Network effects & land redistribution in Zimbabwe

A quasi-natural experiment

Tara McIndoe Calder

Trinity College Dublin

TIDI Research Showcase
20th May 2010
Supervisor: Dr. Pedro Vicente

1. Overview
   - Motivation
   - Natural experiment
2. Paper design
   - Field Trip
3. Analysis
   - Data
   - Descriptive statistics
   - Results
   - Work in progress
4. Conclusion

Motivation

- Zimbabwe: recent large scale land redistribution
- Commercial farmers (hold title deads, own large tracts of land, highly skilled, productive, land reallocated 1999)
- Communal farmers (no title deeds, small (secure) areas of land, unskilled, lack credit, few beneficiaries post-1999)
- Anecdotal evidence:
  - Commercial farmers facilitate(d) informal access to K (human and physical) by communal farmers
  - Recent land redistribution affected by low access to skills, machinery
- RQ(1): did these links exist?
- RQ(2): what effect on productivity of their removal

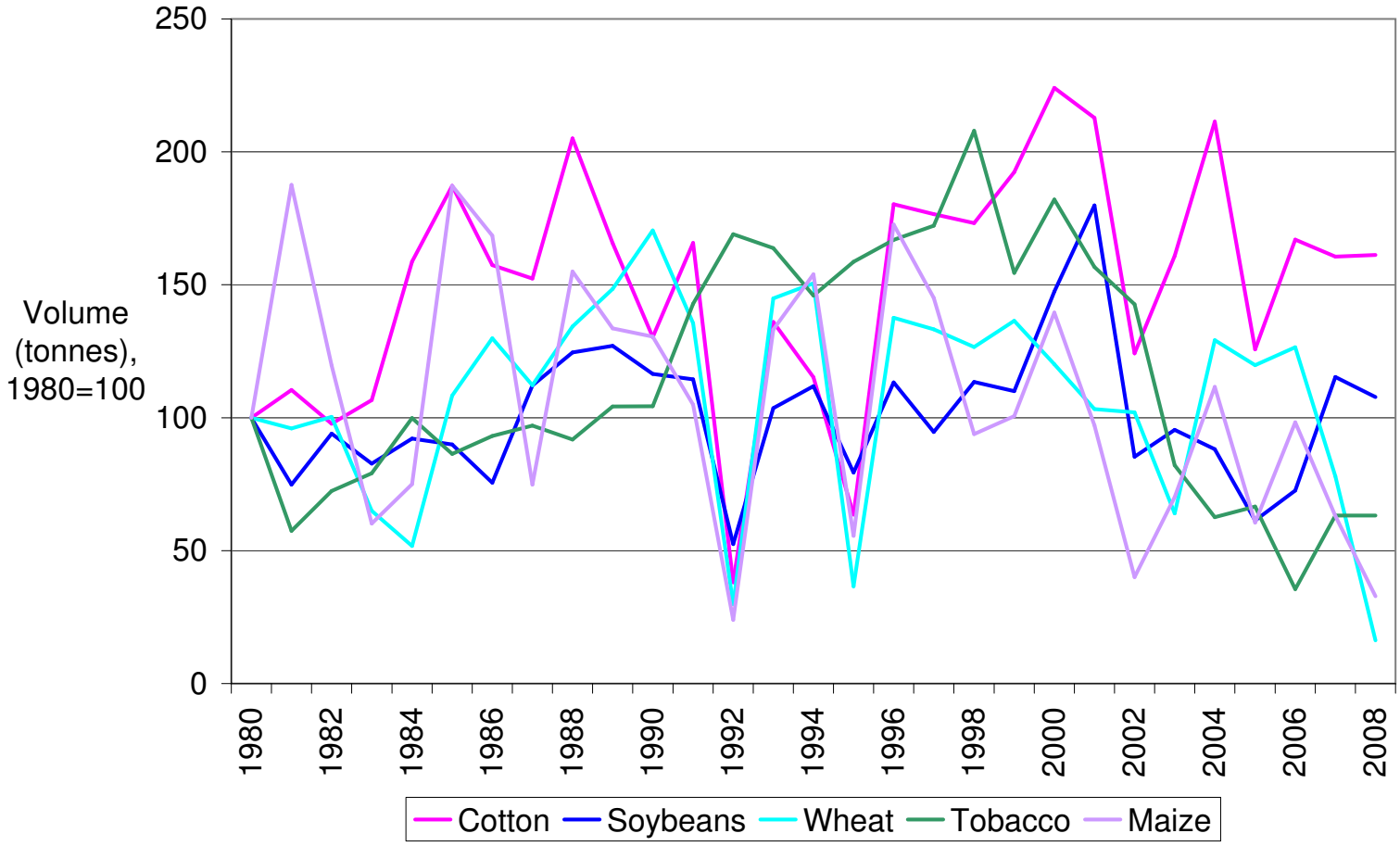
Commercial vs Communal

- 2000 CFU document - national land holding by various groups:
  - (white) commercial farmers: 21% (average size: 1500ha)
  - (black) commercial farmers: 3% (average size: 1500ha)
  - (black) communal farmers: 42% (ave size: 2ha)

Why cotton?

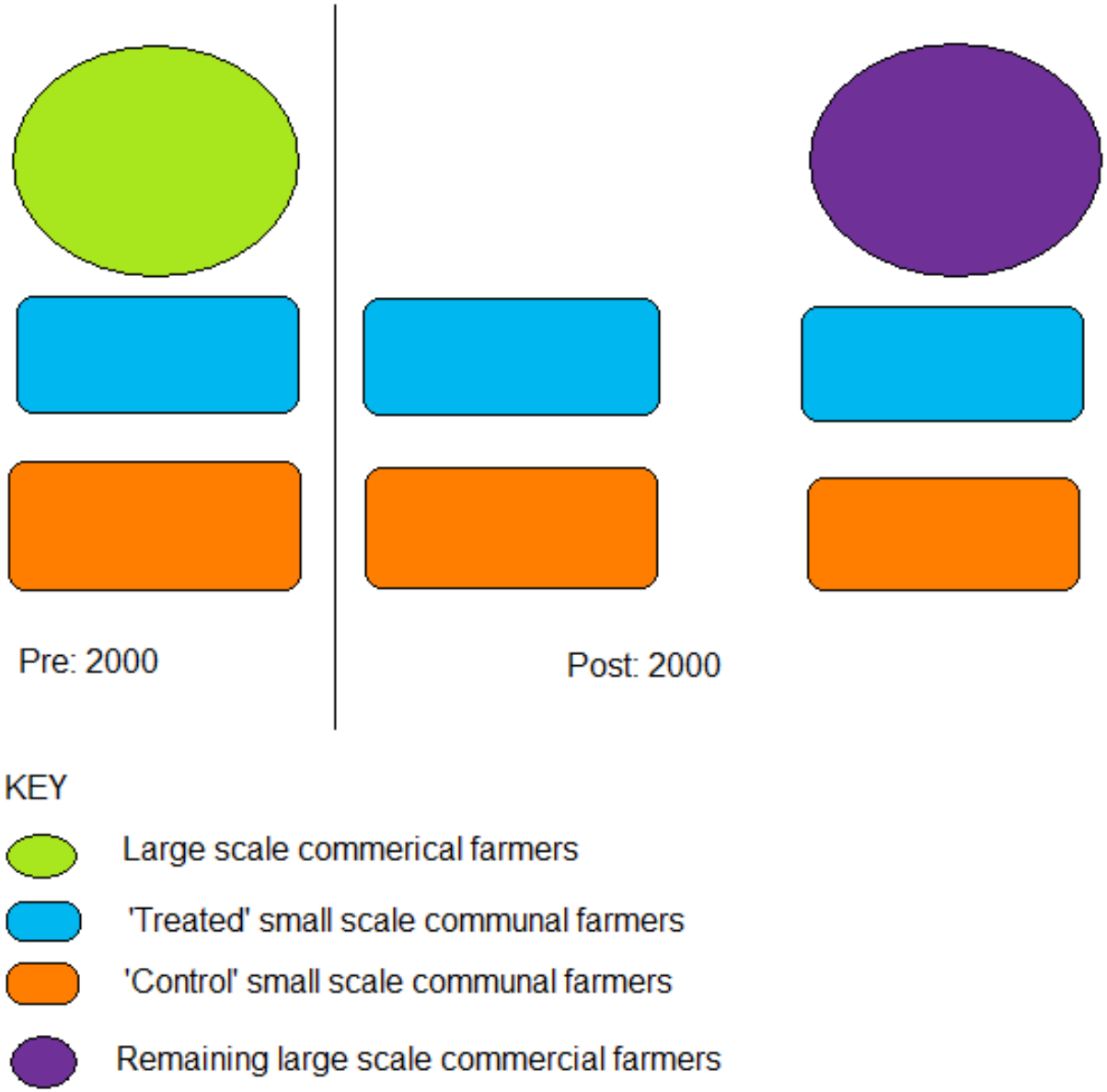
- Cotton: widely grown cash & insurance crop
  - Grown by 300,000 HHs, income for 25% rural pop
- (Some) cotton support structures survived economic decline
  - Mostly grown by small-scale farmers
  - Input credit schemes
  - Extension services (non-government)
  - Purchased at farm gate
- *Ceteris paribus* is more credible for cotton than other agri-industries
- Data from largest cotton marketing company

Figure: Production volume, major Zimbabwean crops: 1980-2008



Natural experiment (difference-in-difference)

- Treatment: land redistribution
- Identify: productivity network effects
- Treated group: communal farmers close to (previously) large scale commercial farmland
- Control group: communal farmers further away
- Treatment
  - Lack pre-2000 data
  - Solution: some large-scale farmers *not* targeted for land redistribution
  - Targeted Farmers $\neq$ f(characteristics important to network effects &/or productivity)
  - Targeted Farmers $=$ f(ethnicity)


Pre: 2000
Post: 2000
KEY
Large scale commerical farmers
'Treated' small scale communal farmers
'Control' small scale communal farmers
Remaining large scale commercial farmers

Land holdings after 'Fast Track Land Reform'

- 2003 Utete report - Mashonaland Central and East
  - (white) commercial farmers: 269 farms
  - (black) commercial farmers: 247 farms
  - (black) A2 farmers: 560 farms

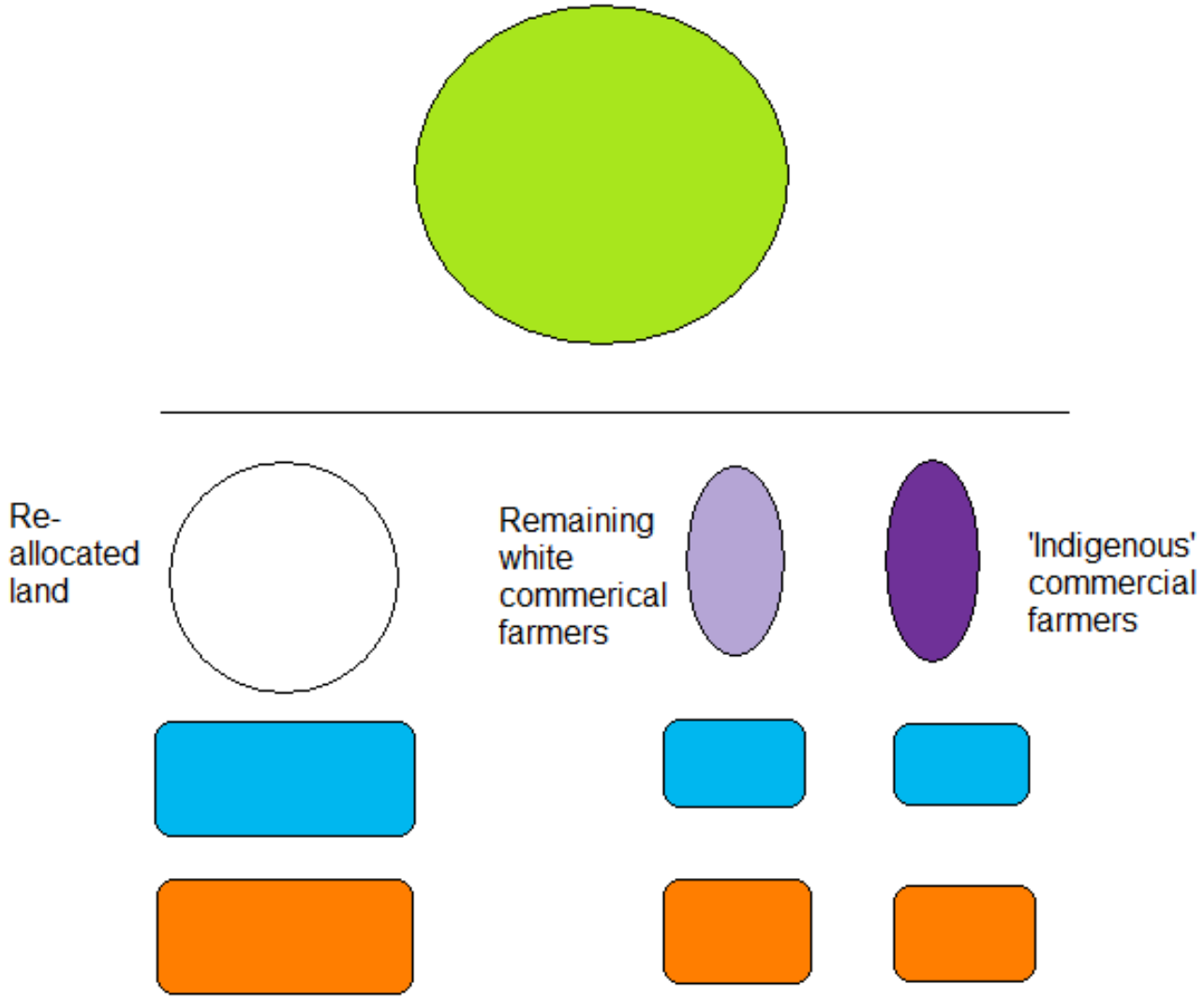

Re-
allocated
land
Remaining
white
commerical
farmers
'Indigenous'
commercial
farmers

Figure: Cotton Farmers, Bindura

Figure: Cotton Field, Kadoma

Figure: Cotton Field, Kadoma

Data - Mashonaland Central and East

- Farm level data (2008, 2009)
  - yield, yield quality, basic inputs, ha, seed growers (quality)
  - rich data on assets, detailed inputs (200 farmers)
- Soil quality, rainfall
- Distance to: gins, roads, commercial farms
- Enumeration level data(25-60 HH)
  - Income, consumption and expenditure data (1995, 2001)
  - Farmers trained by NGO

Variable	
Hectares	2.10
	(1.12)
Yield per hectare (productivity)	254.16
	(260.51)
Fertilizer (kg)	31.37
	(45.54)
A grade cotton (kg)	2.02
	(33.23)
Soil Quality (1-7)	1.58
	(0.67)
Annual rainfall (mm)	771.43
	(69.41)
Altitude (m)	813.92
	(325.98)
Distance to closest road (m)	3,605.72
	(4763.57)
Distance to closest indigenous farmer (m)	36,526.81
	(28,556.76)
Distance to closest redistributed land (m)	28,816.57
	(23,633.02)
Observations	64,750
Standard deviations in parentheses	

Analytic model

$$Y_i = \alpha + \beta_1 d_i + \beta_2 t_i + \beta_3 d_i^* t_i + x_i^{'} \gamma$$

- $Y_i =$ farmer yield per hectare
- $d =$ distance
- $t =$ indicator time variable
- $t^* d =$ interaction (treatment)
- $x_i^{'} =$ farmer characteristics
- Expected signs on $\beta_i^{'} s$:
  - $\beta_1 < 0$
  - $\beta_2 < 0$
  - $\beta_1 + \beta_3 = 0$
  - $\beta_2 + \beta_3 < 0$
  - $\beta_3 > 0$

Preliminary Regression Results

Variable	Coefficient	(Std. Err.)
Distance	-0.001	(0.000)
Time	-28.792	(5.495)
Distance*Time	0.001	(0.000)
Fertilizer (kg)	0.657	(0.028)
Seed (kg)	0.080	(0.098)
Altitude (m)	0.018	(0.007)
Ann rainfall (mm)	0.022	(0.033)
Soil quality	8.565	(2.233)
Roads (m)	0.001	(0.000)
Distance to gins (m)	-0.001	(0.000)
Constant	238.607	(26.074)

Robustness

- Selection bias: today's black farmers vs previous white farmers vs remaining white farmers
  - Compare productivity of small holder farmers living close by
  - Use rich evidence from sub-group
  - Compare geographic conditions (land quality, road proximity)
  - Compare ICES data
- Replicate D-I-D using living conditions
- Training experiment (further control on productivity)

Conclusion

- The FTLF has been detrimental to productivity of cotton farmers regardless location
- Those close to previously commercial land have suffered marginally more than those further away
- This result provides evidence that the FTLR may have disrupted externalities important to small-holder (cotton) farming

Conclusion

Thank-you.