Finally, the two predictive modeling approaches are compared. The first modeling approach predicts future LCC using only past land cover change data in the form of empirical transitional probabilities of LCC obtained from pathways of past LCC. These empirical probabilities are used in a LSDV1 for fixed –group effects, a LSDV1 for fixed-time effects, and an Ordinary Least Square model (OLS) for the pooled sample. Results from these models are entered in a modified Markov chain model's matrix multiplication. The second modeling approach predicts future LCC using socio-demographic and economic survey variables at the household level. The survey data is used to perform a multinomial logit regression model to predict the LC class of each pixel. In order to compare the explanatory and predictive capacity of both modeling approaches, LCC predictions at the pixel level are summarized in terms of percentage of cells in which future LC was predicted correctly. Percentage of correct predicted land cover class is compared against actual pixel classification from satellite images. The presence of differences among farmers in the LSDV1-fixed group effect by farmer suggests that small farmers are not a homogeneous group in term of their probabilities of LCC and that further classification of farmers into homogeneous subgroups will depict better their LCC decisions. Changes in the total area of landholdings proved a stronger influence in farmer's LCC decisions in their main property (primary lot) when compared to changes in the area of the primary lot. Panel data analysis of the LCC empirical transition probabilities (LSDV1 fixed time effects model) does not find enough evidence to prefer the fixed time effects model when compared to a Ordinary Least Square (OLS) pooled version of the probabilities. When applying the results of the panel data analysis to a modified markov chain model the LSDV1-farmer model provided a slightly better

accuracy (59.25% accuracy) than the LSDV1-time and the OLS-pooled models (57.54% and 57.18%, respectively). The main finding for policy and planning purposes is that owners type 1 –with stable total landholdings over time-- tend to preserve forest with a much higher probability (0.9033) than owner with subdividing or expanding properties (probs. of 0.0013 and 0.0030). The main implication for policy making and planning is to encourage primary forest preservation, given that the Markov chain analysis shows that primary forest changes into another land cover, it will never go back to this original land cover class. Policy and planning recommendations are provided to encourage owner type 1 to continue their pattern of high forest conservation rates. Some recommendations include: securing land titling, providing health care and alternative sources of income for the OT1's family members and elderly owners to remain in the lot. Future research is encouraged to explore spatial autocorrelation in the pixel's probabilities of land cover change, effects of local policies and macro-economic variables in the farmer's LCC decisions.

Keywords: land-cover change, Markov chains, multinomial logit regression, pathways, deforestation, Amazon, panel analysis, fixed-time effects, fixed-group effects

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"Just when the caterpillar thought the world was over, it became a butterfly."

-anonymous

“Painting is never finished. It simply stops in interesting places”

Garner

I believe this applies to research as well,…

Garner, what was your dissertation on?

Shayna R. Nerit

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LIST OF MOST USED ACRONYMS

Acronym	Meaning
LC	Land cover
LCC	Land cover change
PF	Primary forest
SF	Secondary Forest
NF	Non forest
OT1	Owner type 1
OT2	Owner type 2
OT3	Owner type 3
PT1	Property type 1
FT 1	Farmer type 1
MUN	Municipio
AP	Alto Paraiso
NU	Nova Uniaõ
RM	Rolim de Moura
OLS	Ordinary Least Square
LSDV	Least Square Dummy Variable
FGEM	Fixed Group Effects Model