-neutral technology favouring equal distribution of benefits. Other important factors are: the distribution of land with secure ownership or tenancy rights; the degree of access by farmers to input and output markets and to credit; and a level playing field in terms of policies” (FAO, 2008, pp. 83-84).

Sufficed to say, the number of conditions and caveats captured in this description explains why biofuels will be subject to the same constraints and infrastructure challenges in developing countries as are faced by cash-cropping itself.

Recent foreign acquisitions of lands in poor countries to serve the food security or biofuels interests of the investing countries pose similar dilemmas. The land being sold may bring productivity-enhancing investment, or it may displace smallholders with insecure ownership rights. It may stimulate broad-based modernization, or it may create islands of production where the inputs do not spill over into the traditional farming sectors and the outputs remain inaccessible to the poor and hungry.

In short, analogizing biofuels to cash-cropping influences suggests that both face major constraints and challenges. If they are sufficiently profitable to attract developers to construct much of the physical infrastructure necessary for commercial agricultural development, it will be difficult to keep them scale-neutral and favorable to smallholders. This will occur only if the governments’ attention is focused on avoiding increased inequalities, exploitation of fragile or scarce resources and food insecurity. Few governments in less developed countries are likely to meet these tests.

This leads to conjecture: can we extrapolate from the conditions that have given rise to successful biofuels programs in other settings to the likely effects biofuels initiatives would have

on the development prospects of poor countries? To do this, consider the ethanol experience in the United States and three questions. First, where do successful ethanol plants get built? Second, what are the characteristics of a successful ethanol investment? Third, what are the consequences of successful ethanol programs? Answers to these questions from the U.S. experience can help decide whether biofuels can play a constructive direct role in the development strategies of poor countries.

Where do successful plants get built?

Several conditions must be met for a successful (i.e., profitable) corn-based ethanol plant in the United States. First, plants are generally located in the midst of a large supply of surplus corn. In order to ensure cheap, abundant, reliable supplies of raw material with limited alternative or competitive uses, plants are generally built where corn is in surplus and other uses are distant. In the language of the industry, plants are built where corn is cheap and the “basis” (transportation cost to market) is a large discount.

In the United States, the ethanol industry has been able to piggyback on the existence of an efficient grain-origination infrastructure already in place. Goods roads connecting farms to plants, good quality and ample on-farm storage, and efficient, reliable truck delivery of corn to the plant all reduce the amount of storage that must be built at the plant, lowering the cost of originating the raw material in volume.

Second, the principal byproduct of corn-based ethanol production is distillers dried grains (DDGs). Each bushel produces 18 pounds (nearly one-third of the bushel by weight) of DDGs, which can be fed to animals. Poultry rations have lower limits for DDGs, so it is preferable to locate near cattle or dairy feeding operations and secondarily near confined hog-feeding operations.

Tiffany and Taff (2008, p. 8) model the economics of ethanol production assuming that DDGs sell for 81.2 percent of the price of the corn feedstock. They find that the byproduct revenue from DDG's must cover about one-fourth the raw material cost. Drying the byproduct and shipping it long distances reduces this net contribution. So, having a large commercial feeding market—especially for beef or dairy cattle--within economic range is important to ethanol economics. Somewhat ironically, the primary effect of ethanol plant location is to drive up the local price of corn, which is the primary feed ingredient, making cattle and hog production less profitable.

Third, processing corn into ethanol is energy-intensive. It is important to have a reliable supply of cheap power, both to run the plant and to dry the byproduct, if necessary. In the Tiffany-Taff analysis, a relatively low electricity cost (\$.06 per kWh) was assumed, with one-third of that cost rebated in the form of an alternative energy credit. So, cheap power, reliable power and subsidies for clean energy are important parts of a profitable operation.

Fourth, ethanol plants are expensive to construct, sophisticated in their engineering and equipment needs, dependent on high-quality maintenance and have complex fermentation processes to run. Each gallon of ethanol requires 4 to 5 gallons of process water, which must be sourced and then cooled and cleaned before it leaves the plant. All of this requires access to good engineering services, equipment manufacturers, service technicians and a well-educated, well-trained workforce. There also is a learning curve for plant construction and operation, which disadvantages local producers competing against large multinationals.

In addition to being costly to build (ethanol plants' capital costs are \$2 to \$5 per gallon of installed capacity, depending on the technology being used), they are costly to run. Raw material acquisition must be financed, product inventories must be maintained and plant operating costs

must be covered. Initial and working capital can be sourced from lenders, cooperative members or equity investors. High capital costs are put against a low-value product (fuel is less valuable than food or feed uses of corn) and narrow operating margins. At the same time, both corn commodity prices and gasoline prices can be volatile, often moving in unrelated sequences in the short term. This makes price-risk management extremely important on both raw materials and finished products. The third-largest U.S. ethanol producer (Vera Sun) was bankrupted last year because of ineffective price-risk management, and most ethanol producers have suffered severe margin pressures over the past year, requiring significant financial “staying power.”

All of these factors make cost of and access to capital very important. The U.S. government has offered loan guarantees and subsidies for many of the plants. Even so, lenders have become more cautious, equity investors have swung from wild enthusiasm to virtually withdrawing from the market, producers have seen corn sales contracts canceled, and financial returns have plummeted. And all of this has occurred in a market where subsidies are estimated to be worth roughly half of the market value of the ethanol product.

Finally, the U.S. government and a number of state governments have embraced policies designed to make the ethanol market friendly to its suppliers. Mandated usage has become common, with the size of the mandate rising over time to guarantee market growth. Subsidies have flowed to construction, job creation, operating costs and final product prices. Tax breaks have been extended to retail distributors to install ethanol pumps. Environmental reviews have been loosened on plant construction. Exceptions have been created to the Corporate Average Fuel Economy (CAFÉ) standards for “flex-fuel” vehicles. A lot of public resources, in other words, have gone into smoothing the way for the development of the industry, resources that developing countries may not have or for which they may have better uses.

What characterizes successful ethanol programs?

There seem to be three major policy instruments that characterize successful ethanol programs. They are subsidies, mandates and standards.

Among the subsidies used in the United States are the following: (1) the U.S. corn program encourages corn production by guaranteeing a minimum price return to producers even while market prices can go as low as necessary to “clear the market”; a newly created Biomass Crop Assistance Program promises a 5 percent subsidy to grow such materials; (2) plant construction and job-creation subsidies, as well as subsidized training for plant workers; (3) substantial federally-funded research into processing methods to lower costs or increase yields; (4) a large product subsidy in the form of a blender’s tax credit, to narrow the price disadvantage relative to gasoline; (5) federal assistance to develop foreign markets for DDGs; (6) incentives to users in the form of the flex-fuel exception to the CAFÉ standards and tax credits for installing E-85 pumps; and (7) buying down the cost of process energy where a renewable energy credit can be claimed.

Escalating mandates for incorporation of ethanol into transportation fuels have been used to accomplish several goals. The simplest is to ensure that ethanol produced is in fact used. In addition, escalating the mandate ensures that the market grows, encouraging industry expansion. Mandates also provide a substantial degree of protection against price cycles in either the raw material or competitive gasoline. Finally, the existence of escalating mandates far into the future encourages further research and development beyond what the economics of the industry itself would justify. The costs of these mandates are borne mainly by American consumers in the form of higher prices.

Standards are important to the ethanol industry in several ways. First, they ensure that the product can perform; this helps protect against bad product destroying market acceptance. Second, standards can and have been used to give a preference to local production—both one state’s production over another’s and domestic product over imports. Most recently, standards have been proposed to ensure that the environmental benefits that are supposed to flow from replacing fossil fuels—largely reduced greenhouse gas emissions—in fact are captured; it will be interesting to see how these develop.

What are the consequences of successful ethanol programs?

The principal consequence is to create an ethanol industry that is shaped by political forces rather than market forces. Ethanol would be a premium product for the oxygenate market created by U.S. reformulated gasoline requirements and the unavailability of other oxygenates. In the United States, that is a 6-billion gallon market per year. Demand above that level is largely driven by the existence of ethanol subsidies and mandates.

Moreover, these policies are undertaken to promote ethanol production from domestically-sourced raw materials. Other countries have largely followed the same track, as the earlier discussion of programs in the Ukraine, Canada, Argentina and in Asia illustrated. Typically, biofuels have been an expensive but effective way to shift money from consumers and taxpayers to farmers—not a likely prospect in most poor countries.

This policy-induced market is less responsive to price changes, making it a source of price instability in the food, feed and export markets for corn. It also makes it a disruptive competitor for land as against other crops. These two factors have made global food prices more volatile, pushed food prices higher, stimulated fertilizer and agricultural chemical use and pushed cropping onto additional acres. In a word, the U.S. ethanol program has increased food

insecurity and environmental stress without materially improving energy security and potentially exacerbating changing climate.

What does this tell us about biofuels and development?

The analogy some draw between biofuels and other cash crops in terms of biofuels' development potential glosses over the key question: does a country have a competitive cost advantage in producing biofuels? A quick look at the U.S. ethanol experience highlighted some of the factors that go into creating such an advantage: a surplus of cheap raw material; good accumulation and distribution infrastructure; attractive byproduct feed markets nearby; cheap, reliable process energy; sophisticated suppliers and a well-trained workforce; and access to cheap capital and good price-risk management.

The U.S. ethanol industry had all of these advantages: America is the largest corn exporter in the world; it has the world's most modern, efficient grain handling system; it has large domestic feeding industries to take off the DDGs byproduct; it has cheap, reliable energy; it has the best engineering, maintenance and service industries for this technology, plus extensive worker-training resources; and it has access to efficient capital markets and sound risk-management tools. Yet, with all of these built-in advantages, it could not build its ethanol industry without large infusions of public resources, mandates to compel use and substantial governmental support in smoothing ethanol's path to market.

It seems likely that few poor countries will have the economic advantages that the U.S. offers, let alone sufficient attractiveness so that the industry could also bear some of the costs of building the physical and institutional infrastructure needed to enhance local food security. Even fewer poor countries will have the public resources to pour into the infant stages of development of a biofuels industry, let alone having alternatives that would produce better social, economic

and environmental returns. And no poor countries will have the domestic markets and infrastructure to absorb its own biofuels or the clout to pry open rich countries' borders and streamline their standards to ensure that poor countries' biofuel products can compete on an equal footing with products produced in the rich countries.

Where biofuels industries have become established in poor countries, there is a hedge that seems built into their strategies. In Malaysia and Indonesia, local biodiesel program costs can be recouped from higher palm oil prices in food markets and substantial conversion of idle land to cropping. Brazil's sugar-based ethanol program is similar: with ethanol margins depressed in 2009, "according to a major Brazilian sugar-cane grower and processor, millers will produce as much sugar as possible and will cut back on ethanol output" (Alexander, 2009, p. 16). In both cases, these countries are the leading producers and exporters of palm oil and sugar, respectively, able to profit from the leverage their biofuels programs has given them in their traditional cash-crop markets.

It might be worth asking whether biofuels could be more attractive to some developing countries if the current production- and trade-distorting biofuels policies of the rich countries went away. In a world of open, equitable markets, biofuels might find a niche in the same way as some other cash export crops. But such a world is not currently on offer. And even if it were, it would not be a good substitute for the hard work of basic agricultural and rural development aimed at enhancing food security directly.

Consequently, the challenges to building biofuels industries in poor countries as a new cash crop are daunting. They typically lack the physical and institutional infrastructure needed. They usually have other, better uses for scarce public resources. And, they are essentially foreclosed from the best markets for their biofuels and by-product outputs. At the same time,

biofuels are more likely to be competitive with expanding food production rather than complementary to it. In other words, biofuels seem an unlikely and potentially unhelpful new source of cash for poor, agriculture-dependent economies to use in spurring their rural development.

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