Analyzing the Global Poverty Impacts of Biofuel Mandates

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Abstract

Background and Motivation: The recent food price spike in global markets has placed considerable stress on millions of low income households around the world (Ivanic and Martin, 2008). Estimates to date of the role of biofuels in this price spike are all over the map – with some arguing that they have contributed next to nothing (USDA, 2008) to the recent price spikes and others arguing that the majority of the recent price increases (Mitchell, 2008). As usual, the truth likely lies somewhere in between. Regardless of the absolute size of the price rise driven by the biofuels boom, there is an important question about the qualitative impact of biofuels growth on poverty. It is ambiguous, since consumers – particularly in low income households -- are hurt by higher food prices, while rural producers potentially gain due to higher incomes. The goal of this paper is to begin sorting out this ambiguity.

Biofuels growth in the US has been extremely rapid since 2001, with ethanol production rising by more than 300% by 2006. Projections for 2015 involve the more than doubling of 2006 production levels (US Energy Information Agency, 2008). In the EU, biodiesel is the dominant biofuel, and there the rate of increase is even more dramatic – 500% between 2001-2006 and nearly the same rate of increase projected to 2015 – largely fueled by generous subsidies and tax exemptions. With this amount of agricultural production being absorbed by the energy sector, a significant impact on food prices is to be expected. This paper examines the global poverty impacts of EU and US biofuels growth over the entire period: 2001 to 2015.

Methodology: The poverty impacts of higher world prices stemming from biofuels depend on a whole host of factors which may vary by country. For example, it has been shown in the case of Mexico, that the transmission of higher food prices from the US border to rural communities across Mexico diminishes sharply as one moves away from the border region towards the South of the country (Nicita, 2004). Once agricultural prices rise in a community, the ensuing impact on unskilled wages will be an important determinant of the poverty outcomes – and the elasticity of wages with respect to commodity prices can vary significantly across regions and over time (Ravallion, 1990). In some cases, the wage and employment increases can be sufficient to offset the consumption impact of higher food prices on the rural poor (Ferreira-Filho and Horridge, 2006). These complexities not-withstanding, it is the goal of this paper to analyze the poverty impacts of EU-US biofuel production across a wide range of developing countries in Africa, Asia and Latin America in the hope of identifying some common threads. In particular, we would like to better understand whether the beneficial earnings effects are likely to be large enough to offset the adverse impact of higher food prices, and which socio-economic groups are likely to benefit/be hurt by such policies.

The analytical framework for this study is that of global, general equilibrium analysis. The global focus is necessary in order to identify the developing country poverty impacts of EU-US policies. A general equilibrium approach is needed in order to capture the labor market impacts which often dominate the poverty consequences of world food price shocks for small developing countries with large agricultural sectors (Hertel and Winters, 2006). This study combines a framework used previously for the analysis of biofuels (Birur, Hertel and Tyner, 2008), with one used for analysis of the poverty impacts of global trade reforms (Hertel et al., 2007). Both are extensions of the GTAP model (Hertel, 1997), and both require significant amounts of additional data.

In the case of the poverty module, household survey data have been processed for 16 countries in order to estimate earnings functions for households in the neighborhood of the poverty line in seven different socioeconomic strata in each country. These are combined with estimated poverty elasticities and consumption behavior of the poor in order to allow computation of changes in the poverty headcount in each stratum and each country in the sample. So, with 7 strata in each of 16 developing countries, there are 7x16 = 112 poverty changes for each policy. Rather than focus on these changes individually, we follow Hertel et al. (2007) in computing the *sign consistency* (SC) of poverty impacts. This is defined at the ratio of the average change divided by the average absolute value of changes and is accordingly bounded between -1 and +1. Therefore, if the impact of a given policy on a specific stratum of the population shows SC = -1, it is always poverty reducing in all countries. If SC = +1, it is always poverty increasing.

The SC changes for this sample of countries indicate that the poverty impacts of EU-US biofuels growth are fairly consistent within strata, with the agricultural self-employed and diversified households experiencing poverty reductions, while wage labor households and non-agriculture self-employed households experience poverty increases. The specific SC measures are as follows (in parentheses): agricultural self employed households (-0.99), rural diversified (-0.47), urban diversified (-0.46), transfer dependent (0.84), rural wage labor households (0.9), urban wage labor (0.93), and non-agriculture self-employed households (0.97).

A decomposition of the poverty changes into consumption and earnings impacts shows that the earnings impact is consistently poverty reducing at the national level, while the spending impact is consistently poverty increasing. More interesting is the relative size of these two effects on national poverty – as measured by the average absolute value of the national poverty changes. This is somewhat larger for the earnings effect than for the spending effect. In light of the fact that *all households* are adversely affected by the higher food prices, but *only some* benefit from higher earnings, these results point to the relatively higher poverty rates and poverty elasticities in the household groups benefiting from earnings-driven poverty reductions. The final paper will provide a more extensive analysis of these poverty impacts, in addition to decomposing the relative contributions of EU and US policies on poverty in developing countries.