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Evaluating Crop Substitution: An Empirical Approach Involving Sugarcane, Soybean, Beef and Corn

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Abstract

With the objective of evaluating the relationship between the relative use of Brazilian agricultural areas in the production of soybean, beef, corn and sugarcane as a function of relative prices and other economic constructs, we fit an econometric model in the Cobb-Douglas family. The empirical exercise is of importance in actual Brazilian context, where drastic changes are envisioned for the agricultural profile of the country, in response to the potential world increase in demand for bio fuels and the likely increase of the area cultivated with sugarcane. We observe that during the period (1994–2005), soybean and corn prices dominate the prices of the other products. Important variations of relative prices were only observed for the pair soybean-corn. The statistical analysis indicates that an increase of 1 % in the relative price of soybean relative to sugarcane implies an expected increase in area of 0.01 % in favour of soybean. In regard to the relative areas of pasture and sugarcane as a function of the relative prices of beef/sugarcane we did not find a clear increasing linear relation. Relative to the coefficient of corn/sugarcane one can infer that an increase of 1 % in the relative price of corn in relation to the price of sugarcane, would lead to an increment of 0.05 % in the area planted with corn relative to sugarcane. For the relationship between soybean and pasture we estimate that a 1 % of increment in the relative price of the soybean in relation to the price of beef leads to an increase of 0.06 % in the planted area of soybean in relation to the area of pasture. For the combination soybean-corn we infer that a 1 % of increase in the relative price of the soybean in relation to the price of the corn will cause a significant increase of 0.94 % in the relative area in favour of soybean. It is concluded from the analysis, in general, that there is not enough past evidence to infer significant changes in crop areas relatively to the status quo in regard to changes in relative prices.

Keywords: Beef, corn, sugarcane, soybean, substitution effects of crop areas, substitution elasticities