Farm or Fortune? The Role of Heirs' Intentions and Tax Policies in Farmland Succession Planning

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Roadmap

Motivation

- Farmland access is challenging and critical for new and beginning farmers (Ahearn and Newton, 2009; Rippon-Butler, 2020)
- Farmland represents $\approx 85\%$ of farm assets (USDA - ERS, 2025)
  - $\Rightarrow$ Useful for studying asset holding behavior and small business succession
- Farmland market is imperfect with capital gains taxation reducing transactions through the "lock-in" effect (Hennessy, 1999; Pietola et al., 2009; Cavalcanti and Erosa, 2007)
- Limited research on the behaviors of landowners who have an heir who wants to keep the farm
  - $\Rightarrow$ This is the first simulation in which individuals effectively face different tax policies based on their heir's intentions rather than the value of their assets

What is the "lock-in" effect?

- The "lock-in" effect is a market distortion in which there is an incentive to delay selling an asset and triggering a tax liability
- In the context of capital gains, a gain occurs upon realization (sale)
- Combined with "step-up" basis,[1] the "lock-in" effect incentivizes holding land through death.

[1] The policy in which the basis for calculating gains on inherited property is "stepped-up" to the market value of the asset at the original owner's time of death; thus, lowering the gains that may be taxed if the inheritor sells the asset.

Research Questions

- How does "stepped-up" basis, capital gains taxes, and estate taxes affect optimal selling and holding behavior of asset owners?
- Does the intentions of heirs (regarding inheriting the farm) affect this optimal behavior?
- What do the answers to these questions mean for agricultural land turnover and land access in general and especially for new and beginning farmers?

Methodological Strategy

1. Theory: adapt a decision tree model (Hennessy, 1999) to include different heir intentions and tax policies
2. Empirical: Derive, and apply to the model, ground-truthed empirical parameters from a 2022 statistically representative panel of Iowa farmland owners
3. Policy Simulations: Simulate four policy scenarios on the optimal selling/keeping behavior of landowners

Theory Model of Landowner Succession Decisions

Landowners objective is to maximize the expected value of their estate under altruism (Cox and Rank, 1992; Hennessy, 1999; Mishra et al., 2010) subject to

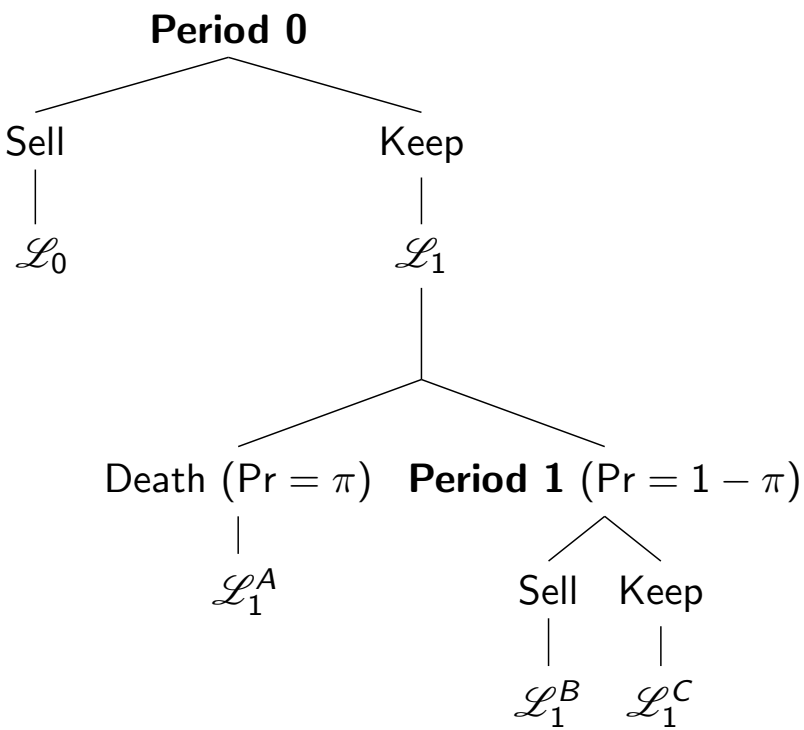
- estate and capital gains (with stepped-up basis) taxes (Hennessy, 1999)
- uncertainty of probability of death (Feldstein, 1980; Just and Miranowski, 1993)

and conditioned on whether the landowner believes their identified heir intends to

- sell (Hennessy, 1999) or keep the farm

$\Rightarrow$ The implication is that certain tax polices are only present in some landowner's objective functions.

Game Tree of Landowner Decisions



⏩ Full Decision Tree

- Solve using backwards induction
- Period 1 (if alive)
  - Sell at 1 if $\mathscr{L}_1^B \geq \mathscr{L}_1^C$
  - Keep at 1 if $\mathscr{L}_1^B < \mathscr{L}_1^C$
  - $\mathscr{L}_1 = \pi \mathscr{L}_1^A + (1 - \pi) \max\left(\mathscr{L}_1^B, \mathscr{L}_1^C\right)$
- Period 0
  - Sell at 0 if $\mathscr{L}_0 \geq \mathscr{L}_1$
  - Keep at 0 if $\mathscr{L}_0 < \mathscr{L}_1$

Original Parameters (Hennessy, 1999)

- Return factor ($R = 1 + r$) where r is the rate
- Consumption (C)
- Growth in consumption (D)
- Estate tax rate (Φ)
- Farm profit (k)
- The additional productivity gained by a more efficient farmer (δ)
- Capital gains tax rate (τ)
- Farm basis ($\bar{V}$)
- Probability of death at time 1 (π)
- Estate tax exemption for non-farm (E_{NF}) and farm (E_F) assets
- Value of the farm (V_t) at time $t \in \{0, 1, 2\}$

Added Parameters

- Stepped-up basis indicator ($\gamma \in \{0, 1\}$)
  - $\gamma = 1$ with
  - $\gamma = 0$ without

- Probability that the heir wishes to keep the farm ($\eta \sim U(0, 1)$)
  - $\eta = 0$ when the heir wishes to sell with certainty (as in Hennessy (1999))
  - $\eta = 1$ when the heir wishes to keep with certainty

Assumptions

Equations

Effects on Hennessy (1999) Table 1 (Keep, Sell)

Notation & More Tables

		$\tau = 0.05$	$\tau = 0.15$	$\tau = 0.25$	$\tau = 0.35$
$\delta = 0.1$	$\Phi = 0.2$	H, 0	H, 2	H, 2	H, 2
	$\Phi = 0.35$	H, 2	H, 2	H, 2	H, 2
	$\Phi = 0.5$	H, 2	H, 2	H, 2	H, 2
$\delta = 0.2$	$\Phi = 0.2$	H, 0	H, 0	H, 2	H, 2
	$\Phi = 0.35$	H, 0	H, 2	H, 2	H, 2
	$\Phi = 0.5$	H, 2	H, 2	H, 2	H, 2
$\delta = 0.3$	$\Phi = 0.2$	H, 0	H, 0	H, 0	H, 2
	$\Phi = 0.35$	H, 0	H, 0	H, 2	H, 2
	$\Phi = 0.5$	H, 2	H, 2	H, 2	H, 2

[1] $R = 1.5$, $k = 0.55$, $V_0 = V_1 = V_2 = (k + \delta) / (R - 1)$, $\bar{V} = 1.0$, $\pi = 0.5$, $E_F = 1.3$, $E_{NF} = 0.85$, $C = 0.2$, $D = 1.1$, and $\gamma = 1$ where all dollar values are in millions.

Iowa Farmland Ownership and Tenure Survey (IFOTS)

- A statistically representative sample of Iowa farmland
- Only state level survey (and data) of its kind on ownership and tenure
- Contains important survey questions for parameterizing model including:
  - Potential successors (heirs)
  - Anticipated transfer methods
  - Acres anticipated to be transferred in the next five year
  - Type of ownership
- This paper uses the 2022 survey but data goes back to 1997[2]

⏩ IFOTS Sample Question Responses

[2]Some years contain different questions (e.g. successors, detailed conservation practices, etc.)

Summary Statistics

	mean	sd	min	max
Acres	354.03	380.69	6.00	2,960.00
Nominal Basis ($)	1,046,756.10	1,296,860.54	13,653.00	8,829,146.00
Nominal Value ($)	3,870,776.85	4,272,682.30	70,188.00	33240800.00
Nominal Gain ($)	2,824,020.74	3,432,404.48	0.00	25293388.00
Age	68.01	12.98	22.00	96.00
Gender				
Male	76%			
Female	24%			
Ownership Successor				
Yes	81%			
No	19%			
Management Successor				
Yes	63%			
No	37%			
N	362			

Empirical Strategy

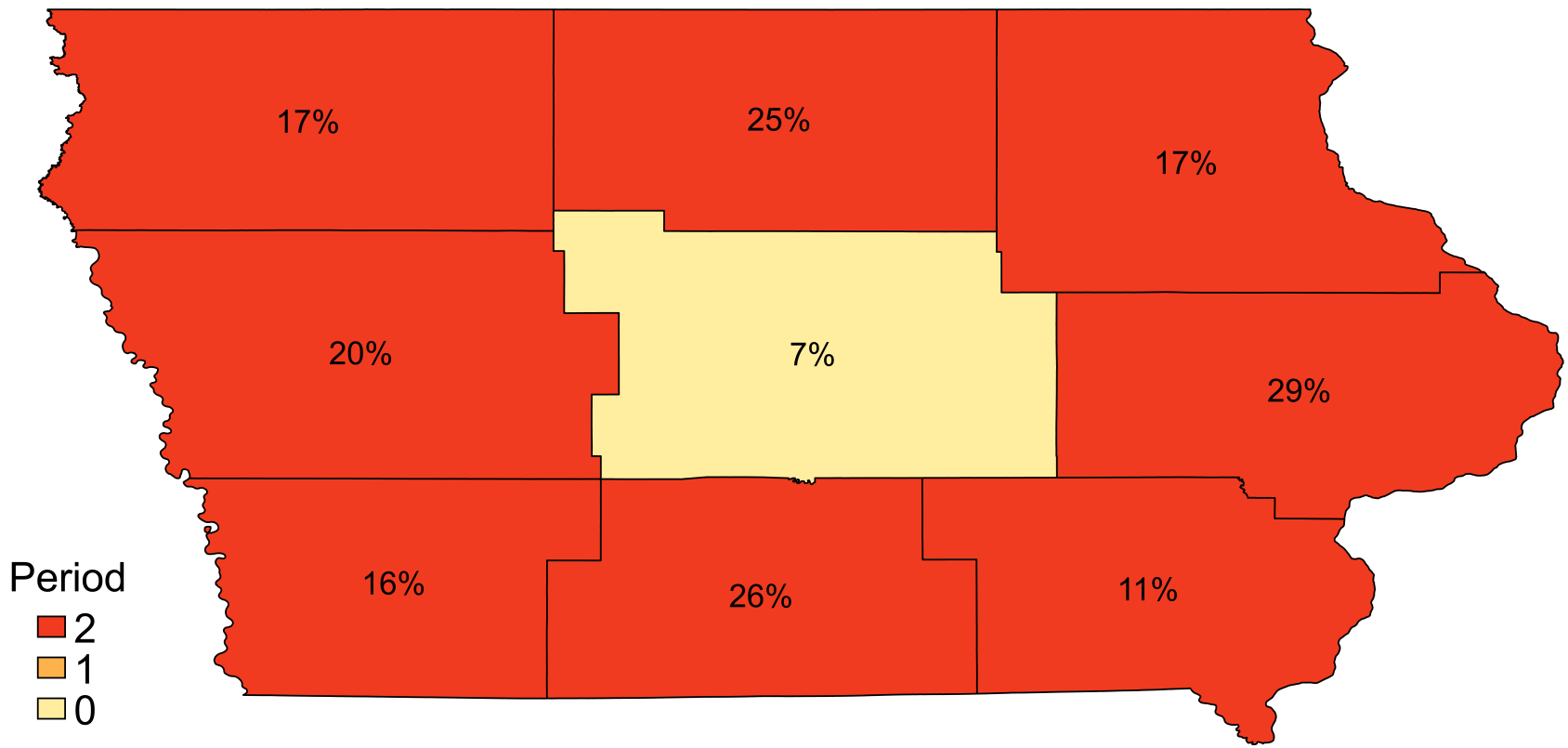
- Leverage the 2022 IFOTS cross-section
- Assume that the heir:
  - intends to keep the land = has an ownership successor
  - intends to sell the land = no ownership successor
- Create representative agents at the district level[3] to simulate four policy scenarios:
  - Scenario 1: Current Policy
  - Scenario 2: Sunsetting of the 2017 Tax Cuts and Jobs Act
  - Scenario 3: Proposed, One Big Beautiful Bill Act (2025)
  - Scenario 4: Proposed American Families Plan (2021)
- The first three scenarios affected the estate tax exemption while Scenario 4 also would have eliminated "step-up" basis

[3] Full sample represents $\approx$ 30 million acres and district simulations represent $\approx$ 21 million acres for accurate value calculations ($\approx$ 4 without a successor and $\approx$ 17 million with a successor

Summary of Simulation Results

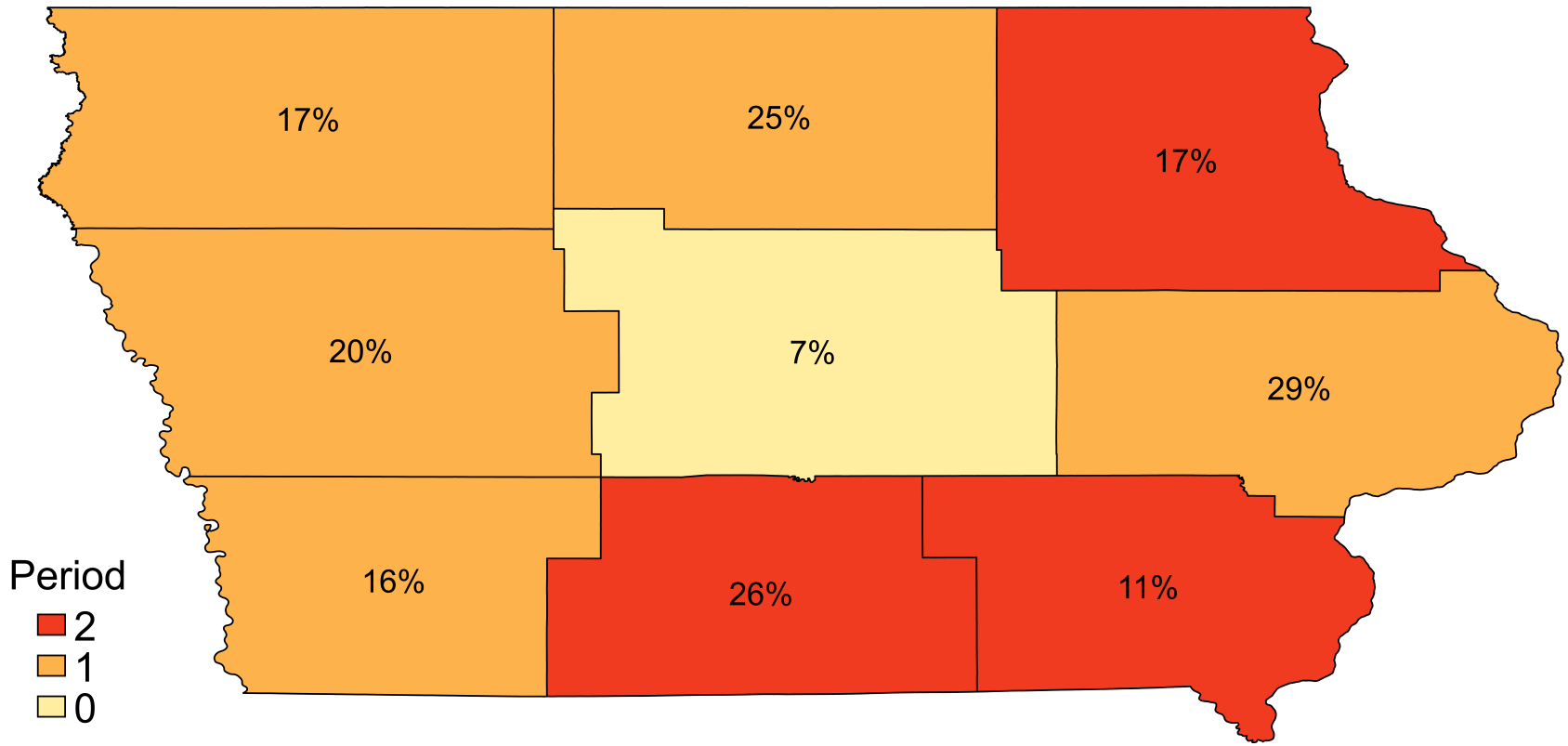
- For landowners with an heir intending to keep the farm, it is always optimal to keep through death
- For landowners with an heir intending to sell the farm, it depends
  - In three districts (NE, SC, and SE), it is always optimal to keep through death
  - In one district (C), is is always optimal to sell immediately
  - In the remaining five districts (NW, NC, WC, EC, and SW), there are critical values for the estate tax exemption such that when the estate tax exemption is,
    - below the value, it is optimal to farm for one decade/period and then sell
    - greater than the value it is optimal to keep through death

Optimal Selling Period, Heir Intends to Sell: Scenarios 1, 2, and 3



Districts are labeled with the percent of farmland affected.
E.g., central Iowa has 7% of farmland owned by landowners with an heir wishing to sell.

Optimal Selling Period, Heir Intends to Sell: Scenario 4



Districts are labeled with the percent of farmland affected.
E.g., central Iowa has 7% of farmland owned by landowners with an heir wishing to sell.

Simulation Findings

- "Lock-in" effect is currently strong, affecting 8 of 9 districts
- Central Iowa (District 5) has a very low percentage of land without an ownership successor and optimal behavior is not sensitive to changes in tax and capital gains tax policies
- The proposed AFP would have eliminated the "lock-in" effect for five of the remaining districts where it becomes optimal to sell after keeping for a decade

  $\Rightarrow$ Eliminating "step-up" basis is not enough in all regions to prompt sales prior to death

  $\Rightarrow$ Other policy changes may be "better" at promoting access for new and beginning farmers across regions

Still to Come

- Survival analysis on land disposal using acquisition history
- Extend analysis beyond Iowa (e.g. TOTAL)
- Robustness checks (e.g. bounds on heir types)

Thank you! Questions?

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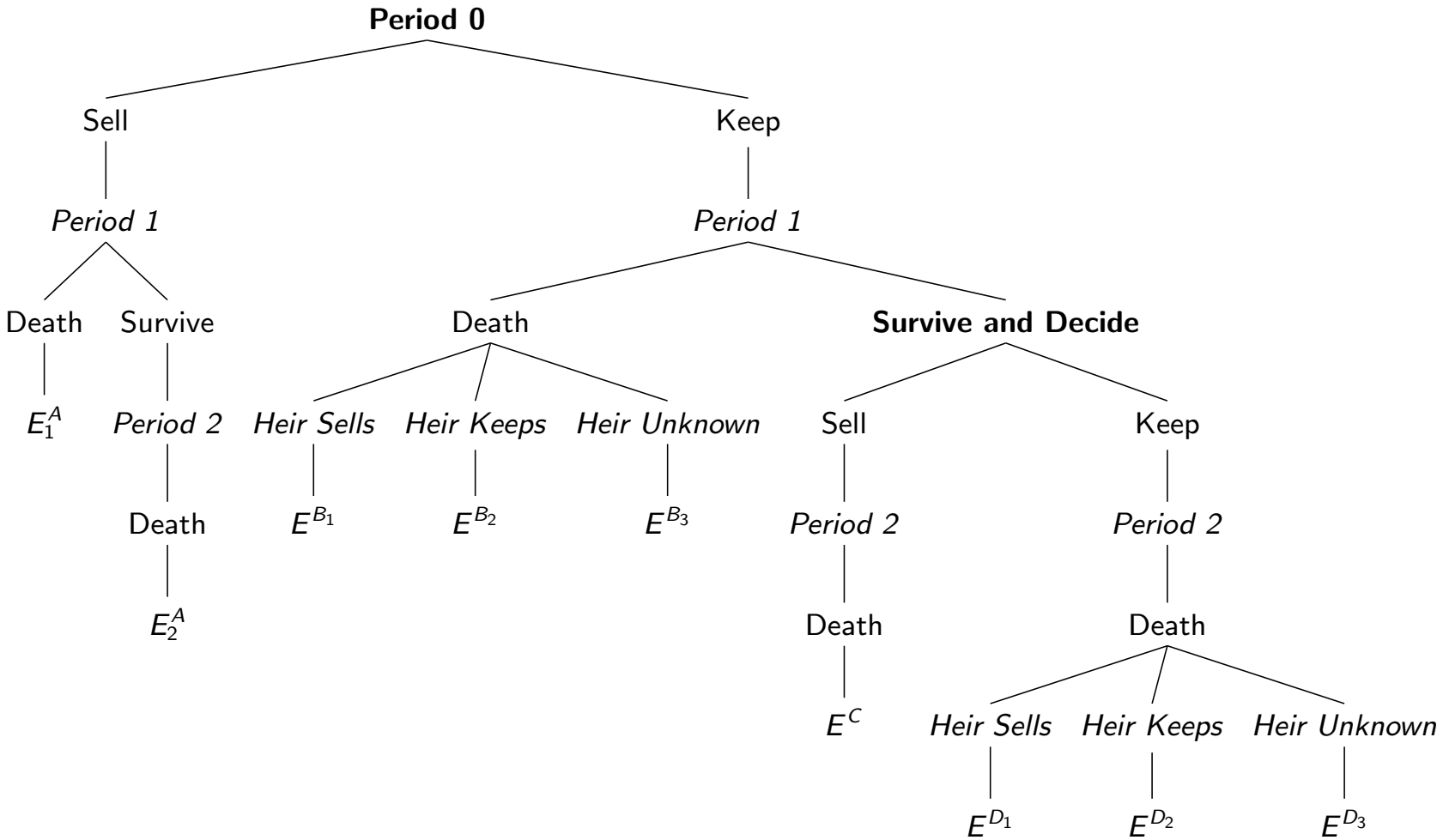
Game Tree of Landowner Decisions



◂ Landowner Decisions

Estate Valuations at Time 0

Estate value if farm is sold at time 0:

$$\begin{aligned}\mathscr{L}_0 =& \left(V_0 - \tau\left(V_0 - \bar{V}\right)\right)R^2 - CR - CD\left(1-\pi\right) \\ & - \Phi \max\left(0, \left(V_0 - \tau\left(V_0 - \bar{V}\right)\right)R - C - E_{NF}\right)\pi R \\ & - \Phi \max\left(0, \left(V_0 - \tau\left(V_0 - \bar{V}\right)\right)R^2 - CR - CD - E_{NF}\right)\left(1-\pi\right)\end{aligned}$$

Estate value if farm is kept at time 0

$$\mathscr{L}_1 = \pi \mathscr{L}_1^A + (1-\pi)\max\left(\mathscr{L}_1^B, \mathscr{L}_1^C\right)$$

▸ Estate Valuations if Kept at Time 0

◂ Added Parameters

Estate Valuations if Kept at Time 0

Estate value if landowner dies before time 1:

$$\mathscr{L}_1^A = \eta \left(k\left(R+1\right) + V_1 R - CR - \Phi \max\left(0, k + V_1 - C - E_F\right) R \right)$$
$$+ (1-\eta) \left(kR + V_1 R - CR \right.$$
$$\left. - \Phi \max\left(0, k + V_1 - C - E_F\right) R - \tau \left(V_1 - \bar{V}\right)\left(1-\gamma\right) R \right)$$

Estate value if landowner lives to time 1 and sells:

$$\mathscr{L}_1^B = kR + \left(V_1 - \tau\left(V_1 - \bar{V}\right)\right) R - CR - CD$$
$$- \Phi \max\left(0, kR + \left(V_1 - \tau\left(V_1 - \bar{V}\right)\right) R - CR - CD - E_{NF}\right)$$

Estate value if landowner lives to time 1 and keeps:

$$\mathscr{L}_1^C = \eta \left(k\left(R+1\right) + V_2 - CR - CD \right.$$
$$\left. - \Phi \max\left(0, k\left(R+1\right) + V_2 - CR - CD - E_F\right) \right)$$
$$+ (1-\eta) \left(k\left(R+1\right) + V_2 - CR - CD \right.$$
$$\left. - \Phi \max\left(0, k\left(R+1\right) + V_2 - CR - CD - E_F\right) - \tau\left(V_2 - \bar{V}\right)\left(1-\gamma\right) R \right)$$

◂ Added Parameters

Theory Model Assumptions

- Landowner wishes to maximize the post-tax value of their estate
- A single, identified heir
- All wealth is within the farm
- If sold, the farm must be sold in its entirety
- Constant tax rates
- If stepped-up basis policy changes, it affects future owners only
- V_t is equal to the discounted value of cash flows, $\frac{k+\delta}{R-1}$
- Relaxed assumption that all estates will incur an estate tax

◂ Added Parameters

Notation

Optimal selling period tables are formatted using:

		Stepped-up Basis	
		With	Without
Heir	Keeps	K_y	K_n
	Sells	S_y	S_n

Optimal periods:

- Landowner sells in period *0* or *1*
- Landowner keeps through death and heir sells, *2*
- Landowner keeps through death and heir keeps, H

▸ Hennessy Table 1 with γ
◂ Hennessy Table 1

Effects on Hennessy (1999) results, K_n, S_n (K_y, S_y)

		$\tau = 0.05$	$\tau = 0.15$	$\tau = 0.25$	$\tau = 0.35$
$\delta = 0.1$	$\Phi = 0.2$	H, 0 (H, 0)	H, 0 (H, 2)	H, 0 (H, 2)	H, 0 (H, 2)
	$\Phi = 0.35$	H, 2 (H, 2)	H, 2 (H, 2)	H, 2 (H, 2)	H, 2 (H, 2)
	$\Phi = 0.5$	H, 2 (H, 2)	H, 2 (H, 2)	H, 2 (H, 2)	H, 2 (H, 2)
$\delta = 0.2$	$\Phi = 0.2$	H, 0 (H, 0)	H, 0 (H, 0)	H, 0 (H, 2)	H, 0 (H, 2)
	$\Phi = 0.35$	H, 0 (H, 0)	H, 0 (H, 2)	H, 0 (H, 2)	H, 0 (H, 2)
	$\Phi = 0.5$	H, 2 (H, 2)	H, 2 (H, 2)	H, 2 (H, 2)	H, 1 (H, 2)
$\delta = 0.3$	$\Phi = 0.2$	H, 0 (H, 0)	H, 0 (H, 0)	H, 0 (H, 0)	H, 0 (H, 2)
	$\Phi = 0.35$	H, 0 (H, 0)	H, 0 (H, 0)	H, 0 (H, 2)	H, 0 (H, 2)
	$\Phi = 0.5$	H, 0 (H, 2)	H, 0 (H, 2)	H, 0 (H, 2)	H, 0 (H, 2)

▸ Optimal Sale Across π

◂ Hennessy Table 1

[3] $R = 1.5$, $k = 0.55$, $V_0 = V_1 = V_2 = (k + \delta) / (R - 1)$, $\bar{V} = 1.0$, $\pi = 0.5$, $E_F = 1.3$, $E_{NF} = 0.85$, $C = 0.2$, and $D = 1.1$ where all dollar values are in millions.

Optimal Sale Date Across Probabilities of Death ($\pi = 0.4$, $\pi = 0.5$, $\pi = 0.6$)

◂ Hennessy Table 1

		$\bar{V} = 3.4$	$\bar{V} = 3.6$	$\bar{V} = 3.8$	$\bar{V} = 4.0$	$\bar{V} = 4.2$
$\eta \in \{0.0, 0.1, 0.2, 0.3\}$	$\delta = 0.2$	0, 0, 0	0, 0, 0	0, 0, 0	0, 0, 0	0, 0, 0
	$\delta = 0.4$	0, 0, 0	0, 0, 0	0, 0, 0	0, 0, 0	0, 0, 0
	$\delta = 0.6$	0, 0, 0	0, 0, 0	0, 0, 0	0, 0, 0	0, 0, 0
$\eta = 0.4$	$\delta = 0.2$	2, 2, 2	0, 0, 2	0, 0, 0	0, 0, 0	0, 0, 0
	$\delta = 0.4$	0, 0, 2	0, 0, 0	0, 0, 0	0, 0, 0	0, 0, 0
	$\delta = 0.6$	0, 0, 0	0, 0, 0	0, 0, 0	0, 0, 0	0, 0, 0
$\eta = 0.5$	$\delta = 0.2$	2, 2, 2	2, 2, 2	2, 2, 2	0, 0, 2	0, 0, 0
	$\delta = 0.4$	2, 2, 2	2, 2, 2	0, 0, 2	0, 0, 0	0, 0, 0
	$\delta = 0.6$	2, 2, 2	0, 2, 2	0, 0, 2	0, 0, 0	0, 0, 0
$\eta = 0.6$	$\delta = 0.2$	2, 2, 2	2, 2, 2	2, 2, 2	2, 2, 2	2, 2, 2
	$\delta = 0.4$	2, 2, 2	2, 2, 2	2, 2, 2	2, 2, 2	0, 2, 2
	$\delta = 0.6$	2, 2, 2	2, 2, 2	2, 2, 2	2, 2, 2	0, 2, 2
$\eta \in \{0.7, 0.8, 0.9, 1.0\}$	$\delta = 0.2$	2, 2, 2	2, 2, 2	2, 2, 2	2, 2, 2	2, 2, 2
	$\delta = 0.4$	2, 2, 2	2, 2, 2	2, 2, 2	2, 2, 2	2, 2, 2
	$\delta = 0.6$	2, 2, 2	2, 2, 2	2, 2, 2	2, 2, 2	2, 2, 2

[3] $R = 1.5$, $k = 1.4$, $\Phi = 0.2$, $\tau = 0.2$, $E_{NF} = E_F = 6$, $C = 1$, $D = 1.2$, and $\gamma = 1$ where all dollar values are in millions.

In this example, 2 means keep through death.

IFOTS Table

Percentage of Iowa Farmland Owners regarding Potential Successors for Farmland Management or Farmland Ownership (Tong and Zhang (2023) Table 6.1)

Management of farmland	Ownership of farmland			
	Total	Have a potential successor	Do not have a potential successor	Don't know/refuse to answer
Total	100%	80%	19%	$< 1\%$
Have a potential successor	58%	56%	2%	0%
Do not have a potential successor	37%	20%	17%	0%
Don't know/refuse to answer	5%	4%	$< 1\%$	$< 1\%$

◂ IFOTS