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Scaling Up RCTs

(Lecture 2)

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Lecture 2: Scaling Up RCTs (2/27)

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Overview

- What are the spatial spillovers of village interventions?
- A scaled up RCT on 50,000 villages
- Patterns in the data
- Constructing a model based on previous village economy work
- Household and village level heterogeneity
- The welfare impact of liberalized inter-regional trade and financial flows

Ehrlich and Townsend (2019) “Spatial Spillovers and Labor Market Dynamics: Village Financial Interventions in Thailand”

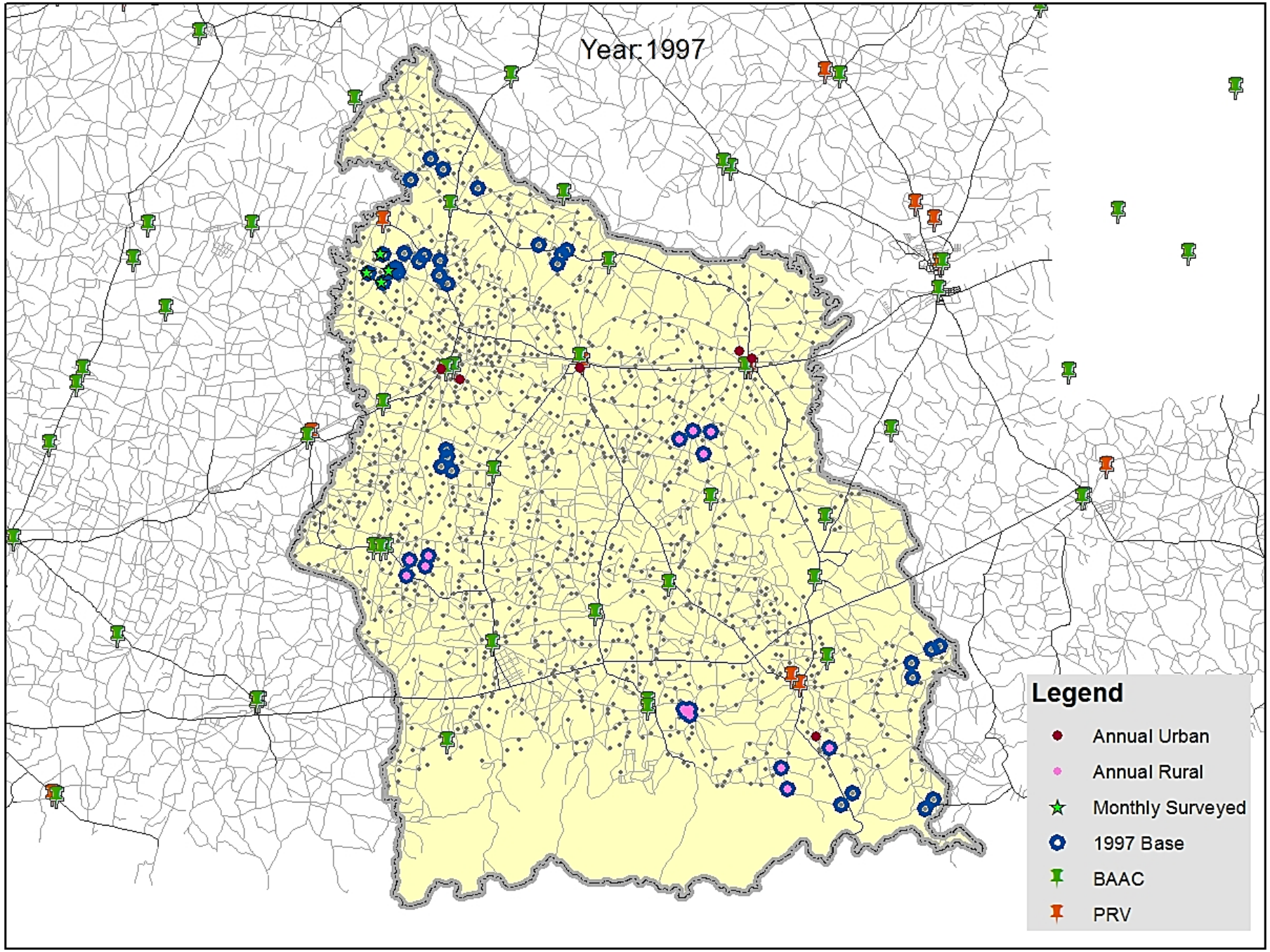
Data

Thailand's Community Development Department (CDD) panel:

- Bi-annual village-level survey 1986 - 2011
- Includes average village daily wages and village population
- Measurement error in population levels

GIS data of Thailand's road network:

- Construct buffer zones using travel time and travel distance


Year: 1997
Legend
Annual Urban
Annual Rural
Monthly Surveyed
1997 Base
BAAC
PRV

Result 1: Baseline effect of Credit on Wages

We run the reduced form regression

$$y_{it} = \beta \text{Credit}_i * \text{Post}_t + \phi_i + \phi_t + \epsilon_{it} \quad (1)$$

where

- y_{it} is wage in village i at time t
- Credit_i is equivalent to $100/\textit{NoHouseholds}_{i,2001}$, the inverse of the number of households in village i in 2001
- Post_t is a dummy equal to 1 if $t \geq 2003$
- ϕ_i is the village fixed effect
- ϕ_t is the time fixed effect

Result 1

Table: Microfinance and Wages Baseline

VARIABLES	(1) Wage	(2) Wage	(3) Wage	(4) Log Wage	(5) Log Wage	(6) Log Wage
Credit$_j$ * Post	1.495***	1.508***	1.195***	0.00997***	0.0114***	0.00996***
	(0.221)	(0.202)	(0.176)	(0.00197)	(0.00140)	(0.00121)
Constant	38.70***			3.587***		
	(0.187)			(0.00280)		
Observations	432,783	432,783	432,783	432,783	432,783	432,783
R^2	0.790	0.831	0.851	0.861	0.894	0.906
Number of Villages	39,628			39,628		
Year FE	YES	NO	NO	YES	NO	NO
Village FE	YES	YES	YES	YES	YES	YES
Prov-yr FE	NO	YES	NO	NO	YES	NO
Amphoe-yr FE	NO	NO	YES	NO	NO	YES
Drop Outliers	YES	YES	YES	YES	YES	YES

This table reports the results of equation 3 on wages. Standard errors clustered at tambon-level throughout.
*** p<0.01, ** p<0.05, * p<0.1

Result 2: Dynamic effect of Credit on Wages

We run the regression

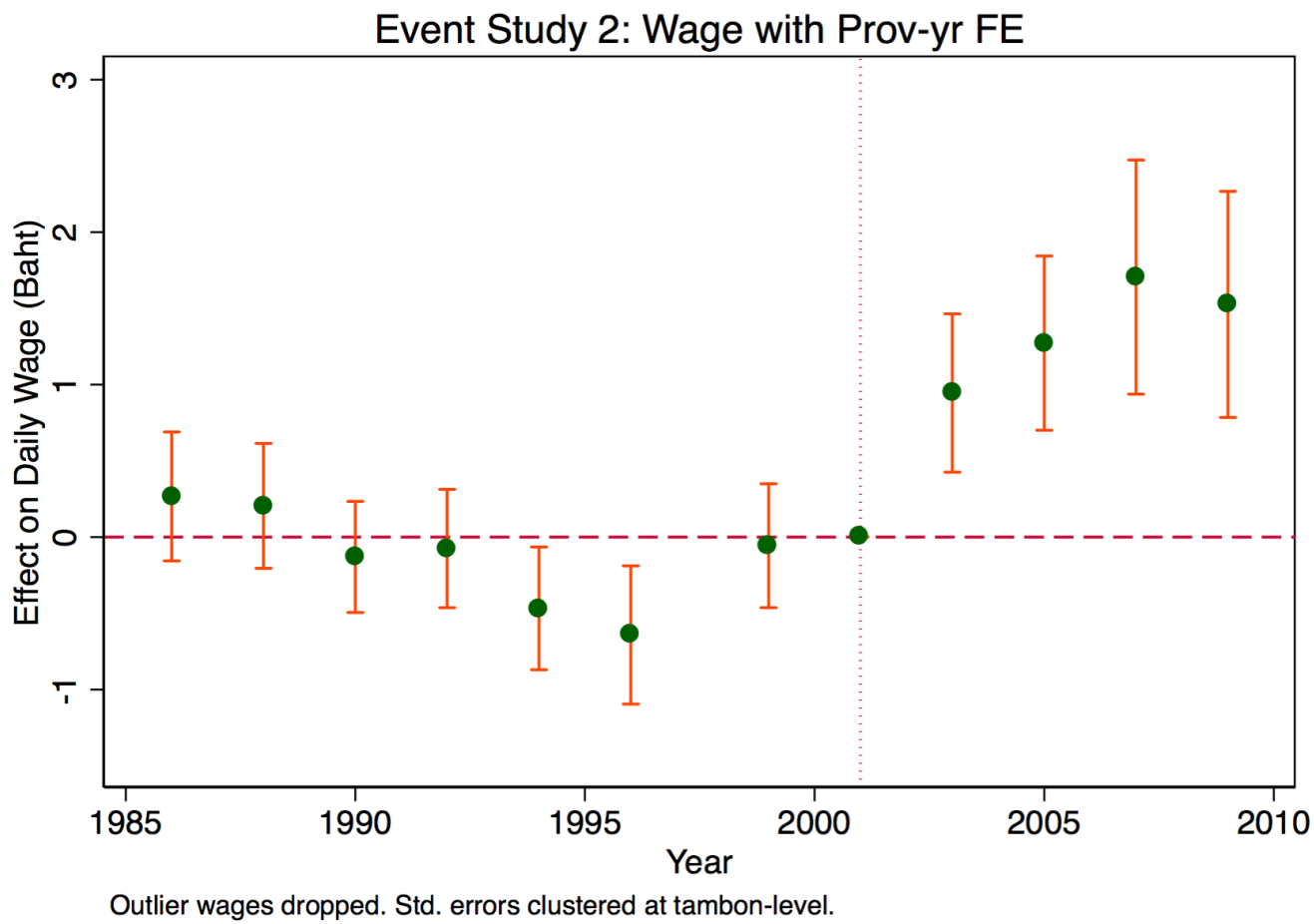
$$y_{it} = \sum_{t=1986}^{2009} \beta_t \text{Credit}_i * \phi_t + \phi_i + \epsilon_{it} \tag{2}$$

where

- Credit_i is interacted with the time effect

Result 2

Figure: Event Study of Credit on Wages with Prov-yr FE



Result 3: Effect of Credit Spillovers on Wages

We capture spatial spillovers by modifying the baseline specification to

$$y_{it} = \beta \text{Credit}_i * \text{Post}_t + \gamma \text{NeighborCredit}_{r,i} * \text{Post}_t + \phi_i + \phi_t + \epsilon_{it} \quad (4)$$

where

- $\text{NeighborCredit}_{r,i}$ is a spatial kernel estimate of the inverse of the number of households in villages within radius r km of village i in 2001
- Kernel is the inverse of the average village population within a buffer zone of radius r. Can weight the village populations by distance.
- All other terms defined as earlier

Result 3

Table: Spillovers where $r = 5$ km

VARIABLES	(1) Wage	(2) Wage	(3) Wage	(4) Log Wage	(5) Log Wage	(6) Log Wage
$\text{Credit}_i * \text{Post}$	0.913***	1.060***	1.110***	-0.00106	0.00739***	0.00853***
	(0.191)	(0.186)	(0.175)	(0.00174)	(0.00130)	(0.00121)
$\text{NeighborCredit}_{5,i} * \text{Post}$	3.238***	3.242***	0.955	0.0623***	0.0289***	0.0161**
	(0.991)	(1.054)	(1.042)	(0.00928)	(0.00757)	(0.00703)
Constant	38.70***			3.587***		
	(0.187)			(0.00280)		
Observations	432,252	432,252	432,252	432,252	432,252	432,252
R^2	0.790	0.831	0.851	0.861	0.894	0.906
Number of Villages	39,579			39,579		
Year FE	YES	NO	NO	YES	NO	NO
Village FE	YES	YES	YES	YES	YES	YES
Prov-yr FE	NO	YES	NO	NO	YES	NO
Amphoe-yr FE	NO	NO	YES	NO	NO	YES
Drop Outliers	YES	YES	YES	YES	YES	YES

This table reports the results of equation 4 on wages. Standard errors clustered at tambon-level throughout.

*** p<0.01, ** p<0.05, * p<0.1

Result 4: Quadratic Time Trend

We run the regression

$$y_{it} = \beta \text{Credit}_i * \text{Post}_t + \text{NeighborCredit}_{r,i} * \Delta\text{t} + \text{NeighborCredit}_{r,i} * \Delta\text{t}^2 + \phi_i + \phi_t + \epsilon_{it} \quad (4)$$

where

- Δt is the difference between the year and 2002 if $t > 2002$ and 0 if $t \leq 2002$
- Δt^2 is the difference squared

Quadratic Time Trend

Table: Quadratic Time Trend

VARIABLES	(1) Wage	(2) Wage	(3) Wage	(4) Log Wage	(5) Log Wage	(6) Log Wage
$Credit_i * Post$	1.008***	1.086***	1.088***	0.000772	0.00786***	0.00858***
	(0.187)	(0.183)	(0.171)	(0.00169)	(0.00128)	(0.00119)
$NeighborCredit_{5,i} * t$	2.145***	1.856***	0.431	0.0351***	0.0170***	0.00746
	(0.599)	(0.668)	(0.705)	(0.00512)	(0.00454)	(0.00463)
$NeighborCredit_{5,i} * t^2$	-0.280***	-0.207**	-0.0240	-0.00421***	-0.00203***	-0.000672
	(0.0844)	(0.0977)	(0.109)	(0.000635)	(0.000621)	(0.000668)
Constant	38.72***			3.587***		
	(0.187)			(0.00280)		
Observations	431,913	431,913	431,913	431,913	431,913	431,913
R^2	0.790	0.831	0.851	0.861	0.894	0.906
Number of newvill8	39,544			39,544		
Year FE	YES	NO	NO	YES	NO	NO
Village FE	YES	YES	YES	YES	YES	YES
Prov-yr FE	NO	YES	NO	NO	YES	NO
Amphoe-yr FE	NO	NO	YES	NO	NO	YES
Drop Outliers	YES	YES	YES	YES	YES	YES

Standard errors clustered at tambon-level throughout.

*** p<0.01, ** p<0.05, * p<0.1

Result 4: Effect of Isolation on Spillovers

We run the following regression

$$y_{it} = \beta \text{Credit}_i * \text{Post}_t + \theta \text{Credit}_i * \text{Post}_t * \text{Isol}_i + \phi_i + \phi_t + \epsilon_{it} \quad (5)$$

where

- Isol_i is a measure of the isolation of a village
- Define isolation several ways, including: distance to nearest village, dummy for whether the distance to the nearest village is greater than some percentile in the distribution

Result 4

Table: Isolation

VARIABLES	(1) Wage	(2) Wage	(3) Wage	(4) Log Wage	(5) Log Wage	(6) Log Wage
$Credit_i * Post$	0.842***	1.270***	0.889***	0.00367	0.00345*	0.00546***
	(0.321)	(0.289)	(0.259)	(0.00294)	(0.00199)	(0.00180)
$Isol_i * Post$	0.867***	0.306	0.402*	0.00841***	0.0104***	0.00592***
	(0.288)	(0.260)	(0.236)	(0.00260)	(0.00184)	(0.00166)
Constant	38.71***			3.587***		
	(0.187)			(0.00280)		
Observations	432,165	432,165	432,165	432,165	432,165	432,165
R^2	0.790	0.831	0.851	0.861	0.894	0.906
Number of Villages	39,569			39,569		
Year FE	YES	NO	NO	YES	NO	NO
Village FE	YES	YES	YES	YES	YES	YES
Prov-yr FE	NO	YES	NO	NO	YES	NO
Amphoe-yr FE	NO	NO	YES	NO	NO	YES
Drop Outliers	YES	YES	YES	YES	YES	YES

This table reports the results of equation 4 on wages. Standard errors clustered at tambon-level throughout.

*** p<0.01, ** p<0.05, * p<0.1

Initial Structural Models

Kaboski and Townsend (2011)'s model includes:

- Precautionary liquid savings to smooth uninsured income shocks (will be included in our model)
- Limited borrowing due to financing constraints, as a function of permanent income (constraints key in our model)
- Investment which is discrete with stochastic opportunities, common real return (investment smooth in our model)

New ingredients and results not in original models

Banerjee, Breza, Townsend, and Vera-Cossio (2018):

- Large heterogeneity in terms of underlying household productivity
- TFP estimated with pre-intervention data
- Large increase post intervention in profits, and assets used in production, especially non-agriculture business, but not for the lower quartiles of productivity
- Our model has TFP heterogeneity as key ingredient across villages (and will be also within)

Pawasutipaisit and Townsend (2011), Samphantharak and Townsend (2017):

- Average returns are highly persistent over time (our model allows for this, TFP currently fixed)

Village committee did not allocate funds by productivity (our model does not encompass this)

Alternative Commodity Spaces

Paweenawat and Townsend (2018):

- Documented villages more open to capital than labor (we keep this)
- Multiple goods and trade

Breza and Kinnan (2018):

- Multiple goods, tradable and non-tradable

Our model has one good. Documenting commodity output, consumption, and input flows in Thailand:

- Burstein, Hanson, Tian, and Vogel (2018): prices respond more in non-tradable than tradable sectors to immigration
- Most goods at the village level are tradable - Paweenawat and Townsend (2018)
- Also Paweenawat and Townsend (2018): no responses in village imports and exports due to Village Fund

Across Village Perspective, Effects of Micro Finance

Bryan, Chowdhury and Mobarak (2017):

- Migration subsidy $\rightarrow$ outflow of labor
- Increased wages for those left in village (big part of our model)

Lagakos, Waugh, Mubarak (2018):

- Substantial gains to migration for the low income, low asset households (also in our model)

Baseline Model

Environment:

- $i = 1, ..., N$ villages
- Villages partially integrated in labor markets
- Discrete time
- Households either entrepreneurs e or workers w
- There is open economy interest rate $1 + r$
- The wage is endogenous
- Distribution of workers across villages and asset levels, $L^w_{it}(a)$.
- Distribution of entrepreneurs across villages and asset levels, $L^e_{it}(a)$.

Worker Problem

- Continuum of workers
- Maximize lifetime utility
- Discount rate β
- Born with assets a_0 that differ by both worker and village $\rightarrow$ Villages have different populations and worker asset distributions
- Provide one unit of inelastic labor
- Can migrate from village i to j paying migration cost κ_{ij}

Worker Problem I

The recursive formulation of the worker problem is

$$V^w_{i,t}(a) = \max_{a' \geq -\bar{a}} \{u((1+r)a + w_{i,t} - a') + \mathrm{E}[\max_{j \in M} \{\beta V^w_{j,t+1}(a' - \kappa_{ij}) + \epsilon_{j,t}\}]\}$$

Assuming that the idiosyncratic shocks ϵ are iid and follow a Type-I Extreme Value Distribution, we can rewrite the value function to:

$$V^w_{i,t}(a) = \max_{a' \geq -\bar{a}} \{u((1+r)a + w_{i,t} - a') + \nu \log(\sum_{j \in M} (\exp(\beta V^w_{j,t+1}(a' - \kappa_{ij})))^{1/\nu})\}$$

Worker Problem II

Let $g^w(i,a)$ be the worker's asset policy function. We then derive the migration shares, the fraction of workers who start period t with assets a in village i and move to j at the end of the period:

$$m_{ijt}(a) = \frac{(\exp(\beta V^w_{j,t+1}(g^w(i,a) - \kappa_{ij})))^{1/\nu}}{\sum_{m \in M}(\exp(\beta V^w_{m,t+1}(g^w(i,a) - \kappa_{im})))^{1/\nu}}$$

The distribution of workers across locations and assets evolves according to

$$L_{jt+1}(a') = \sum_{i \in N} \int_{a: g^w(i,a) - \kappa_{ij} = a'} m_{ijt}(a) L_{it}(a) da$$

and the labor supply in each village is

$$L_{jt} = \int_a L_{jt}(a)$$

Entrepreneur Problem I

There is one representative firm per village.

The recursive formulation of the entrepreneur's problem is

$$V_i^e(a,z) = \max_{a' \geq -\bar{a}} \{u((1+r)a + \pi(a,z) - a') + \beta \mathrm{E}[V_i^e(a',z')]\}$$

where

$$\pi(a,z) = \max_{k,l} \{z(k^\alpha l^{1-\alpha})^{1-\gamma} - w_{i,t} l - rk\}$$
$$\text{s.t } k \leq \phi a$$

and $\alpha, \gamma < 1$, $\phi > 1$.

Entrepreneur Problem II

The law of motion for entrepreneurs is

$$L^e_{it+1}(a') = \int_{a:a'=g^e(i,a)} L^e_{it}(a)da \quad \forall i$$

Since entrepreneurs cannot migrate, we do not need to consider flows of entrepreneurs between villages.

Equilibrium

A stationary equilibrium is wages $\{w(i)\}$, asset policy functions $\{g^w(i,a), g^e(i,a)\}$, and distribution of workers and entrepreneurs across villages and assets $L^w_{it}(a), L^e_{it}(a)$ such that

1. Given wages $\{w(i)\}$, workers optimize.
2. Given wages $\{w(i)\}$, entrepreneurs optimize.
3. Labor markets clear in each village.
4. The distribution of workers across villages and assets is stationary

$$L^w_{it}(a) = L^w_{it+1}(a)$$

5. The distribution of entrepreneurs across villages and assets is stationary

$$L^e_{it}(a) = L^e_{it+1}(a)$$

Calibration of Other Parameters

Table: Calibration of Model Parameters

Target Moments	Parameters
Thailand Interest rate in 2002	$r = 0.051$
Thailand Loan-to-collateral ratio, 95% quantile	$\phi = 20$
Bryan and Morten (2018), Morten and Oliveira (2018), etc.	$\nu = 3$
Thailand estimates from Ji and Townsend (2018)	$\beta = 0.9$
Thailand estimates from Paweenawat and Townsend (2014)	$\gamma = 0.16$
Thailand estimates from Paweenawat and Townsend (2014)	$\alpha = 0.33$

Computation

We compute the equilibrium using the following algorithm:

(1) Guess the wage function $w(i)$ (i.e guess wage w for every village i)

(2) Solve the household and the firm problem using value function iteration

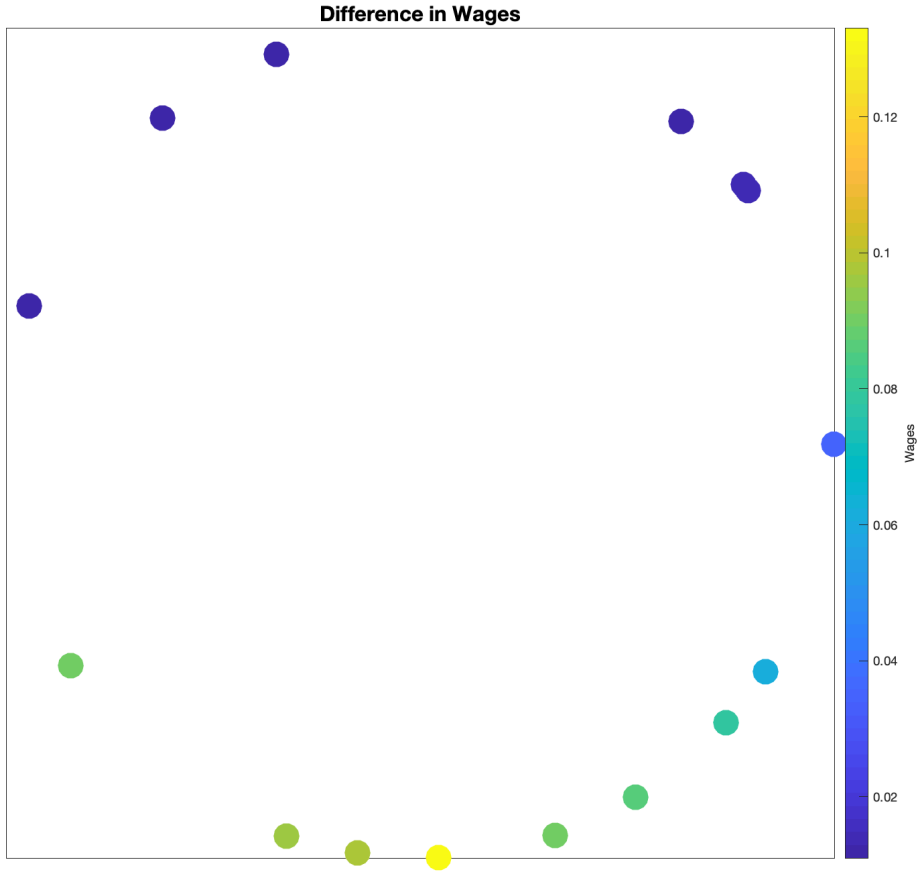
(3) Construct stationary distributions for workers and entrepreneurs

(4) Check if the labor markets clear in each village

(5) Update the wage function and repeat the previous steps until the wage function converges to a stationary equilibrium. Wage function is update by calculating a Jacobian and correcting the wages in the appropriate directions.

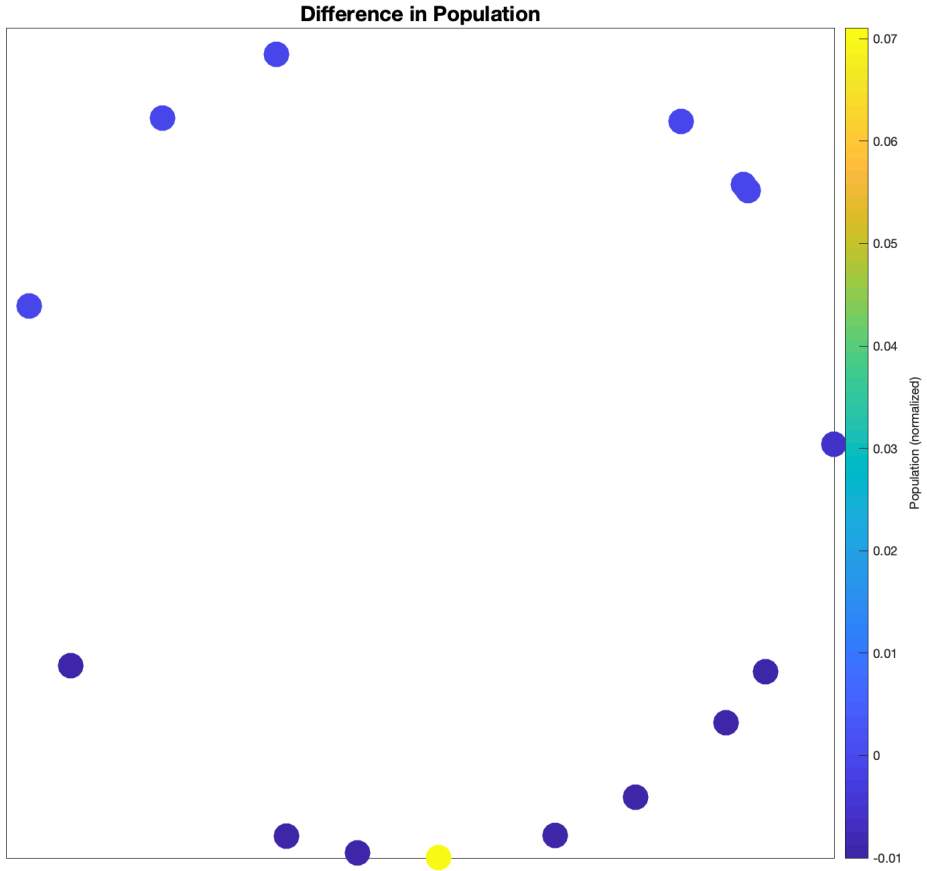
Stylized Examples of Model Mechanics: Leverage Shock

Figure: The difference in wages between two equilibria before and after leverage shock to the bottom most village.



Stylized Examples of Model Mechanics: Leverage Shock

Figure: The difference in population between two equilibria before and after leverage shock to the bottom most village.



Back to the Village Fund

How to simulate the Village Fund?

1) The Village Fund resulted in a *permanent* increase in the credit availability (Kaboski and Townsend 2011, 2012).
   - Village banks would loan out the 1 million Baht
   - Loans would be repaid
   - Banks would loan out the funds again

   In the model, we think of the village fund as permanent relaxation of the leverage constraint. We compare the equilibria before and after the shock to the leverage constraints.

2) Leverage constraint shocks are scaled inversely proportional to the village population; in the Village Fund, credit per capita increases as village size decreases.

Village Fund Simulation

We simulate the village fund program and run the following regression to compare to the data:

$$\Delta y_i = \beta \Delta \phi_i + \gamma \Delta \text{Av}\phi_{r,i} + \epsilon_i \tag{6}$$

where

- $\Delta \phi_i$ is the change in the leverage constraint scaled to inverse population size
- $\Delta \text{Av}\phi_{r,i}$ is the average change in the leverage constraint for villages within a buffer zone

Village Fund Simulation

Table: Village Fund Simulation Regressions

VARIABLES	(1) Wage	(2) Log Wage	(3) Pop	(4) Log Pop
$\Delta\phi_i$	0.00242***	0.00458***	0.000746***	0.0376***
	(0.000574)	(0.00108)	(5.87e-05)	(0.00288)
$\Delta \text{Av}\phi_{r,i}$	0.00113**	0.00214**	-8.10e-05*	-0.00430*
	(0.000434)	(0.000815)	(4.43e-05)	(0.00218)
Constant	-0.0348***	-0.0663***	-0.00707***	-0.354***
	(0.00851)	(0.0160)	(0.000870)	(0.0427)
Observations	50	50	50	50
R^2	0.310	0.312	0.794	0.803

*** p<0.01, ** p<0.05, * p<0.1

Comparison to Data

We are able to match:

- Increase in wages
- Credit spillovers in wages
- Credit spills over less onto isolated villages
- Increase in investment
- Increase in profits

We are not able to match:

- In the data, consumption initially increases and then decreases.

Macro Variables and Welfare

Workers: Increasing wages for all workers, thus increasing welfare.

Entrepreneurs:

- Direct effect: Output, consumption, capital usage, profits increase.
- Spillover effect: Entrepreneurs in highly populated villages near small villages are hurt by the increased wages.

A discussion about welfare must consider the transition paths (in progress).

Unequal effects across workers and villages: workers who can migrate right away capture more of the gains from the village fund, other workers need to save wealth in order to migrate.

Counterfactuals

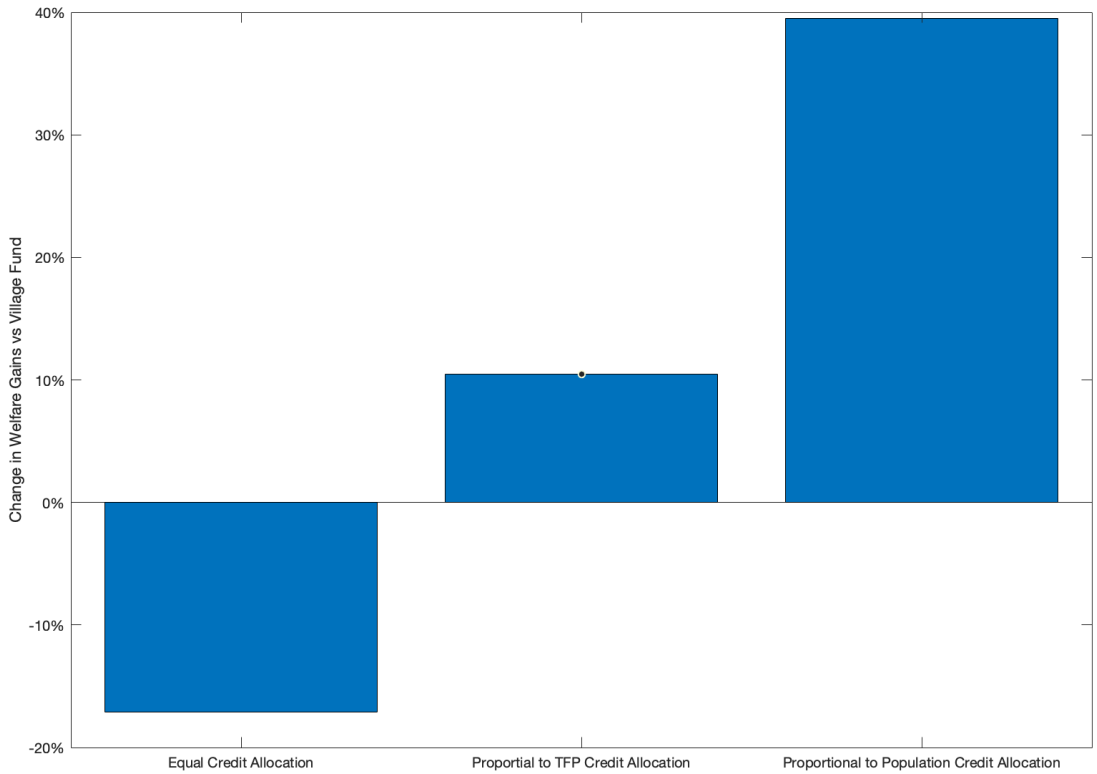
How do we allocate credit to maximize welfare?

3 possible counterfactual allocations of credit:

- Relax leverage constraints equally across all villages
- Relax leverage constraints proportional to TFP
- Relax leverage constraints proportional to village population

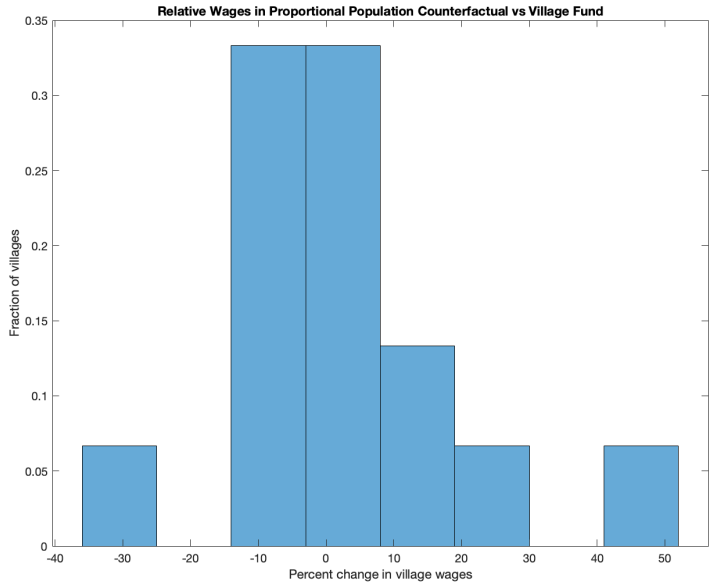
Counterfactuals: Welfare

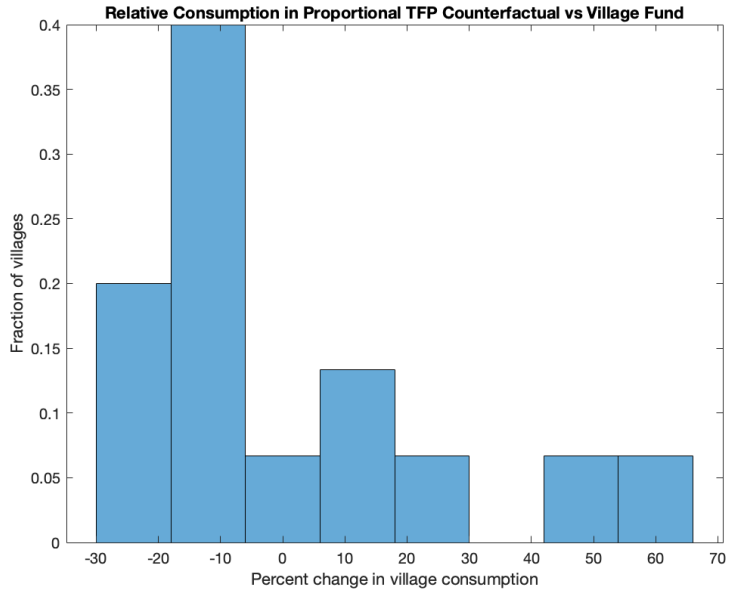
Figure: Relative welfare gains of counterfactuals to Village Fund



Counterfactuals: Wages and Consumption

Figure: Left: Relative Wages in counterfactual where leverage constraints are relaxed proportional to village population vs Village Fund. Right: Relative Consumption in counterfactual where leverage constraints are relaxed proportional to village TFP vs Village Fund.





Concluding Thoughts

Why do you need a model with multiple villages to think about scaling-up?

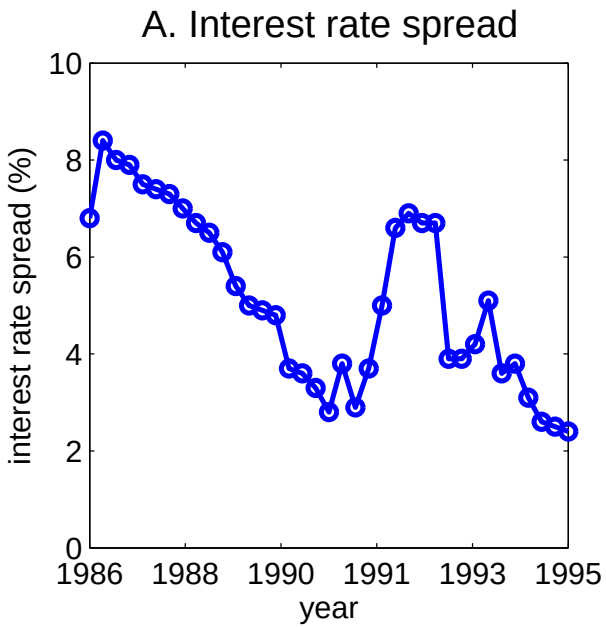
1) Macro Aggregates differ from one village model and a general equilibrium model with price effects but without spatial frictions
2) Village heterogeneity and spatial linkages result in spatially unequal effects of the policy on firms and workers

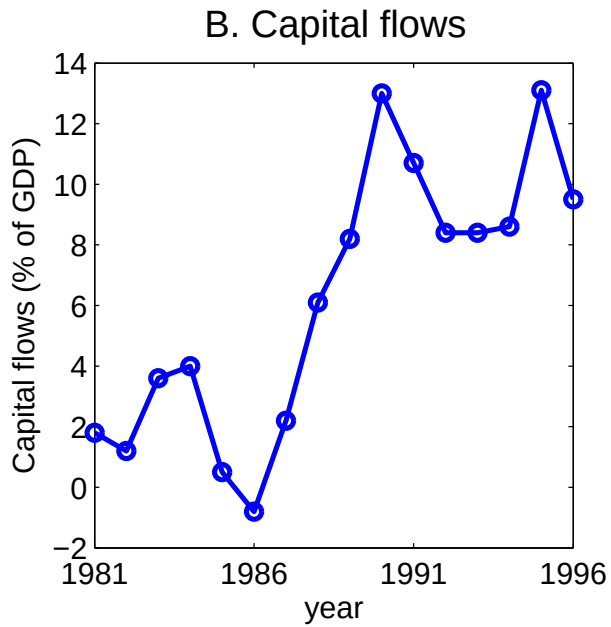
Research question

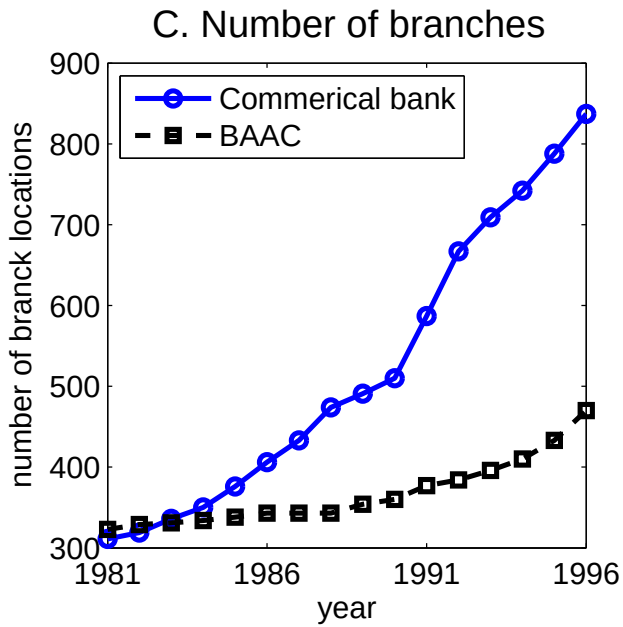
- Financial liberalization brings both domestic deregulation and the liberalization of international transactions.
- How to distinguish their impacts?
- We quantify their effects by developing a spatial equilibrium model.
- To evaluate bank branch expansion,
  - Introduce heterogeneity across time and space.
  - Distinguish credit extension and deposit mobilization.
- To evaluate capital account liberalization,
  - Introduce flow of funds across spatially connected local markets.
  - Determine interest rate/wage from economy-wide general equilibrium.

Financial reforms in Thailand 1986-1996

- Thailand GDP more than doubled during this decade.
- Accompanied with deep structural changes in financial sector.

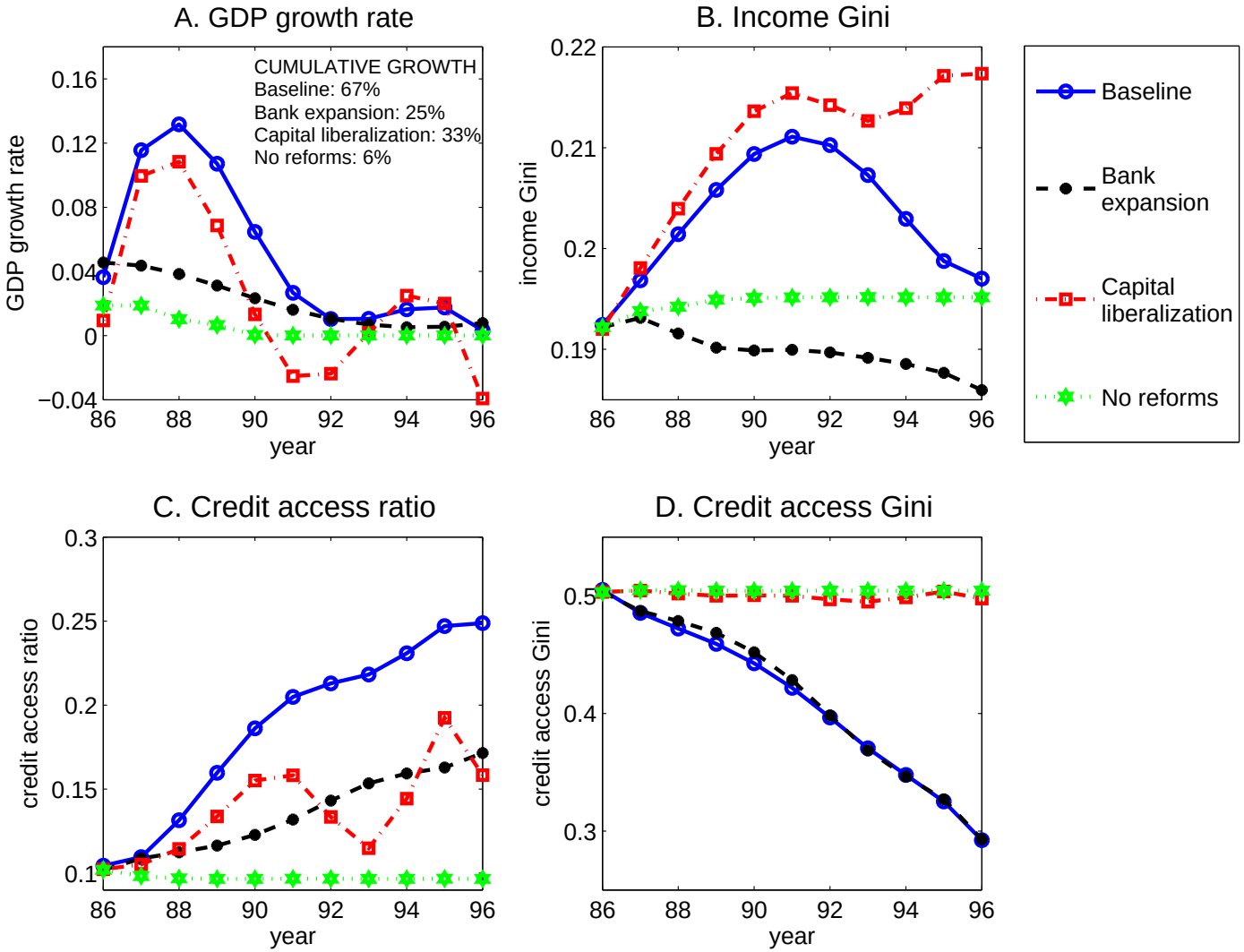




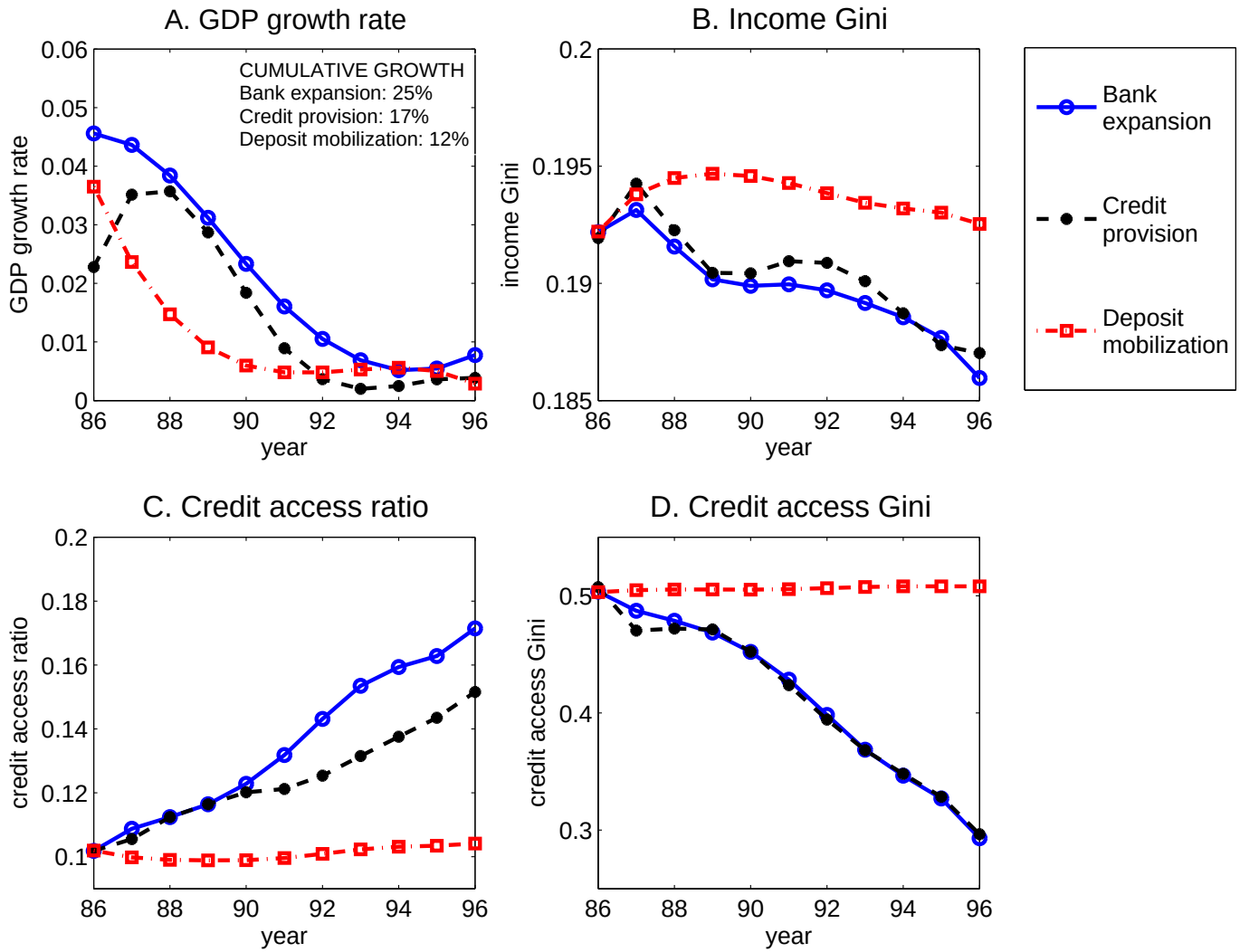


- We take two major reforms as given and study their implications:
  - Capital account liberalization: interest rate spread and capital flows.
  - Bank expansion: commercial banks decide where to open branches; BAAC branch locations are exogenously given.
    - Deposit mobilization vs credit provision.

The impact of two reforms on macro aggregates



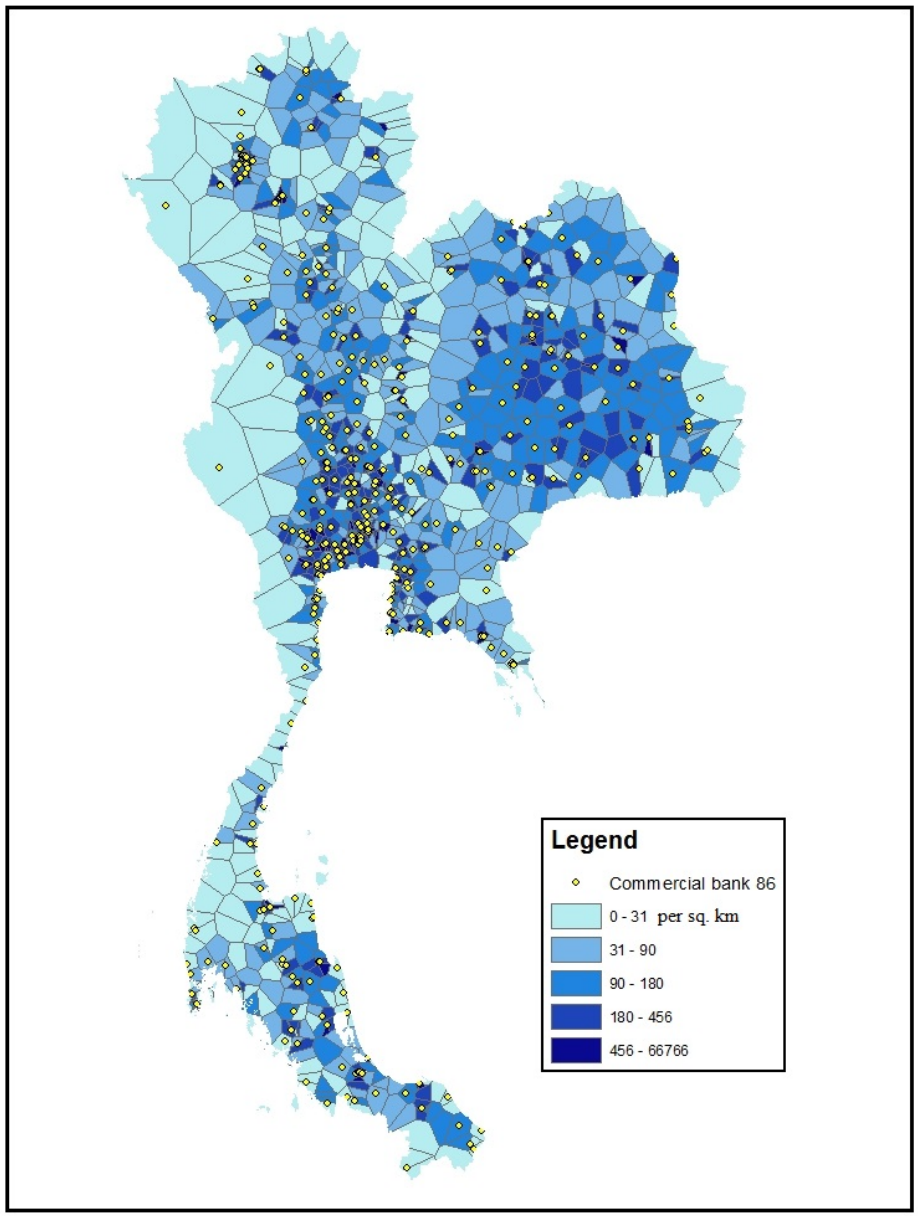
Inspecting the two channels of bank expansion



Data

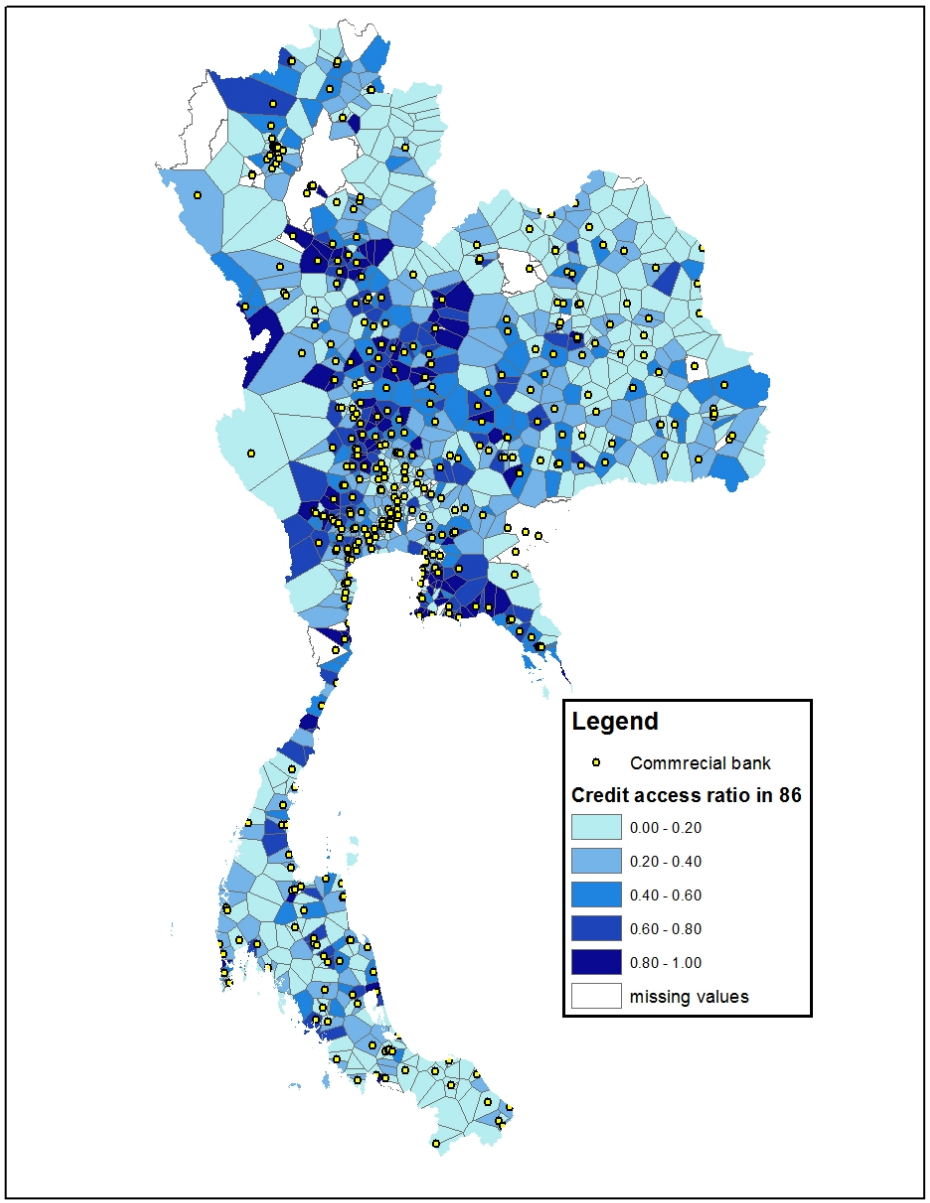
- Household surveys and census data
  - The Thai Socio-Economic Survey (SES).
  - The Thai Community Development Department (CDD) dataset.
  - The Townsend Thai Survey - annual urban, annual rural, monthly.
  - The Thai Population and Housing Census (PHC)
  - The Enterprise Survey of Thailand.
- High-resolution GIS data
  - Road network - computing car travel time based on road conditions.
  - Commercial bank and BAAC branch locations.
- Macro variables
  - Interest rate spread and capital flows from Bank of Thailand.
  - World Development Indicators (WDI).

More commercial branches are in populous areas



- Source: PHC and CDD
- PHC census
  - Municipal pop in 1990
  - Map municipality to "market"
- CDD village survey
  - Village pop.
  - Map village to "market".
  - About 70,000 villages.

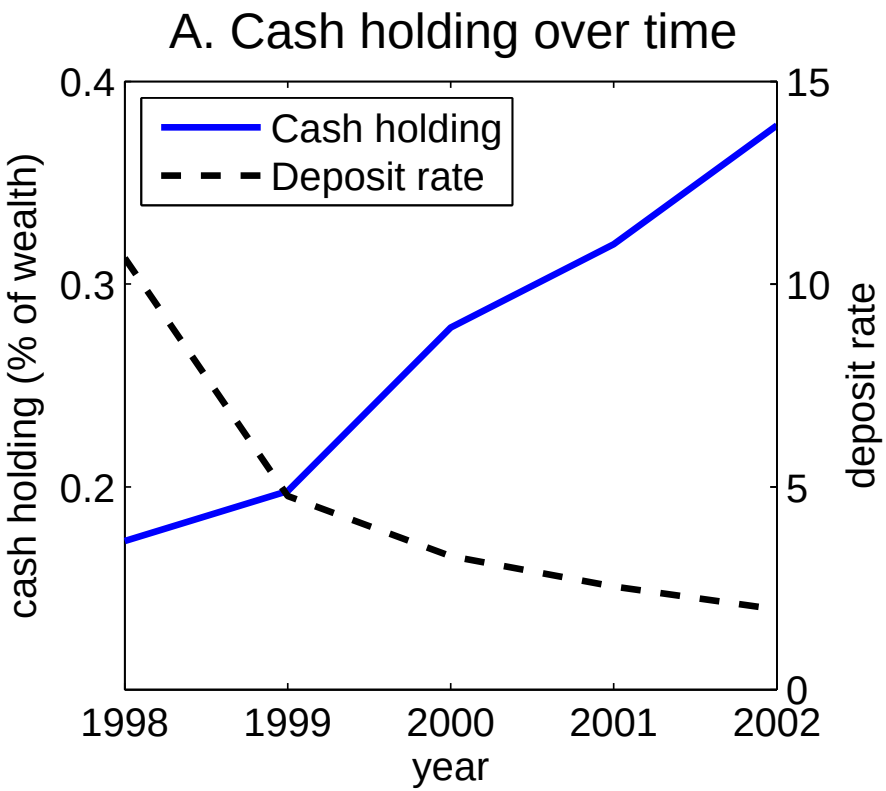
Better credit access in areas closer to branches

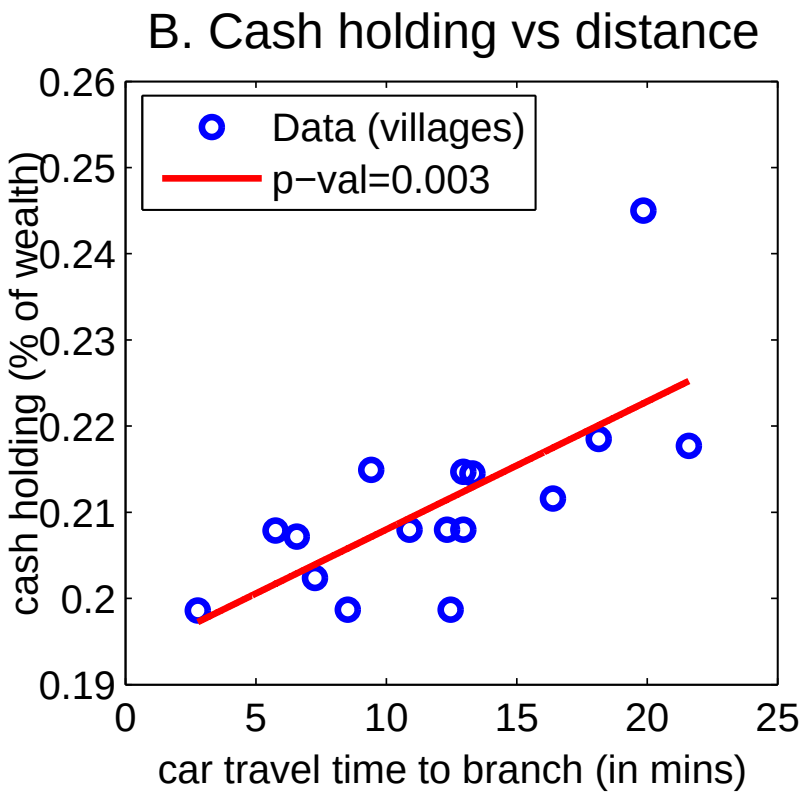


- Source: CDD village survey
  - Village headman reports credit condition.
  - Aggregate to obtain credit access ratio in each "market".
- Large credit access inequality
  - Gini=0.5.
- Significant spatial correlation
  - Moran's test p-val<0.0001.

Suggestive evidence on cash holdings

- Cash holdings tend to be negatively correlated with deposit rate and positively correlated with travel time to bank branch.





- Source: Townsend Thai monthly survey 1998-2011.
- Identifies the parameter governing cash withdrawal costs.

Outline of the talk

- Model
- Computation strategy
- Calibration and validation tests
- Counterfactuals
- Conclusion

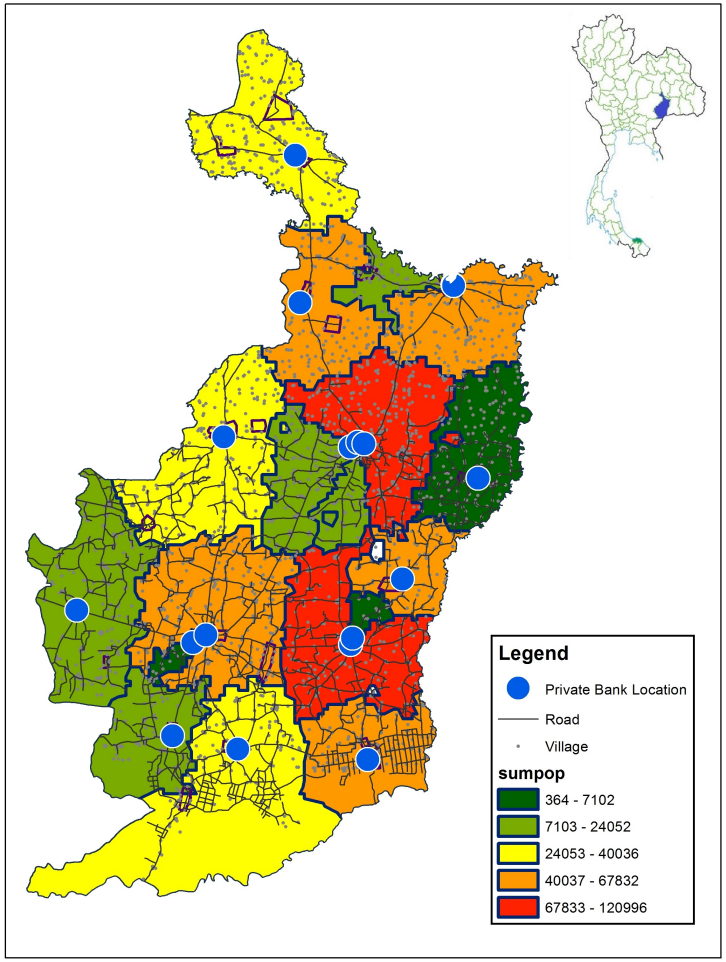
Environment

- Time is discrete denoted by t.
- The economy has N markets, connected by road networks.
- In each market n, a continuum of agents of measure P^n.
  - P^n represents market size.
  - Calibrated from local population (PHC+CDD).
- Branches opened by commercial banks or BAAC.
  - Provide same financial service at the same cost.
  - Equal market share on households' deposit.
- Each market may have no branch, one branch, or two.

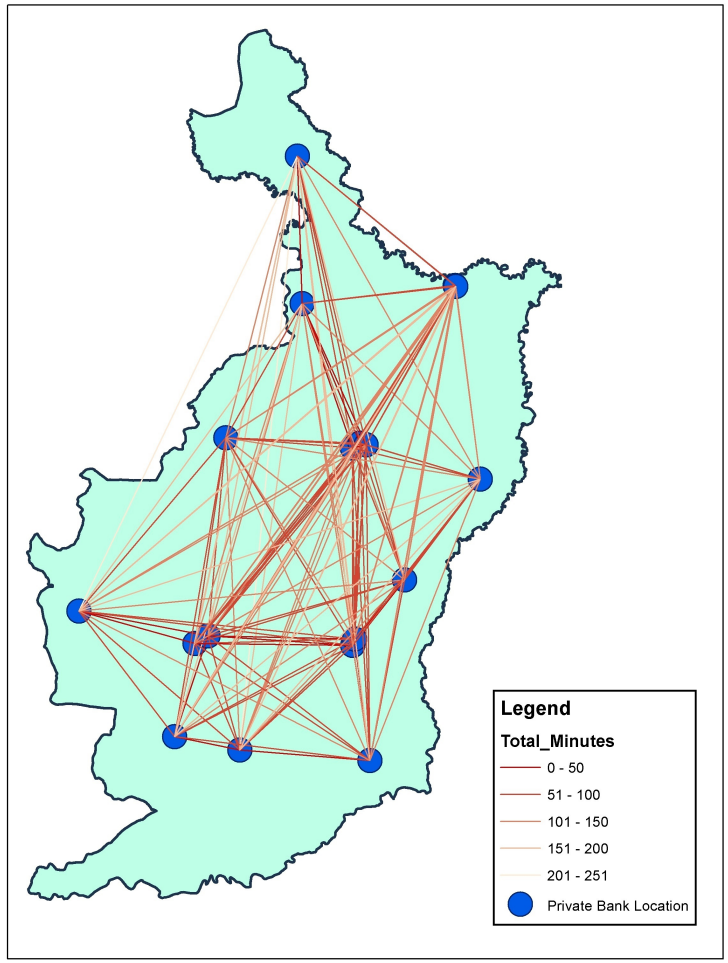
Market illustration

- Markets: 1428 commercial bank branches opened by 2011.

A. Illustration of market and GIS



B. Illustration of model's network structure



The bank opens branches to maximize profit

- Focus on commercial banks, exogenous BAAC locations.
- Dynamic bank expansion: chooses branch locations to maximize discounted profit from intermediation.

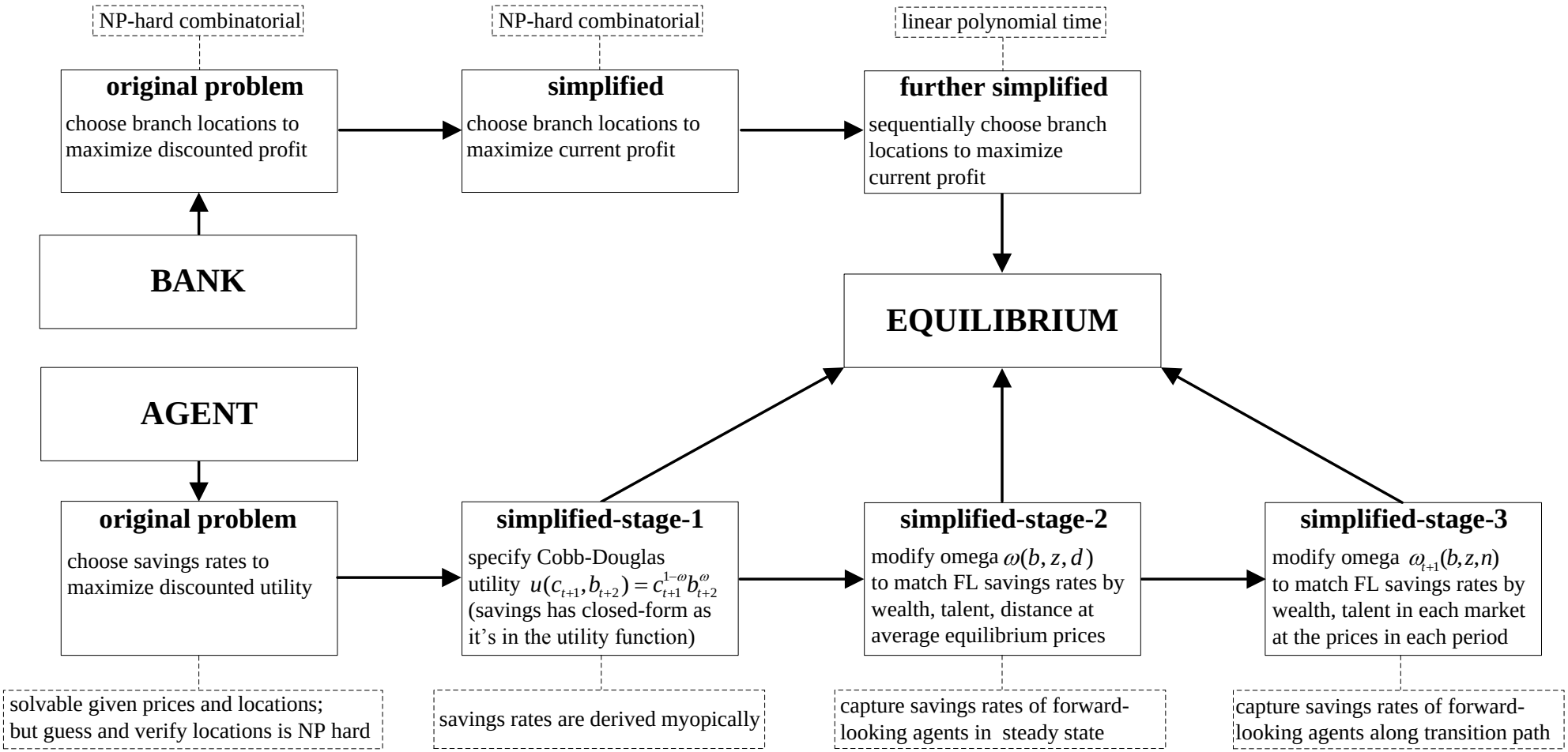
$$\sum_{t=0}^{\infty} \beta^t \chi_t \left[\sum_{n \in \Lambda^1} S_t^n + \frac{1}{2} \sum_{n \in \Lambda^3} S_t^n + \tau \times \text{CAPITAL INFLOW}_t \right],$$

  - Λ^1: markets with only commercial bank.
  - Λ^3: with both BAAC and commercial bank, equal market share.
  - τ: fraction of capital flowing into commercial banks.
  - CAPITAL INFLOW$_t$ $\rightarrow$ exogenously given as % of GDP (BOT).
    - Capital inflow$_t$ in model = % of GDP$_t$ in data $\times$ GDP$_t$ in model.
- Profit is equally distributed to agents (tr_t) at the end of the period.

Effects and channels of bank expansion

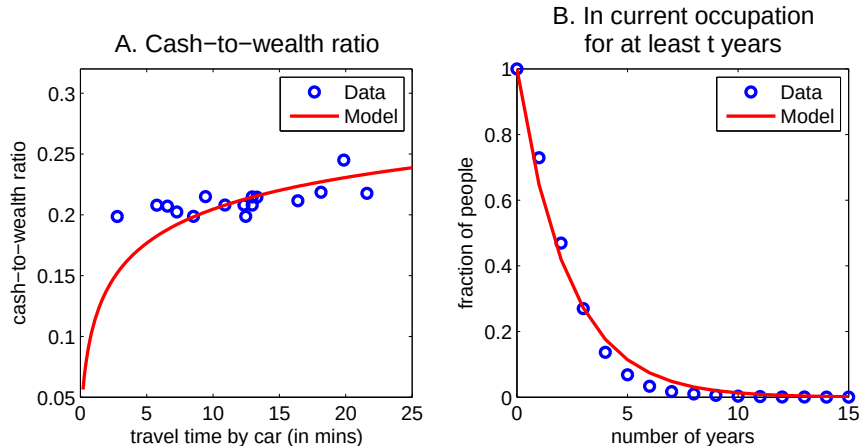
- Opening a new branch in market n has three effects on bank profit:
  - **Direct effect**: increase in the bank's savings from agents in market m where a new branch is opened.
  - **Network effect**: agents in nearby markets come to new branch. $\Rightarrow$ savings in new branch $\uparrow$, savings in nearby existing branches $\downarrow$.
  - **GE effect**: change in savings from agents in all markets due to the change in interest rates and wages.
- Household and economy level, two channels:
  - Deposit mobilization and credit provision.

Computation strategy



Summary of calibration

Target moments	Data	Model	Parameters
Parameters internally estimated (mainly use 1986 data)			
Occupation persistence	see Figure below		$\gamma = 0.352$
Average cash-to-wealth ratio	see Figure below		$s = 0.0051$
Average credit access ratio in 86	0.105	0.102	$\eta = 1.1$
Credit access inequality in 86	0.500	0.502	$\kappa = 0.45$
Fraction of entrepreneurs in 86	0.15	0.14	$f_0 = 0.48$
Top 20% employment	0.722	0.720	$\rho = 4.7$
Average wealth in 86	0.266	0.266	$q_w = 0.209$
Interest rate in 86	11.5%	11.5%	$\beta = 0.9$
Percent of out-migrants in population in 86	8.1%	8.1%	$\varkappa = 0.025$
Parameters determined outside the model			
Wage growth rate, 76-86	0.5%	0.5%	$g_f = 0.5\%$
Loan-to-collateral ratio, 95% quantile	20	20	$\lambda = 20$
Estimates from Paweenawat and Townsend (2014)			$\nu = 0.16$
Estimates from Paweenawat and Townsend (2014)			$\alpha = 0.33$
Estimates from Samphantharak Townsend (2009)			$\delta = 0.08$



Bergquist, Faber, Fally, Hoelzlein, Miguelk and Rodriguez-Clare (2019) "Scaling Agricultural Policy Interventions: Theory and Evidence from Uganda"

Abstract

Interventions aimed at raising agricultural productivity in developing countries have been a centerpiece in the global fight against poverty. These policies are increasingly informed by evidence from field experiments and natural experiments, with the well-known limitation that findings based on local variation do not speak to the general equilibrium (GE) effects if the intervention were to be scaled up to the national level. In this paper, we develop a new framework to quantify these forces based on a combination of theory and rich but widely available microdata. We build a quantitative GE model of farm production and trade, and propose a new solution method in this environment for studying high-dimensional counterfactuals at the level of individual households in the macroeconomy. We then bring to bear microdata from Uganda to calibrate the model to all households populating the country. We use these building blocks to explore the average and distributional implications of local shocks compared to policies at scale, and quantify the underlying mechanisms.

Egger, Haushofer, Miguel, Niehaus and Walker (2019) "General equilibrium effects of cash transfers: experimental evidence from Kenya"

Abstract

How large economic stimuli generate individual and aggregate responses is a central question in economics, but has not been studied experimentally. We provided one-time cash transfers of about USD 1000 to over 10,500 poor households across 653 randomized villages in rural Kenya. The implied fiscal shock was over 15 percent of local GDP. We find large impacts on consumption and assets for recipients. Importantly, we document large positive spillovers on non-recipient households and firms, and minimal price inflation. We estimate a local fiscal multiplier of 2.7. We interpret welfare implications through the lens of a simple household optimization framework.

Scaling Up RCTs

- A more recent literature integrates experimental results at the local level into macro modeling at an economy-wide level, thus examining the impact of experimental policy at scale. Buera et al. (2012) studies the macroeconomic impacts of universal access to microcredit. The model is calibrated with macro and firm distributional moments but is shown to match at the partial equilibrium level the micro evidence of impact from RCT and natural experimental variation, in India and Thailand respectively. Buera et al. (2014) use a similar model and methods to examine the impact of cash grants to the poor. Both papers are clear that the partial equilibrium versus general equilibrium implications prices, wages, interest rates, TFP, saving and capital can be quite distinct, as will be the distribution of winners and losers.
- Donovan (2018) examines the impact of introducing farmers to a low-risk seed. With incomplete markets, idiosyncratic productivity shocks, and subsistence requirements, risk averse farmers put large weight on bad potential shocks realizations when making input decisions. The calibrated model accounts for nearly half of the difference in intermediate input shares between the US and India. The model is also validated against randomized control trial findings for risk reducing seen in India.
- Greenwood et al. (2013) examine the impact of circumcision on AIDS prevalence using experimental evidence and a general equilibrium search and matching model. This work features the selection of individuals into sexual practices while knowing inherent risk.

Macro Policies Gifting Natural Experiments

- Due to the details of implementation, macro policy implemented from the top down has generated instruments or natural experiments, allowing relatively transparent difference-in-difference analysis.
- A prominent example is the study of the effects of fiscal transfers, tax rebates in the US, with randomized timing based on social security numbers: Johnson et al. (2006) study the effect of income tax rebates of 2001, and Parker et al. (2013) study the effect of the stimulus payments of 2008. Kaplan and Violante (2014) use this evidence as input into a life cycle model with costly access to illiquid assets, yielding rich hand-to-mouth agents.
- Identification issues remain, however, as cross-sectional evidence alone cannot pin down macro effects. As in Wolf 2019, Andres Sarto and many others, a stand must be taken on a class of models.
- Natural experiments have also been studied in developing economies. Chodorow-Reich et al. (2019) recently analyze the 2016 Indian "demonetization", a dramatic initiative that made 86% of cash in circulation illegal tender overnight, with new notes gradually introduced over the next several months. Detailed data from RBI allowed plausible variation in the timing of the release of replacement notes.

Lecture 2: Scaling Up RCTs (2/27)

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