Predicting Land Use Competition for US Peanut Acreage Pre- and Post-Quota

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Peanuts are produced across the southern US and compete with corn, cotton, soybeans, and grain sorghum for arable land. Acreage planted to these crops varies annually due to ecological and economic drivers, and government policies. Historic acreage data for peanuts, corn, cotton, soybeans, and grain sorghum by state were collected from 1994 to 2016 and analyzed to identify drivers of land use change under both a pre- and a post-quota model. Planted acreage for each crop served as the dependent variable. Likewise, lag acreage of each crop, the lag fiber:grain price ratio, the lag peanut price paid to farmers, the peanut:grain price ratio, the peanut:fiber price ratio, a dummy variable expressing lag aflatoxin, and dummy variables for years each US farm bill was in effect served as explanatory variables. Additionally, the post-quota model included a dummy variable for new variety (i.e., GA-06G). Equations were simultaneously estimated using iterative Seemingly Unrelated Regression (SUR). The estimated equations expressed goodness of fit based on high R^2 values for all crops, including both peanut models. As expected, peanut acreage in Georgia was highly significantly different compared to all other states ($p<0.001$), except in the post-quota model where Georgia did not differ significantly from Texas. Lag acreage significantly and positively influenced planted acreage of peanuts pre-quota (coef., 0.51; $p<0.001$), but less so post-quota (coef., 0.13; $p<0.10$) indicating some change in perceived resource fixity. The only other factor that was statistically significant in both models was the 2014 Farm Bill, where more acres were planted to peanuts at the expense of cotton ($p<0.05$), with the 2008 Farm Bill serving as baseline. In the post-quota model, the lag fiber:grain price ratio, the lag peanut price paid to farmers, and the lag aflatoxin variable positively and significantly impacted acres planted to peanuts ($p<0.05$). Fewer peanuts were planted at the expense of grain crops under the 2002 Farm Bill when compared to baseline ($p<0.05$). Finally, the release of GA-06G negatively and significantly impacted acres planted to peanuts ($p<0.01$).