Institutions and Development:

Microeconomic Evidence on the Political Economy of Property Rights

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(based on work with Rohini Pande, Harvard and with Markus Goldstein, World Bank)

- We examine fallowing patterns in 4 villages in Akwapim, and

- relate these to

  - on the one hand, agricultural productivity

  - and, on the other, gender, political power, via the route of tenure security.

Why should we care (about fallowing in a few villages in Akwapim)?

economic institutions <—> growth & economic transformation

In particular, it is argued that secure property rights are essential for investment incentives. Adam Smith placed very strong emphasis on this mechanism. Claim holds status of an axiom for many economists.

Economic historians (North and Thomas 1973; North 1981; Jones 1987; Engerman and Sokoloff 2003), joined by cross-country regression evidence (Acemoglu, Johnson, Robinson 2001, 2002; Easterly and Levine 2003; Hall and Jones 1999).

The standard model

Growth

"Property Rights"

$$Y_i = \alpha P_i + X_i \beta + \varepsilon_i$$

but recognizing $E(P_i \varepsilon_i) \neq 0$

"Colonial Heritage" or
"Settler Mortality"....

$$P_i = Z_i \gamma + \upsilon_i$$

Table-1: Institutions and Growth: Literature Review

Article	Dependent variables	Institutions: Measures	Institutions: Instruments	Key results
CORE PAPERS				
Acemoglu, Johnson &Robinson (2001)	Log GDP per capita (1995)	Protection against expropriation risk[1] (1985-1995)	Settler mortality[1]	One standard deviation (SD) increase in protection against expropriation risk (1.5) increases GDP per worker by 118% (OLS) and 309% (IV) .
Hall&Jones (1999)	Log output per worker[1] (1988)	Index of social infrastructure[2] which combines: i. index of government antidiversion policies[3] ii. index of country's openness[4]	I. Distance from equator[2] II. English speakers[3] III. European-language speakers[4] IV. Log predicted trade share[5]	One SD increase in index of social infrastructure (0.25) increases output per worker by 128% (OLS) and 261% (IV).
Knack&Keefer (1995)	I. Average annual growth of GDP per capita (1974-1989) II. Average private investment/GDP (1974-1989)	I. ICRG index[5] II. BERI index[6]	No IV estimates.	One SD increase in ICRG index (13.50) increases average annual growth rate per capita income by 1.24 (OLS)

Table-1: (continued)

Article	Dependent variables	Institutions: Measures	Institutions: Instruments	Key results
CORE PAPERS				
LLSV (1999)	(data from 1990s): I. Interference with private sector II. Efficiency III. Output of public goods IV. Size of public sector V. Political freedom	I. Ethnolinguistic fractionalization II. Legal origin III. Religion	No IV estimates.	A French legal origin country (relative to others) has 42 % more infant mortaliy (OLS)
Mauro (1995)	I. Average growth of GDP per capita (1960-1985) II. Average investment/GDP (1960-1985) III. Average investment/GDP (1980-1985)	I. Index of institutional efficiency[7] II. Index of bureaucratic efficiency[8]	Ethnolinguistic fractionalization[6] (1960)	One SD increase in index of bureaucratic efficiency (2.16) increases average growth of GDP per capita by 0.006 (OLS) and 0.023 (IV)
PAPERS CITING CORE PAPERS				
Acemoglu, Johnson &Robinson (2002)	I. Log GDP per capita (1995) II. Urbanization[2] (1995)	I. Current institutions: i. protection against expropriation risk ii. executive constraints,1990 II. Early institutions: i. exec. constraints, 1900 ii. initial exec. constraints	Settler mortality	One SD increase in expropriation risk (1.5) increases GDP per capita by 118% (IV), controlling for urbanization in 1500

Table-1: (continued)

Article	Dependent variables	Institutions: Measures	Institutions: Instruments	Key results
PAPERS CITING CORE PAPERS				
Acemoglu &Johnson (2005)	I. Log GDP per capita (1995) II. Avg. investment /GDP(1990s) III. Private credit/GDP (1998) IV. Avg. stock mkt. capitalization/GDP (1990-95)	I. Contracting institutions: i. legal formalism[11] II. Property rights institutions: i. executive constraints ii. protection against expropriation risk	I. Settler mortality II. *Log of indigenous population density in 1500*[7] III. legal origin[8]	One SD increase in expropriation risk (1.47) together with one SD increase in legal formalism (1.24, using "check measure") increases GDP per capita by 189% (OLS) and 523% (IV).
Aghion, Howitt&Mayer-Foulkes (2005)	Avg GDP per capita growth rate (1960-95) relative to United States	I. Private credit[12] II. Liquid liabilities[13] III. Bank assets[14] IV. Comm'l-central bank	I. Legal origin II. *Settler mortality*	One SD increase in private credit (0.28) increases steady-state GDP by 21% in Belgium[2]
Alcala&Ciccone (2004)	Log GDP per capita (1995)	Index of institutional quality[16]	I. *Settler mortality* II. European-language speakers III.Log predicted trade share (AC)[12]	One SD increase in index of institutional quality increases GDP per capita by 35% (IV) (controls include log real openness[3])
Bockstette, Chanda& Putterman (2002)	I. Log output per worker (1988) II. Average GDP per capita growth (1960-1995)	I. Index of social infrastructure II. ICRG index	I. Distance from equator II. English speakers III. European-language speakers IV. Log predicted trade share V. State antiquity[9]	One SD increase in index of social infrastructure (0.25) increases output per worker by 126% (OLS) and 229% (GMM-IV)

Table-1: (continued)

Article	Dependent variables	Institutions: Measures	Institutions: Instruments	Key results
PAPERS CITING CORE PAPERS				
Clague, Keefer, Knack&Olson (1999)	I. Annual GDP growth (1970-92) II. Log output per worker (1988) III. Log capital per worker (1988) IV. Schooling per worker (1985) V. Log TFP (1988)	I. Contract-intensive money[17] II. ICRG index III. BERI index	I. Colonial origin[10] II. Ethnolinguistic homogeneity[11]	One SD increase in contract-intensive money (0.14) increases growth by 0.945 (OLS) and 1.739 (IV), controlling for log GDP per capita in 1970
Djankov, La Porta, Lopez-de-Silanes&Shleifer	I. Deaths by (i)intestinal infection (ii) accidental poisoning II. Quality standards (ISO 9000) III. Water pollution IV. (i)Unofficial economy size/GDP (ii) Employment in Unofficial economy V. Product market competition	Number of different procedures that a start-up has to comply with in order to obtain a legal status, i.e. to start operating as a legal entity.	No IV estimates.	One SD increase in number of procedures (4.37) increases deaths from intestinal infection by 4.588% (OLS), controlling for log per capita GDP in 1999
Esfahani&Ramirez (2003)	I. Growth of GDP per capita II. Growth rates of telephones and power production per capita	I. Adverseness of policy environment II. Indices of democracy and centralization[19] III. Indices of contract repudiation, bureaucratic quality and corruption[20] IV. Ethnolinguistic fractionalization	No IV estimates.	One SD increase in contract enforcement (0.24) increases GDP per capita growth by 0.058 (OLS) (includes other institutional quality measures as controls)

Table-1: (continued)

Article	Dependent variables	Institutions: Measures	Institutions: Instruments	Key results
PAPERS CITING CORE PAPERS				
Glaeser, La Porta, Lopez-de-Silanes&Shleifer (2004)	I. Log GDP per capita (2000) II. Growth rates of GDP per capita 1960-2000, overall and by decade III. 5-year change in years of schooling IV. 5-year changes in political institutions	Executive constraints	I. Settler mortality II. Legal origin III. Log indigenous population density in 1500	One SD increase in constraints on executive (0.185) decreases GDP per capita by 6% (IV), controlling for population in temperate zone (1995) and years of schooling
Jones&Olken (2005)	Change in annual growth rate of real GDP per capita comparing 5-year growth averages before and after leader deaths	Index of democratization[22]	No IV estimates.	One SD increase in democratization increases annual growth by 2.1% (OLS) after the deaths of leaders in autocratic regimes
Knack&Keefer (1997)	I. Average annual growth in per capita income (1980-1992) II. Investment/GDP (1980-1992)	I. Trust[23] II. Civic norms (civic cooperation)	I. Ethnolinguistic homogeneity II. Law students as % of postsecondary students in 1963	One SD increase in trust (0.14) increases average annual growth in per capita income by 0.011 (OLS) and 0.012 (IV) (includes other controls)
Kogel (2005)	Annual average growth rate of TFP (1965-1990, panel data of 5-year averages)	Index of social infrastructure	I. English speakers II. European-language speakers III. Log predicted trade shares IV. Distance from the equator V. State antiquity	One SD increase in index of social infrastructure (0.25) increases annual average growth rate of TFP by 0.917 (IV), controlling for log TFP at beginning of 5-year interval

Table-1: (continued)

Article	Dependent variables	Institutions: Measures	Institutions: Instruments	Key results
PAPERS CITING CORE PAPERS				
Masters&McMillan (2001)	Log output per worker (1988)	Index of social infrastructure	I. Distance from equator II. Predicted trade share III. English speakers IV. European-language speakers	One SD increase in index of social infrastructure (0.257) increases output per worker by 680% (IV) for "tropical" subsample of countries (average of fewer than five days per month of frost in winter)
Rodrik (1999)	Average dollar wages in manufacturing (1985-1989)	I. Political institutions: i. two rule of law indicators[24] ii. two democracy indicators[25] II. Labor market institutions: i. unionization rate ii. number of the ILO's six basic workers' rights conventions ratified by a country	I. Dummy for oil exporter II. Colonial origins III. *Each measure of democracy as an instrument for the other*	One SD increase in freedom house index (0.33) increases average dollar wages in manufacturing by 0.198 (OLS) and 0.3762 (IV) (includes controls)
Rodrik, Subramanian &Trebbi (2004)	I. Log GDP per capita (1995) II. Log output per worker (1988) III. Log capital per worker (1988) IV. Log human capital per worker (1988) V. TFP (1988)	Rule of law index[26]	I. *Settler mortality* II. European-language speakers III. *Predicted trade shares*	One SD increase in rule of law index (0.94) increases GDP per capita by 112% (OLS) and 205% (IV), controlling for distance from equator

Lessons from the Literature

- Strong positive correlation between growth outcomes and various indicies of 'good' institutional quality

- Lots of debate over

  - specific identification assumptions

  - magnitudes of effects of different institutions on growth

  - many technical issues

- We conclude that literature is essentially complete; it has established the core conclusion that institutional quality matters a lot for growth, and is unlikely to be able to go much further

Why not?

- Very broad measures of institutional quality (I_i).

- Various technical issues, including 'bundling', obscured heterogeneity, etc...

- The vector of institutions that might influence growth has very high dimension. But

  – many dimensions are unmeasured

  – degrees of freedom are limited

  – number of plausible instruments is extremely small

For example, 'settler mortality' has been used as an instrument for

∗ protection against expropriation risk

∗ executive constraints

∗ measures of financial depth such as private credit

∗ a rule of law index

∗ the overall index of institutional quality

– Most important of all, these broad features of the economy (settler mortality, colonial history, geographic position) are correlated with entire complexes of institutions, and with other aspects of economic organization. They are not valid instruments for any particular institution (AJR 2001).

Opportunity 1: Policy Experiments

Canonical approach:

$$Y_{st} = \alpha_s + \beta_t + \gamma P_{st} + \epsilon_{st}$$

where s denotes regions within a country and t time. Y_{st} is the outcome of interest and P_{st} a measure of property rights.

Key worries:

- $E(P_{st}, \epsilon_{st}) \neq 0$.

- External validity of such a study (heterogeneous treatment effects)

Table-3: Land Titling

Country (Paper)	Outcomes of Interest	Data Set	Policy	Findings
Empirical strategies used in the papers can be found in the notes below.				
PANEL A: AFRICA				
GHANA Besley(1995)	i. Land Rights ii. Productivity	Year: Not given Region: Wassa and Angola Unit: 334 households with 1568 fields	None	Having a deed has a significant positive effect on land rights that require approval in Wassa. In Anloga, the correlation is negative, suggesting lineage sanctions and title are substitutes. Land rights increase productivity.
GHANA, RWANDA AND KENYA Migot-Adholla et al. (1991) Place and Hazell (1993)	i. Credit Use ii. Inputs iii. Investment iv. Yields	Year: 1987-1988 Region: 10 rainfed agriculture regions Unit: Farm surveys	None	No clear relationship between land registration and productivity (Migot-Adholla et al (1991)). Place and Hazell (1993) focus on land rights. Effects of land rights on credit are mixed; in one village, they increase moneylender borrowing; in another they decrease borrowing for food consumption. Land rights did not significantly affect input use. Strongest positive relationship between land rights and investment was for long-term investments in Rwanda; elsewhere results were mixed. No significant relationship between land rights and yield.

Table-3: (continued)

Country (Paper)	Outcomes of Interest	Data Set	Policy	Findings
KENYA Migot-Adholla, Place and Oluoch-Kosura (1994) Place and Migot-Adholla 1998)	i. Investment ii. Output iii. Determinants of Title iv. Access to Credit	Year: 1988 Region: Nyeri and Kakamega Unit: 406 households with 463 parcels	Registered Land Act (1963): individualizes land rights while giving land committees considerable control over land transactions.	Land title and land rights have limited effect on farm investments, and none on yield (Migot-Adholla, Place and Oluoch-Kosura (1994)). Land rights tend to be "more comprehensive" on titled and registered parcels, but many cannot be sold or mortgaged (both because famers with secure tenure do not bother to obtain titles, and because of the persistence of indigenous tenure systems). Registered parcels are slightly more likely to be subject to litigation. Title does not affect credit use, but there is some weak evidence of a positive correlation between titles owned by close relatives and access to credit. Title and registration are positively affected by male household heads and a lack of previous subdivision . Predicted title has no effect on yield (Place and Migot-Adholla (1998)).
KENYA Cartier, Wiebe and Blarel (1994)	i. Input Use ii. Output	Year: Not given Region: Njoro division Unit: 109 households (plot-level data)	i. Squatter Settlement Scheme: opened forest reserve to settlement and redistributed ex-European land. ii. Fourth Development Plan (1979-1983): approved de facto subdivisions of land.	"Untitled" farms produce 20% less than titled ones. Titled farms are more productive but note this may be due to correlation between titling and farmer/farm characteristics. In fixed effect regressions, mixed results for output with no evidence of security-induced demand for inputs.

Table-3: (continued)

Country (Paper)	Outcomes of Interest	Data Set	Policy	Findings
KENYA& TANZANIA Pinckney and Kimuyu (1994)	i. Access to Credit ii. Investment iii.Land Market iv. Inequality	Year: 1991-1992 Region: Murang'a (Kenya) and Moshi (Tanzania) Unit: 230 households	Land registration in Kenya, abolition of private title in Tanzania.	No land-secured loans in Tanzania and only two in Kenya, so titling has not increased credit use. There is more investment in Kenya, but this is due to cash-crop policy, not titling. Differences in inequality are due to differing practices of land partition at inheritance, not land policies.
SENEGAL Golan (1994)	i. Investment ii. Credit Access	Year: 1987 Region: The "Peanut Basin" Unit: 48 compounds holding 351 parcels	i. 1906 Regime d'immatriculation: allowed some persons to apply for registration. ii. 1964 Law of National Domain: stopped new registrations in 1964.	Very few original registered titles, and these were owned by the elite. No surviving investments on titled land but title is used to obtain credit. Areas more affected by the Law of National Domain have greater tenure insecurity. No link between tenure security and farm investments.
SOMALIA Roth, Unruh, and Barrows (1994)	i. Perceived Benefits ii. Land Value iii. Tenure Security iv. Credit Access v. Investment	Year: 1987-1989 Region: Kigezi District Unit: 148 registered and unregistered smallholders and registered largeholders with 226 parcels (Stratified sample)	Agricultural Land Law (1975):sets out registration procedures; individuals can apply at the local district level, though officials are sometimes instructed to find unregistered land for "outsiders."	Registered and unregistered farmers perceive registration increases tenure security, the propensity to sell or lease land, access to credit, and investment. The marginal effect of registration on land value is 44 300-57 300 SSh. Title has an overall negative but insignificant effect on perceived tenure security (significant for small-holders with high quality land). The link between title and access to credit is positive but insignificant, except for large landowners, for whom registration brings access to formal credit.

Table-3: (continued)

Country (Paper)	Outcomes of Interest	Data Set	Policy	Findings
UGANDA Roth, Cochrane and Kisamba-Mugerwa (1994)	i. Investment ii. Perceived Benefits	Year: 1987 Region: Kigezi District Unit: 228 households with 505 parcels	Rujumbura Pilot Land Registration Scheme (1958)	Households compelled to register their parcels receive less cash income and remittances, and are significant coffee producers. Those with voluntarily registered parcels own more productive capital. Dispute incidence is lower for registered land. Registration significantly increases farm investments, with the effect more widespread for voluntary (relative to compulsory) registration.
PANEL B: ASIA				
INDIA Banerjee, Gertler and Ghatak (2002)	i. Productivity	Year: 1979-1993 Region: West Bengal and Bangladesh Unit: District	Operation Barga (1977), which gave tenure security to registered sharecroppers	Relative to Bangladesh, the program raised sharecropper productivity in W.Bengal by 51%. Fixed-effects estimate suggests the program boosted sharecropper productivity by 62 %.
INDIA Pender and Kerr (1999)	i. Credit Use ii. Investment iii. Land Use	Year: 1993 Region: Aurepalle and Dokur, Andhra Pradesh Unit: Survey of 291 households with 563 plots.	No specific policy; most land is held in formal title, "assigned" land has been granted to poorer residents who receive non-transferable usufruct rights.	Assigned land has a negative effect on supply and demand for moneylender and institutional credit. Adult males increase investment on assigned plots but decrease it on titled plots. Effect of household characteristics on investment is greater on titled plots. Share of land subject to sales restrictions has no effect on decision to cultivate in Aurepalle, and a negative effect in Dokur.

Table-3: (continued)

Country (Paper)	Outcomes of Interest	Data Set	Policy	Findings
THE PHILLIPINES Friedman, Jimenez and Mayo (1993)	Land Value	Year: 1983 Region: Manila Unit: 1688 households	None	Formal sector units are worth more than squatter units, and this difference shrinks with age of squatter unit. Concrete foundations, several stories or locating in richer area signals low eviction risk, even in absence of title. A ten-year old residence sells for 25% more if it were in the formal sector.
THAILAND Feder and Onchan (1987)	i. Investment ii. Credit Access	Year: 1987 Region: Lop-Buri, Nakhon Ratchasima, and Khon-Kaen Provinces Unit: 48 compounds holding 351 parcels	Land Code (1954), which created both title deeds and utilization certificates for private land.	Titles increase capital accumulation, except in Lop-Buri, where there is an ample non-institutional credit, more commercialization, and lower-risk cash cropping. Investment in bunding of land and clearing of stumps are positively affected by land title, but effects are insignificant in Lop-Buri.
THAILAND Pagiola (1999)	i. Program Benefits ii. Rate of Return iii. Credit Access	Year: 1991/92 and 1995/96 Region: National Unit: Household survey	Land Titling Project, Phase 2, 1991-1994	Credit use increased faster in provinces where the program was implemented. This increase was greatest in provinces that were poorest at the outset. Results for productivity were too sensitive to model specification to be useful. Anecdotal information suggests titles increase land values. The estimated rate of return from the program is 34%.

Table-3: (continued)

Country (Paper)	Outcomes of Interest	Data Set	Policy	Findings
VIETNAM Do and Iyer (2003)	i. Investment ii. Productivity iii. Credit Access iv. Land Transfers	Year: 1992-1993 and 1997-1998 Region: Not available. Unit: panel of 4000+ households. Province-level data on LUC issuance in 1994, 1998 and 2000.	Land Law (1993), which allows for transferable leases from the state implemented using Land Use Certificates (LUCs).	Titled households increase proportion of multi-year crops by 7.5% relative to untitled farms, at the expense of annuals. This effect is strongest where registration was important earliest. Titled households increase irrigated area by 20% and labor inputs by 4.5 weeks. No productivity advantage in high registration areas. Impact of title on credit access is insignificant, but it does have a positive effect on land transfers.

PANEL C: LATIN AMERICA

Country (Paper)	Outcomes of Interest	Data Set	Policy	Findings
BRAZIL Alston, Libecap, and Mueller (2000)	i. Violent Conflict	Year: 1991-1994 (Conflict), 1985 (Census Data) Region: Para Unit: 105 Municipos	Formal Settlement Programs organized by the government agency INCRA	Squatting, forest clearing and large farms weaken property rights, contributing to violent conflict. Value is significantly related to conflict, "higher land values encourage invasions and evictions."
BRAZIL Alston, Libecap, and Schneider (1996)	i. Supply and Demand for Title ii. Land Value iii. Investment	Year: 1940-1970 (Para) and 1870-1985 (Parana) Region: Para and Parana Unit: 206 households	No specific policy; titling is administered by state governments.	Title has a positive and significant effect on land value, independent from its impact on investment, which decreases with distance. The increase in land value predicted by the value regressions has a positive but less significant impact on title acquisition. Title increases investment.

Table-3: (continued)

Country (Paper)	Outcomes of Interest	Data Set	Policy	Findings
EQUADOR Lanjouw and Levy (2002)	i. Land Value ii. Perceptions of Tenure Security iii. Ability to Transfer Land	Year: 1996 Region: Guayaquil Unit: 400 households (1921 individuals)	1992 Titling project initiated by Municipality of Guayaquil	Title increases perceived market value of property by 23.5%.
GUATEMALA Pagiola (1999)	i. Program Rate of Return	Year: Not given Region: Peten Unit: Household willingness to pay for titles.	Land Administration Project	The estimated rate of return is 12.3%, and the profitability of the program is robust to several changes in assumptions.
HONDURAS Lopez (1996)	i. Productivity ii. Investment iii. Access to Credit	Year: 1983-1994 Region: Santa Barbara and Comayogua Unit: 450 farm households	Project funded by USAID, initiated in 1983.	Average investment for USAID-funded farmers was twice that of others; this effect was especially pronounced with attached capital. A greater proportion of these farmers received credit, and in larger amounts. The difference in yields between the two groups was not statistically significant in 1983, but was in 1993. The rate of return to the titling project was 17%.
NICARAGUA Deninger and Chamorro (2003)	i. Investment ii. Land Value	Year: 1996 and 1999 Region: National Unit: 2476 households (3212 plots)	Programa Nacional de Catastro, Titulacion y Registro, since 1992, which encourages titling and registration.	Full registration increases investment; title without registration has only an insignificant impact. Registration affects plot-level, not household-level, investment, suggesting access to credit is unaffected. Registration increases land values by 30% (same effect as 20 years of continuous possession).

Table-3: (continued)

Country (Paper)	Outcomes of Interest	Data Set	Policy	Findings
NICARAGUA Broegaard et al. (2002)	i. Land Title Registration ii. Perceived Tenure Insecurity iii. Land Use iv. Land Values v. Credit Access vi. Agricultural Production	Year: Not given Region: National Unit: 921 households with 975 plots of land	1997 legislation sanctioning ownership by beneficiaries of Sandinista redistribution	Complete formal documents significantly improve tenure security; the difference between land-reform documentation, inherited plots, and other land is insignificant. Formal title deeds significantly increase probability of public registration and permanent crop cultivation, and reduce perceived future tenure conflict. Formal title has a small positive effect on land value and none on credit. Land-reform documents have significant positive effects on registration and tenure security, but these are smaller than the impacts of formal title. Further, they have no significant effect on permanent crop cultivation.
NICARAGUA de Laiglasia (2004)	i. Investment ii. Determinants of Registration iii. Credit Access	Year: 1996 and 1999 Region: National Unit: 2476 households (3212 plots)	Programa Nacional de Catastro, Titulacion y Registro, since 1992, which encourages titling and registration.	Land registration increases the probability of land-attached investment by 35% -- the specific type of title (excluding indigenous forms) is unimportant. No link between credit and land registration.
PARAGUAY Carter and Olinto (2000)	i. Investment ii. Credit Access	Year: 1987 Region: Paraguari, San Pedro and Itapua Unit: 48 compounds holding 351 parcels	No General Progam: Land can be either "Titled" or "Formal" but untitled.	Legal security improves attached capital ($134-$187 per titled hectare for liquidity unconstrained households, and $73-$254 for constrained housholds) and a negative impact on movable capital (-$110 to -$184 for constrained households and insignificant for unconstrained ones). Positive impact of title on investment weaker for liquidity-constrained farms, and reductions in movable capital are not offset by increases in attached capital for farms below 15 hectares. Below 3 hectares no effect on credit rationing probability.

Table-3: (continued)

Country (Paper)	Outcomes of Interest	Data Set	Policy	Findings
PERU Antle, Yanggen, Valdivia, and Crissman (2003)	Investment	Year: 1997-1999 Region: Cajamarca Unit: 847 parcels	Proyecto Especial de Titulacion des Tierras (Special Land Titling Project), encourages farmers to obtain titles.	Accounting for endogenous titling, titling increases the mean probability of terracing from 25.8% to 32.4%.
PERU Field (2003) Field and Torero (2004)	i. Labor Supply (Field) ii. Credit Access (Field and Torero)	Year: March 2000 (middle of the program) Region:Urban Unit: 2750 households	i. Committee for the Formalization of Private Property ii. Decree 424: Law for Formalization of Informal Properties (1996) : B/w 1992 and 1997 over 1.2 million urban households given formal property titles.	Untitled households work 17% less hours than those with titles and are 47% more likely to work inside the home. Titled households are 28% less likely to engage in child labor (Field). Untitled households are 10% less likely to be approved for formal sector loans. Titling does not affect private sector approval rates, but lowers the interest rate by 9% (Field and Torero).

1. Transition from examination of overall institutional quality to understanding effect of specific institutional changes.

2. Replication across countries may permit generalization,

3. Help understand how effect of titling programs depends on overall institutional environment.

We use micro evidence to examine one particular pathway through which property rights → economic organization.

Land Rights →investment→productivity

Two main possible mechanisms (plus a few more minor)

1. Security (expropriation)

2. Collateral

Currently very limited evidence exists.

We show that:

- people (including almost all women) lacking political connections invest (fallow) much less;

- as a consequence, they achieve much lower yields;

- they fallow less because they are afraid of losing land while is it fallow. Expropriation, not indirect effects of wealth or trading security.

- Political influence and hence tenure security is highly context-specific. For example, power within the village as a polity may have little resonance for disputes over *abusua* land

Outline

1. Land Tenure in Ghana

2. Agronomics: fertility choices and productivity

3. Productivity:

   (a) women have lower yields

   (b) trace to fallowing choices

   (c) magnitudes

4. The determinants of investment: local offices and fallowing

5. Political economy of land allocation in Akwapim

   (a) need, imperfect information

   (b) two-sided imperfect commitment

6. Conclusion

Access to Land in Akwapim

Ghana: Land Cover, 2000

Legend
- Cities
- Closed evergreen
- Croplands (>50%)
- Croplands with woody veg.
- Decid. shrubland
- Decid. woodland
- Degraded evergreen
- Irrigated croplands
- Mangrove
- Mosaic Forest / Savanna
- Sparse grassland
- Waterbodies

TAMALE

KUMASI

TEMA
ACCRA

TAKORADI

0   90   180   Kilometers

CIESIN
Columbia University
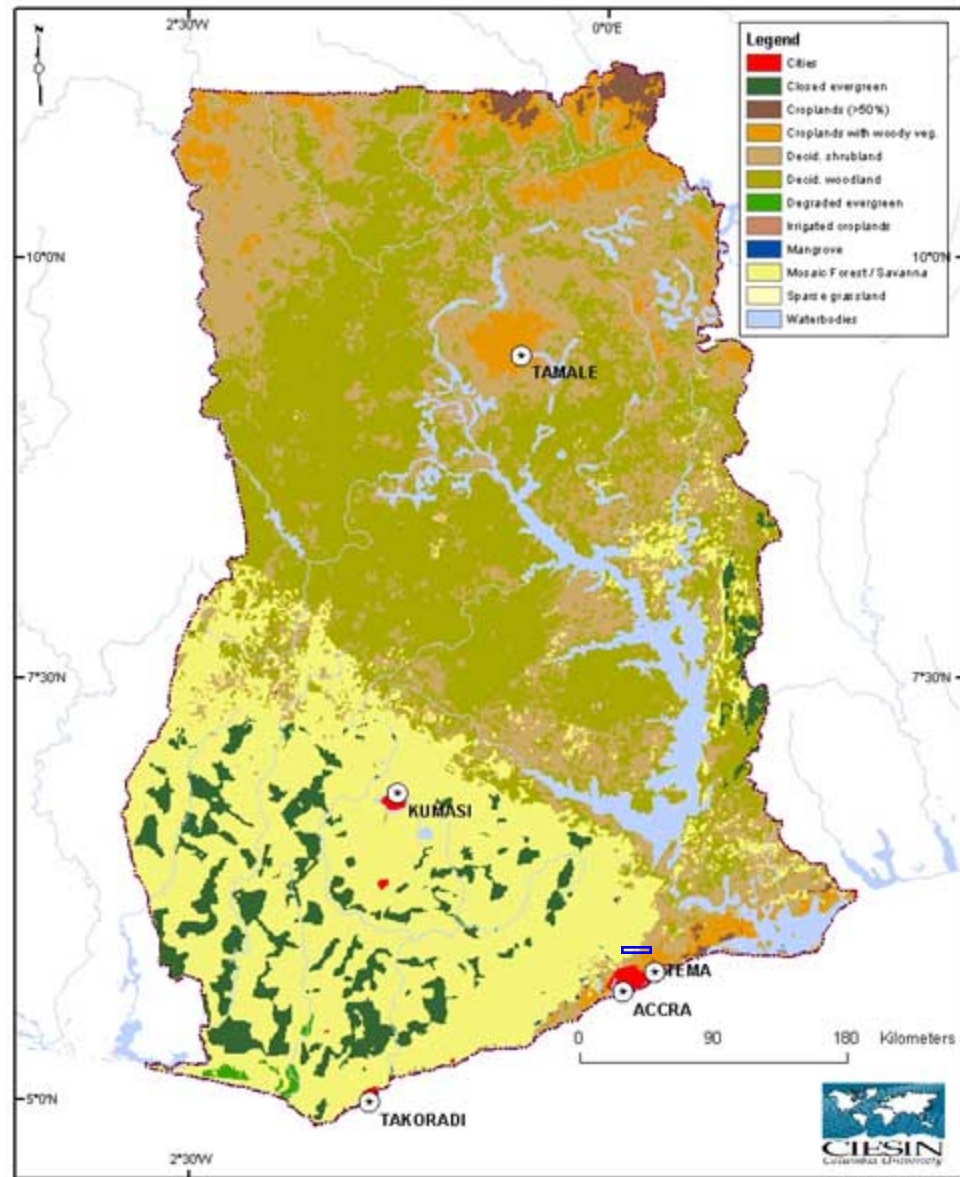
- As in most of West Africa, plots are associated with individuals, not households

- Most land under ultimate control of a paramount chief (stool), allocated locally through a matrilineage (*abusua*)

  1. Individuals have right to cultivate land by virtue of their membership in the matrilineage.

  2. General principle does not establish *which* individual has right to cultivate *which* plot.

  3. A person's right to establish cultivation on a particular plot, and the extent of his/her rights along many dimensions (produce of trees, right to make improvements, right to pass cultivation to heirs) ambiguous

and negotiable. Tension between matriliny and patriliny (Austin 2004, 174)

4. As a consequence, "people's ability to exercise claims to land remains closely linked to membership in social networks and participation in both formal and informal political processes" (Berry, 1993, p. 104).

5. To summarize, while

   "[i]n principle, any individual is entitled to use some portion of his or her family's land, ... people's abilities to exercise such claims vary a good deal in practice and are often subject to dispute. Disputed claims may turn on conflicting accounts not only of individuals' histories of land use, field boundaries, or contributions to land improvements but also their status within the family, or even their claims of family membership itself." (Berry, 2001, p. 145).

- land is subject to multiple, overlapping claims – debate has an impact on use

land ... is subject to multiple, overlapping claims and ongoing debate over these claims' legitimacy and their implications for land use and the distribution of revenue. Rather than induce or impose consensus on rules and boundaries, the formalization of land administration and processes of adjudication have added new layers of interpretation and debate, complicating rather than hardening the lines of authority and exclusion. Berry, CNTB xxi.

Sources of Land:

1. The matrilineage: all members of the *abusua* can request plots for cultivation from *abusua* leadership. Obligation of leadership to allocate land to those members in need. More than $1/2$ of land.

2. The household: usually women obtaining land for cultivation from their husbands. Usually NOT the same *abusua*.

3. Commercial transactions: fixed rent, sharecropping

4. Inherited land from father

Table 1: Perceptions of Land Rights

	Percent of Cultivated Plots on which Respondent Claims Right to:				Percent of Plots Fallowed more than Six Years
	Determine Inheritance	Rent Out	Lend Out	Sell	
	(1)	(2)	(3)	(4)	(5)
Non-office holders	6	22	32	15	13
Office holders	26	53	60	32	22
t-test for equality	6.41	6.74	5.83	4.34	2.14
Number of observations	575	576	576	575	406

- A cultivator's rights over her growing crops, on the other hand, are quite secure. Wilks summarizes the principle as "afuo mu $y\varepsilon$ $de\varepsilon$, asase $y\varepsilon$ ohene $de\varepsilon$" ("the cultivated farm is my property, the land is the stool's" (1993, p. 99)

- "Because of tenure insecurity under traditional land tenure institutions, there is no strong guarantee that the cultivator can keep fallow land for his or her own use in the future." (Quisumbing et al., 2001, pp. 71-72).

Resource Management and Land Tenure

- 3/4 of plots devoted to a maize/cassava intercrop farming system of southern Ghana.

- Fertility maintained, weeds and pest controlled through periodic fallowing.

- The short fallow system:

  1. Farm cleared from bush fallow

  2. Cleared bush is burned

  3. Newly-cleared plot cultivated with one cycle of maize + cassava (one harvest of cassava, two of maize)

4. Cassava harvest continues over many months, typically ending ≈ 2 years after initial clearing

5. Return to fallow for median duration of 4 years

Implications of Optimal Resource Management within Households

1. A 'separation' argument implies that ∃ household-specific shadow prices such that plot value maximized for each plot (this is the second welfare theorem)

2. Therefore all physically-similar plots w/in households are fallowed similarly, and have similar profits.

3. Optimal fallowing depends upon household-specific prices. These are not plot-specific. But they do vary across households. Optimal fallowing also depends on security of tenure.

Table 2: Summary Statistics
Plot Level Data

Variable	Office Holders		Non-Office Holders		
	Mean	Std. Dev.	Mean	Std. Dev.	|t|
profit x1000 cedis/hect	654.07	2434.05	538.22	6856.15	0.18
yield x1000 cedis/hect	1495.29	2903.87	1571.48	7345.97	0.11
hectares	0.48	0.62	0.31	0.30	4.26
labor cost x1000 cedis/hect	651.39	1155.59	883.14	2223.01	1.11
seed cost x1000 cedis/hect	282.12	612.24	243.08	719.98	0.45
ph	6.36	0.71	6.34	0.75	0.22
organic matter	3.22	1.06	3.13	1.08	0.67
last fallow duration (years)	4.83	4.23	3.93	2.65	2.60
length of tenure (years)	16.14	16.10	7.32	9.47	7.26
plot same abusua as individual	0.66	0.47	0.56	0.50	1.79
plot obtained via commercial transactior	0.25	0.43	0.30	0.46	1.17
n	122		484		

Individual Level Data

Variable	Office Holders Mean	Std. Dev.	Non-Office Holders Mean	Std. Dev.	|t|
gender (1=female)	0.11	0.32	0.40	0.49	3.73
age	51.92	13.47	40.08	12.21	5.41
average assets x1000 cedis	1475.52	1767.18	620.39	902.57	4.71
years of schooling	7.56	6.98	7.09	4.92	0.50
1 if mother was a trader	0.09	0.29	0.24	0.43	2.23
1 if mother was a farmer	0.89	0.32	0.72	0.45	2.35
1 if father was a farmer	0.82	0.39	0.79	0.41	0.46
1 if father was an artisan	0.07	0.25	0.11	0.31	0.76
1 if father was a civil servant	0.09	0.29	0.09	0.29	0.02
1 if father was a laborer	0.00	0.00	0.00	0.07	0.46
1 if first in village of family	0.11	0.32	0.23	0.42	1.82
yrs family or resp has been in village	64.80	41.63	53.50	39.44	1.72
number of wives of father	2.82	1.71	2.14	1.20	3.18
number of children of father	12.04	7.32	10.84	6.51	1.10
parity of mother in father's wives	1.71	1.47	1.30	0.64	2.94
1 if fostered as a child	0.58	0.50	0.69	0.46	1.46
size of inherited land	0.62	0.83	0.13	0.39	6.10
1 if mother had any school	0.04	0.21	0.12	0.32	1.43
1 if father had any school	0.16	0.37	0.31	0.46	2.09
n	45		207		

notes: During the survey period, approximately 2200 cedis were equivilent to US $1.

Initial Results: Productivity

- recall same fallow duration on plots cultivated by different individuals

- But, possible imperfect capital or labor markets, so we use a tighter test – this will be true *within* households

- i.e. marginal product of inputs equated across plots within household

- $\pi_t(\tau_p^*, X_p) - \pi_t(\bar{\tau}_{h_p}, \bar{X}_{h_p}) \approx \frac{\partial \pi_t}{\partial \tau}(\tau_p^* - \bar{\tau}_{h_p}) + \frac{\partial \pi_t}{\partial X}(X_p - \bar{X}_{h_p}).$

- Start by assuming no variation in tenure security across plots, in which case $\pi_t(\tau(X_p), X_p) - \pi_t(\tau(\bar{X}_{h_p}), \bar{X}_{h_p}) \approx \left(\frac{\partial \pi_t}{\partial \tau} \frac{\partial \tau}{\partial X} + \frac{\partial \pi_t}{\partial X} \right)(X_p - \bar{X}_{h_p}).$

So estimate

$$\pi_{pt} = \mathbf{X}_p \beta + \gamma G_p + \lambda_{h_{ip},t} + \epsilon_{pt},$$
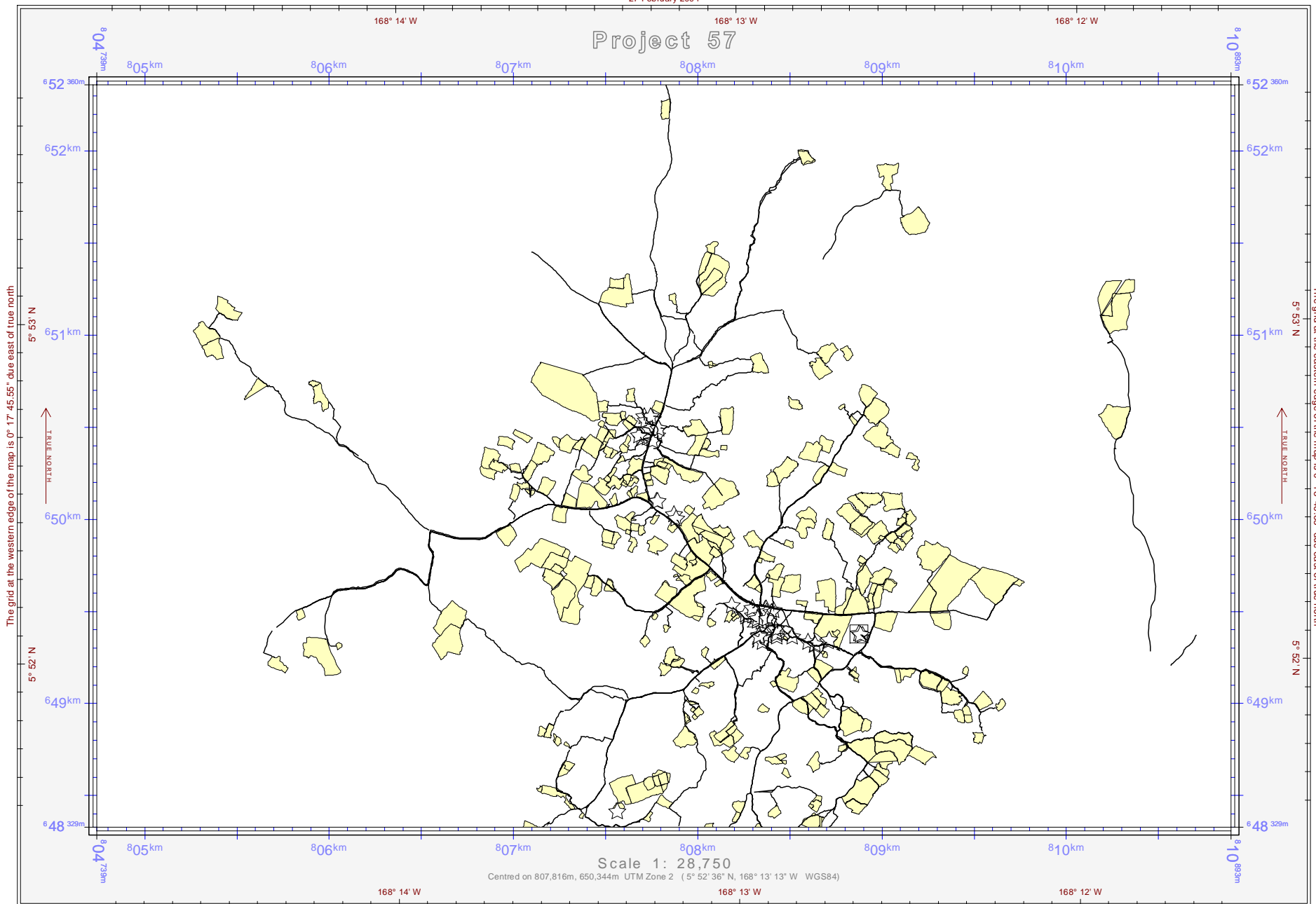
Table 3: Profits and Gender

dependent variable	1 OLS cedis/hect		2 OLS cedis/hect		3 OLS profit x1000 cedis/hect	
	estimate	std error	estimate	std error	estimate	std error
gender: 1=woman	-859	296	-1043	300	-1667	374
Plot Size Decile = 2	-572	200	447	179	1002	244
Plot Size Decile = 3	268	220	1039	295	475	267
Plot Size Decile = 4	-155	407	1135	302	788	298
Plot Size Decile = 5	-412	220	657	134	578	128
Plot Size Decile = 6	-495	290	811	163	97	210
Plot Size Decile = 7	-537	277	875	172	220	249
Plot Size Decile = 8	-616	327	439	302	-374	274
Plot Size Decile = 9	-474	246	249	284	-120	251
Plot Size Decile = 10	-900	283	-316	332	-1195	339
Soil Type = Loam	303	297	-175	211	-442	160
Soil Type = Clay	-199	105	-512	294	-525	324
Toposequence: midslope	-172	171	299	334	-468	389
Toposequence: bottom	19	172	663	337	-525	435
Toposequence: steep	-425	200	3	365	971	577
pH			-260	89	155	43
Organic Matter			-16	52	-347	76
Observations	782		508		508	
Fixed effects	household x year		household x year		spatial (250 meters) and household x year	

Standard errors are consistent for arbitrary heteroskedasticity and spatial correlation.

Project 57

168° 14' W   168° 13' W   168° 12' W

5° 53' N

TRUE NORTH

5° 52' N

The grid at the western edge of the map is 0° 17' 45.55" due east of true north

The grid at the eastern edge of the map is 0° 18' 46.63" due east of true north

5° 53' N

TRUE NORTH

5° 52' N

Scale 1: 28,750
Centred on 807,816m, 650,344m UTM Zone 2 (5° 52' 36" N, 168° 13' 13" W   WGS84)

168° 14' W   168° 13' W   168° 12' W

KILOMETRES 0.1 0.0   0.2   0.4   0.6   0.8   1.0   1.2   1.4   1.6   1.8   2.0   2.2   2.4   2.6   2.8   3.0   3.2 KILOMETRES

Productivity and Fallowing

The gender differences in productivity can be traced to gender differences in fallowing

Table 4: Profits and Fallow Duration

	1		2		3		4		5	
	IV		OLS		IV		OLS		IV	
dependent variable	profit x1000		fallow duration		profit x 1000		fallow duration		profit x 1000	
	estimate	std error	estimate	std error	estimate	std error	estimate	std error	estimate	std error
fallow duration (years)*	421	182			314	146			337	170
gender: 1=woman	19	433	-0.58	0.32	143	341	-0.43	0.26	316	418
age									10	22
> 6 years of school									88	439
1 if first of family in town			-0.44	0.47			0.29	0.20		
years family/resp lived in village			-0.01	0.01			0.01	0.00		
1 if resp holds trad. office			3.91	0.70			1.95	0.34		
number of wives of father			0.39	0.18			0.52	0.14		
number of father's children			-0.08	0.03			-0.02	0.02		
parity of mom in father's wives			-0.44	0.28			-0.42	0.31		
1 if fostered as child			0.86	0.25			0.35	0.33		
size of inherited land			-0.29	0.27			-0.52	0.20		
1 if mother had any education			-0.87	0.46			0.96	0.60		
1 if father had any education			-0.13	0.43			-0.98	0.35		
Observations	654		654		609		609		539	
Fixed Effects	Household x Year				Spatial (250 meters) and Household x Year				Spatial and Household x	
Stat of Over-ID Restrictic	Chi2(9) = 3.55				Chi2(9) = 2.15				Chi2(9) = 2.37	
F-test of instruments			F(10,627) = 7.80				F(10,572) = 20.27			

All regressions include household x year fixed effects and the plot characteristics used in Table 3.
 Standard errors are consistent for arbitrary spatial correlation.
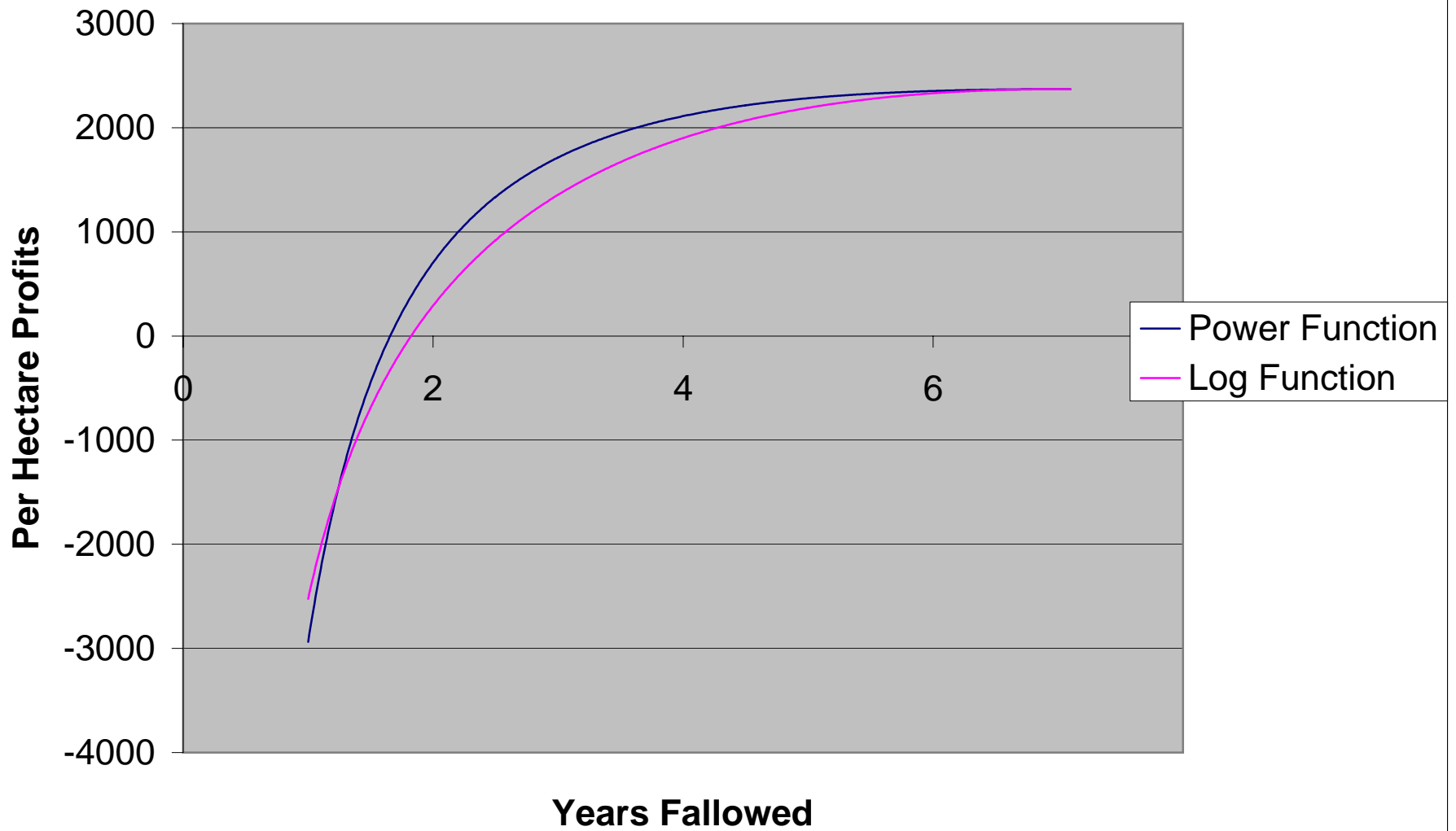
*Treated as endogenous. Instruments as indicated in columns 2&4.

How Inefficient is Fallowing in Ghana?

- Profits must be concave in fallow. Estimate simple quadratic and less parametric forms. Not enough info.

- Add information. Soil science, agronomy provide some (de Rauw (1995), Nweke (1999), and Ahn (1979)).

  under forest conditions, both soil organic matter changes and the transition from thicket of young secondary forest re-growth suggest that, in many areas, a fallow of 6-8 years is a desirable practical minimum: below this the soil will be maintained by successive fallows at a lower organic matter level and level of productivity.

Fallow Duration and Profits

Per Hectare Profits (y-axis): -4000, -3000, -2000, -1000, 0, 1000, 2000, 3000

Years Fallowed (x-axis): 0, 2, 4, 6

— Power Function
— Log Function

- w/o r_{it} can't calculate the optimal fallow duration. from this estimate of the profit function. However, we can calculate the implied rates of return to fallowing an additional year.

Rates of Return to Additional Fallowing

	4-5 years	5-6 years
log spec	50%	16%
power spec	19%	6%

- Experiment: adjust all fallow durations to 5 years. What is the implication for steady-state aggregate profits? Gain on plot i is

$$\frac{2}{7}\hat{g}(5) - \frac{2}{2 + d_{it}}\hat{g}(d_{it})$$

- Average profit gains per hectare associated with this change are large:

– 456 thousand cedis per hectare for log specification of $g()$ is correct

– 672 thousand cedis if the power specification is correct

– Compare current gross output: 1225 thousand cedis

– If extended to all maize & cassava in Ghana: 1.5 to 2 percent of GDP

Why do office holders fallow more?

Table 6: Fallow, Wealth and Land Owned

dependent variable	1 IV fallow duration		2 OLS wealth (x 1000 cedis)		3 OLS fallow duration	
	estimate	std error	estimate	std error	estimate	std error
wealth (x 1000 cedis)*	-0.0001	0.001				
gender: 1=woman	-0.13	0.51	32	107	-0.27	0.23
area on other plots (ha)					-0.16	0.07
1 if first of family in town	0.04	0.62	145	89	0.22	0.28
years family/resp lived in village	0.01	0.01	8	1	0.01	0.00
1 if resp holds trad. office	2.01	0.97	497	174	2.01	0.36
number of wives of father	0.32	0.28	128	36	0.33	0.17
number of father's children	-0.02	0.07	-46	10	0.00	0.02
parity of mom in father's wives	-0.30	0.42	141	64	-0.40	0.34
1 if fostered as child	0.31	0.60	-152	86	0.38	0.34
size of inherited land	-0.44	0.64	-262	118	-0.33	0.23
1 if mother had any education	0.56	1.10	-318	239	0.67	0.52
1 if father had any education	-0.81	0.61	-84	91	-0.83	0.41
1 if mother was a farmer			-658	232		
1 if father was a farmer			357	111		
1 if father had an office job			696	168		
Observations	413		413		413	
Fixed Effects	Household and Spatial Fixed Effects (250 meters)					
J-Stat of Over-ID Restrictions	Chi2(2) = 1.40					
F-test of instruments			F(3,409) = 6.51			

All regressions include the plot characteristics used in Table 3.
Standard errors are consistent for arbitrary spatial correlation.

*Treated as endogenous. Instruments as indicated in column 2.

Table 7A: Fallow Duration and Plot Origin

	1	
	OLS	
	All Plots	
dependent variable	fallow duration	
	estimate	std error
gender: 1=woman	-0.28	0.22
1 if office holder	0.68	0.59
Plot in Same Abusua as Cultivator	0.25	0.21
Office * Plot in Same Abusua as	3.24	0.89
Observations	402	
Fixed Effects	Household and Spatial Fixed Effects	

All regressions include the plot characteristics used
Standard errors are consistent for arbitrary spatial c

Table 7B: Individual Fixed Effects

dependent variable	2 OLS All Plots fallow duration		3 OLS All Plots fallow duration		4 OLS Exclude Commercial Plots fallow duration	
	estimate	std error	estimate	std error	estimate	std error
Plot in Same Abusua as Cultivator			-0.31	0.20	-1.10	0.37
Office * Plot in Same Abusua as Cultivator			2.16	0.88	5.96	2.16
Plot obtained Commercially	0.64	0.26				
Plot obtained from Spouse	-0.58	0.41				
Plot obtained from Family	0.83	0.36				
Observations	388		402		266	
Fixed Effects	Individual Cultivator and Spatial Fixed Effects (250 meters)					

All regressions include the plot characteristics used in Table 3.
Standard errors are consistent for arbitrary spatial correlation.

The Political Economy of Land Rights in Ghana

1. Emergence of matrilineage allocation system during period of land abundance (Austin)

   (a) Essential feature: lack of landless class, flexibility wrt shocks (agege)

2. Persistence through cocoa boom

   (a) fortuitous concurrence of agronomy and *de jure* rule

3. Barriers to transition to tenure security

   (a) huge inefficiency→with capital markets could pay for transition

4. "need" and imperfect information

5. bilateral commitment

   (a) Office holders cannot commit to not take the land in the future.

      i. Office holders can be evicted if there is sufficient coordinated dissent

      ii. They have to give out enough land to generate continued support for their rule

      iii. Any individual who invests too much in his land makes it irresistable to office holders for seizure

iv. This is a fairly standard argument: see Acemoglu (2005)

(b) *Villagers* cannot commit to continued support of the leadership

   i. In exchange for access to land, villagers serve as clients of leaders, providing political support

   ii. Villagers, of course, would be willing to commit to long-run support in exchange for secure property rights

   iii. However, they cannot and would reneg upon receipt of secure tenure.

   iv. Without secure tenure, there must be a probability that the land will be taken while fallow.

Table-7: Fallowing, Networks and Abusua Resources

	Last Fallow Duration (years) Parameter Estimate (1)	Last Fallow Duration (years) Parameter Estimate (2)	Last Fallow Duration (years) Parameter Estimate (3)
Female	0.12	-0.66	-0.69
	(0.45)	(0.35)	(0.60)
Office	2.67	3.88	-2.44
	(0.45)	(0.63)	(2.21)
Talk Frequently w/Office Holder	2.05		
	(0.53)		
Households in Abusua/ha		-0.23	-0.63
		(0.05)	(0.58)
Office*Households in Abusua/ha			3.38
			(1.37)
Number of observations	323	368	368
Quintiles of Population Density	25%	50%	75%
Households in Abusua/ha	1.08	1.91	2.60

Notes: All specifications include full set of plot characteristics, full set of family background variables, and household fixed effects. All regressions also include spatial fixed effects, with radius of 250 meters. Standard errors,corrected for spatial correlations as in Conley (1999), are given in parentheses.

Conclusions

- results align with the conceptualization of land tenure as a political process

- rights depend on farmers ability to mobilize support for a plot

- security of tenure depends upon position in political and social hierarchies

- But, even conditional on position, security depends upon circumstances through which farmer came to access plot

But, the interpretation is different...

- Bassett, indigenous systems are not obstacles; "There is a need to transcend [the WB] technocratic and theological approaches that posit a direct link between freehold tenure and productivity"

- Berry

- Complex multiple and overlapping rights to land *are* associated with barriers to investment in land fertility

- individuals who are not central to networks of social and political power are in danger of losing land while fallow

- strong gender dimension, because women are not in positions of power