Week 1 (J. Conning)

Land property rights, origins, evolution and economic and political impacts

(originally: "Landownership as determinant of economic structure and political economy")

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5-week outline

1. (Conning) The political economy of property rights
2. (Carter) Factor markets and structural transformation
3. (Jedwab) Economics of urban land use and policy
4. (Kilic & Moylan) Survey and data methods
5. (Keswell) Impact evaluation of land interventions

Slides -- Table of Contents

A very broad description of topics for each day:

Day 1: Land tenure. Diversity, origins and change.

Day 2: Resource allocation benchmarks. Misallocation.

Day 3: Land markets

Day 4: Political Economy of land, conflict and appropriation.

Day 5: Property rights reforms and governance challenges

Course Materials

Materials posted to: github.com/jhconning/land_uct_2019

- Syllabus
  - links to readings
- Slides
- Lab problem sets and solutions
- Other materials (e.g. jupyter notebook for code/visualization)

Grading

Course Overall

- 50% -- 3hr exam at end of course 50% (10% each module)
- 50% -- module specific assignments, labs, participation, presentations, etc.

Week 1 module breakdown

- 30% -- Labs and Participation
- 20% -- Research proposal development (essay and presentation)
- 50% -- Exam questions at end of course 50%

Day 1

Day 1 topics

1. Intros; Land tenure systems, diversity, change.
2. Approaches to a theory of institutions and institutional change
3. Tenure and production relations: some historical trajectories
4. Technology, factor endowments and choice of technique (Isoquants and Edgeworth boxes)
5. Land and labor resource (mis)allocation. Benchmark planner and market models. Boserup (Otsuka/Place) on technological and institutional adaptation in response to rising land pressure
6. Evolutionary theories (Coase and transaction costs). When do property assignments matter?

Labs

1. Problem Set 1 (Coase and land market transactions)
2. QGIS setup, basics. Form groups for research proposals
3. Problem Set 2 (allocation, appropriation and conflict). 1 paragraph research summaries.
4. Problem Set 3: Replicating Bubb (2013).
5. Research Proposal Presentations

Work in groups, try to write up answers individually.

What are Property Rights?

Where do they come from?

Are they formal or informal?

Property Rights and Institutions

North, Douglass. 1990. *Institutions, Institutional Change, and Economic Performance*. Cambridge University Press. From chapter 1 which you must read:

- "Institutions are the rules of the game .. the humanly devised constraints that shape human interaction ... they structure incentives in human exchange, whether political, social, or economic...
- "... reduce uncertainty by providing a structure to everyday life. They are a guide to human interaction... define and limit the set of choices of individuals"
- formal and informal (norms, codes of behavior, conventions)
- Differential performance of economies over time is fundamentally influenced by the way institutions evolve. Dysfunctional institutions may persist.

North's sports analogy

- **Institutions:** like rules of the game in competitive sport
- **Organizations:** like teams
  - political (parties, village council),
    economic (firms, unions, cooperatives),
    social (churches, clubs, families, educational orgs).
  - orgs. also provide structure.. but purpose is to 'win/advance interests' of team.
    Are the agents of institutional change
- **Individuals**: the players

"The Central puzzle of human history:

is to account for widely divergent paths of historical change and disparate performance"

Land tenure and production relations

Possible Historical Trajectories

The diagram on next two slides is from Binswanger, Deininger, Feder (1995). It is a schematic of the diversity of historical land tenure systems and production relations in agriculture.

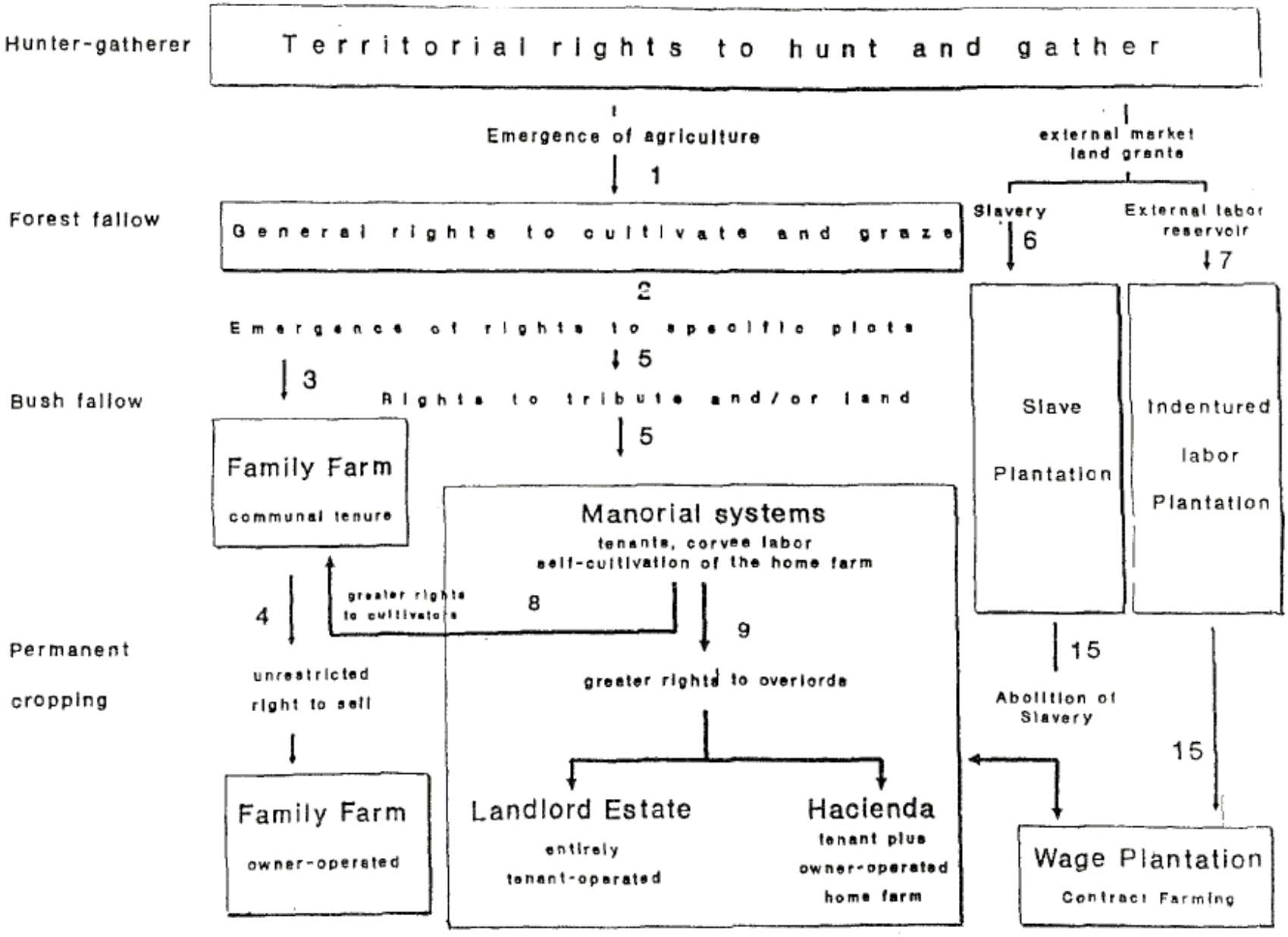

Figure 42.1. Evolution of production relations & property rights.

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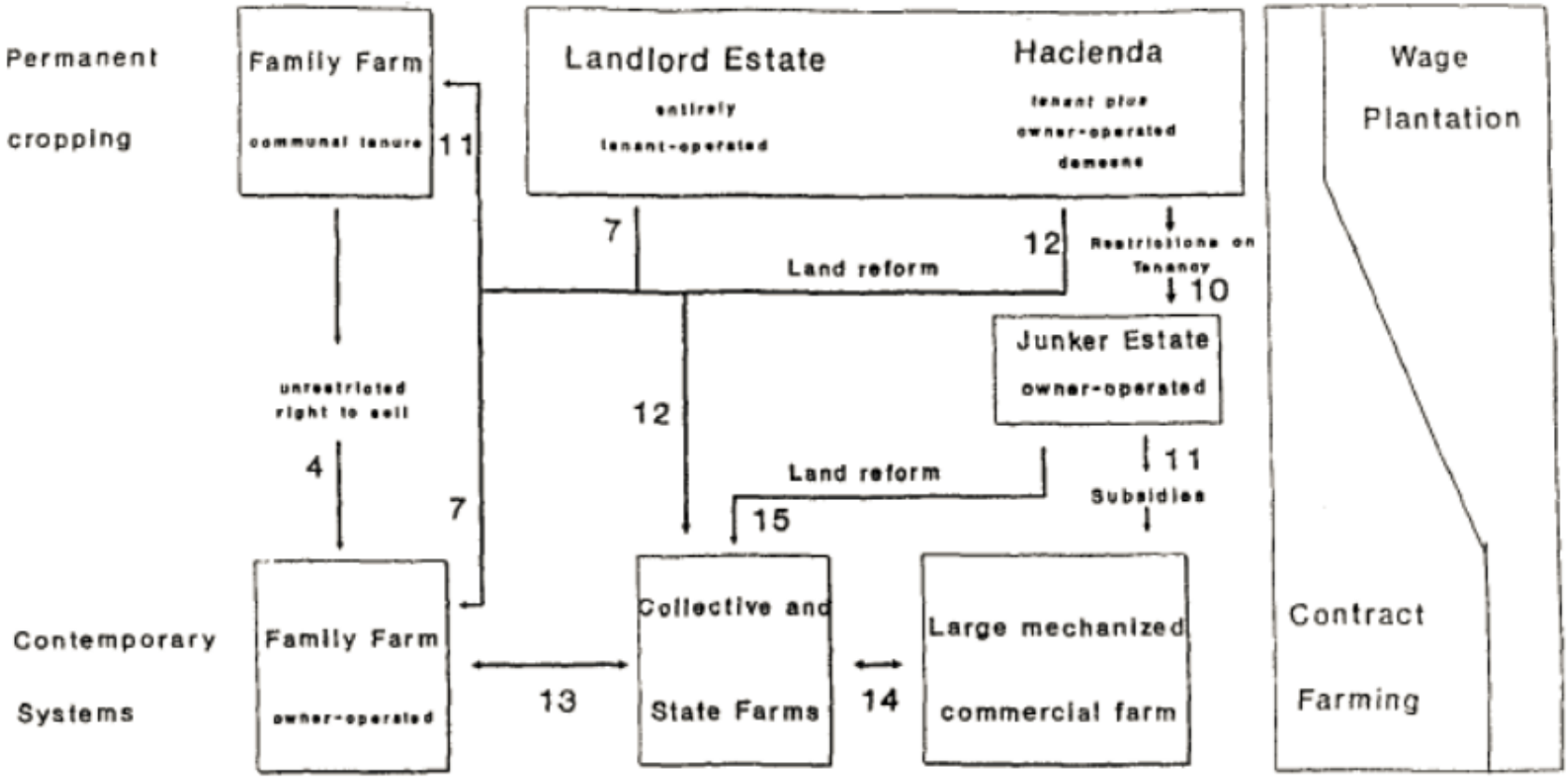
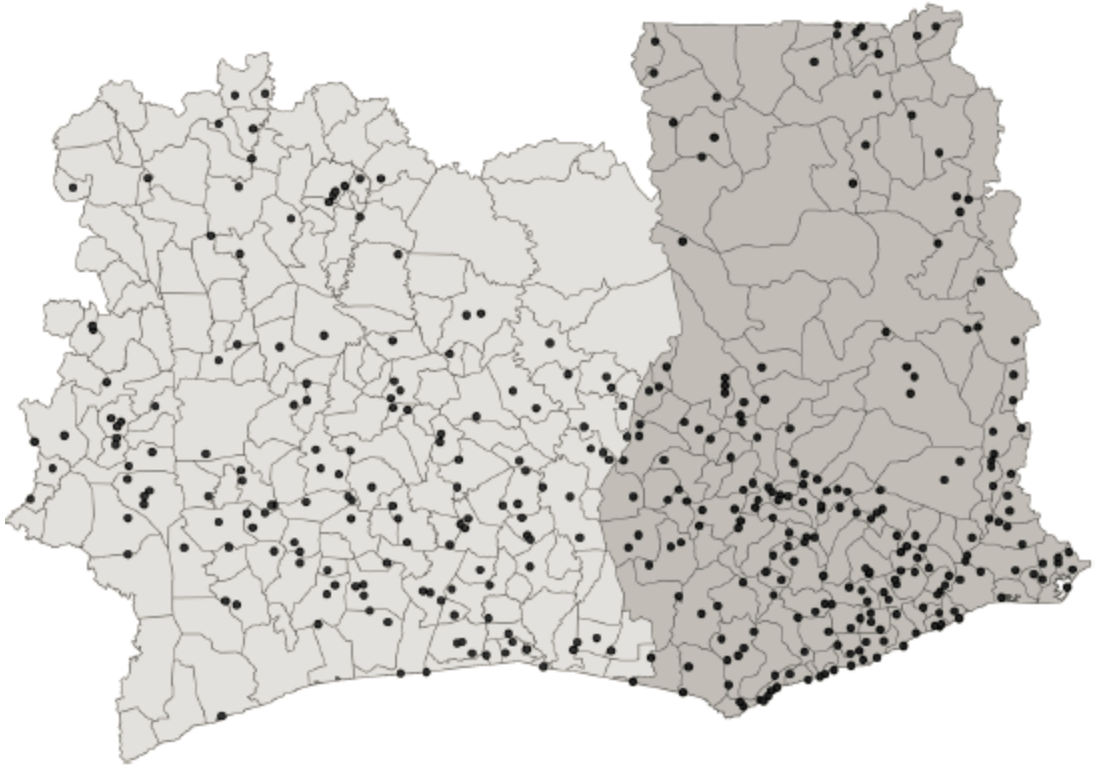

Permanent
cropping
Family Farm
communal tenure
11
Landlord Estate
entirely
tenant-operated
Hacienda
tenant plus
owner-operated
demesne
Wage
Plantation
7
Land reform
12
Restrictions on
Tenancy
10
Junker Estate
owner-operated
unrestricted
right to sell
4
12
Land reform
11
Subsidies
7
15
Contemporary
Systems
Family Farm
owner-operated
13
Collective and
State Farms
14
Large mechanized
commercial farm
Contract
Farming

Land rights institutions

Form	Functions
Laws, norms, rules, and policies	State proper ways of transacting
Registries, survey departments, councils of elders, land overseers	Keep information on interests, dimensions, and locations
Courts, tribunals	Adjudicate land disputes
Police, task forces, village committees, boards	Enforce and monitor compliance with rules concerning rights

from Onoma (2009) *The Politics of Property Rights Institutions in Africa*, Table 1.1

Where is this?



Cote d'Ivoire and Ghana

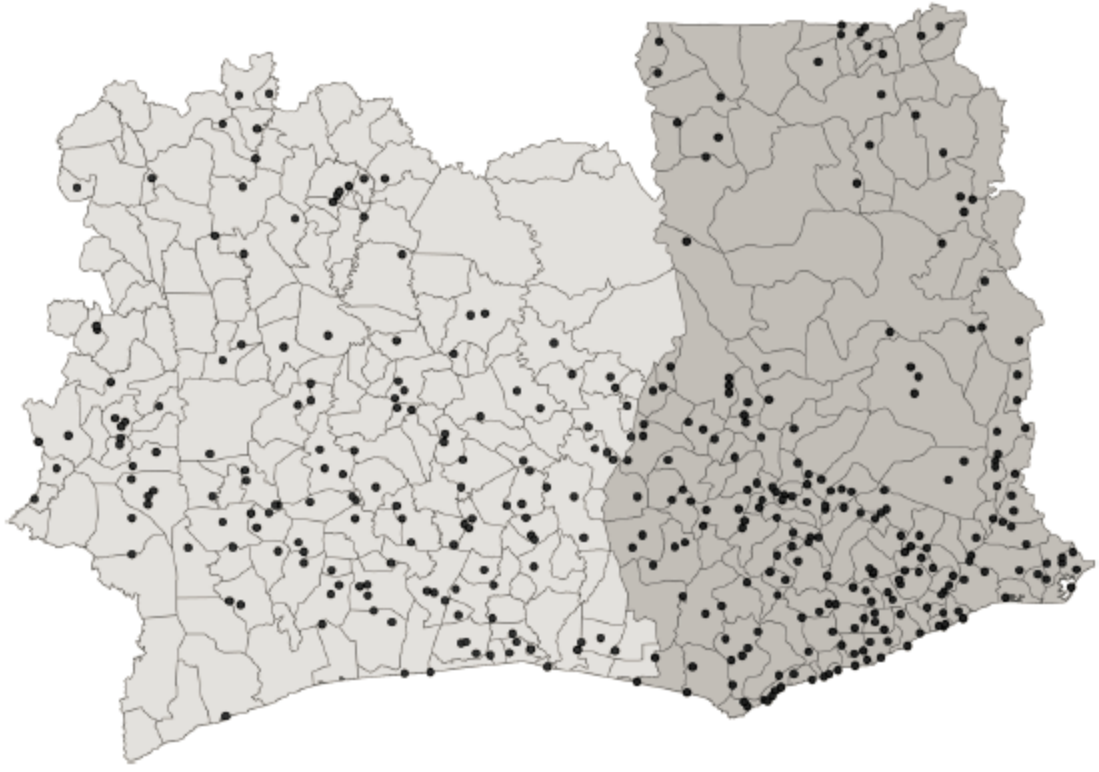


Figure 1. Ghana Living Standards Survey rounds 1 and 2 and Côte d'Ivoire Living Standards Survey enumeration areas.

State law in Cote d'Ivoire and Ghana

- Ghana maintained British common law institutions. Indirect-rule delegated authority to local elites, legalized form of customary law. Slowed individualization of property rights.
- In Cote d'Ivoire french colonial authorities initially claimed state ownership of all 'unnoccupied and uncultivated land', extinguishing customary claims, established freehold. Independent CI maintained state legal framework to loosen customry claims.

de-jure vs. *de-facto* law.

Lab exercise to replicate maps and regressions in:

Bubb, Ryan. 2013. "The Evolution of Property Rights: State Law or Informal Norms?" *The Journal of Law & Economics* 56 (3): 555–94.

- Compare state boundaries to Murdock Ethnic Atlas Map
- Research discontinuity design to explore whether state law or more organic customary law prevails (distance to border as running variable).
- Combine raster and polygon data to calculate crop suitability zonal statistics and explore how varies with measures of property rights individualization.

Introductions

- Your name, place of study, country of origin
- Research topics or experience on land or land-related topics
- Special training (e.g. law, GIS..)
- A small land-related anecdote in your life

What drives institutional change?

In most accounts:

- changing relative factor scarcities (e.g. rising population)
- technological innovation and change
- new opportunities for trade, changing relative prices
- State capacity and power, constraints on the state.
- Imposed political and economic change (appropriation, coercion, tribute)

Evolutionary versus non-evolutionary approaches

- Evolutionary adaptions/innovations to take advantage of new opportunities. Emergent, spontaneous.
- Purposefully (coercively) imposed institutions. The State.
    - Power balance outcome between those who wan to impose their interests and those who resist

Do institutions, property rights and land tenure systems evolve to organize production more efficiently over time?

To advance the interests of elites?

Do dysfunctional institutions arise and persist? Why?

Economic approaches to study of land institutions

- **Classical** (Smith, Ricardo, Mill...). Great attention to land.
- **Marxian**: More conflict base model of institutional change. Appropriation and control.
- **Neo-classical** (marginalist). Institutional and organizational problems black-boxed, land just one more factor.
- **New-institutional** (transactions costs; CDAWN -Coase, Demsetz, Alchian, Williamson, North). Institutions and contract forms shape incentives; evolve over time.
- **Modern asymmetric information contracting** (Stiglitz, Holmstrom, Tirole, Hart). Property rights and contracting matter with asymmetric information.
- **Modern political economy** (later North, Acemoglu/Robinson, Engerman/Sokoloff and others). Institutions fundamental, shaped by political as well as economic interests.

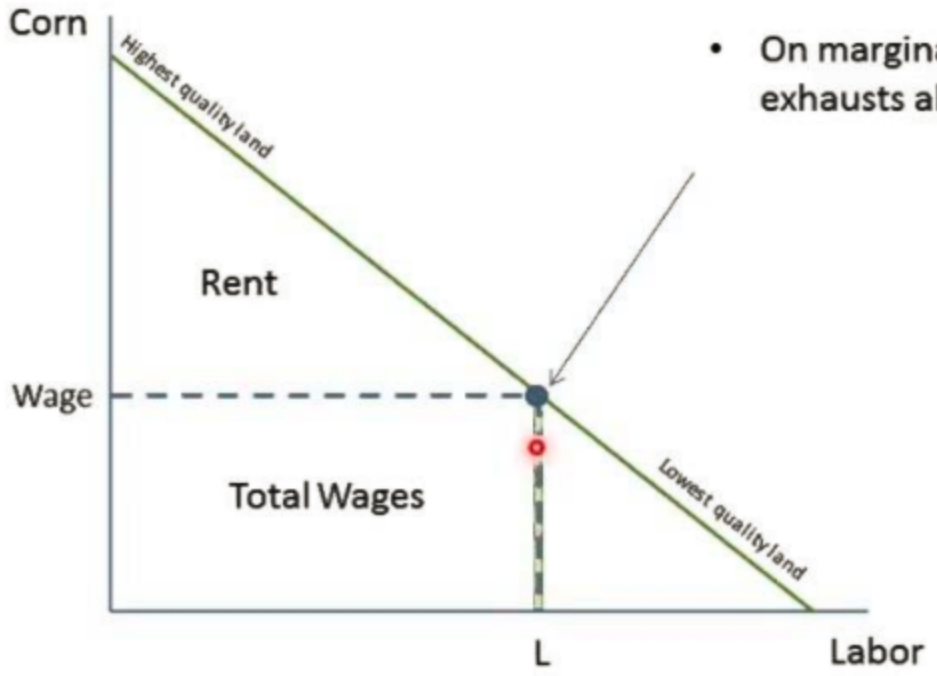
Classical economists on land rents, enclosure and incentives

How land ownership and contracts shaped incentives and divided output a central concern. Writing in 18th and 19th centuries:

- "landlords' right has its origin in robbery (Say)"
- "landlords...love to reap where they never sowed... demands a rent even for unimproved land... when the lease comes to be renewed.. the landlord commonly demands augmentation of rent [made by the tenant] (Smith)"
- "Those laws and customs so favorable to the yeomanry, have perhaps contributed more to the present grandeur of England, than all their boasted regulations of commerce taken together .. the security of the tenant is equal to that of the proprietor (Smith)"
- Marx on transformation of manoralism and enclosure. On Wakefield and land policy in colonies.

Ricardian Rent

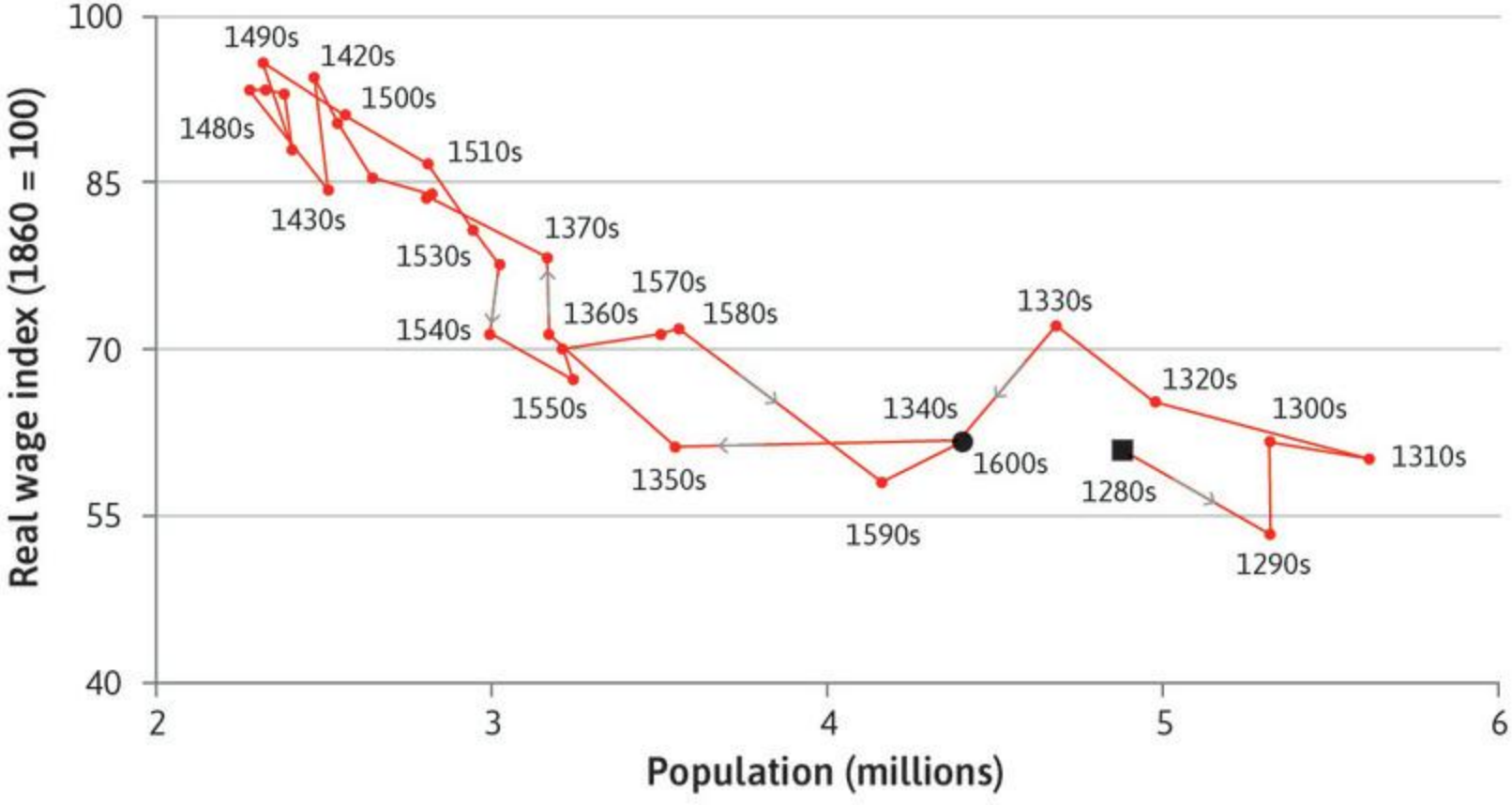
- Most fertile land used first.
- No 'rent' can be charged (above cost of clearing land) if worker can clear land of same quality on frontier.
- Land rent hence zero on 'marginal' (last to be used) land so long as not-exhausted.
- Positive rent only on infra-marginal land. Rent is charged for resource scarcity of higher fertility, better access/location.

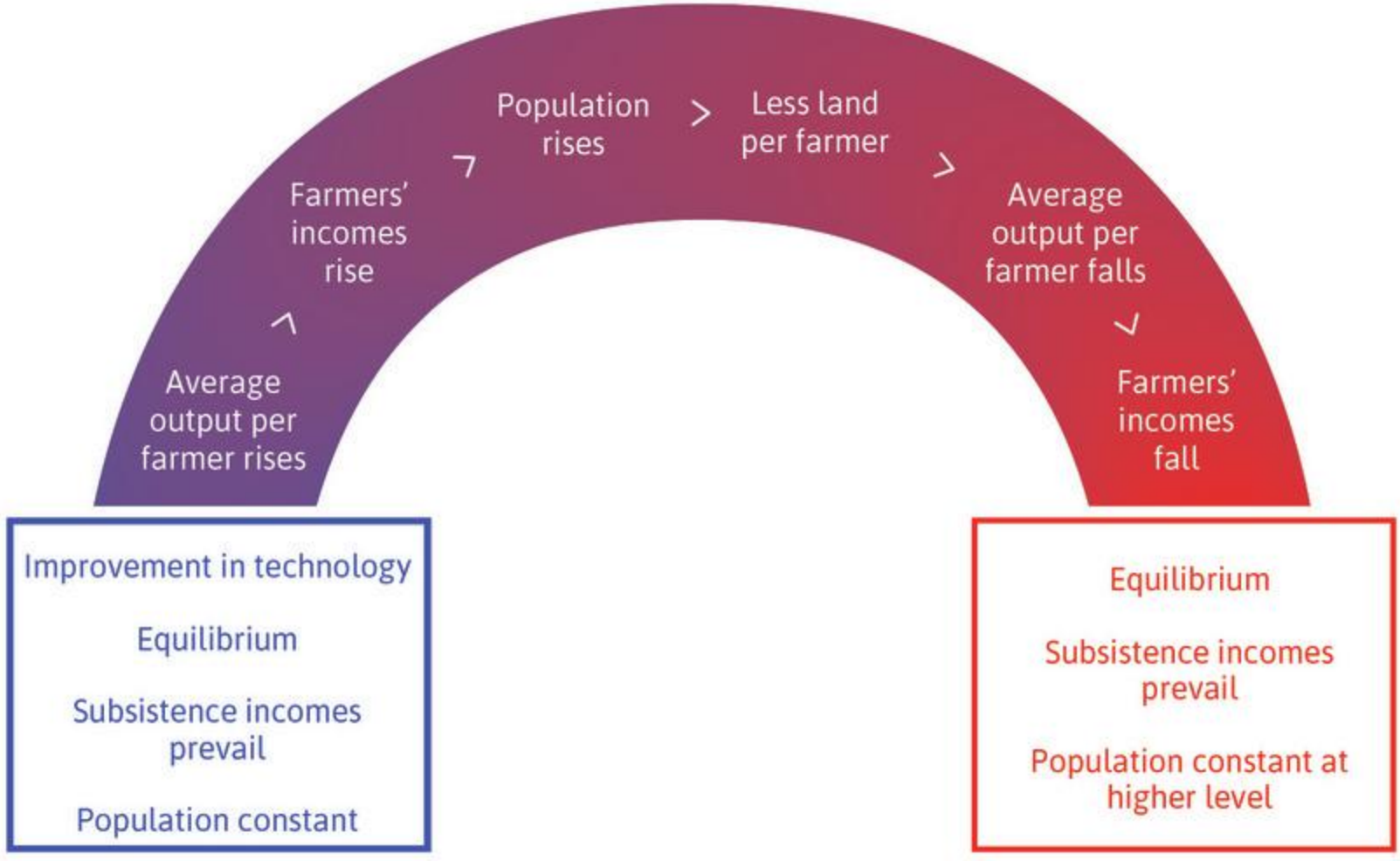


- On marginal land, rent is zero—wage exhausts all product.

Ricardo, Malthus and diminishing returns

With fixed technology, rising population pushes against fixed land and other natural resources.

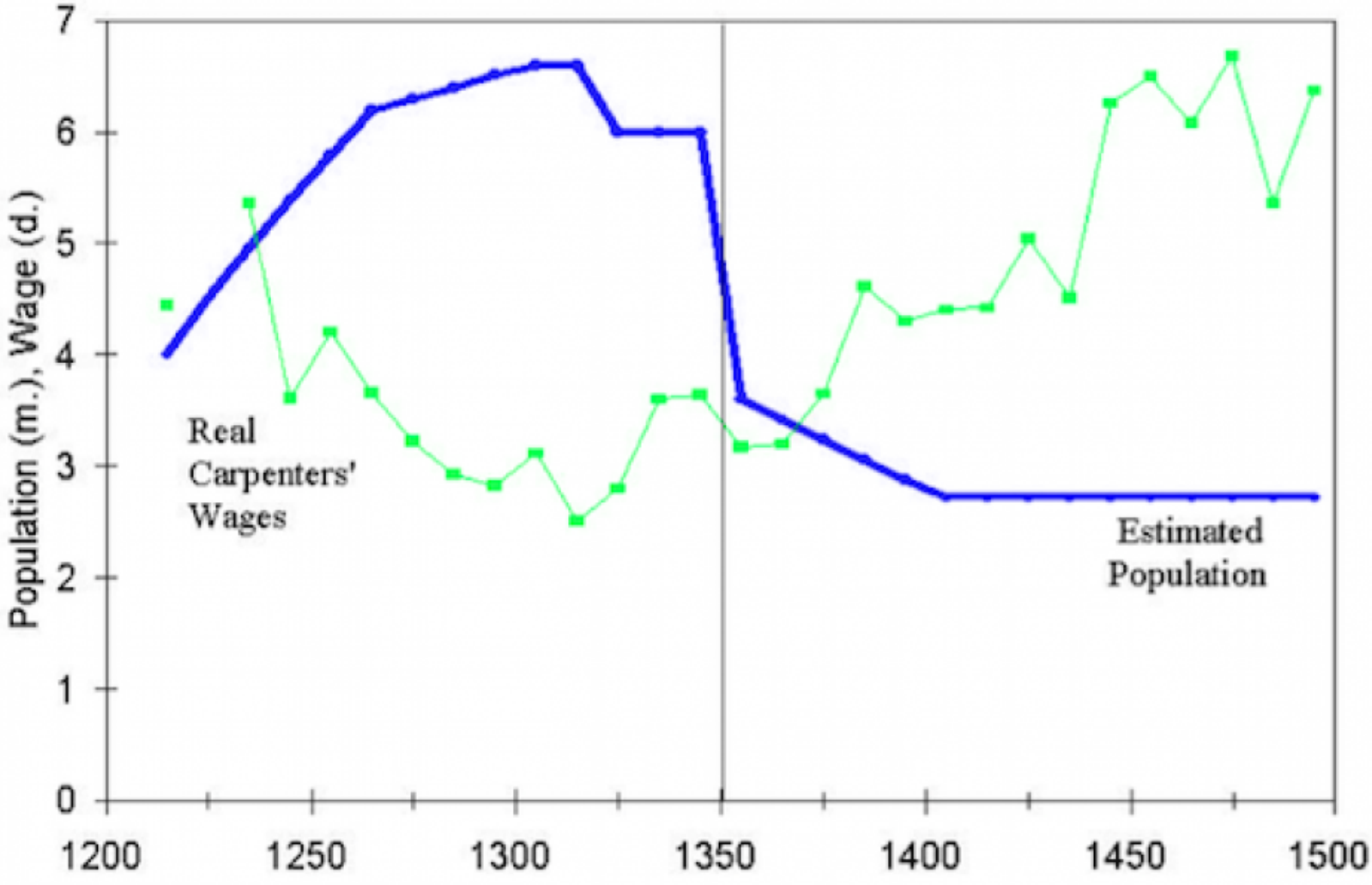




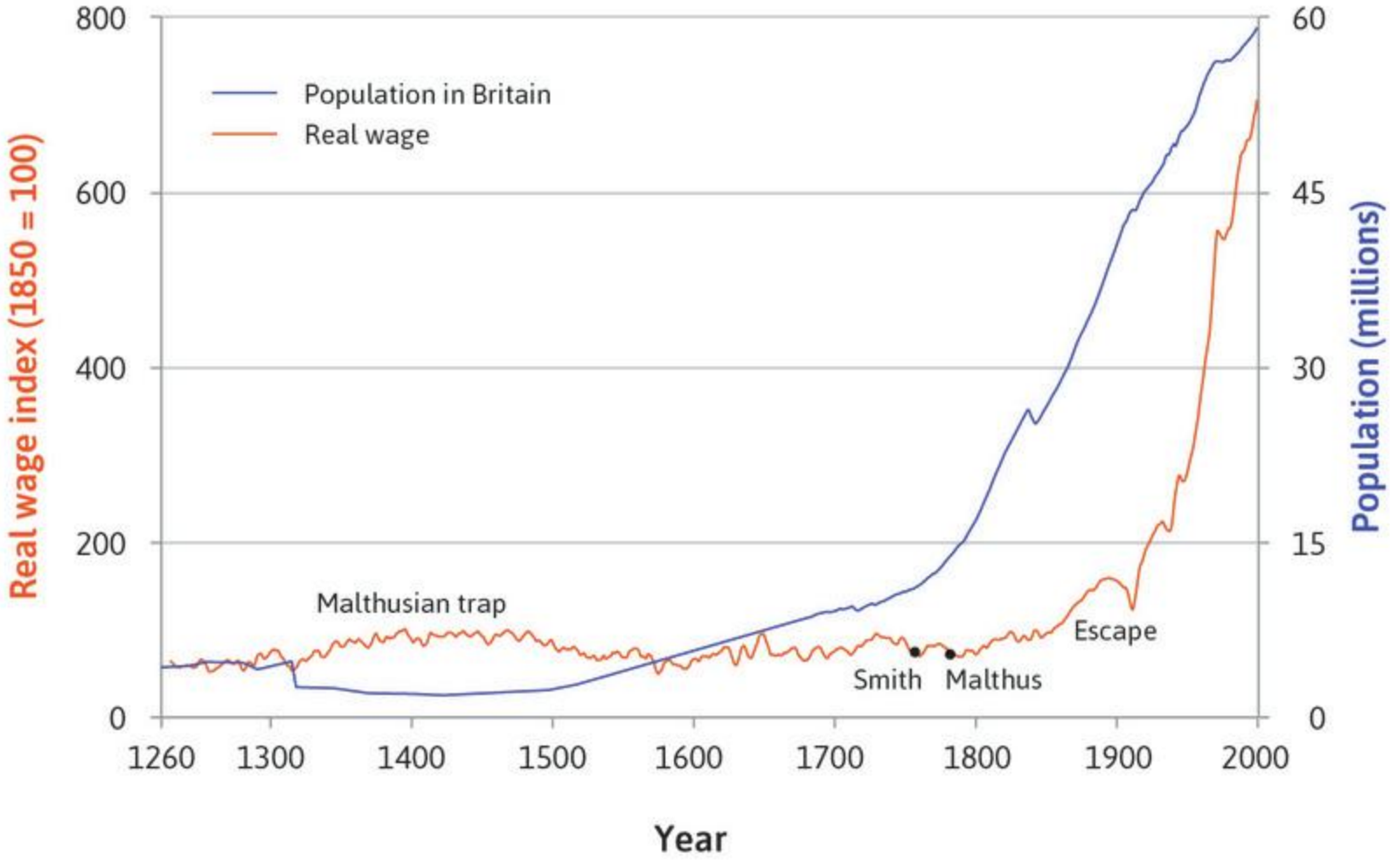
For millenia technological change was slow.

World was largely Malthusian.

The Black Plague



In W. Europe when pop fell, wages rose and serfdom collapsed.
in E. Europe landlords responded to labor scarcity w/ 2nd serfdom



Ricardo and Malthus were contemporaries, Marx wrote in late 19th

What allowed this escape?

- Technology, rising productivity, industrialization, competition, new rights.
  But what led those things to happen and why didn't it happen before?
- Structural and institutional transformation
  - What role did the transformation of customary land tenure in Europe play (much more below)?

Neo-classical approaches

Pareto, Walras, Jevons, Marshall. Textbooks are now dominated by 20th century marginalism.

- Land now treated more symmetrically with other factors
- Property rights typically analyzed as individualized.
- Contracting and property rights problems assumed away

Neo-classical efficient allocation

- Under strong assumptions about technology and preferences and the perfect and costless enforcement of property rights: complete markets.
- **First-welfare Theorem** (Smith's 'invisible hand'): competitive market equilibria with complete markets will be Pareto efficient (***regardless of the initial distribution of property rights***).
- Abstracts away (assumes too much about) how property and contracts are enforced.
- Institutional and organizational detail erased . Firms are black boxes, contracts are all arms length.
- Claim that efficiency and equity considerations can be separated.

> **'An economic transaction is a solved political problem ...economics has gained the title Queen of the Social Sciences by choosing solved political problems as its domain'**

Abba Lerner (1972, p259) cited in Bowles and Gintis (1993)

Historical footnotes: like classical political econs (Smith, Ricardo, Marx, Mill), many early 20th century marginalists saw security of tenure and land markets as important to prosperity but also often descriibed rents from rising value of unimproved land as 'unearned.'

Leon Walras argued for common ownership, Henry George for that or 100% tax on unearned land rent.

Broadening of land rights in late 19th century early 20th century under political pressure in W. Europe (agitation and franchise extension led to far-reaching tenancy reforms) and USA (rapid expansion of frontier and transfer of public lands under pressure of squatters, claims clubs, speculators...Preemption and Homesteading acts).

Autocratic landownership prevailed longer elsewhere in East Europe, Russia, Asia, Latin America.

Colonial Scramble for Africa in late 19th century

New-institutional Economics

Focus on institutions and property rights (largely within a neo-classical market framework):

- Coase (1937) 'The Boundaries of the Firm',
  Coase (1960) "The Problem of Social Cost."
- "Transactions Costs" get in the way of trades. Views:
  - "Property Rights and Markets Paradigm": Institutions and organizations emerge/evolve to economize on transactions costs (TC), capture potential gains to trade. Bad institutions are weeded out via process similar to natural selection (Alchian, Demsetz, early North).
  - TC hard to overcome (coordination, information, etc), dysfunctional institutions slow to change.
  - Those with power may shape institutions in their interests, to stay in power, not necessarily to be efficient.

Spontaneous order versus planning...

> Customs are better understood as a living, negotiated tissue of practices which are continually being adapted to new ecological and social circumstances—including, of course, power relations. Customary systems of tenure should not be romanticized; they are usually riven with inequalities based on gender, status, and lineage. But because they are strongly local, particular, and adaptable, their plasticity can be the source of microadjustments that lead to shifts in prevailing practice.

Scott, James C. *Seeing Like a State*, p.34

The Emergence of Property rights to Land

Coase and the Property Rights and Markets paradigm

- Property rights emerge when they become worth enforcing
- Rising land scarcity leads to better definition of rights; over time leading to accessible sale and rental markets
- Perhaps empirically true in some cases, clearly not in others.
- Important grain of truth worth understanding.
    - Why does it fail to happen.

When land is abundant, control over labor

- Critical issue is access to labor, not land.
- Little incentive to invest in soil fertility (restored naturally through long tree fallow)

> "When population densities rise, fallow periods ...shortened until the land is continually cultivated. Then plows, manure, artificial fertilizers, and other investments and labor intensive methods ...required to maintain soil fertility ... [m]arginal lands ...brought under cultivation requiring higher investments... Only now, ownership security becomes and important incentive
>
> Boserup, 1965, quoted in Binswanger, Deininger Feder (1995)

Transformation of land tenure systems in response to rising population pressure (Boserup)

Before the emergency of private property in land...certain families are recognized as having cultivation rights within a given area...

Members 'general cultivation right to cultivate a plot inalienable ...but after lapse of normal period of allow if family does not re-cultivate a given plot, it may lose its right to this particular plot ... As long as forest-fallow cultivators has abundant land ...shift to new plot or have it allocated by the chief of the tribe...

Otsuka, Keijiro, and Frank M. Place. 2001

"Issues and Theoretical Framework", *Land Tenure and Natural Resource Management: A Comparative Study of Agrarian Communities in Asia and Africa*. IFPRI & Johns Hopkins University Press.

Synthesis evolutionary model of farming systems & induced technical change

In a book with chapters on Ghana, Malawi, Uganda, Nepal, Sumatra, Vietnam and Japan. Property rights institutions or land tenure systems:

- communal, state, common-property, individual
- As population grows and markets penetrate demand for individual property rights grows, communal and state ownership may face serious difficulties.
- Not clear that making private property is always preferable (e.g. negative externalities like soil erosion may intensify, inequity may rise, costly defense)

Model elements (pset 1)

Endowments, technology and choice of techniques

- territory-wide endowment of land $\bar{T}$ and labor $\bar{L}$
- F(T, L) assume CRS or linear homogenous at first
    - isoquant and choice of technique
    - iso-cost lines
    - cost-minimization

Technology vs. choice of technique

$$F(T, L) = A \cdot T^{\alpha} L^{1-\alpha}$$

Simplify to two groups of identical farmers

Land T: includes 'fallowed lands'. Fallow land is not unused.

If population is scarce and land abundant little incentive to claim individual property rights. Forest area use is unrestricted except exclusion of outsiders.

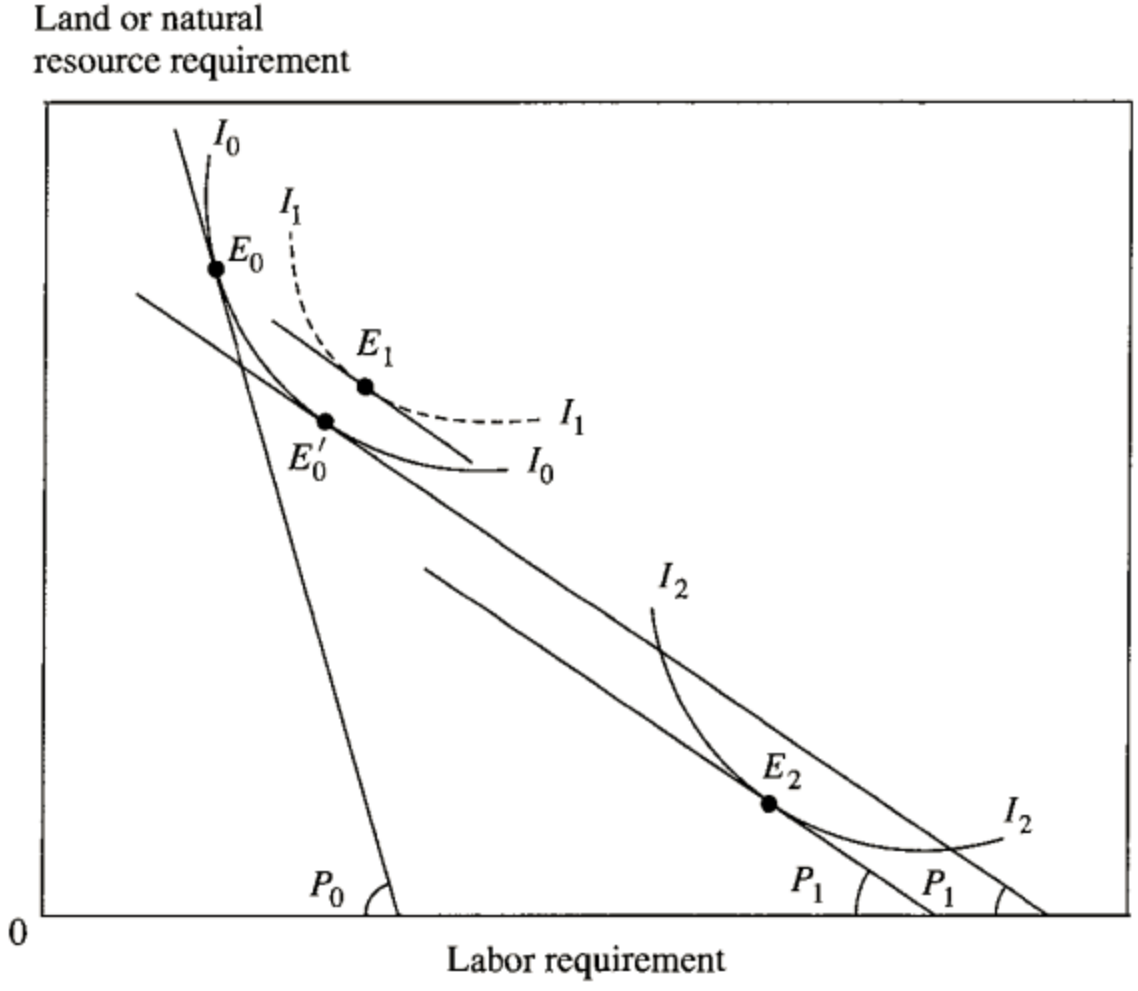
Usufruct rights of individual members are well establish for cultivated fields but less so for fallow. Community chief may determine its allocation

Diagrammatic analysis

(on Chalkboard)

- Homogenous production functions, properties.
- Cobb-Douglas properties
- Isoquant and isocost lines
- A as total factor productivity and land quality parameter
- Planner and competitive market first order necessary conditions for efficient allocation
    - Appropriate choice of technique
    - Equilibrium (shadow) wage-rental
    - Edgeworth Box

FIGURE 1.2 A model of induced institutional innovation



(On Chalkboard)

- Effect of rising population density
  - Change to Edgeworth Box
  - Change in equilibrium efficient choice and shadow w/r
  - Shorter fallowing $\rightarrow$ declining land productivity

Without technological/institutional change commercialization accelerates process placing pressure on most elastic factors (land, resources)

(on chalkboard)

Sustainable responses:

- improve land quality by investing in irrigation or terracing
- investing in commercial trees (cocoa, coffee, rubber, etc). To maintain soil fertility under continuous cultivation new farming systems with composting and other organic and inorganic fertilizer.
- Viewed as *new* more labor intensive production technology
- Depict new technology as more profitable

Land tenure system adaptation for sustainability

- restricted transfer rights and not totally secure usufruct rights under traditional land tenure may lower expected returns to investment.
    - Fear may not reap full benefits of investment or inability to bequeath to desired heirs or sell land freely if need arises.
- Establishment of clearer common property for degraded secondary forests

Why institutions may fail to adapt

Will we see demand driven process toward greater individualization or continued resource degradation?

Factors that may inhibit

- high cost of investments, or poor returns
- difficulties in organizing collective actions
- high transaction costs
- legal restrictions (e.g. nationalization of forests, granting leasehold/freehold to large holders, suppression of tenancy contracts)

Coase, Property rights and the 'Coase Theorem'

Coase, R. H. 1960. “The Problem of Social Cost.” *The Journal of Law and Economics* 3:1–44.

Coase, Ronald H. 1937. “The Nature of the Firm.” *Economica* 4 (16):386–405.

(Also see jupyter notebook on Coase)

Coase (1960): A rancher and wheat farmer

On adjacent fields. No fence.

The Wheat Farmer

The wheat farm chooses inuts for a maximized profit of $\Pi_W = 8$.

- to things simple assume this all or nothing choice.

The Rancher

Chooses herd size x to maximize profits:

$$\Pi_C(x) = P \cdot F(x) - c \cdot x$$

P is cattle price and c is the cost of feeding each animal.

FOC for optimal herd size $x^* : P \cdot F'(x^*) = c\$$

If $F(x) = \sqrt{x}$, FOC are:

$$\frac{P}{2\sqrt{x}\ *} = c \rightarrow x^* = \frac{P^2}{4c^2}$$

Example: If $P_c = 4$ and $c = 1$

the rancher's privately optimal herd size: $x^* = 4$

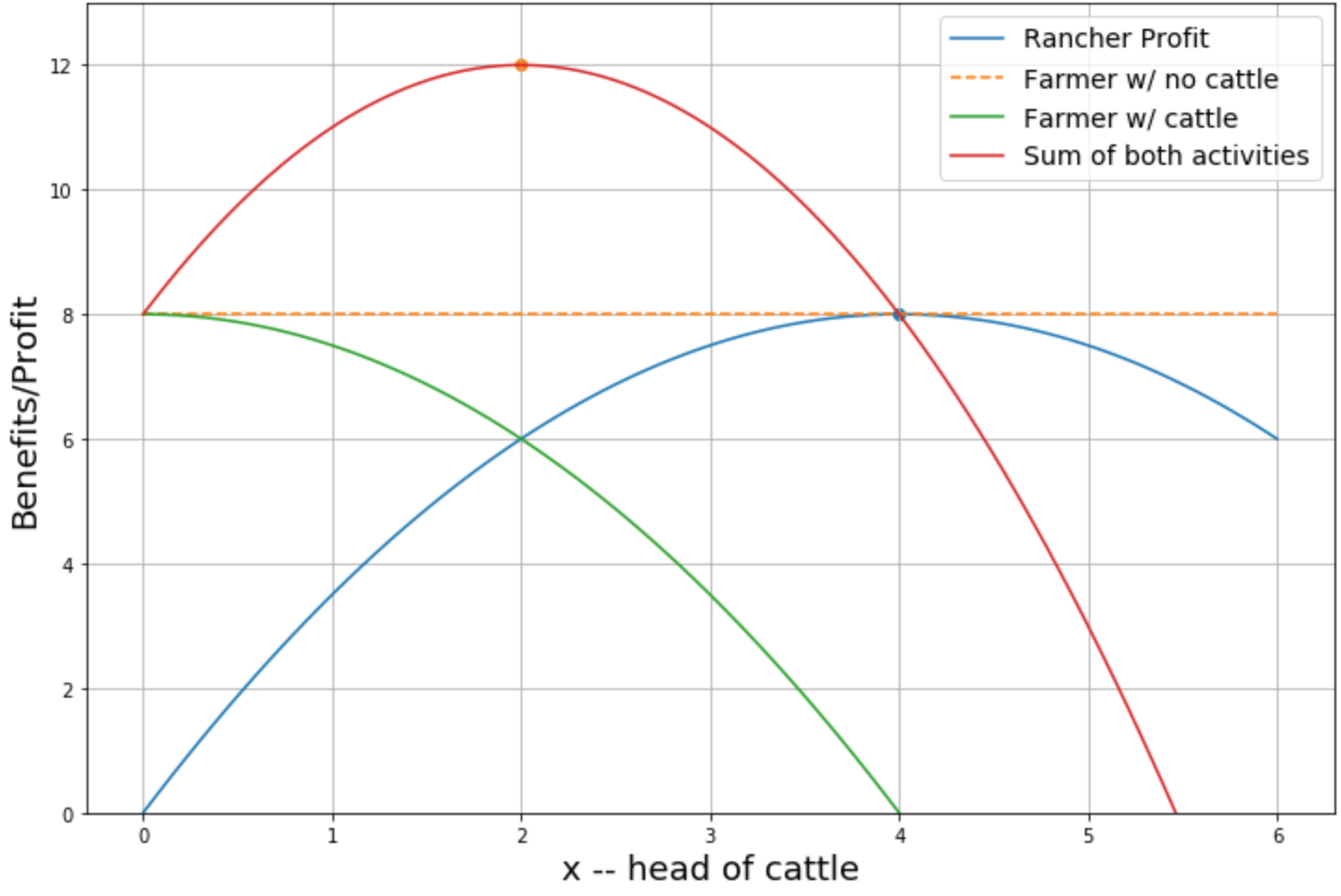
The external cost

No effective barrier between fields so cattle can stray into wheat farmer's fields, damaging crops and profits.

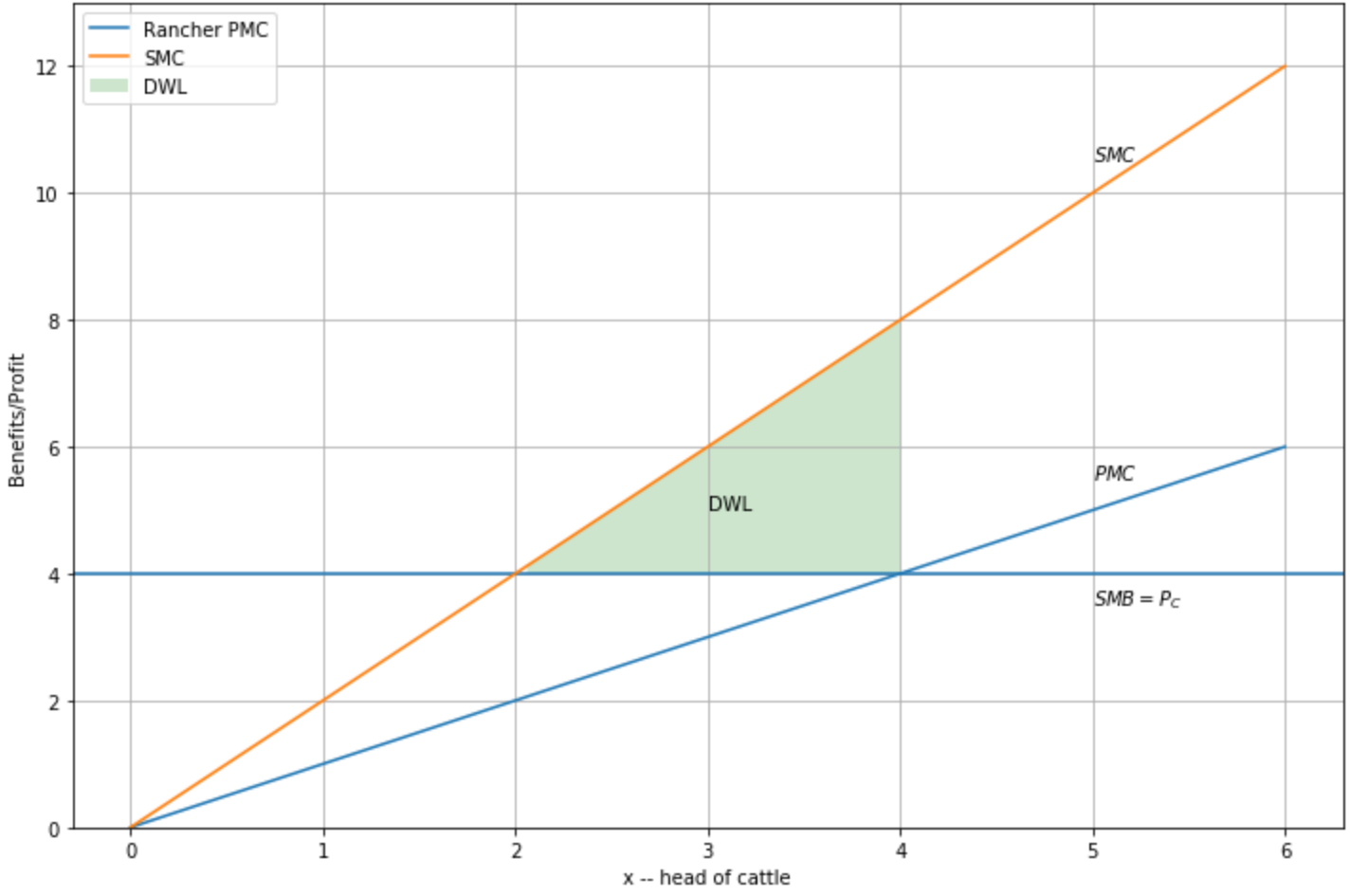
Specifically, herd of size x reduces net wheat profits to:

$$\Pi_W(x) = \Pi_W - d \cdot x^2$$

Suppose $d = 1$.
At ranchers private optimum $x^* = 4$ wheat profits are zero.


Rancher Profit
Farmer w/ no cattle
Farmer w/ cattle
Sum of both activities
Benefits/Profit
x -- head of cattle
0
2
4
6
8
10
12
0
1
2
3
4
5
6

As private social marginal benefits and costs to see DWL:



Assigning Property Rights

Who is causing harm to who?

The cattle damages crops but if we prohibit all cattle then rancher is harmed.

Assignment of liability equivalent to assigning property rights

Think: right to graze cattle (e.g. tradable permits to graze 1 head cattle)

Case1: Property Rights to the Farmer

Farmer has right to enjoin cattle herding (prohibit via an injunction).

Rancher now earns $0. Farmer $8.

This is not Pareto efficient.

If rancher herded just 2 would earn $6. Could offer $2 compensation to the wheat farmer and capture $6-2 =$4.

...or they could bargain to divide the gains to trade of $4 in other ways.

Case 2: Property Rights to the rancher

Rancher has right to graze with impunity.

Farmer earns $0 if rancher herds at private optimal of 4 cattle.
This is not Pareto efficient.

Farmer pay $2 to have rancher reduce herd by 2 leaving rancher no worse off but raising farmer earnings from $0 to $4 (= 6-2).

...or they could bargain to divide the gains to trade of $4 in other ways.

The so called 'Coase Theorem'

With zero transactions costs :

- **The initial assignment of property rights does not matter:** The parties bargain to an efficient outcome either way.
- However legal rights are valuable, so *the initial allocation will affect the distribution of benefits and incomes between parties*
- The farmer might 'buy out the rancher" (or vice-versa) to create a larger single firm that internalizes the costs.

Creating Property Rights

The emergence of property rights: Even there were no initial assignment of property rights the parties would create them by negotiating to establish an efficient outcome.

Creating tradable legal-entitlements to complete markets. Restore efficiency.

When transactions costs are positive

- With zero transactions costs property rights gravitate to who values them most.
- With positive transactions costs this may not happen. Hence the initial allocation of property rights can affect the efficiency of the outcome.
- Simple example: suppose rights to herd cattle are issued but cannot be traded due to high transactions costs. If allocate all rights to rancher then social output is below allocation where allocation is 2 and 2.

Coase and the development of a land market

Two scenarios:

1. Open frontier: where land is still abundant
2. Congestion or Land Scarcity.

A stylized system of "customary tenure"

An open field and no land market.

Under what we will call 'customary law' land is allocated to person with more status in village. They can clear as much land as can 'productively use'.

The other villager obtains access to remaining land or as much land as they can profitably use.

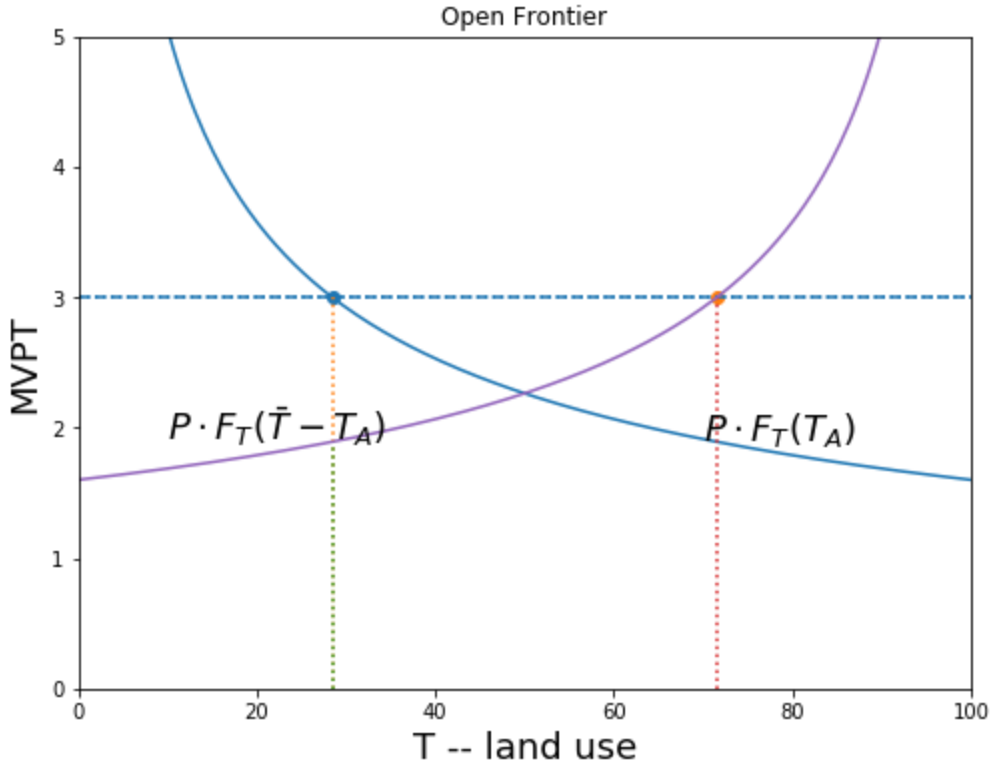
Land abundance or non-congestion

$\bar{T}$ units of land and N=2 households.

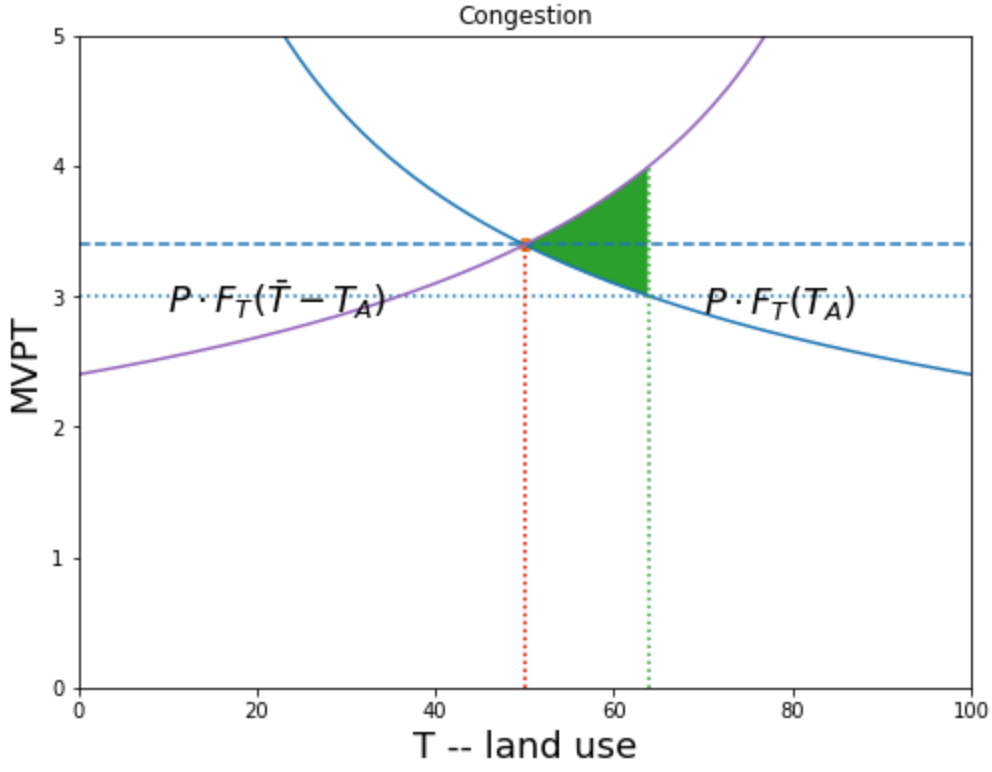
Land clearing cost c. Frontier land not yet exhausted.

Each farmer will maximize profits at $P \cdot F_T(T) = c$

No land rent (above cost of clearing land)



Congestion/land scarcity



- Why is the initial allocation inefficient?
- How do we calculate deadweight loss?
- What kind of bargains can farmer B offer to farmer A (or vice-versa)?
- How would a land market work?
- What 'transactions costs' might stand in the way of such a solution?

- The Coase Theorem (zero transactions costs)
- Coase with transactions costs
- Does the initial assignment of property rights matter?
    - Evidence from natural experiments (English enclosures, colonial land policy) and field experiments
- Why property insecurity might matter (claimed channels)

Barriers to Coasian bargaining

Costless bargaining between the parties will lead to an efficient outcome regardless of which party is awarded the rights?

Here farmer B can offer to pay farmer A to rent out the land farmer A has claimed. Emergence of a land market.

Initial assignment of land rights does not matter... those who value rights more highly will be willing to compensate those who value them less to transfer the rights to highest value use.

Coase Theorem: True, False or Tautology?

Tautology?: "if there are no costs to fixing things, then things will be fixed."

Like the First Welfare Theorem (complete competitive markets will lead to efficient allocations, regardless of initial allocation of property rights).

The Coase Theorem 'works' by assuming new legal entitlements can be created and made tradable.

Key issue to which we return: If land is secure and tradable and 'small family farm' is most efficient operational size (issue we examine later) then a large landholder would have rental tenants rather than farm themselves.

With transactions costs, initial property assignments matter

Transactions costs in the land rental market:

- asymmetric information about plot characteristics
- fear that tenant will 'squat' and not pay rent/return land
- under some forms of customary farmer A may fear that rental to B will be viewed as evidence that A does not need as much land. A earns more by farming inefficiently than by giving up claim

Under insecure property rights as above then initial 'property rights' assignment matters (more output if A and B gets original assignment)

Do initial land assignments matter in practice?

- Plenty of evidence (studied later) says yes.
- Purposeful 'market Design' mechanisms used how to allocate initial property rights (e.g. spectrum auction in USA, 19th century debates over how to allocate public lands)
- Evidence from natural experiments and field experiments suggest that even in environments with functioning land markets trading to efficient farm size/shape can be difficult
    - hard to consolidate fragmented holdings, move boundaries

A Natural Experiment

Libecap, Gary D., and Dean Lueck. 2011. "The Demarcation of Land and the Role of Coordinating Property Institutions." *Journal of Political Economy* 119 (3):426–467.

19th century state of Ohio. Two different land demarcation systems:

- Metes and bounds (MB) : decentralized plot shapes and alignment (e.g. follow topography). Most prevalent world wide.
- Rectangular system (RS): centralized grid with uniform square plots that does not vary with topography.
- In low transactions costs world Coase Theorem states property rights will be re-arranged for efficiency either way.
- Study finds RS leads to better outcomes on variety of measures

Research Discontinuity Designs

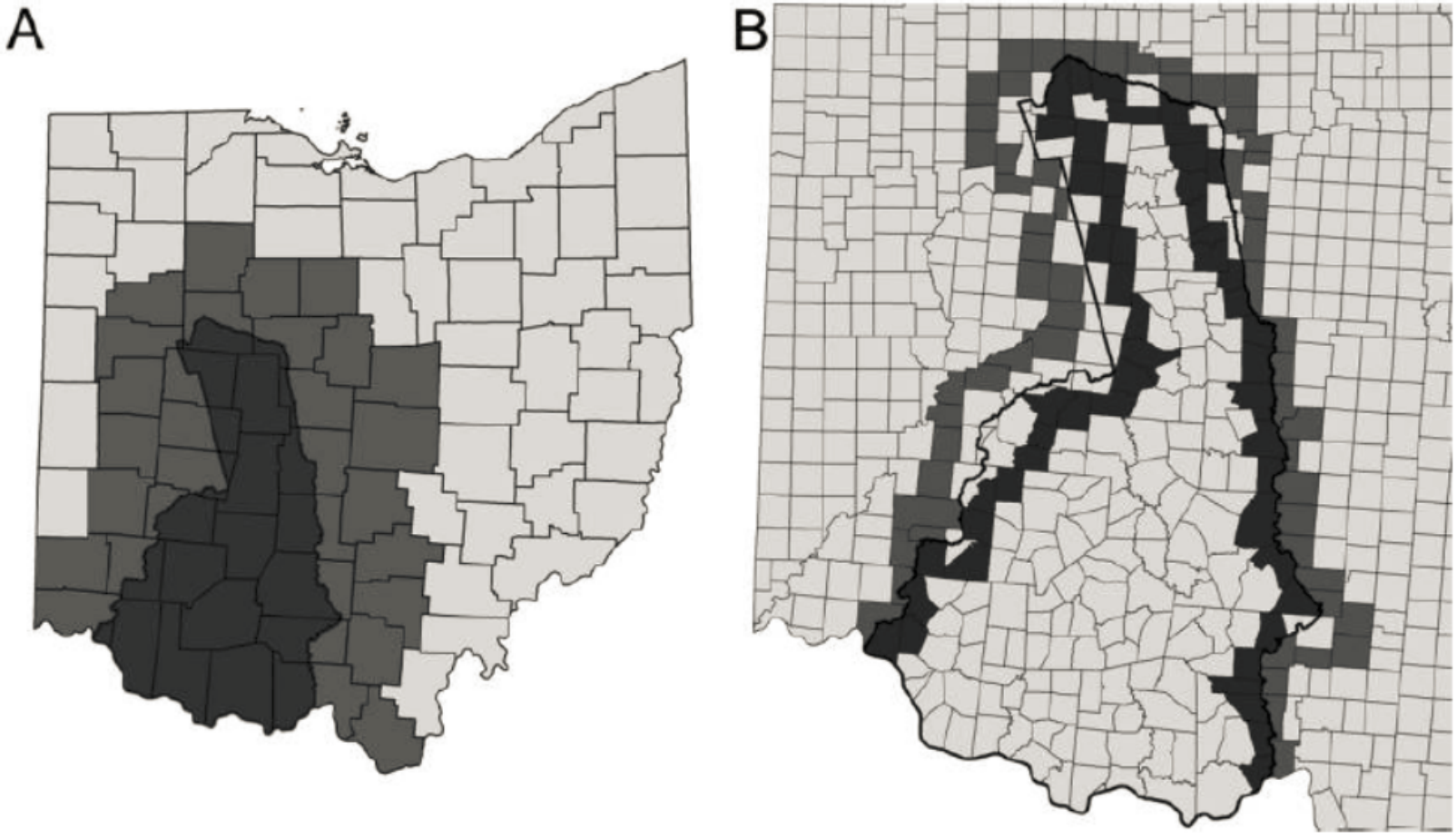
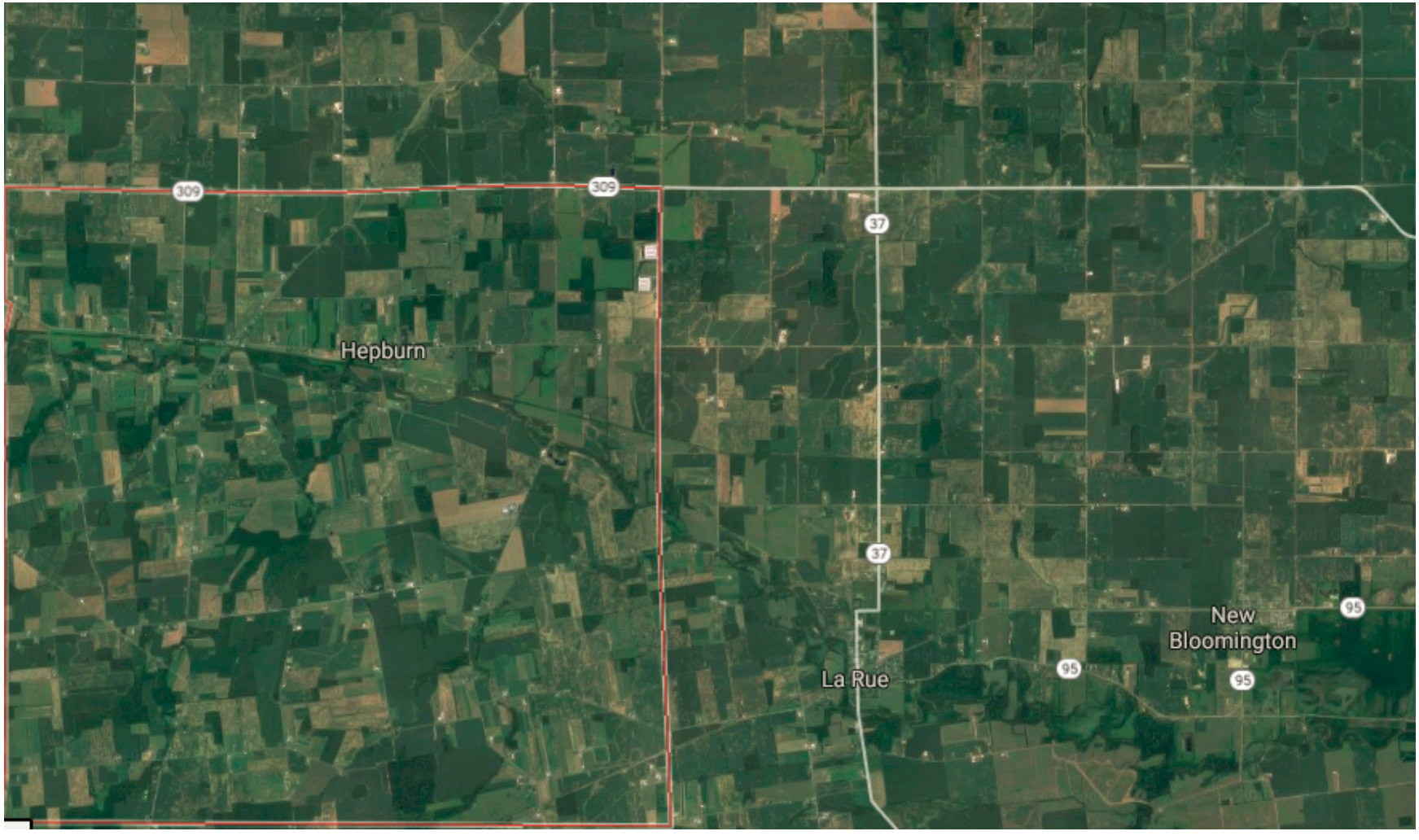


FIG. 3.—Ohio and the Virginia Military District. *A*, 39-county region: metes and bounds (MB) is dark shaded; rectangular system (RS) is lighter shaded. *B*, Border townships: MB is darker; RS is lighter. Source: Calculated by authors.

A


GRAND
MONTGOMERY
NEW
BLOOMINGTON
DUDLEY
LARUE
MOUNT VICTORY
HALE
BOWLING
GREEN
309
37
N
M
5
River

B


309
309
37
Hepburn
37
95
New
Bloomington
La Rue
95
95

Research design

- Check for balance: Properties on either side of the boundary dividing MB and RS have similar characteristics (soil, terrain ruggedness, stream density, etc)
- Sample rectangular blocks either side of border but not bisected by it
- regress measure of impact (land value) on a number of controls and dummy for RS

Findings

RS system associated with:

- 31 percent higher land values in flat land (in sufficiently rugged MB is better, but only 5% of sample)
- More land market activity, population density, farmland in use
- less property disputes
    - multiple claims
    - uncertainty about location (deed says boundary runs 'from the white Oak 338 poles to a Gum'... but Oak is now gone). Some disputes lasting >60 years.

A Framed Field experiment

Bryan, Gharad, De Quidt, Jonathan, Tom Wilkening, and Nitin Yadav. 2017. "Land Trade and Development: A Market Design Approach." SSRN Scholarly Paper

- Field fragmentation. Difficult to consolidate scattered plots into contiguous, larger plots.
- Requires willing buyer/seller, coordination, financing
- Farmer A may not be able to buy plot X from farmer B until can first sell another plot, farmer B may not be willing to sell X until can find another suitable plot Z.

Land Fragmentation and Consolidation

- Evidence that it doesn't happen easily by itself.
- Some countries run explicit programs. 4-year Danish consolidation plan:

Figure 1: Agricultural Plots in Oster Stillinge Village, Denmark Before and After Land Consolidation. Image taken from Hartvigsen (2014).

Framed Field Experiment findings:

- Compared performance of different continuous-time land exchanges
- Kenyan Farmers were able to understand experiment and achieve high degrees of efficiency
- Higher efficiency however needed support for more complicated contingent 'package trades' (e.g. bidder can specify that is willing to sell a specific plot if and only if she is able to buy another specific plot)
- All simulated trades. Farmers assigned different abilities and endowments of 3 types of land. Complementarity between ability and endowment allows farmers to increase values via trade.