

On Intertemporal Capital Theory and the Economics of Forestry

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This talk is based on the ongoing work with Dr. Adriana
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Structure of the Talk

- 1 Background: Discrete Time
- 2 The Gale-McKenzie Reduced Form Model
- 3 Affiliated Models
 - 3.1 The 2-sector RSS Model
 - 3.2 The Mitra-Wan Tree Farm
 - 3.3 The LS Model
 - 3.4 The RST Model
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- 5 A Result

Introduction: The results of this research program, despite their simplicity, call into question a variety of intuitions regarding optimal intertemporal resource allocation:

- the substantive similarity of discrete- and continuous-time formulations;
- the importance of smoothness, and thereby of infinitesimal calculus, for the theory of capital;
- the predominance, independent of the discount factor, of saddle-point stability of optimal control trajectories;
- the irrelevance of the undiscounted case for an analysis of the discounted one;
- the existence of optimal policy functions rather than correspondences;
- the irrelevance of turnpike theory.

The RSS Model

References

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The MW Tree Farm: The First Analyses

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The MW Tree Farm: Ongoing Work

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- [10] Khan M. Ali and Piazza A., 2009. On the Mitra-Wan Forestry Model: A Unified Analysis. *Publicación Técnica CMM*. No. ????. Paper presented at WMD 2009.
- [11] Khan M. Ali and Piazza A., 2009. Classical turnpike theory and the economics of forestry, mimeo, Johns Hopkins University.
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The MW Tree Farm: Unification

Standing Hypothesis (BMW): There exists $\sigma \in \{1, \dots, n\}$ such that

$$(b_\sigma/\sigma > b_i/i) \text{ for all } i \in \{1, \dots, n\} \setminus \{\sigma\}.$$

The Non-Interiority Condition: $(1/\sigma) \notin \text{int } S_f$.

Theorem 1 *Assume the Standing Hypothesis and that $\{x(t)\}$ is program from x_0 . If the non-interiority condition holds, the following are equivalent:*

1. $\{x(t)\}$ is optimal,
2. $\sum_{t=0}^{\infty} \delta(x(t), x(t+1)) = \Delta(x(0))$,
3. $\{x(t)\}$ is maximal,
4. $\{x(t)\}$ is finitely maximal.