Designing Forestry Taxes to Promote Conservation

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OVERVIEW

- Should a special fiscal regime apply to the forestry sector?
  - Externalities
  - Rents?
- What determines land use?
  - Agricultural taxation
- How do forestry taxes affect SFM incentives?
  - Recurrent annual charges
  - Output-based taxes
- Balancing government and producer risks
- Conclusions

Should a Special Tax Regime Apply to the Forestry Sector?

- Positive externalities from forests:
  - Carbon sequestration (global)
  - Biodiversity (global)
  - Watershed protection (local/regional)
  - Aesthetic and recreational (local/regional/global)
- Positive externalities justify sectoral subsidies
  - Domestic revenue constraints may prohibit

Should a Special Tax Regime Apply to the Forestry Sector?

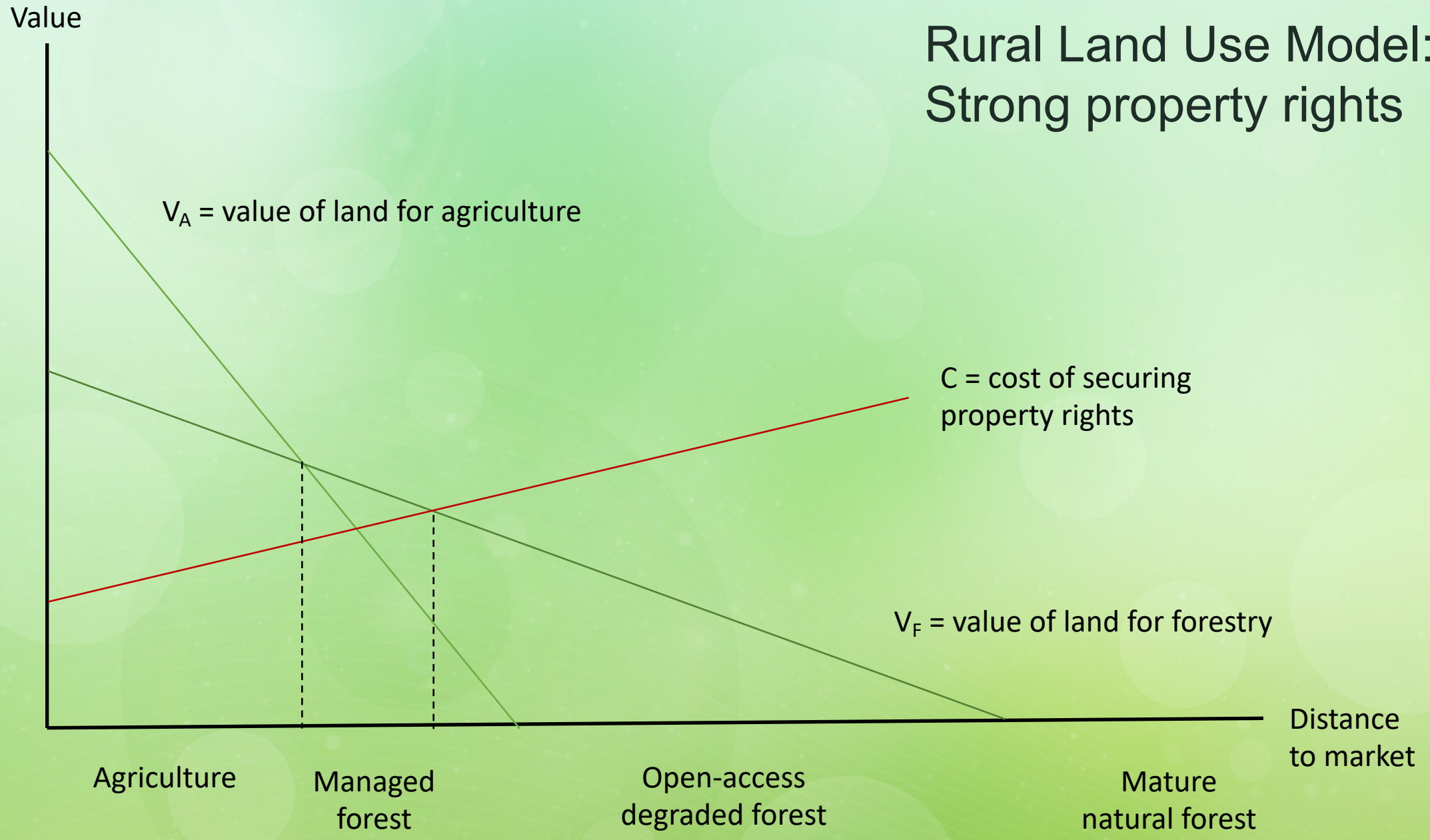
- Rents?
  - Natural forest
  - Major input is “fixed” factor (land)
  - Man-made barriers to entry
- Where forestry sector is large, may be necessary to tax
  - Especially where MNEs log natural forest
  - CIT may be difficult to enforce

What determines (rural) land use?

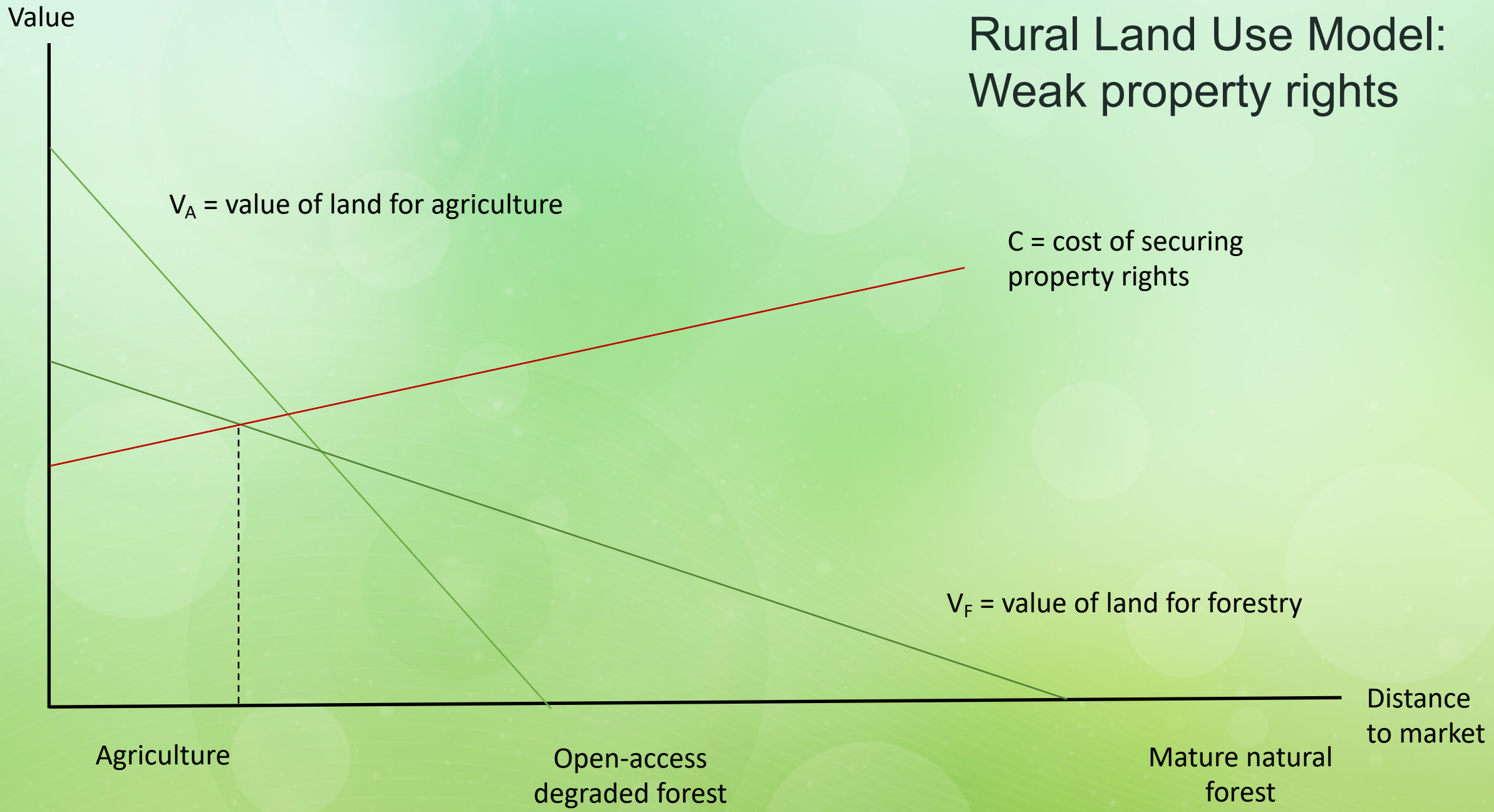
W.F. Hyde, *The Global Economics of Forestry* (2012)

- Rural land use margins:
  - Mature, natural forest
  - Open-access degraded forest
  - Managed forest
  - Agriculture
- Access to markets, excludability (property rights) are key

Rural Land Use Model: Strong property rights



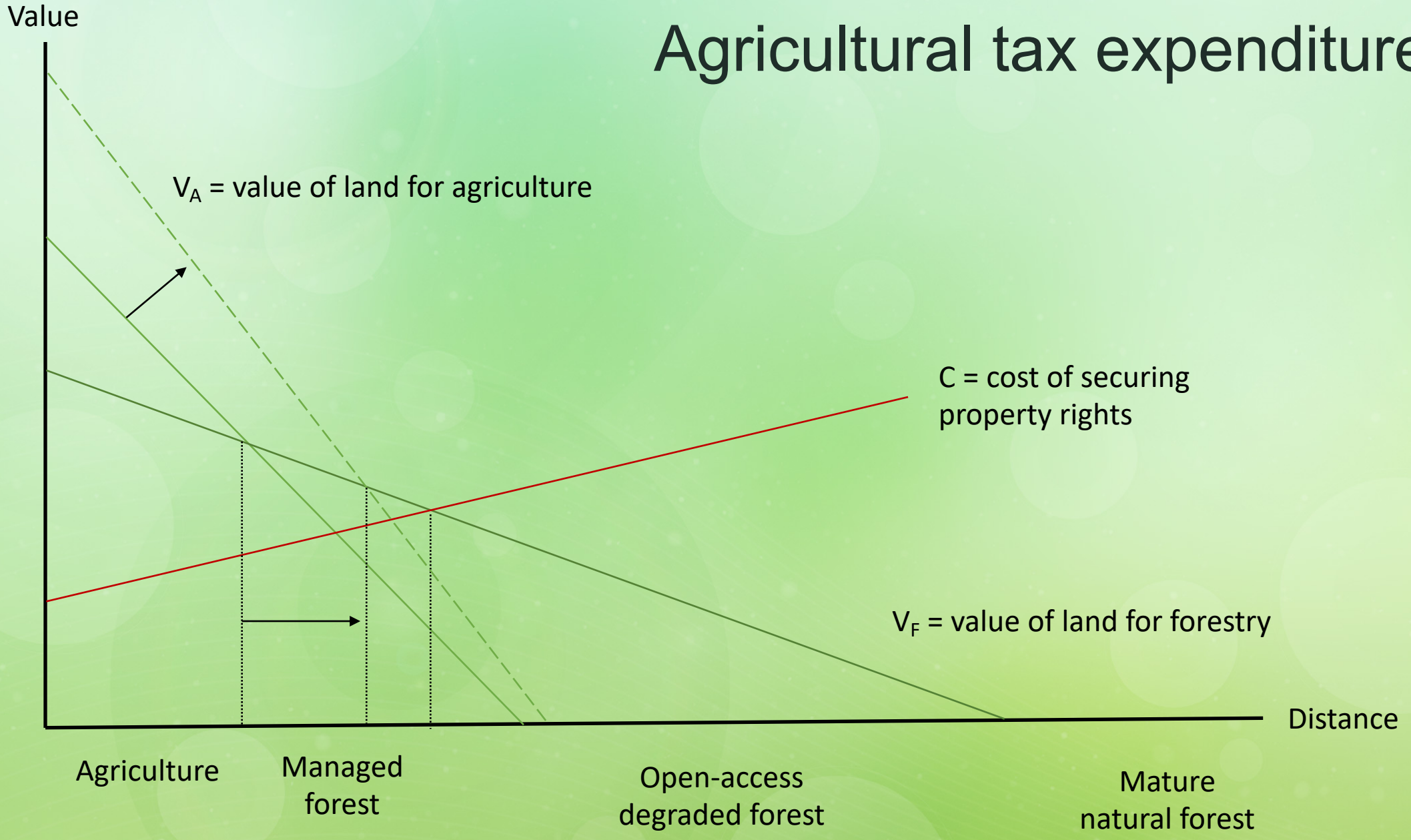
Rural Land Use Model: Weak property rights



What determines land use?

- Agriculture often enjoys numerous fiscal advantages
  - Subsidies
  - Reduced (or zero) income and property tax rates
  - VAT exemptions for inputs and outputs
- Agriculture may thus have higher post-tax return than forestry, even if pre-tax return to forestry is higher
  - Eliminating agricultural subsidies, including tax expenditures, can promote forestry

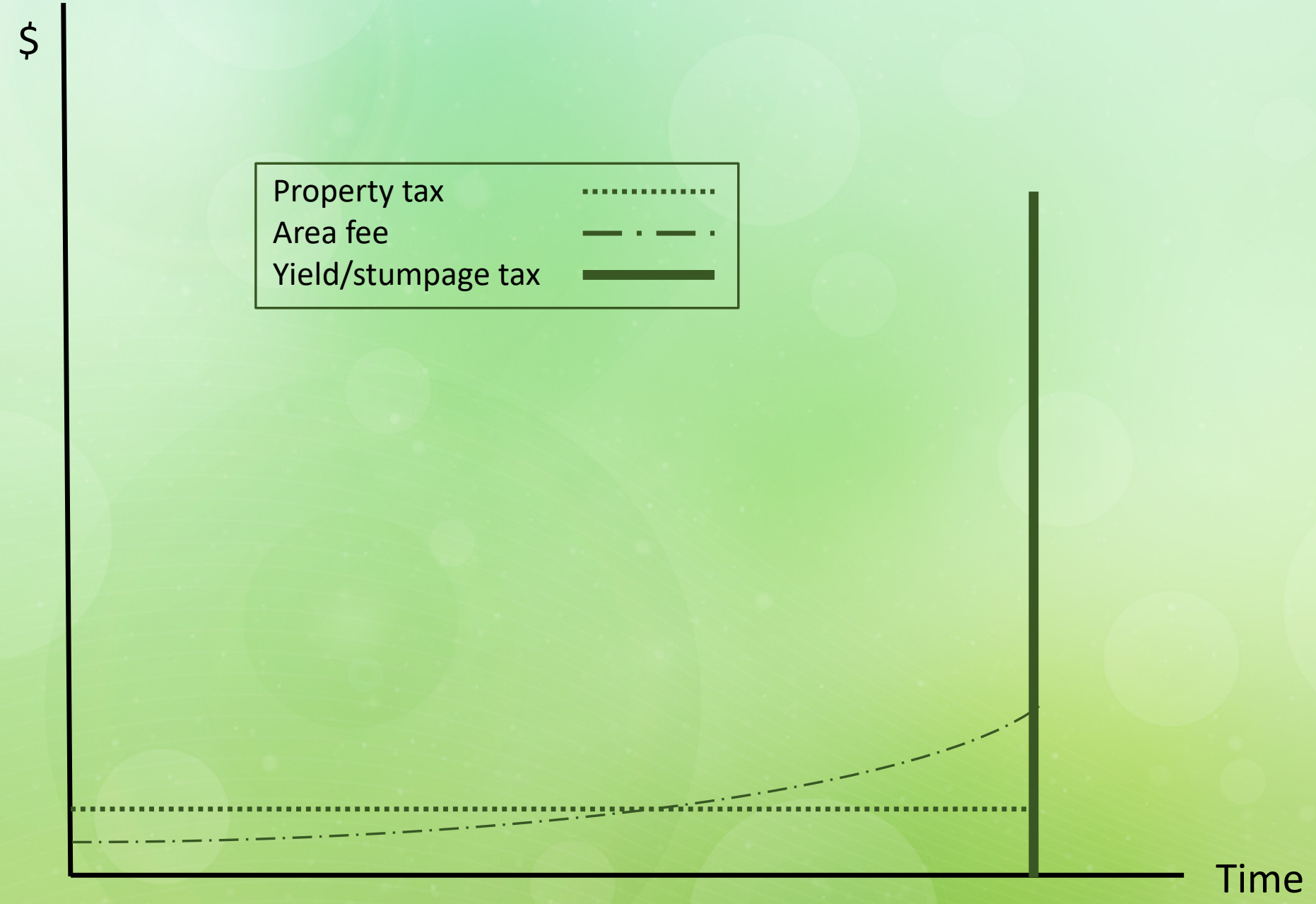
Agricultural tax expenditures



How do forestry taxes affect land use and SFM?

Types of forestry taxes

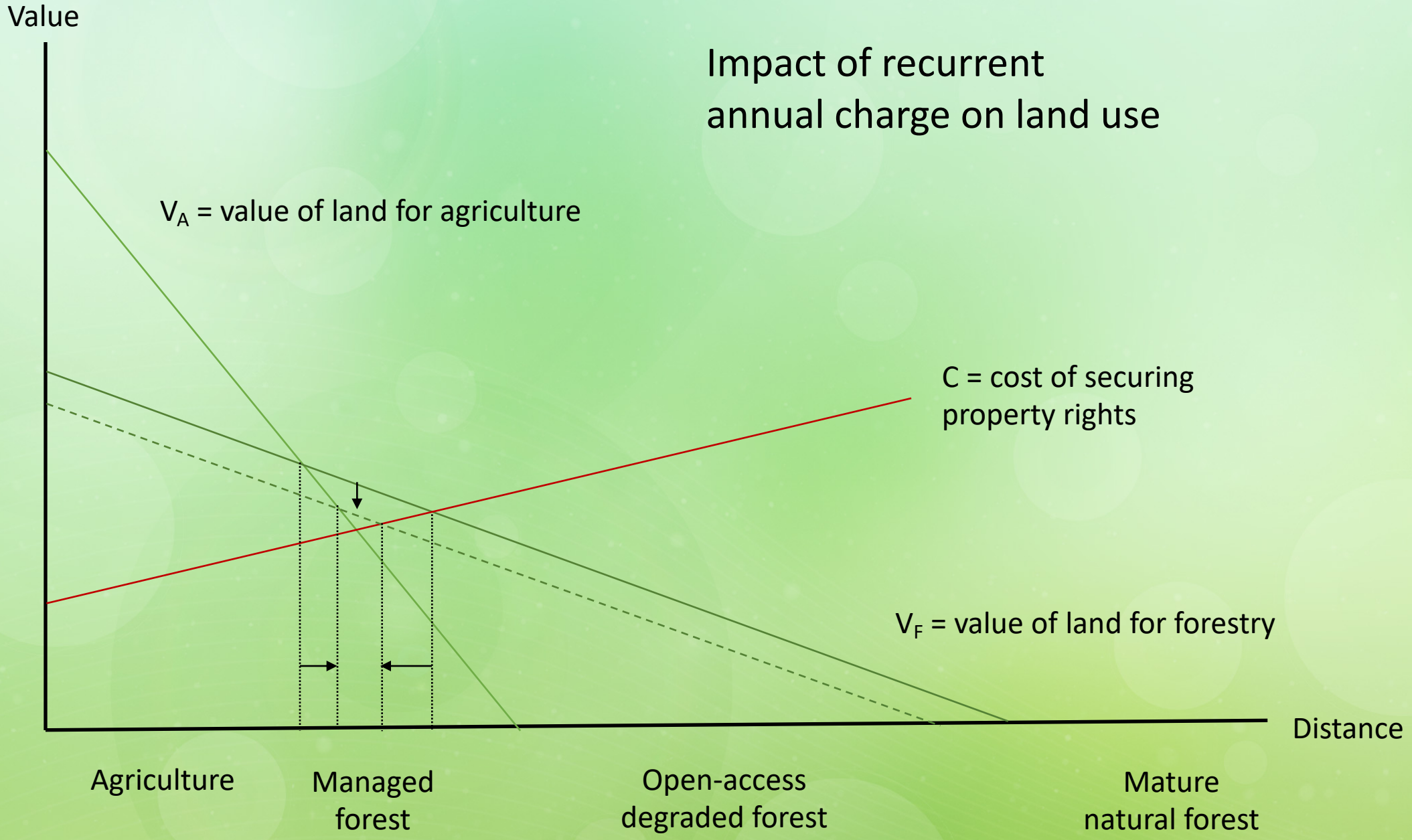
- Recurrent annual charges
  - Property tax: Percentage of value of land, trees or both
  - Area fees: Flat annual charge per hectare, based on expected yield
- Output-based taxes
  - Yield tax: Percentage of gross value of timber extracted
  - Stumpage/severance tax: Fixed charge per tree or m^3 of extracted timber
    - May vary by species
  - Export tax: Yield or stumpage tax on exported logs only
- Standard income tax
- Rent tax


$
Property tax
Area fee
Yield/stumpage tax
Time

Recurrent annual charges

- Impose fixed costs
  - Reduce extensive and intensive forestry margins
- Create barrier to entry
  - Drive out marginal players
  - Professionalize the industry
  - May create or increase sectoral rents
  - May increase logging in low-price states

Impact of recurrent annual charge on land use



Recurrent annual charges

- Area fees
  - Set by government or by auction
  - Auctioned fee is tax on expected rent
    - Bidders shade down estimate of expected rents due to risk aversion
    - Collusion, corruption are concerns in weak institutional environments
- Property tax
  - Where trees are included in base, tax compounds on value of old growth
    - Shortens optimal rotation period
    - Discourages reforestation: “Cut and run”

Chang (1982)

Net revenue increment rate:

$$NRIR = V'(t)/[V(t) - C]$$

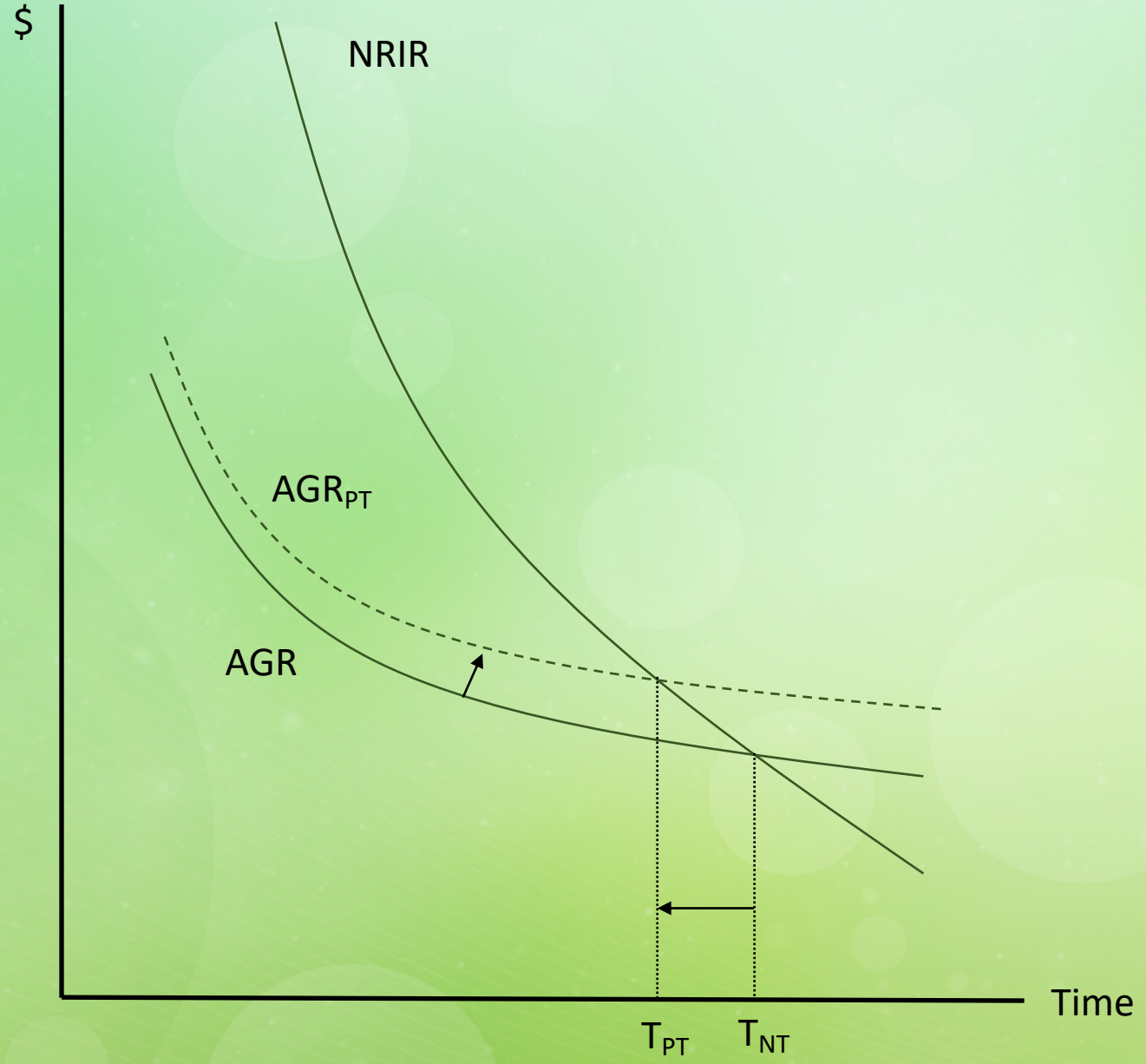
V(t) = value of trees as a function of rotation age

Adjusted guiding rate:

$$AGR = (r+y)e^{(r+y)t}/(e^{(r+y)t} - 1)$$

y = property tax rate on trees

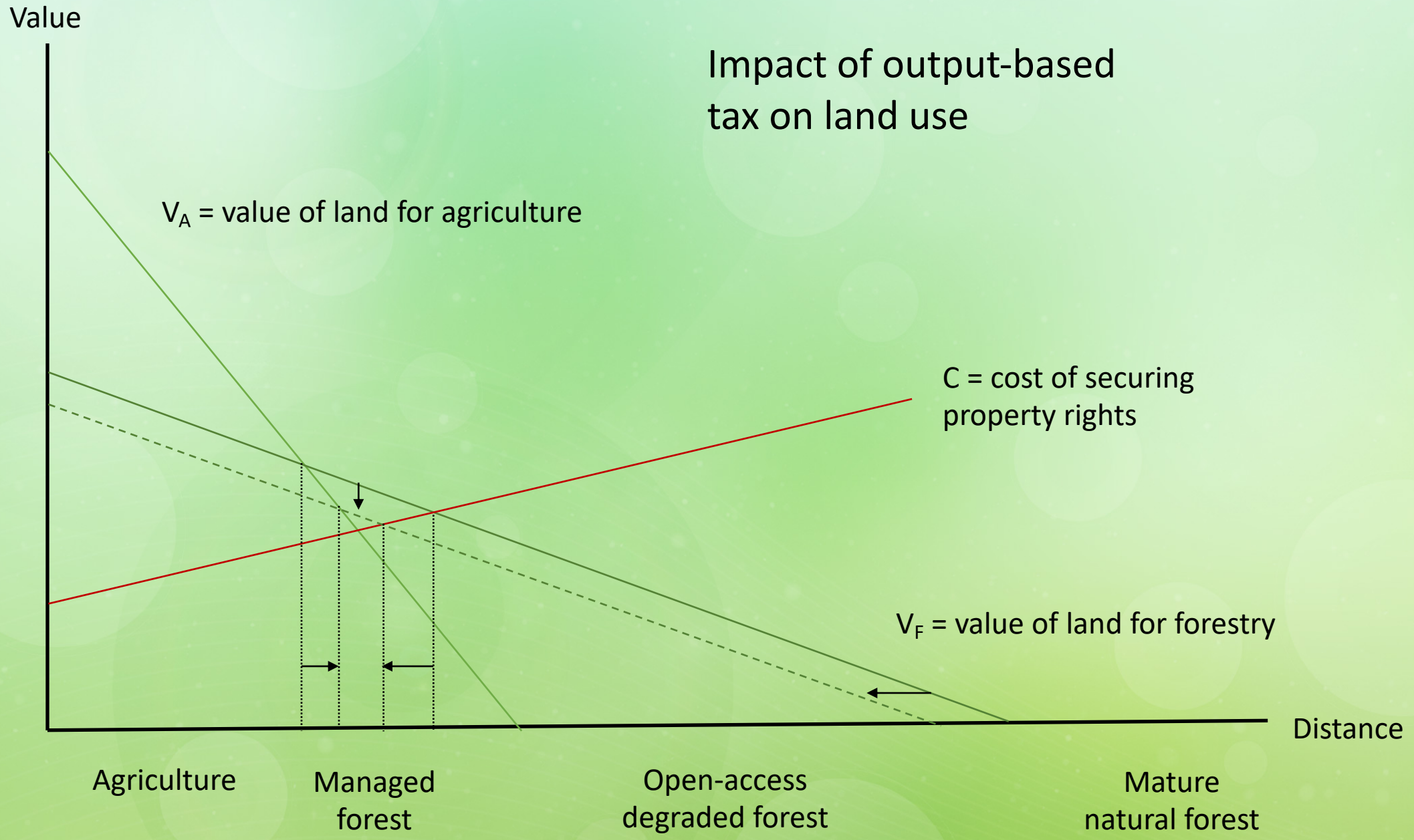
Assumes tax is fully capitalized into land value.



Output taxes

- Effect on land use:
  - Similar to recurrent annual charge, reduces managed forestland
  - However, if applied to informal logging, can extend area of natural forest
  - Holding forest area constant, reduces rate of extraction and extends rotation period

Impact of output-based tax on land use



Chang (1982)

Net revenue increment rate:

$$NRIR = (1-w)V'(t)/[(1-w)V(t) - C]$$

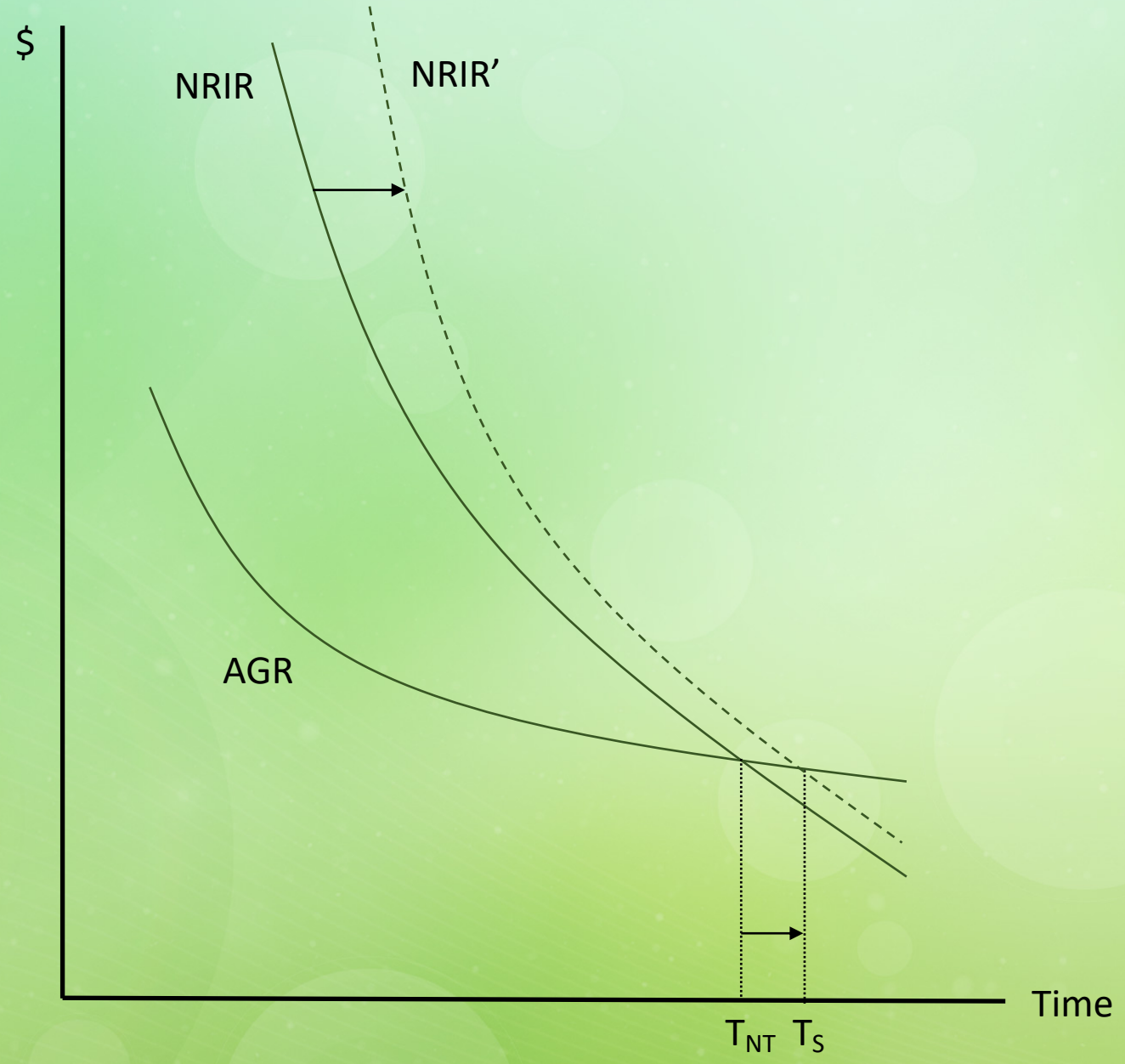
V(t) = value of trees as a function of rotation age

Adjusted guiding rate:

$$AGR = re^{rt}/(e^{rt} - 1)$$

w = yield tax rate

Assumes tax is fully capitalized into land value.



Yield/stumpage taxes

- May be difficult to levy at source
  - Sawmill, customs are alternative “choke points”
- Do not (typically) depend on method of harvesting
  - If method can be verified, lower rate can be charged on SFM

Export tax

- Imposition at customs eases administration
  - May be only available instrument in low-capacity environments
- Often used to stimulate domestic processing
  - (Temporarily) reduces price of input to domestic industry
  - Creates distortions/arbitrage opportunities
  - Can result in negative value added

Export tax distortion - example

Unprocessed log export value	$100
Export tax on unprocessed logs (10%)	$10
Net proceeds of unprocessed wood export	$90
Processing cost	$5
Post-processing export value	$100
Net proceeds of processed wood export	$95
Gain to forestry company	$5
Loss to government	-$10
Net value of processing to economy	-$5

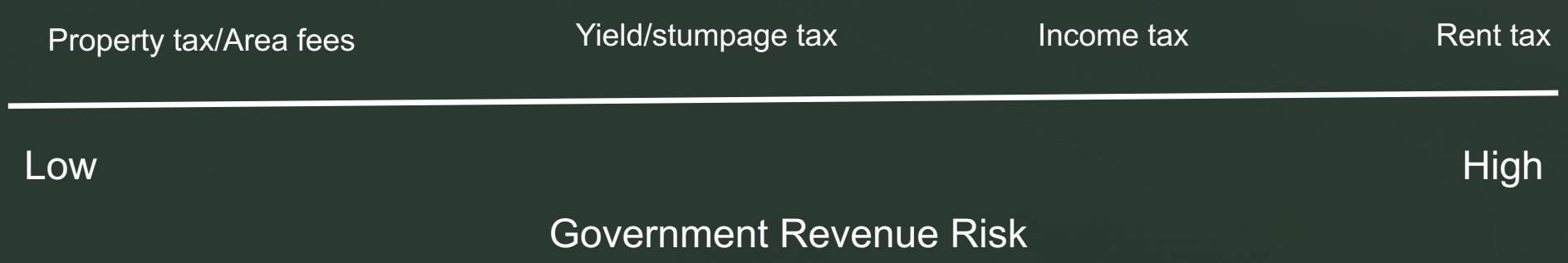
Based on example in Krelove and Melhado (2010)

Rent tax

- Cash flow tax allowing investment expensing
  - Frequently used in mining and petroleum industries
- Least financial risk for forestry companies (but most for government)
  - Revenues extremely back-loaded, given forestry's long investment horizon
  - However, could yield near-term revenues for logging of natural forest
- Less distortive than area fees
  - Properly designed tax should not deter investment
  - Appropriate "uplift" rate for capital investment is key to neutrality
  - Where rents don't exist, tax liability will be zero

Balancing risks

- Very long time horizon of SFM
  - Property rights, fiscal regime stability are critical
- Land use regulation can stabilize extensive margin
  - Create or enhance sectoral rents
- Taxes impose different financial and revenue risks:



Conclusions

- Positive forest externalities justify subsidies
- Where domestic revenue constraints prevent this, policies to minimize deforestation while generating revenue include:
  - Strengthen property rights and land use regulations to promote managed forestry
  - Eliminate agricultural subsidies, including tax expenditures
  - Favor output-based forestry taxes or rent taxes over recurrent annual charges

THANK YOU!