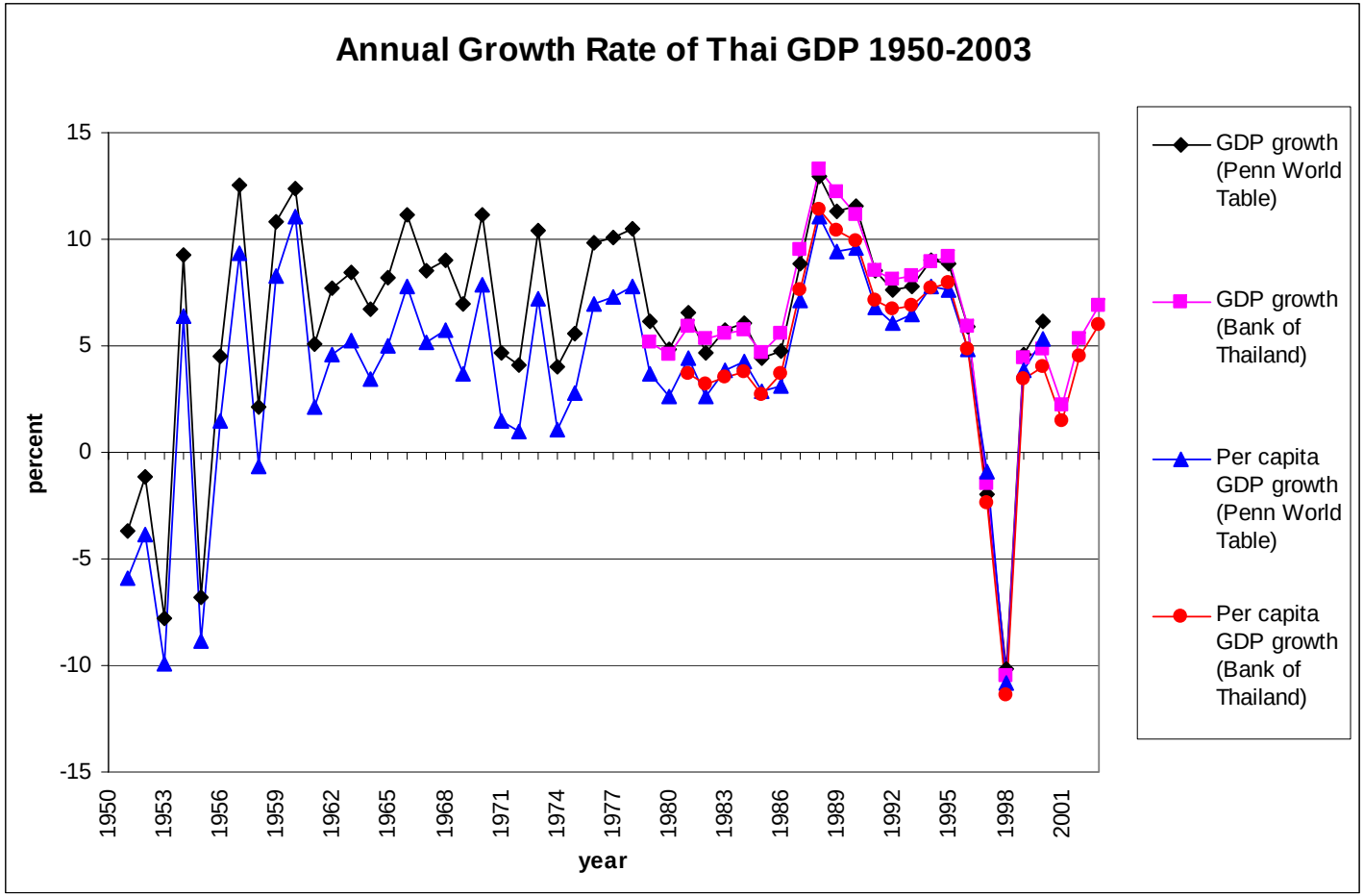
THREAT ANTICIPATION

POVERTY, INEQUALITY, AND TERRORISM


Annual Growth Rate of Thai GDP 1950-2003
15
10
5
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-10
-15
percent
1950
1953
1956
1959
1962
1965
1968
1971
1974
1977
1980
1983
1986
1989
1992
1995
1998
2001
year
GDP growth (Penn World Table)
GDP growth (Bank of Thailand)
Per capita GDP growth (Penn World Table)
Per capita GDP growth (Bank of Thailand)

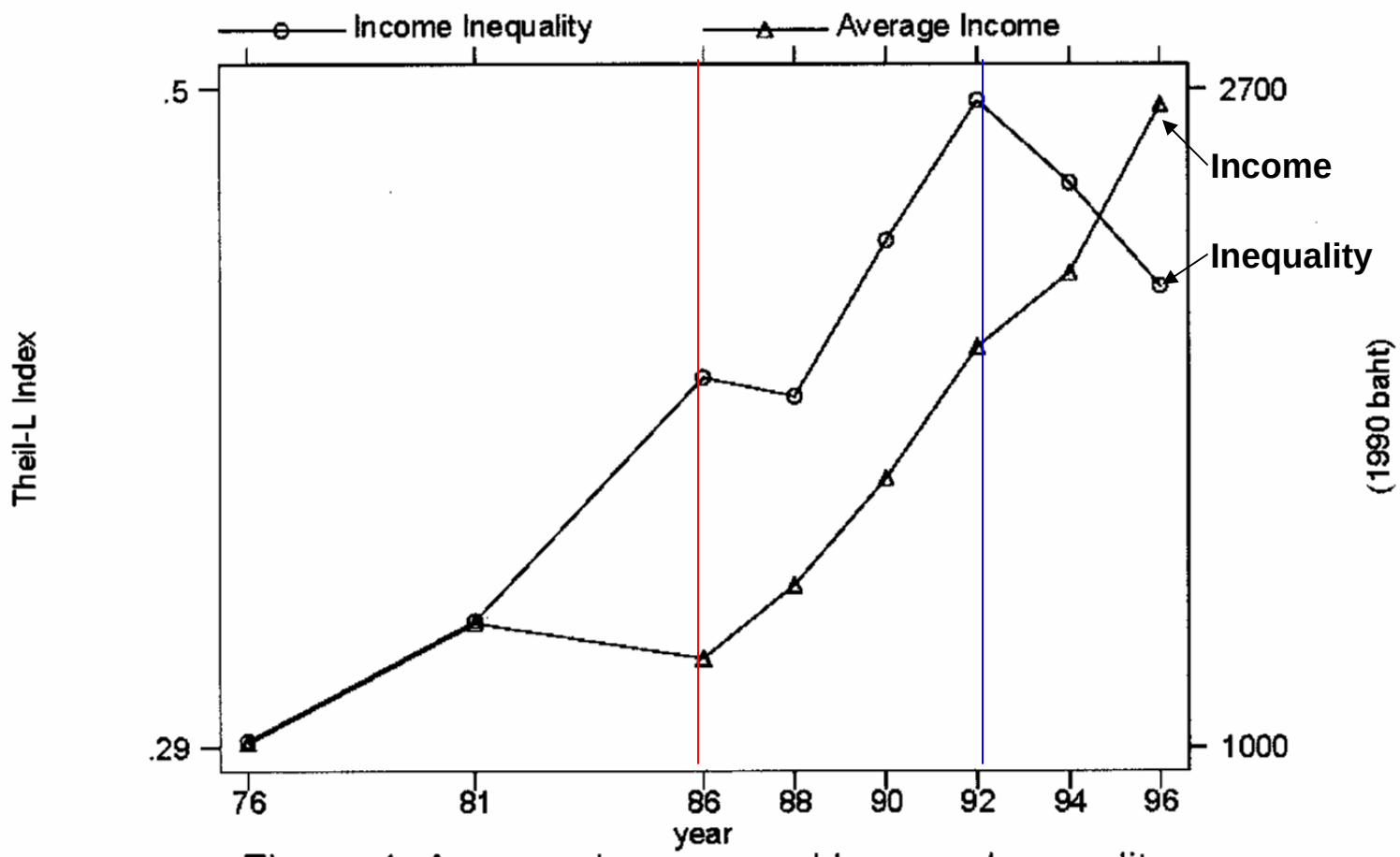


Figure 4. Average Income and Income Inequality

Kuznets Curve – see stages marked

Levels not low compared to others

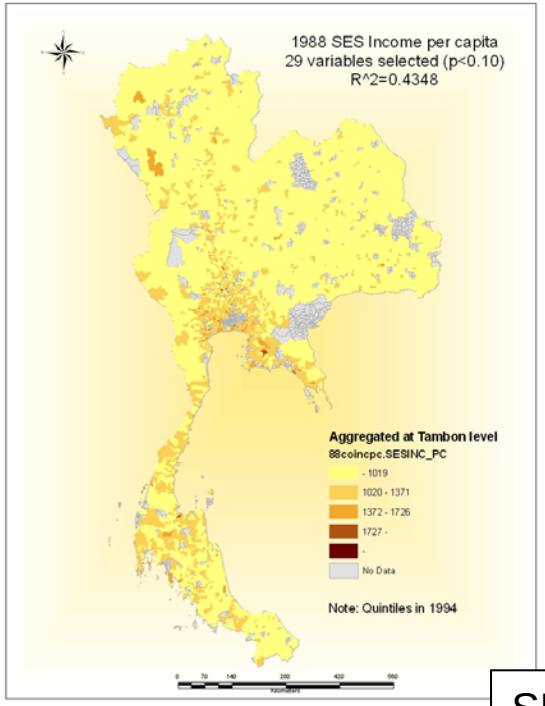
Facts – Informative of Underlying Economy/Heterogeneity

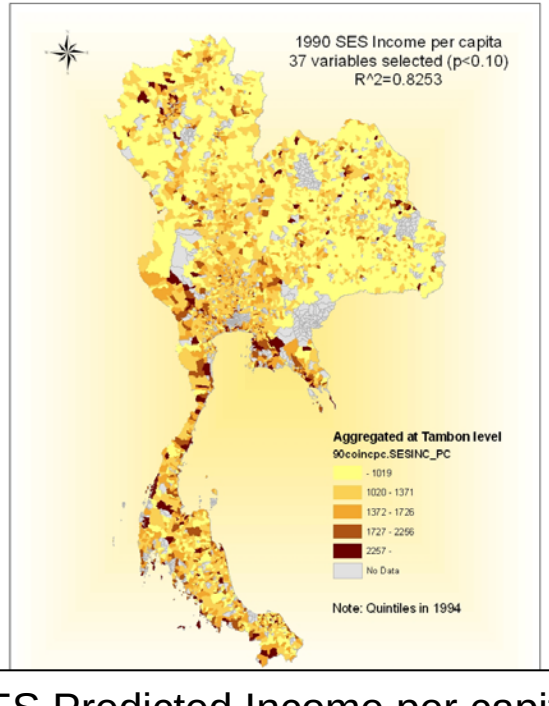
Crisis: Has little impact

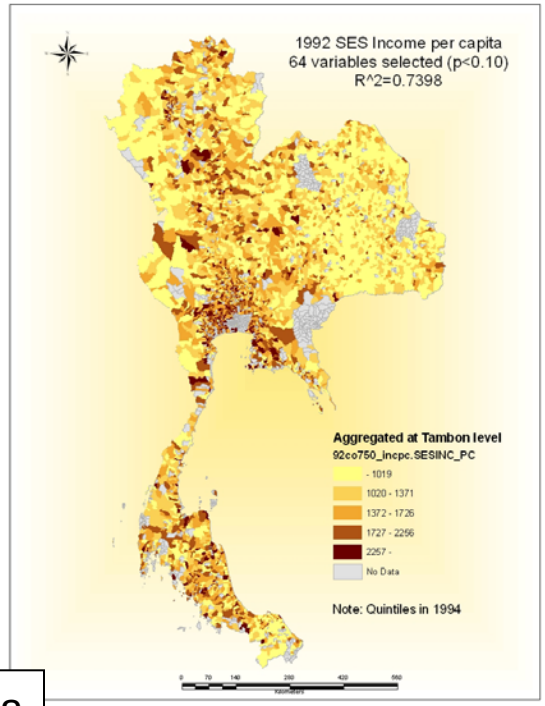
Table 1: Summary Statistics of Income in Thai SES

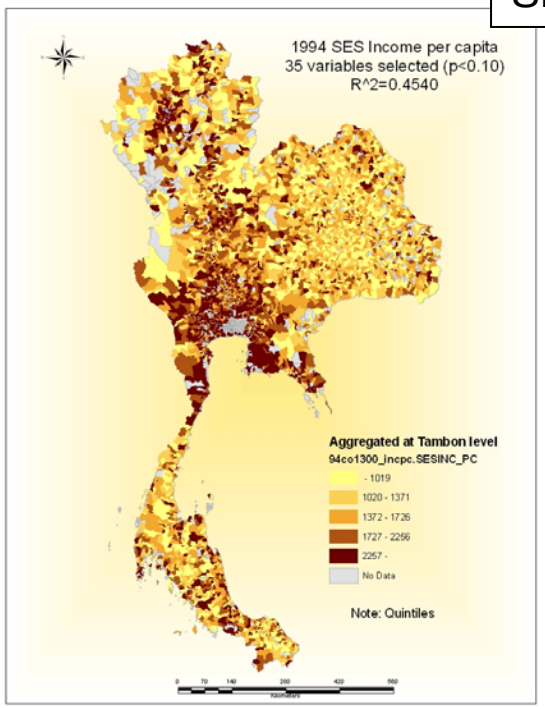
Poverty	1976	1981	1986	1988	1990	1992	1994	1996	1998	2000	2002
Head-count Ratio	0.483	0.359	0.446	0.365	0.307	0.256	0.205	0.130	0.125	0. 149	0.089
Poverty Gap	0.175	0.119	0.170	0.127	0.100	0.079	0.061	0.034			
FGT P_2	0.083	0.054	0.085	0.060	0.044	0.034	0.026	0.013			
Sample Size	11356	11880	10895	11044	13174	13458	25208	25110			

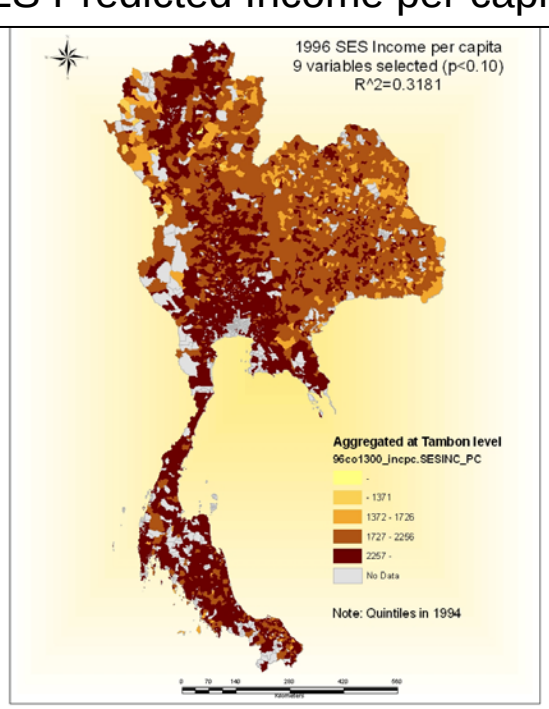
SES Predicted Income per capita

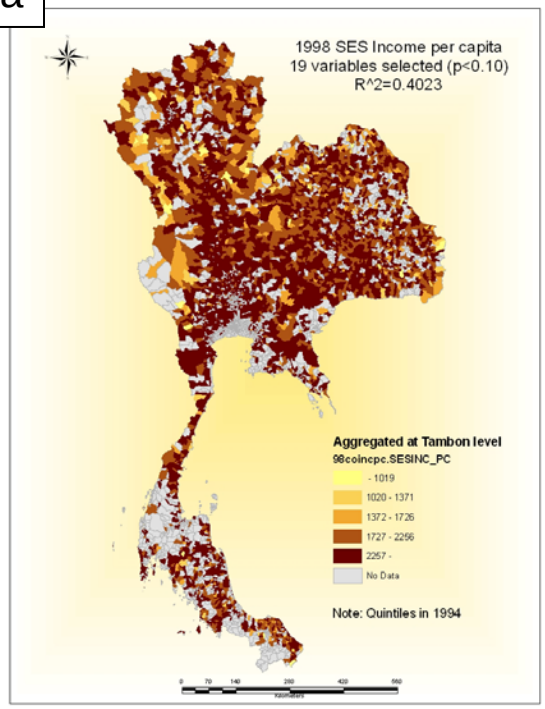


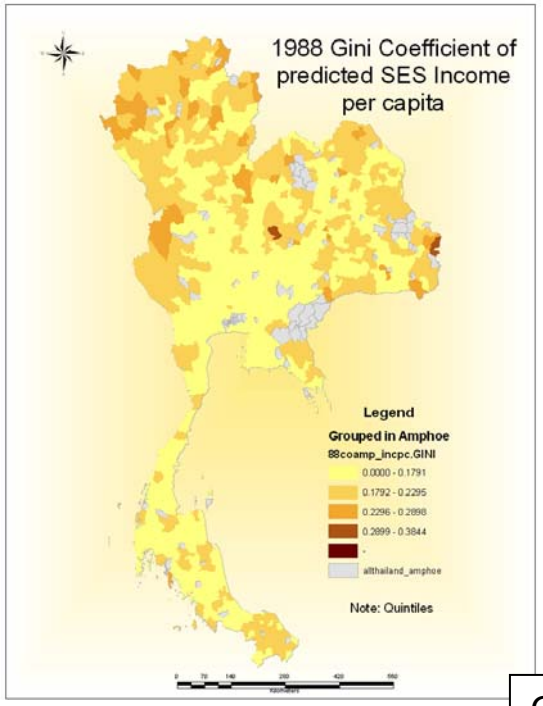


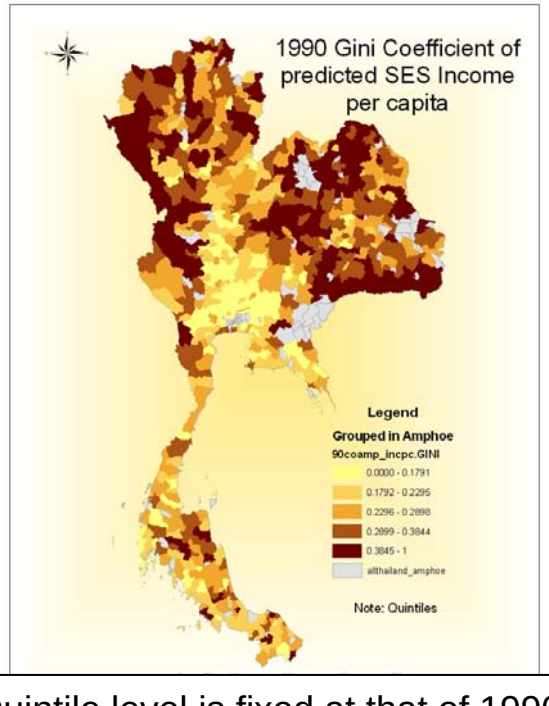


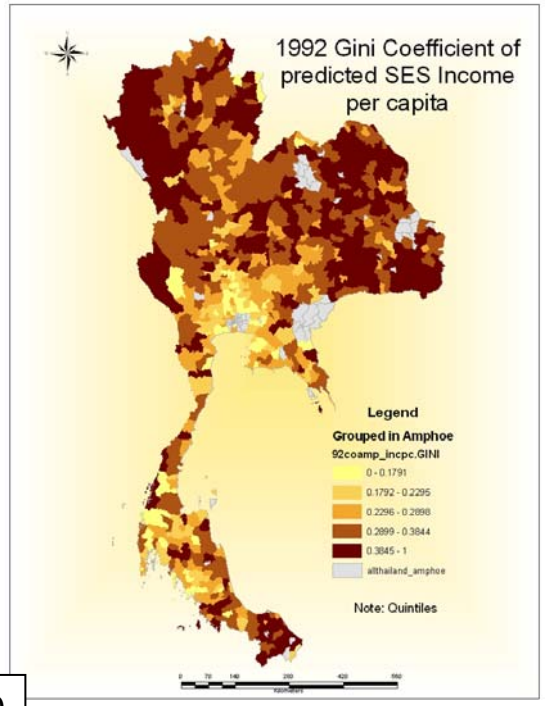




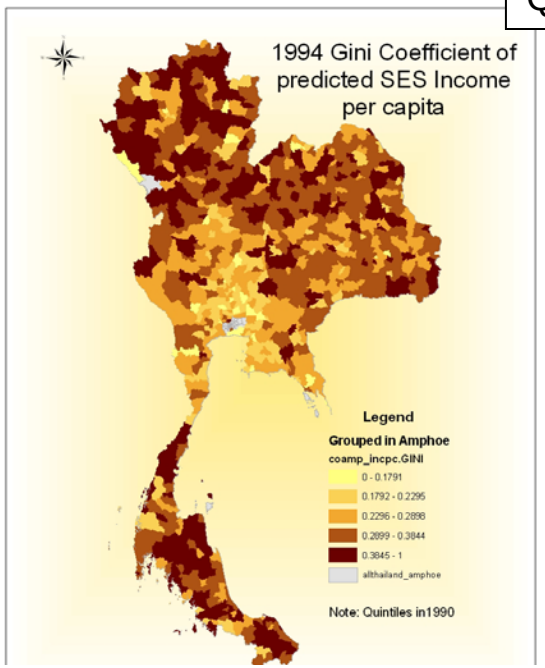


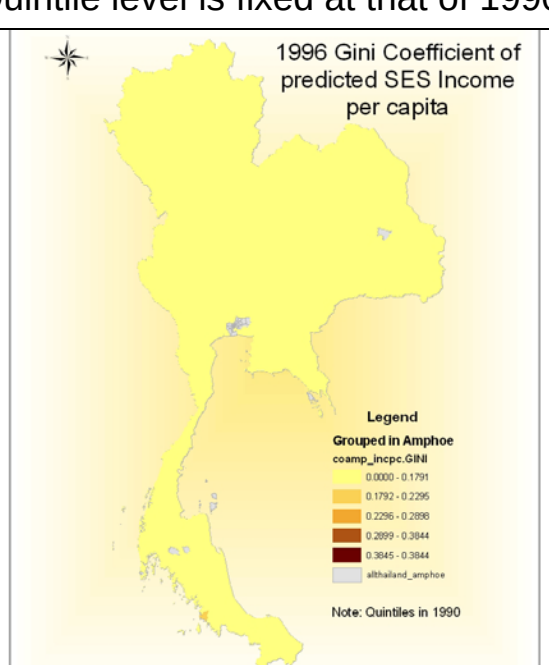


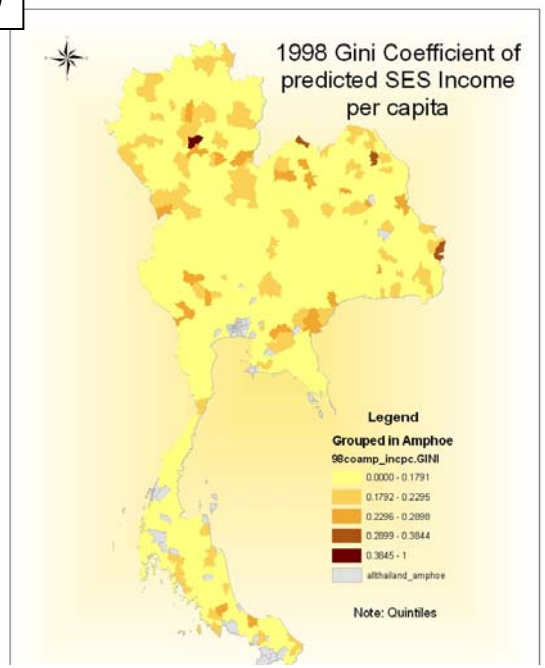




Quintile level is fixed at that of 1990







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- World Scope
- OECF1
- OECF2
- JBIC

IN THE NE

We make available the use of spatial analysis at the village tambon, amphoe, and changwat level of Thailand.

RECENTLY PUBLISHED

An assessment of the relationship between growth and inequality using micro data from Thailand.

Thailand Project

his site contains a variety of databases for Thailand and a number of models that can be sed to understand the Thai economy. These can be used as an integrated research and dvisory tool for academics and policy makers. The data include microeconomic data on ouseholds and firms as well as macroeconomic data from the Bank of Thailand and the ational Economic and Social Development Bureau (NESDB). Intermediate between these wo are village-level data from the Community Development Department (CDD) and rovincial level domestic product data from the NESDB.

he purpose of having multiple data sources readily available and easily accessible is to urther research on the microeconomic foundations of the macro economy, that is, to develop icroeconomic and macroeconomic models, ideally combining the two. Specifically, these ata can be used to construct and estimate general equilibrium models with impediments to ade and with heterogeneity across households and firms. The user can choose the appropriate degree of aggregation of the microeconomic data, or go back and forth between micro and macro. Indeed, this archive facilitates fact-finding missions. Several of the individual databases have automated search and data extraction facilities. Several of the microdata files include geographic identifiers at the plot, village, sub-county (tambon), county (amphoe), or province (changwat) level, thus enabling use of an accompanying Geographic Information System.

The larger goal of this web-based archive is to facilitate the integration of theory with measurement. Frequently the data a theorist might need to calibrate or estimate a model is not available in the single database on hand, hence the inclusion of multiple databases here. Frequently, the necessary data are not available at all. That is, existing surveys do not include variables critical to theoretical models. For example, until recently, there were no longitudinal data for Thailand. A key component of this website is a panel database derived from micro surveys designed from a theoretical perspective. This collection, know as the Townsend Thai Project, is available from this site. The other databases Related Thai data are also available.

The project was funded primarily by US government foundations, specifically, the National Institute of Health (NICHD) and the National Science Foundation (NSF), with Robert M. Townsend as principal investigator. Grants from the Ford Foundation, Melon Foundati on and the University of Chicago are also gratefully acknowledged.

Papers and publications that use the data available in this archive and describe the details of

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A stratified, three-stage s il 1986. The primary and secondary sampling units were Amphoes and as) respectively; private households were the ultimate sampling units. s adopted for the survey, with the primary sampling units being bloc a villages for non-municipal areas, and private households being the secondary sampling units.

For all surveys, stratification was by region (North, North-East, Central, South and Bangkok Metropolitan) and community type (urban, rural and sanitary districts). Within strata, sampling units were chosen randomly using probability proportional to population. But across strata, households were not equally likely to be drawn - in particular, urban areas were generally over-sampled relative to rural areas.

Although different households were not equally likely to be drawn for sampling, survey weights are provided with the SES results, and can in principle be used to calculate unbiased aggregate statistics. However, some doubts exist regarding these weights - in particular, the weights are based on planned, rather than actual, survey sizes in the different provinces. Hyeok Jeong has calculated alternative weights using the following simple method:

for each survey, calculate the number of enumerated survey households for each region and community type combination. Then take the ratio of these values to the total number of households in each region and community type (taken from the Report of the Household Socio-Economic Survey, for example see page 47 of the 1996 publication). The inverse of this ratio gives the sampling weights.

These alternative weights have been calculated for all surveys, except the 1998 survey for which the Report of the Household Socio-Economic Survey publication is not yet available.

More information on the survey methodology is contained in the Report of the Household Socio-economic Survey. Chapter 1 of the book "The Analysis of Household Surveys" by Angus Deaton is a good general reference on survey design.

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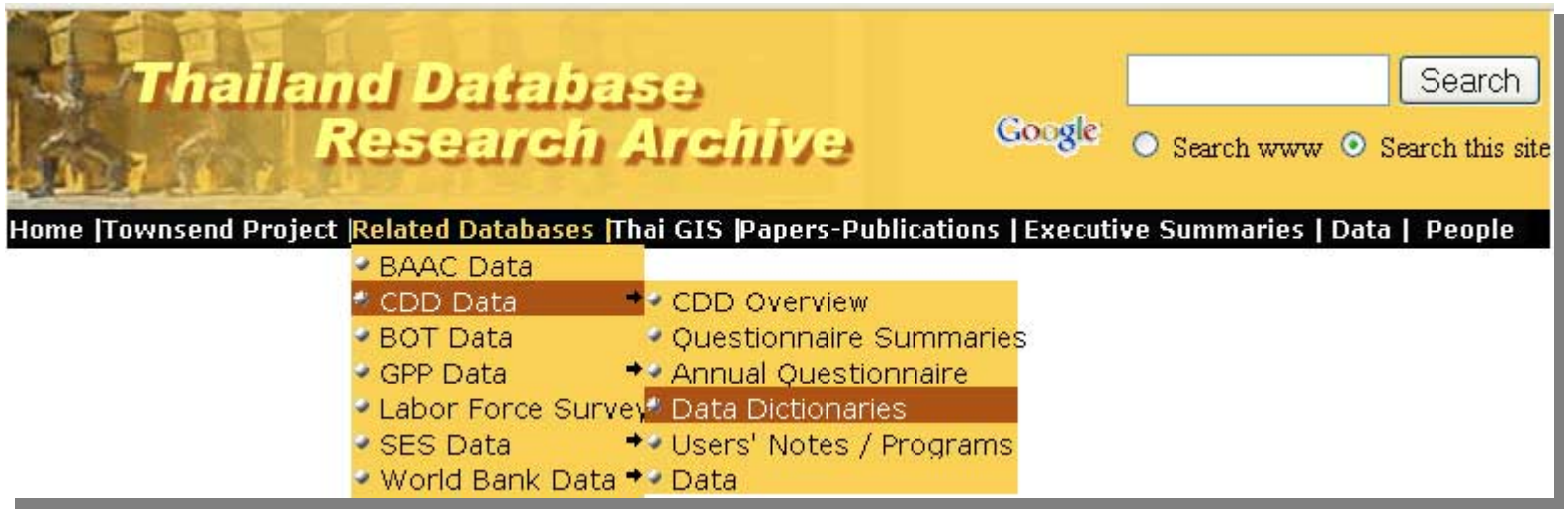

allvariables

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312	346	i_otag2	otherag6	Number (Single)	4	Median income per household engaged in 2nd major other agri	86GECb	88GECb	90GECb	92GECb	94GECb	96GECb		7	
313	349	i_otag3	otherag9	Number (Single)	4	Median income per household engaged in 3rd major other agri	86GECb	88GECb	90GECb	92GECb	94GECb	96GECb		7	
314	756	i_othani	oth_animal_3	Number		@AVERAGE INCOME BAHT PER YEAR OF HOUSEHOLDS RAISING OTHER ANIMALS FOR SALE							99GECb		
315	228	i_otsing	sing21	Number (Long)	4	Median income of households with other single occupations				92GECa	94GECa	96GECa	99GCb	8	
316	209	i_paddy	sing4	Number (Long)	4	Median income of households exclusively engaged in paddy production				92GECa	94GECa	96GECa	99GCb	7	
317	366	i_pighh	pig_2	Number (Single)	4	Median yearly income per household raising pigs for sale in ba	86GECb	88GECb	90GECb	92GECb	94GECb	96GECb	99GECb	7	
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319	219	i_retail	sing14	Number (Long)	4	Median income of households exclusively engaged in retailing business				92GECa	94GECa	96GECa	99GCb	8	
320	762	i_rubber	rubber_11	Number		@AVERAGE INCOME PER YEAR PER HOUSEHOLD FROM RUBBER PLANTATION							99GECb		
321	389	i_seara	seara4	Number (Single)	4	Median yearly income per household for brackhish and seawat	86GECb	88GECb	90GECb	92GECb	94GECb	96GECb	99GECb	7	
322	207	i_singoc	sing2	Number (Long)	4	Median income of households with single occupation				92GECa	94GECa	96GECa	99GCb	8	
323	382	i_smseaf	seafish2	Number (Single)	4	Median yearly income per small-scale marine fisherman house	86GECb	88GECb	90GECb	92GECb	94GECb	96GECb	99GECb	8	
324	324	i_veg	vegf4	Number (Single)	4	Median yearly income from vegetable production per household	86GECb	88GECb	90GECb	92GECb	94GECb	96GECb	99GECb	5	
325	1	id	id	Number	8	Village Code	86GCa	88GCa	90GCa	92GCa	94GCa	96GCa	99GCa	2	
326	2	idd	idd	Text	2	NB: This is an added variable to identify villages given identical	86GCa	88GCa	90GCa					3	
327	396	indust1	indust11	Number (Integer)	2	1st major industrial activity	86GECc	88GECc	90GECc	92GECc	94GECc	96GECc	99GECc	7	
328	405	indust2	indust21	Number (Integer)	2	2nd major industrial activity	86GECc	88GECc	90GECc	92GECc	94GECc	96GECc	99GECc	7	
329	414	indust3	indust31	Number (Integer)	2	3rd major industrial activity	86GECc	88GECc	90GECc	92GECc	94GECc	96GECc	99GECc	7	
330	588	infraprob	probm1	Number (Integer)	2	Degree of infrastructural problem as seen by village committee	86LM	88LM	90LM	92LM	94LM	96LM		9	X
331	571	lagefem	workf6	Number (Single)	4	Lowest age of females working outside tambon			90LM	92LM	94LM	96LM		7	
332	573	lagemale	workf8	Number (Single)	4	Lowest age of males working outside tambon			90LM	92LM	94LM	96LM		8	
333	575	lagepop	workf10	Number (Single)	4	Median lowest age of total population working outside tambon	86LM	88LM	90LM	92LM	94LM	96LM		7	
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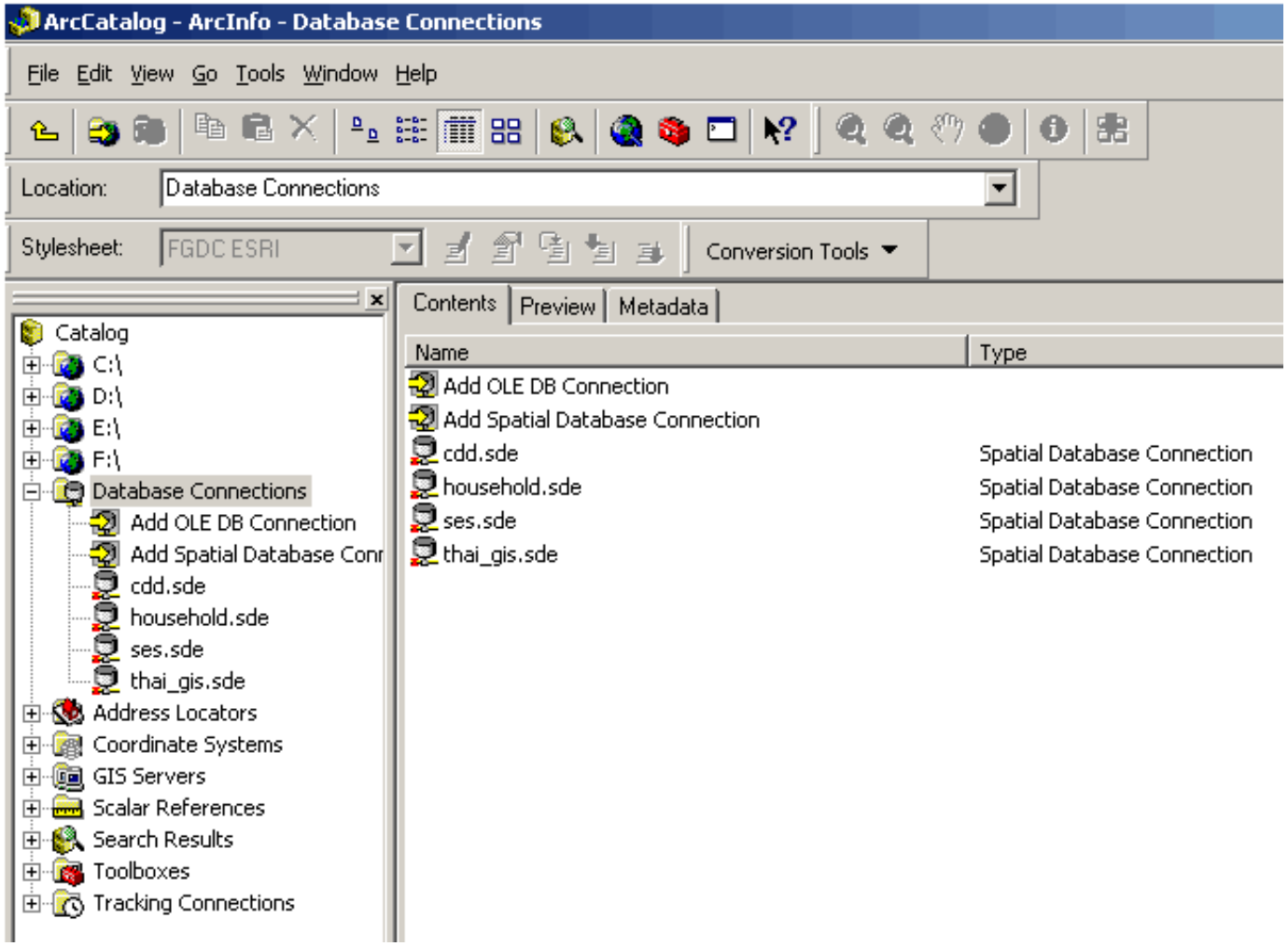
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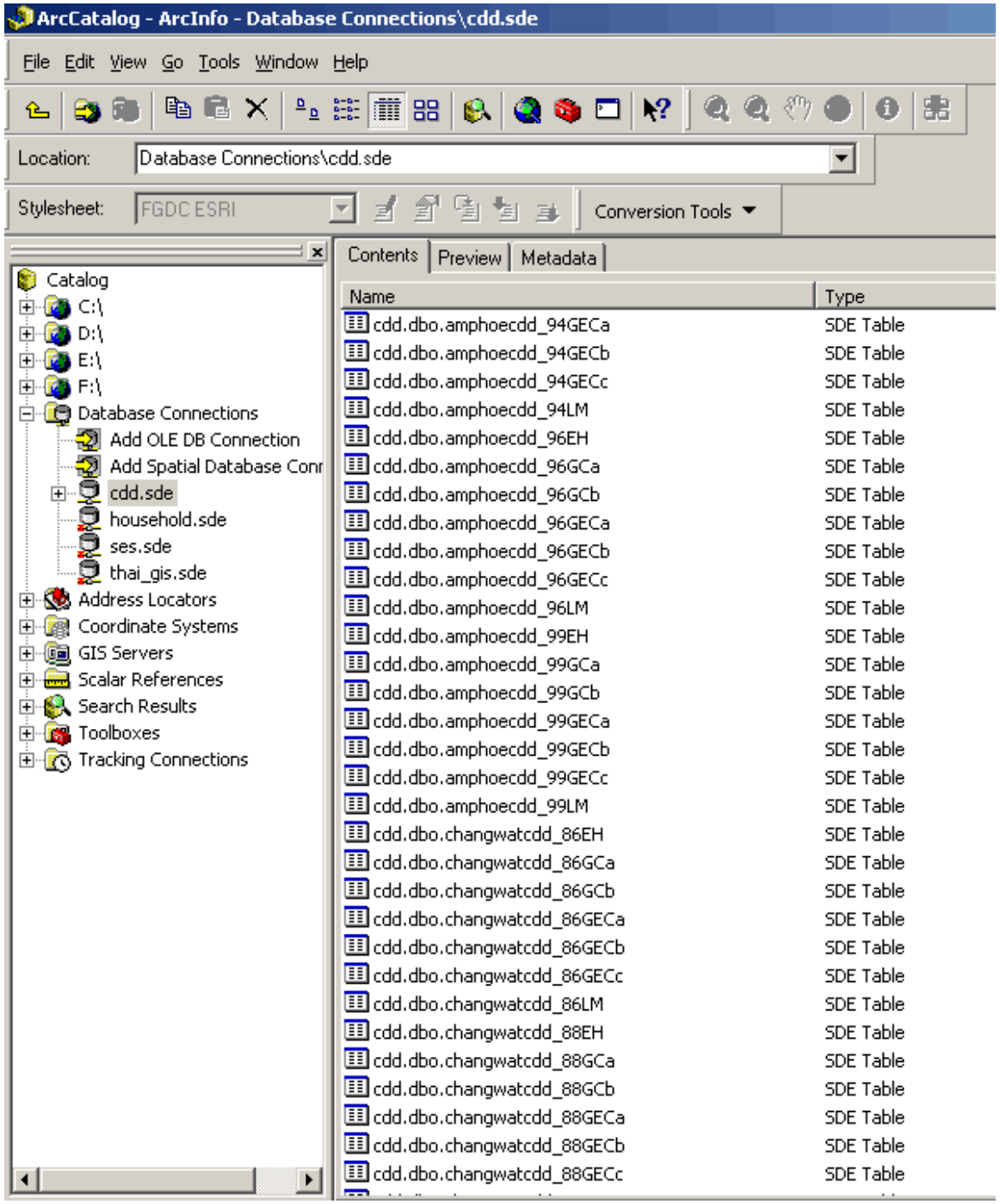
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809	8.27272727272727	8.83333333333333	320	2.3636
810	22.3	26.75	247.35	
811				
901	97.8	99.1	595.928571428571	2.1428
902	88.9142857142857	95.1714285714286	959.714285714286	2.1428
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Preview: Table

SDE Table selected

Start | iTunes | Inbox - Microsoft Outlook | ArcCatalog - ArcInfo -... | 2:07 PM

Untitled - ArcMap - ArcInfo

File Edit View Insert Selection Tools Window Help

1:11,515,633

Layers
- sde.DEFAULT (homer.src.uchicago.edu)
  - thai_gis.DBO.thai_all_amphoe
- sde.DEFAULT (homer.src.uchicago.edu)
  - cdd.dbo.amphoecdd_96GECa

Display Source Selection

Join Data

Join lets you append additional data to this layer's attribute table so you can, for example, symbolize the layer's features using this data.

What do you want to join to this layer?

Join attributes from a table

1. Choose the field in this layer that the join will be based on:

AMPHOE

2. Choose the table to join to this layer, or load the table from disk:

cdd.dbo.amphoecdd_96GECa

☑ Show the attribute tables of layers in this list

3. Choose the field in the table to base the join on:

amphoe

Advanced...

About Joining Data | OK | Cancel

Drawing Arial 10

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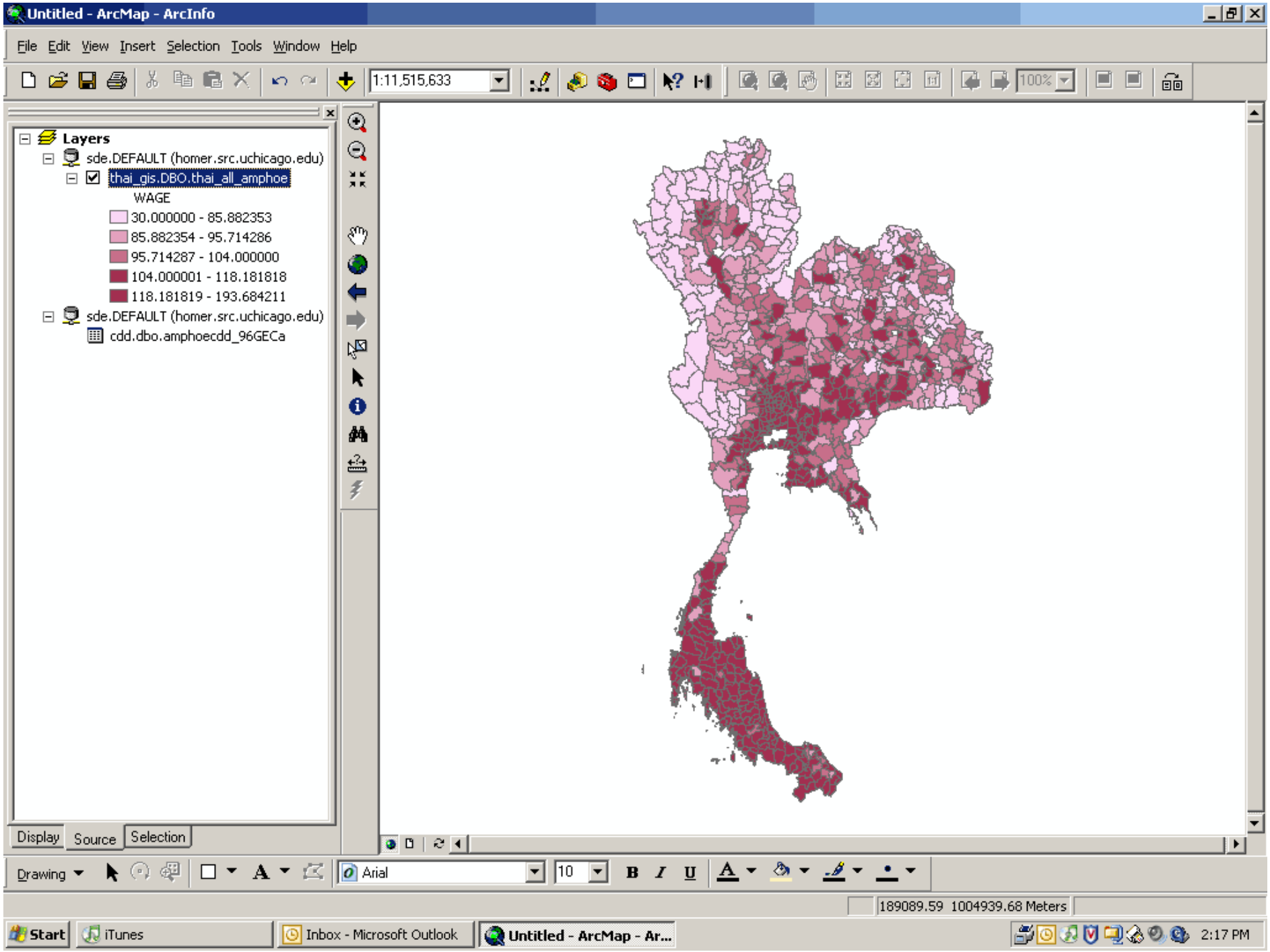
Untitled - ArcMap - ArcInfo
File Edit View Insert Selection Tools Window Help
1:11,515,633
100%
Layers
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WAGE
30.000000 - 85.882353
85.882354 - 95.714286
95.714287 - 104.000000
104.000001 - 118.181818
118.181819 - 193.684211
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Start
iTunes
Inbox - Microsoft Outlook
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2:17 PM

All Papers and Publications

Christian Ahlin and Robert M. Townsend. "Using Repayment Data to Test Across Models of Joint Liability Lending." Working Paper, October 2003.
abstract | full text

Matthias Doepke and Robert M. Townsend. "Credit Guarantees, Moral Hazard, and the Optimality of Public Reserves." Working Paper, April 2001.
abstract | full text

Xavier Gine and Robert M. Townsend. "Evaluation of Financial Liberalization: A general equilibrium model with constrained occupation choice." Working Paper, June 2001.
abstract | full text| new version

Joseph P. Kaboski and Robert M. Townsend. "Policies and Impact: An Evaluation of Village-Level Microfinance Institutions." Working Paper, October 2002.
abstract | full text | new version

Douglas Miller and Anna L. Paulson. "Gambling and Remittances in Thailand." Working Paper, June 2000.
abstract | full text

Anna L. Paulson. "Insurance Motives for Migration: Evidence from Thailand." March 2000.
abstract | full text

Anna L. Paulson and Robert M. Townsend. "Entrepreneurship and Financial Constraints in Thailand." Working Paper, February 2001.
abstract | full text | tables

Anna L. Paulson and Robert M. Townsend. "The Nature of Financial Constraints: Distinguishing the Micro Underpinnings of Macro Models." Working Paper, September 2002.
abstract | full text | tables

Edward S. Prescott and Robert M. Townsend. "Firms as Clubs in Walrasian Markets with Private Information." Working Paper, November 2001.
abstract | full text

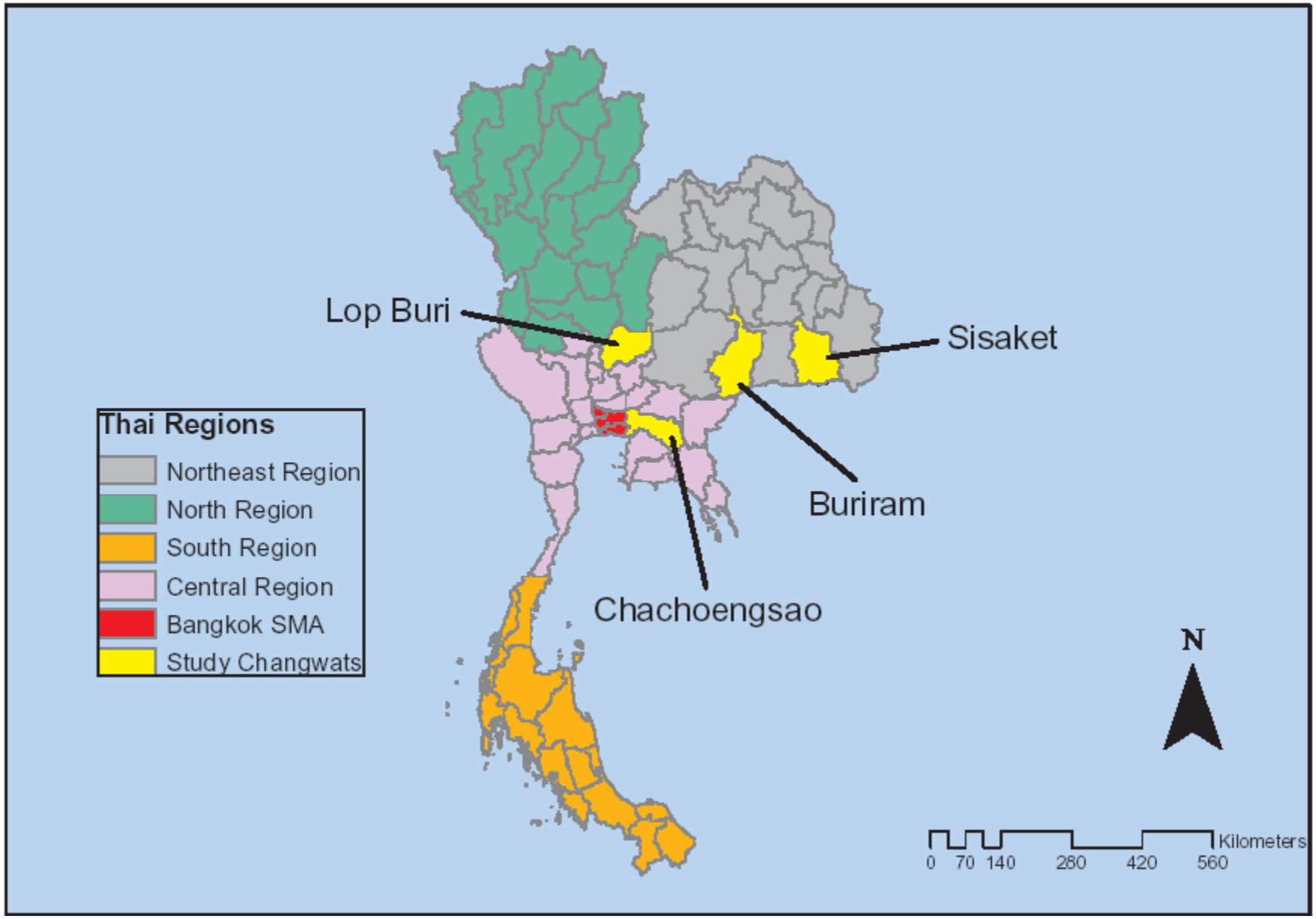
Edward S. Prescott and Robert M. Townsend. "Inequality, Risk Sharing, and the Boundaries of Collective Organizations." Working Paper, June 2000.
abstract | full text | tables

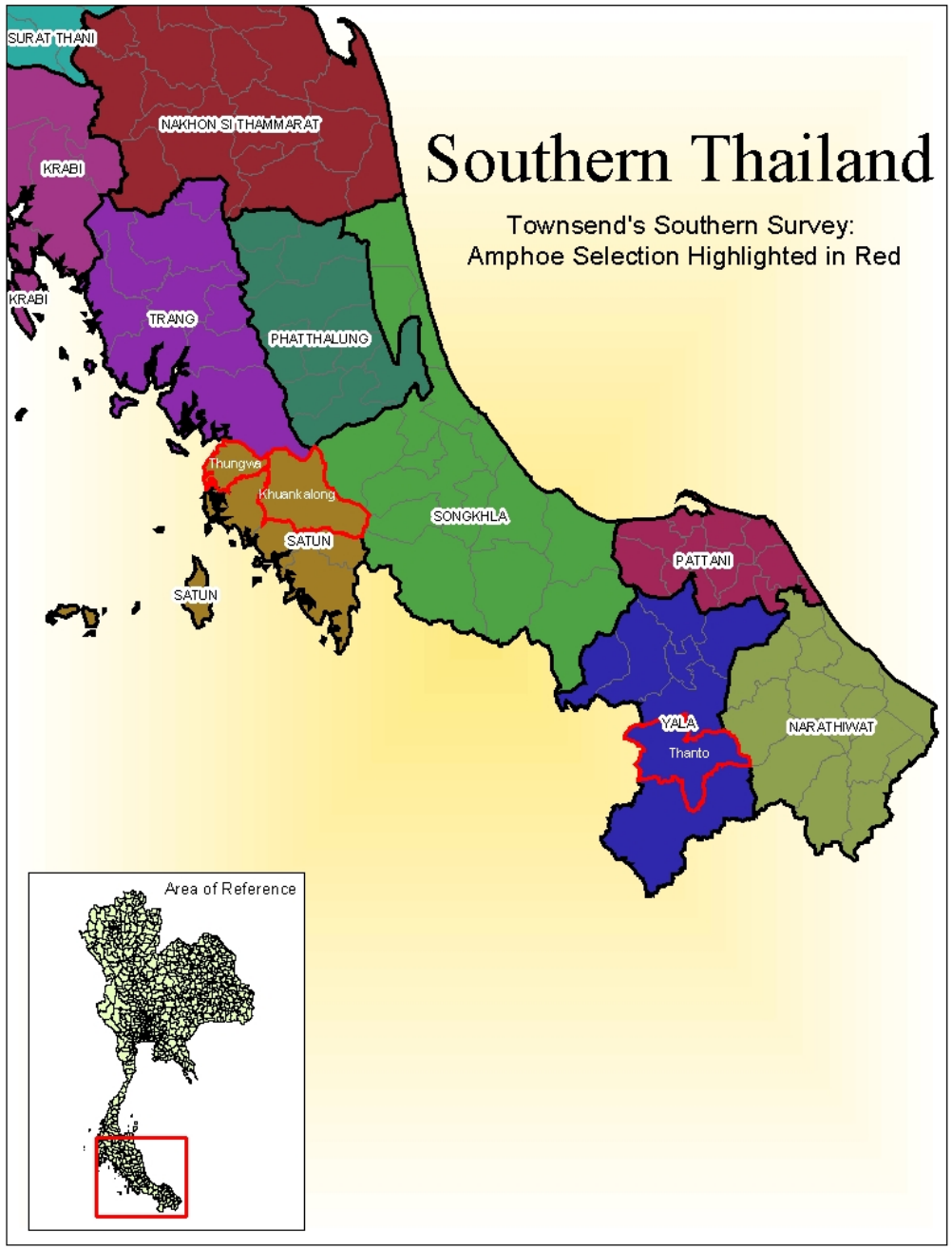
Edward S. Prescott and Robert M. Townsend. "Mechanism Design and Assignment Models." Working Paper, October 2002.
full text

Robert M. Townsend and Jacob Yaron. "The Credit Risk Contingency System of an Asian Development Bank." *Economic Perspectives*, Q3 2001.
full text

John S. Felkner. "A Digital spatial Predictive Model of Land-Use Change Using Economic and Environmental Inputs and a Statistical Tree Classification Approach: Thailand 1970s - 1990s". Dissertation Paper 2000
full text

Figure 1: Thai Geographic Regions and Study Changwats




Southern Thailand
Townsend's Southern Survey:
Amphoe Selection Highlighted in Red
SURAT THANI
NAKHON SI THAMMARAT
KRABI
KRABI
TRANG
PHATTHALUNG
Thungwa
Khuankalong
SATUN
SATUN
SONGKHLA
PATTANI
YALA
Thanto
NARATHIWAT
Area of Reference

Section Overview

BAAC Group | Financial Institutions | Soils | Summary Statistics | Papers

The T ectional survey. It was fielded in May, prior to the economic/financial crisis which began with the devaluation of the Thai

- to obtain reliable information o l and formal mechanisms and institutions, and
- to acquire retrospective inform high growth with increasing inequality and uneven financial deepening.

The survey included separate instruments for the households, village headmen as key informant , local financial institutions, and joint-liability BAAC groups. Approximately 23% of the interviewed households were also running some kind of business. There are also direct, environmental measurements of the local village environment. Soil samples were taken, administered with a separate soil questionnaire and plot photos. Finally there are overhead air photos of each of the survey villages, going back three decades.

SAMPLE DESIGN

Two separate regions were deliberately picked, the more highly developed region Central Region near to Bangkok and the poorer semi-arid Northeast. Four provinces (changwats) were chosen in total, two in the Central region -- Lop Buri and Chachoengsao -- and two in the Northeast-- Sisaket and Buriram. These particular provinces were chosen as each one contained one county (ampheur) that had been sampled every year of the Thai SES, available from this Thai data archive, thus providing us with benchmark or comparative information. The two regions, the Central and Northeast regions, can also be ordered from relatively wealthy to relatively poor not only by wealth and income but also by soil moisture, soil chemistry, and other environmental characteristics.

Section Overview

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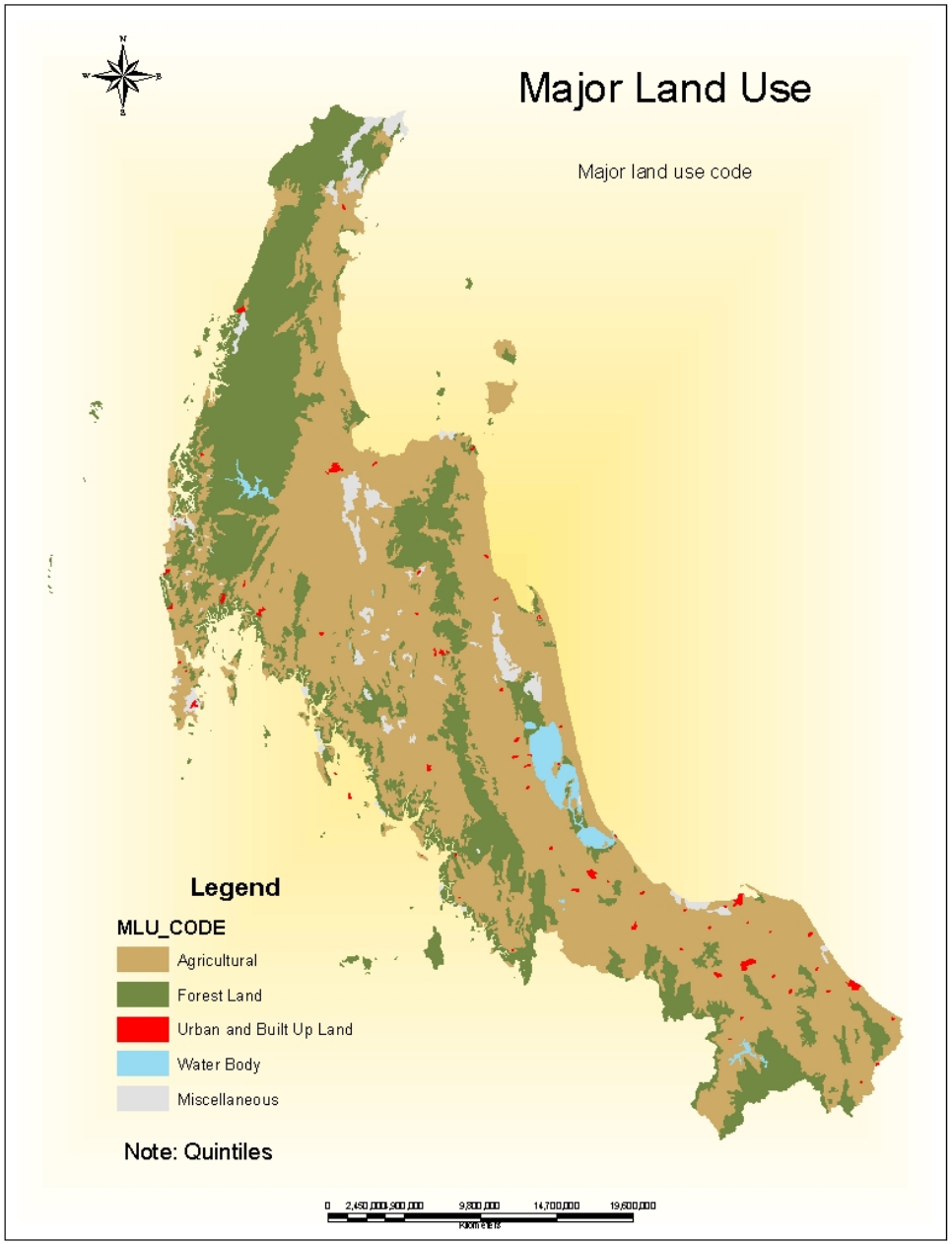
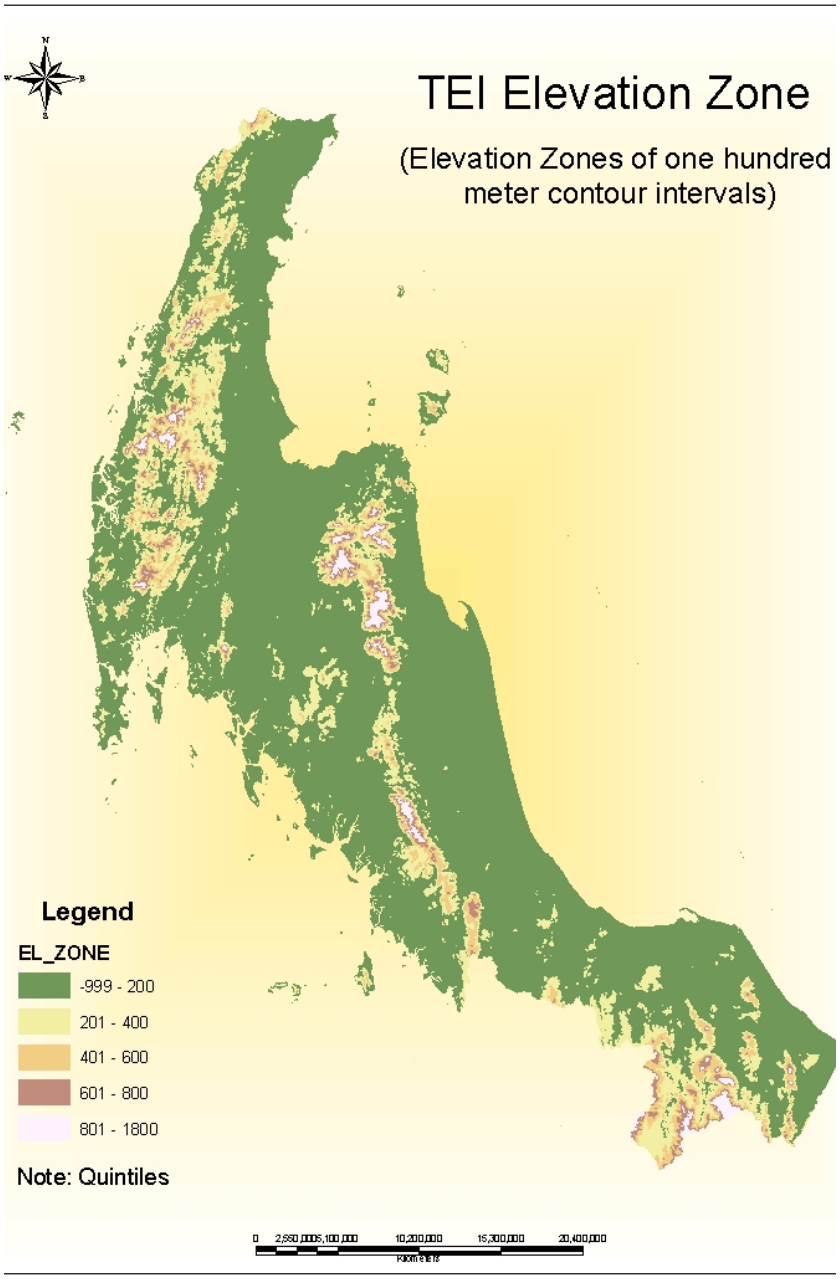
Southern Thailand vs Northeast

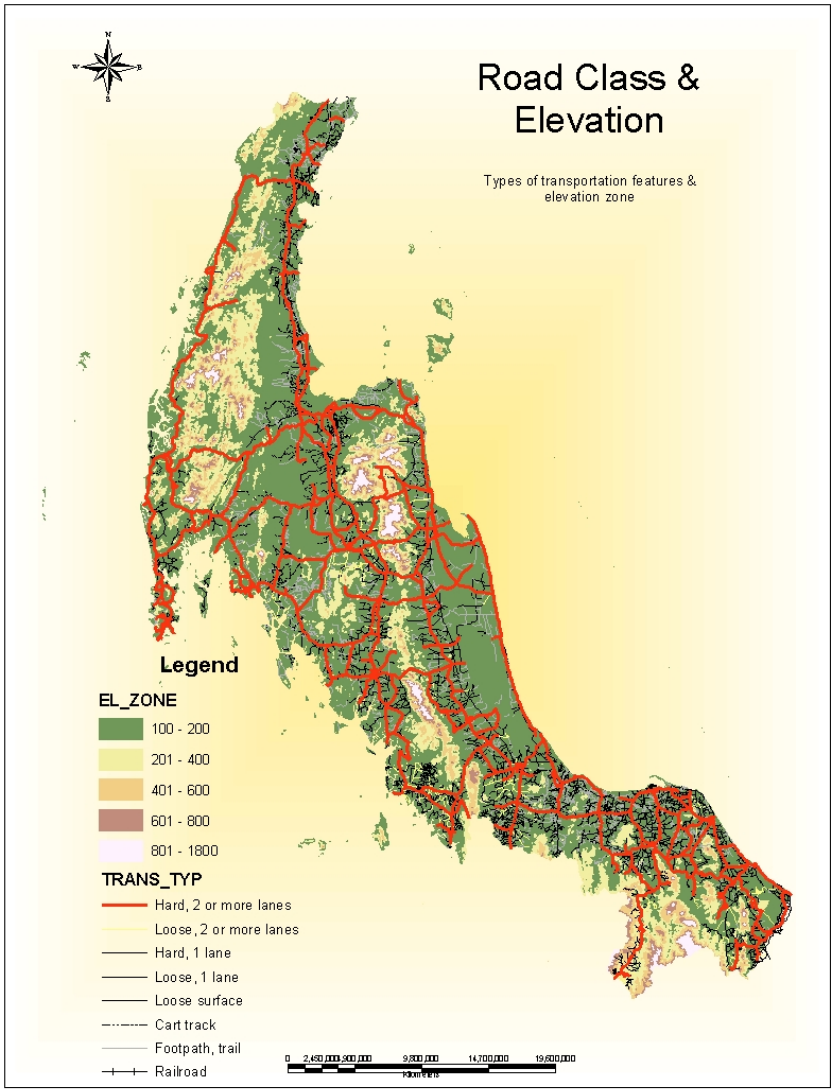
A comparison of southern Thailand with that of the north, northeast, central, and east.

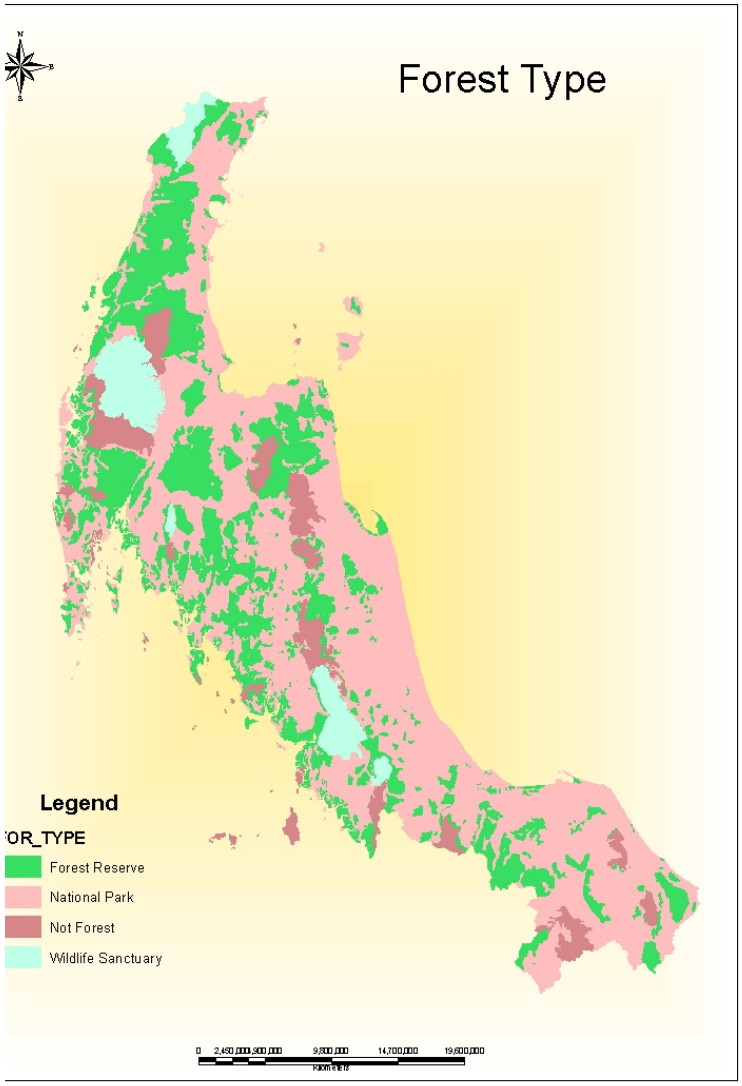
Summaries are based on multiple datasets from research archive

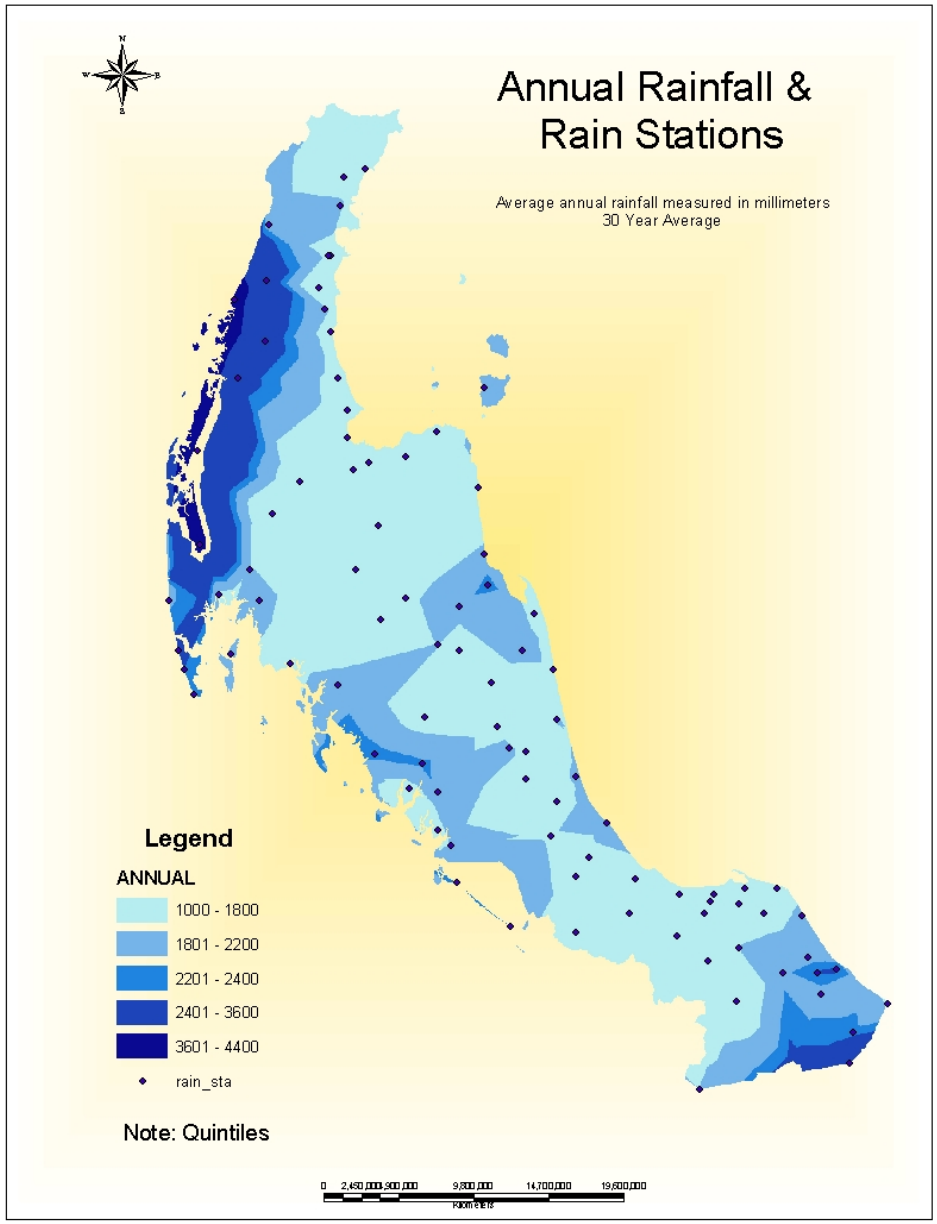
THE ENVIRONMENT

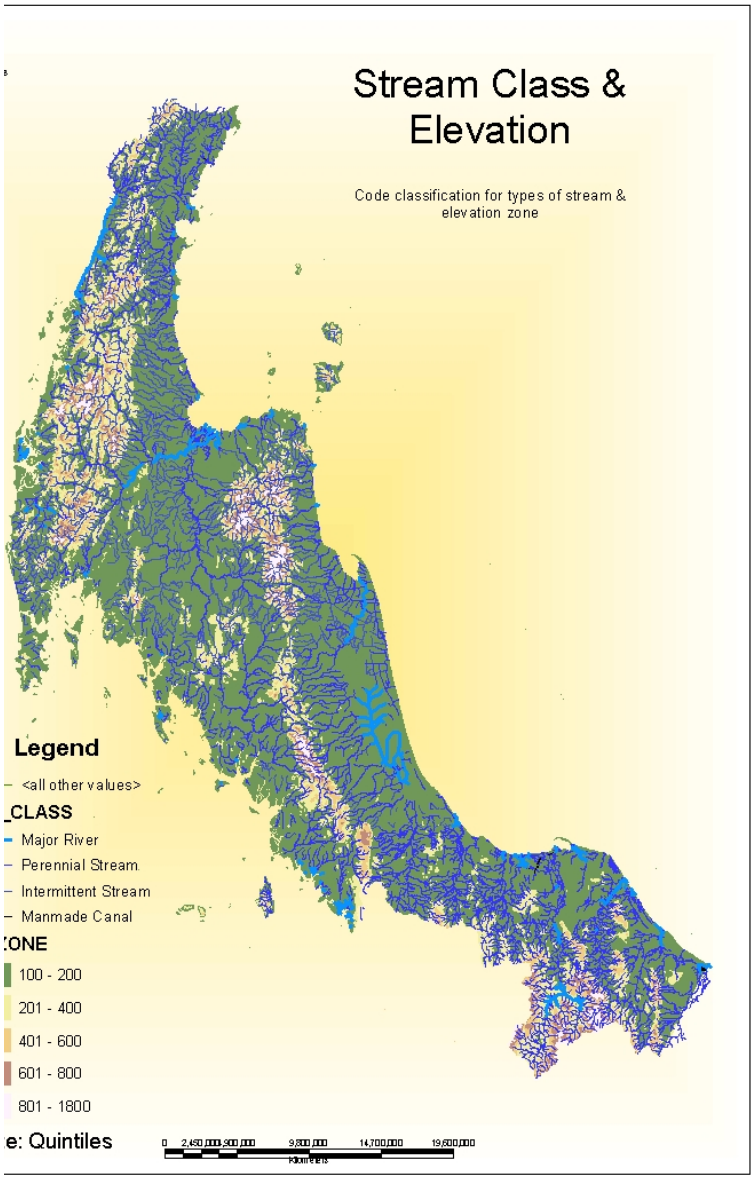

Major Land Use
Major land use code
Legend
MLU_CODE
Agricultural
Forest Land
Urban and Built Up Land
Water Body
Miscellaneous
Note: Quintiles


TEI Elevation Zone
(Elevation Zones of one hundred meter contour intervals)
Legend
EL_ZONE
-999 - 200
201 - 400
401 - 600
601 - 800
801 - 1800
Note: Quintiles


Road Class & Elevation
Types of transportation features & elevation zone
Legend
EL_ZONE
100 - 200
201 - 400
401 - 600
601 - 800
801 - 1800
TRANS_TYP
Hard, 2 or more lanes
Loose, 2 or more lanes
Hard, 1 lane
Loose, 1 lane
Loose surface
Cart track
Footpath, trail
Railroad


Forest Type
Legend
'OR_TYPE
Forest Reserve
National Park
Not Forest
Wildlife Sanctuary

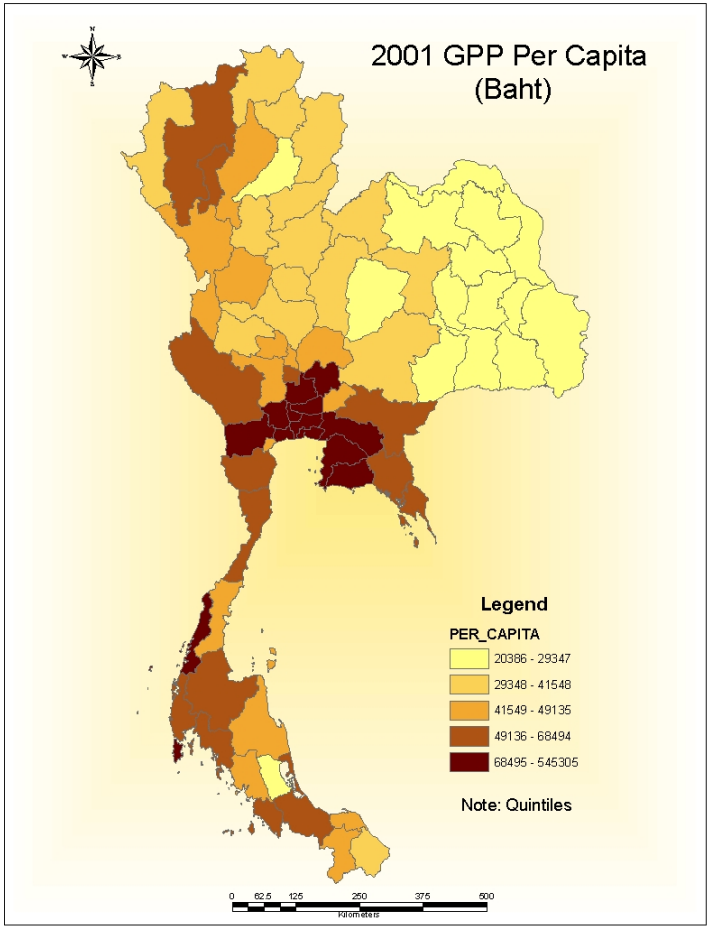

Annual Rainfall &
Rain Stations
Average annual rainfall measured in millimeters
30 Year Average
Legend
ANNUAL
1000 - 1800
1801 - 2200
2201 - 2400
2401 - 3600
3601 - 4400
rain_sta
Note: Quintiles
0 2,450,000 4,900,000 9,800,000 14,700,000 19,600,000
Kilometers


Stream Class &
Elevation
Code classification for types of stream &
elevation zone
Legend
<all other values>
_CLASS
Major River
Perennial Stream
Intermittent Stream
Manmade Canal
ONE
100 - 200
201 - 400
401 - 600
601 - 800
801 - 1800
e: Quintiles
0 2,450,000 4,900,000 9,800,000 14,700,000 19,600,000
Kilometers

INCOME, CONSUMPTION, AND WEALTH

Per Capita GPP

- **National Account Division, Office of the National Economic and Social Development Board, 1999**. Gross provincial product at current market prices and per capita income by region and province 1999: In comparison to the other regions in Thailand the south has a high GPP Per Capita. The region as a whole is second only to the central region which includes Bangkok. .
  - The provinces of Surat Thani, Krabi, Phangnga, Satun, and Songkhla are in the second highest quintile.



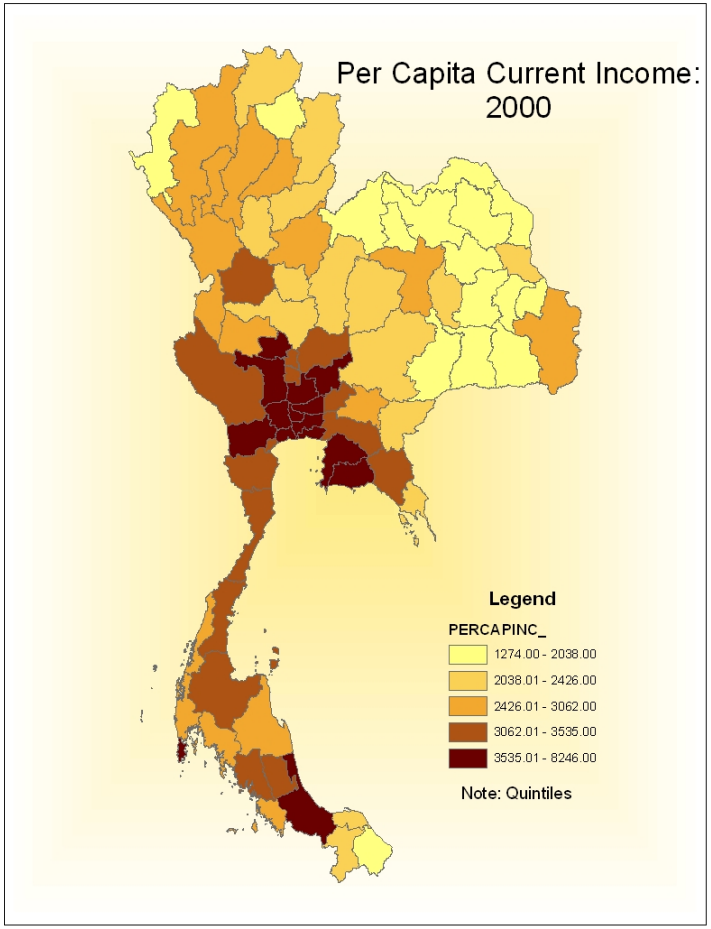
NESDB - gross provincial product

Per Capita Income

- **Townsend Survey**: Southern Thailand is poorer that CN/E and has less sources of income.
  - Gross income: 9,913 baht in the South, 15,796 in the CNE.
  - Net income: 7,344 baht in the South, 9,891 in the CNE.

  Satun comparable to Buriram

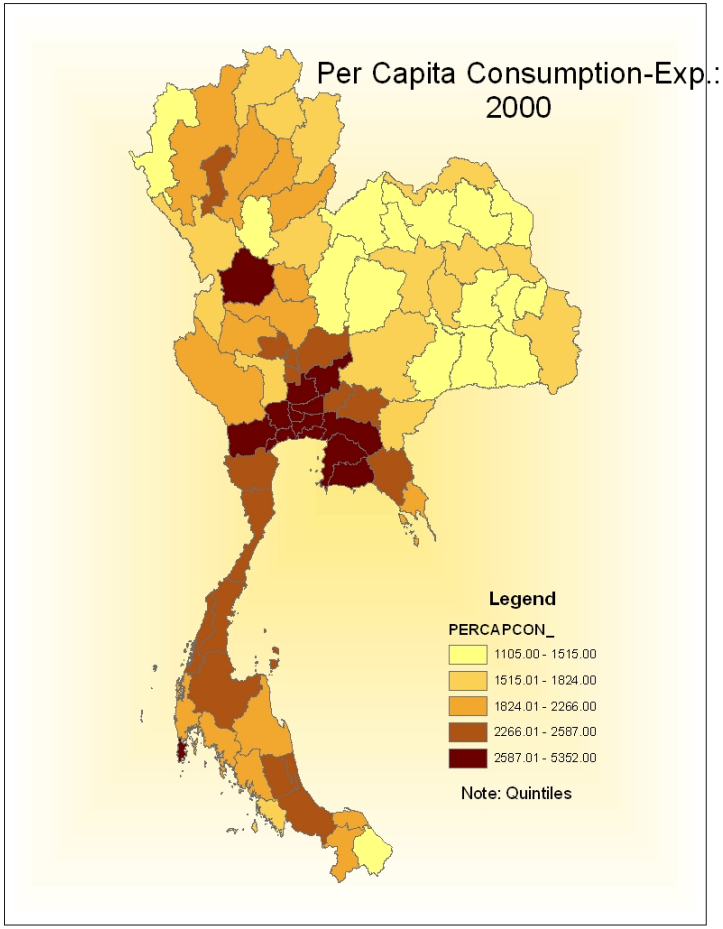
  Yala is lowest
- **Socio-Economic Survey 2000**: The southern region of Thailand, with the exception of Pattani, Yala, and Narathiwat, have a high per capita current income.
  - The southern provinces of Songkhla, Trang, Phatthalung, and Surat Thani are in the same quintile (3,500-8,200 baht) as that of the central region, which includes Bangkok.



Source: Thailand Human Development Report 2003 (UNDP)

Per Capita Expenditure

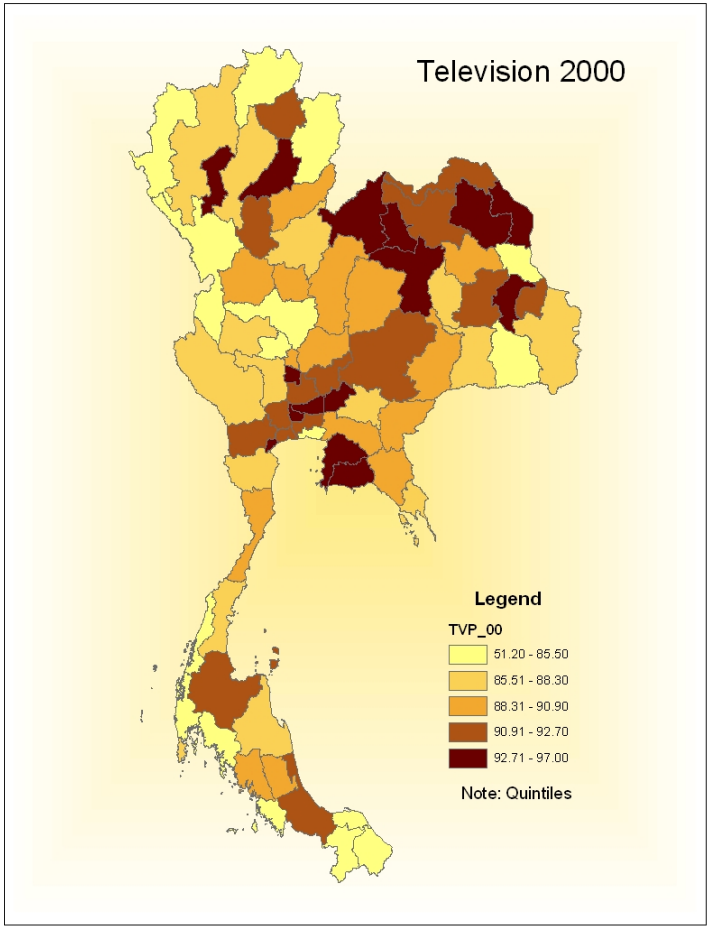
- **Townsend Survey**:
  - The level of expenditure is higher in the South than in the CNE, which translates in higher savings in the CNE than in the South. South households spend 10% more than CNE households in ”Household repairs”, 14% more in ”vehicle repairs”, 67% in ”education”, 140% more in ” clothing and 23% more in ”food eaten away”.
- **Socio-Economic Survey 2000**: The southern region of Thailand, with the exception of Narathiwat, has above average levels of expenditures. The central region has the highest levels of consumption-expenditure (2,500-5,300 baht).



Source: Thailand Human Development Report 2003 (UNDP)

Assets: Television

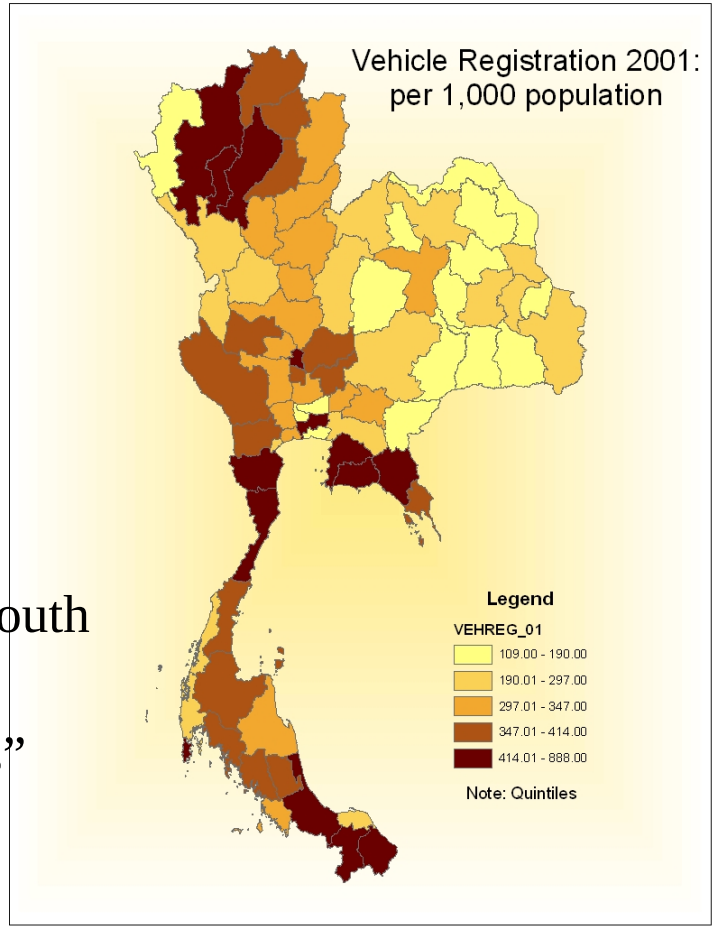
- Townsend Survey: In general CNE household hold more assets than south household, but there are some interesting exceptions, like ”VCR”: 31% of the households in the south has it and 17% in the CNE; however ”TV” is less common in the South (75% vs 84%).



Source: Thailand Human Development Report 2003 (UNDP)

Assets:
Vehicle Registration / Cars

- ”Cars” are more
- common in the south
- (8% vs. 2.5%),
- but not ”bicycles”
- (25% vs 56%).

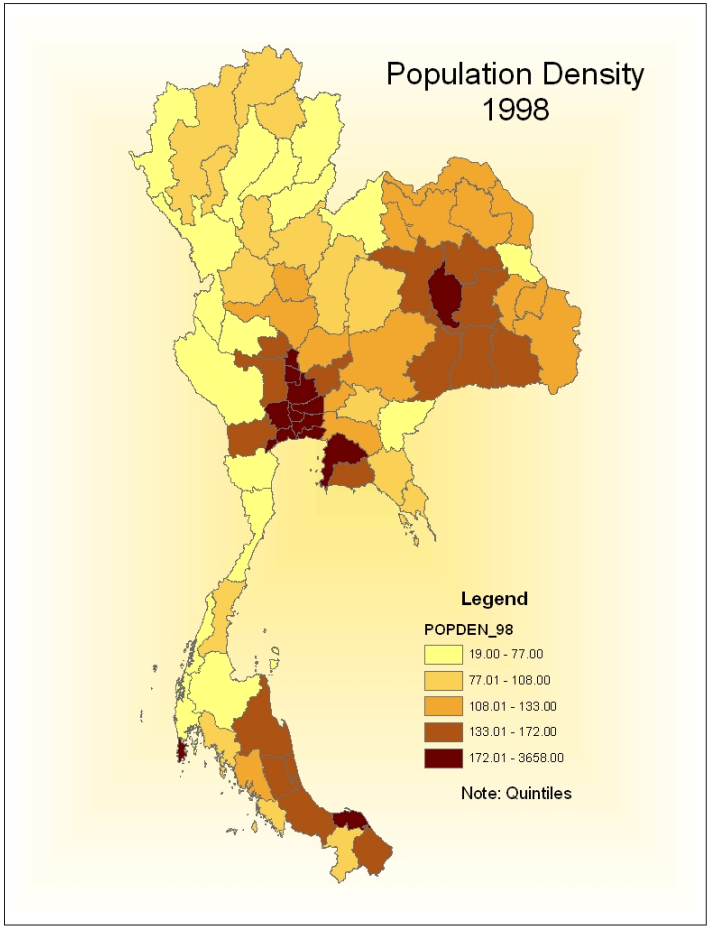


Source: Thailand Human Development Report 2003 (UNDP)

PROBLEMS FOR THE FAR SOUTH

Demographics: Population Density

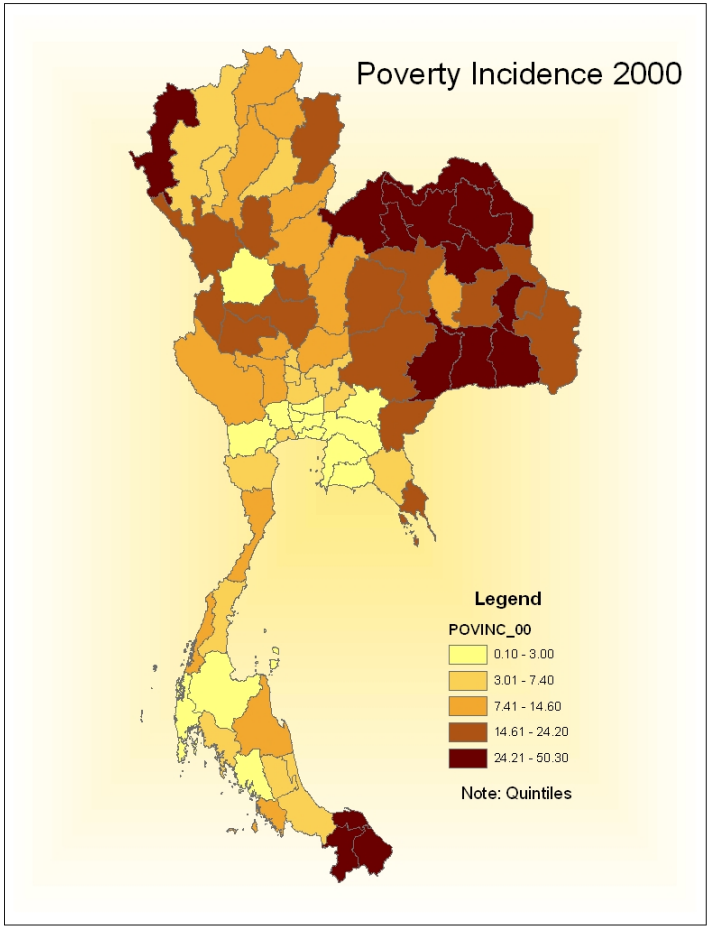
- Royal Thai Survey Department and Royal Forest Department, LANDSAT, 1998: The central and northeastern regions of Thailand have the greatest population density. The south in comparison has a few densely populated provinces.
  - Within the southern region the province of Pattani has the greatest population density. The next most densely populated provinces are Narathiwat, Songkla, Phatthalung, and Krabi.



Landsat l998, Thai survy, Forest depts

Poverty:
Poverty Incidence

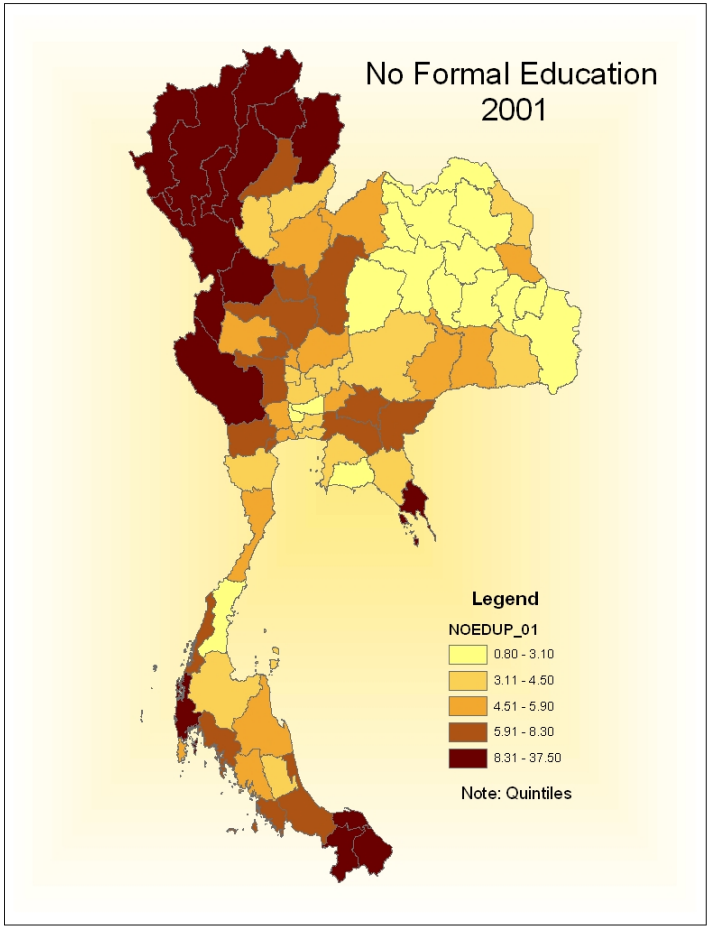
- **Socio-Economic Survey 2000**: In comparison to the other regions in Thailand the south has a lower poverty incidence rate. The exception to this is in the provinces of Yala, Pattani, and Narathiwat which are in the highest quintile (24-50%). The central region has by far the lowest poverty incidence rate in all of Thailand.



Source: Thailand Human Development Report 2003 (UNDP)

Education:
No Formal Education

- **Townsend Survey**:
  - No Education
    - Men: 9.7% south vs. 5.7% cne
    - Women: 18.5% south vs. 13.4% cne
  - P.4.
    - Men: 28.5% south vs. 44.4% cne
    - Women: 31.2% south vs. 42.6% cne
  - So the level of education is lower in the south than in the CNE.

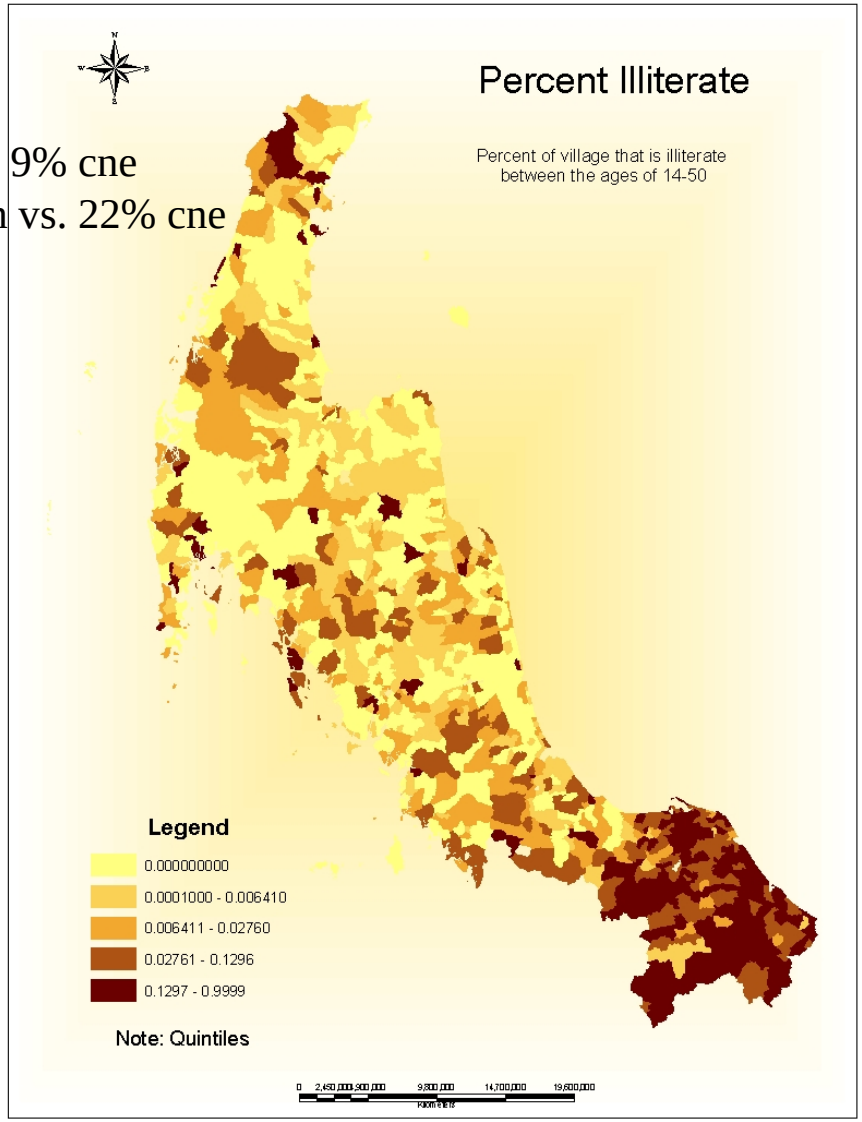


Source: Thailand Human Development Report 2003 (UNDP)

Education: Percent Illiterate

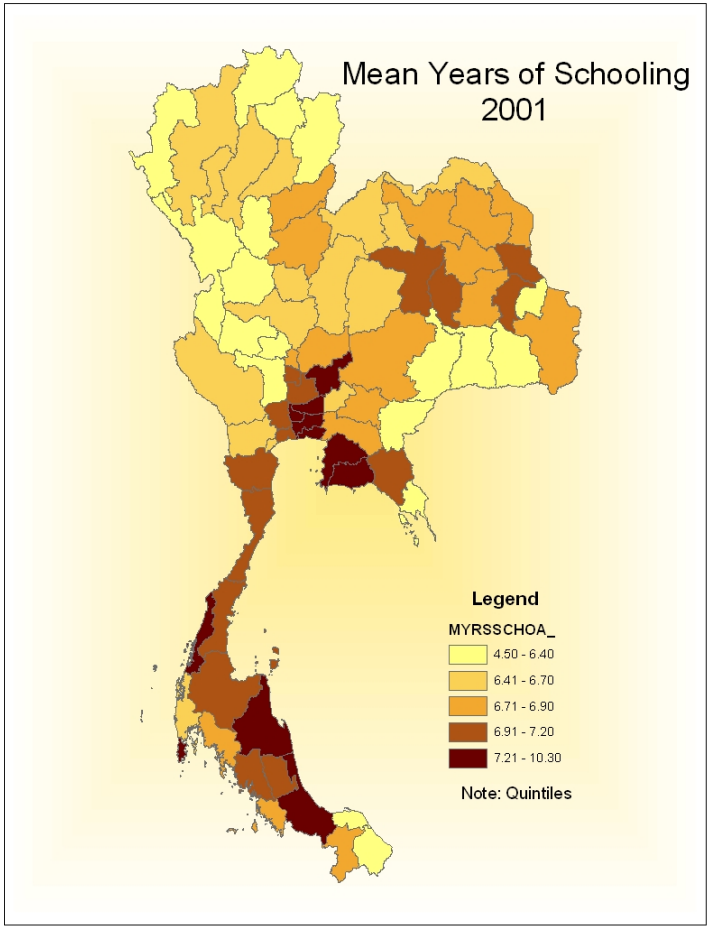
•

–Head of the households
–no education:
- •Men:14% south vs. 9% cne
- •Women: 34% south vs. 22% cne



Education:
Mean Years of Schooling

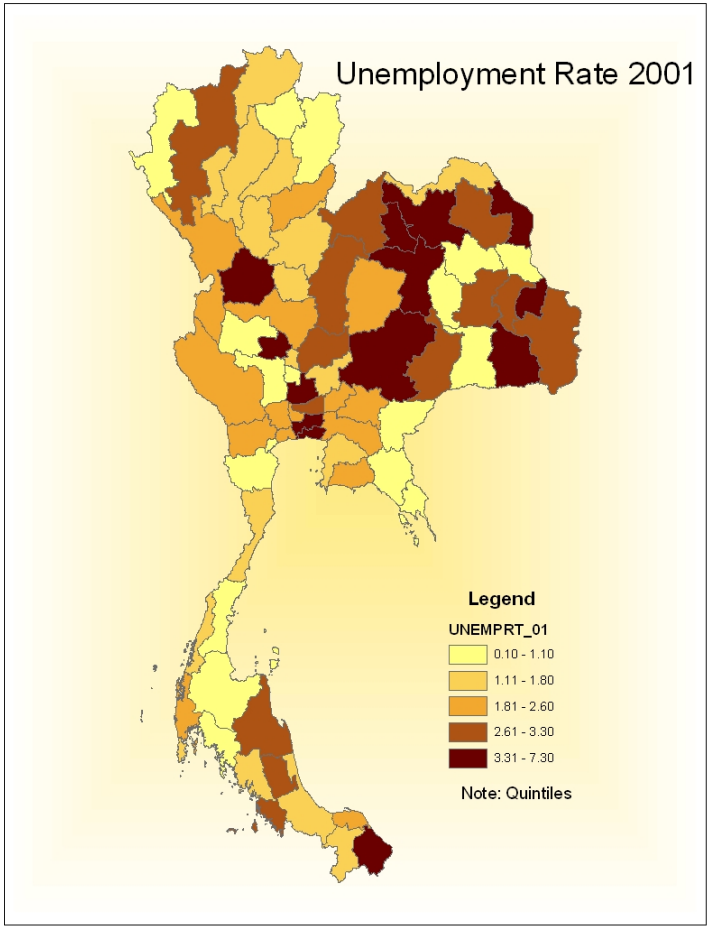
- **Labor Force Survey**, Round 3 (July-September), 2001: The southern region of Thailand, with the exception of Pattani and Narathiwat, have a high mean years schooling.
  - The southern region is in the same quintile as that of the central region, which includes Bangkok.



Source: Thailand Human Development Report 2003 (UNDP)

Employment: Unemployment Rate

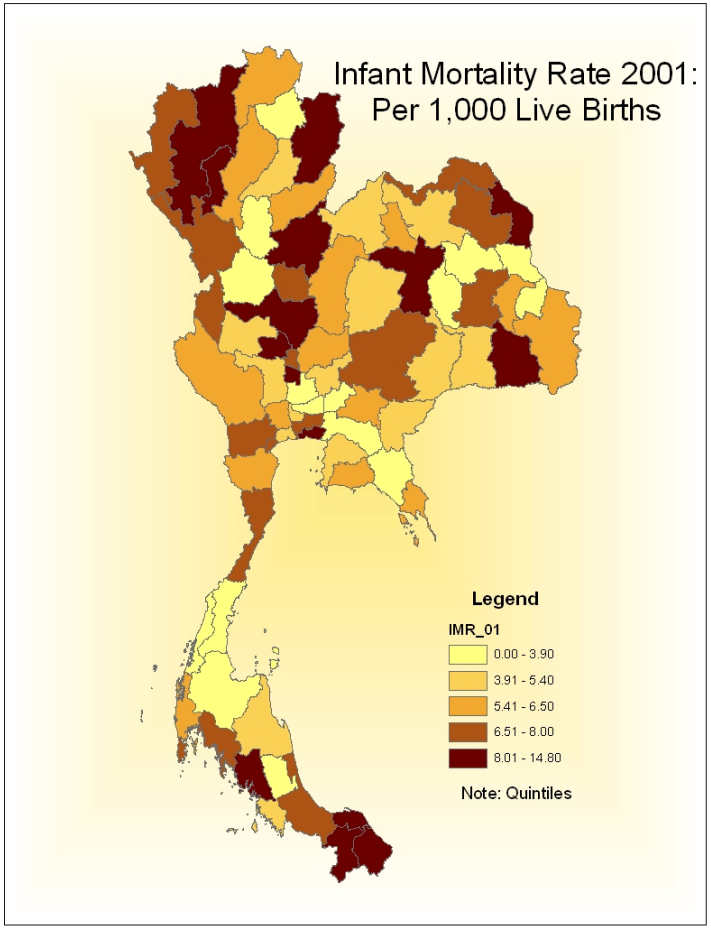
- **Labor Force Survey, Round 3 (July-September) 2001**, National Statistical Office: In comparison to the other regions of Thailand the south has an average level of Unemployment. The northeast has the highest unemployment rates in the country.
  - Within the southern region the province of Narathiwat has the largest unemployment rate. Followed closely by Satun, Nakhon Si Thammarat, and Phatthalung.



Source: Thailand Human Development Report 2003 (UNDP)

Health:
Infant Mortality Rate

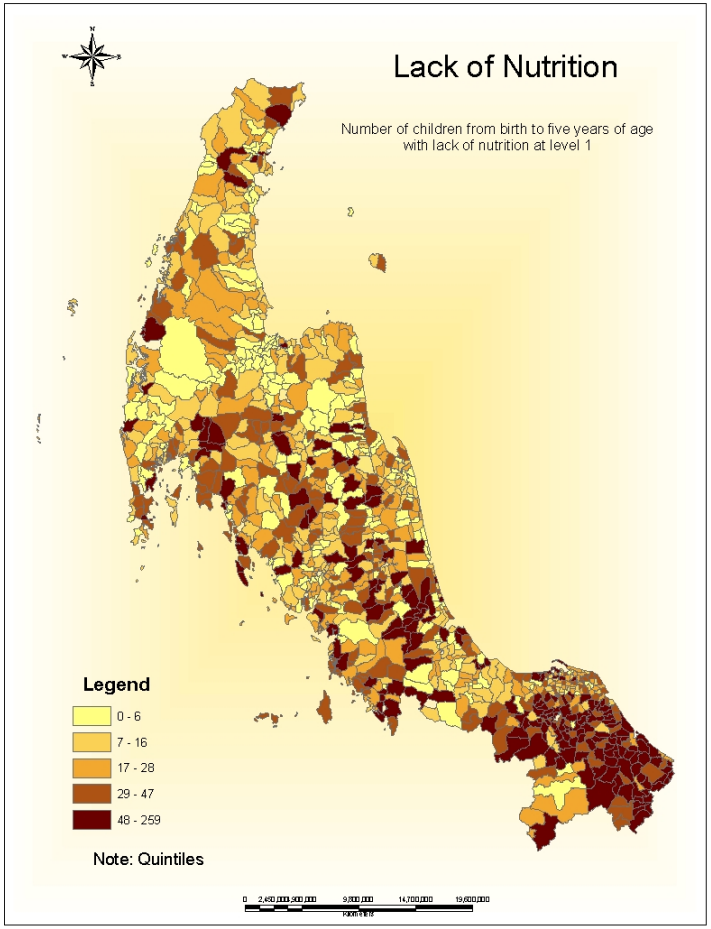
- **Public Health Statistics 2002**, Health Information Division, Bureau of Health Policy and Planning, Ministry of Public Health: In comparison to the other regions in Thailand the south has patterns of disbursed IMR. There are high concentrations of IMR in the north along the Myanmar border and along the highway between Phitsanulok and Suphan Buri and in the northeast along the Lao Peoples Democratic Republic.
  - Within the southern region Yala, Narathiwat, Pattani, and Trang are in the lowest quintile with 8-15 per 1,000 dying. Followed closely by Songkhla and Krabi.



Source: Thailand Human Development Report 2003 (UNDP)

Health: Malnutrition

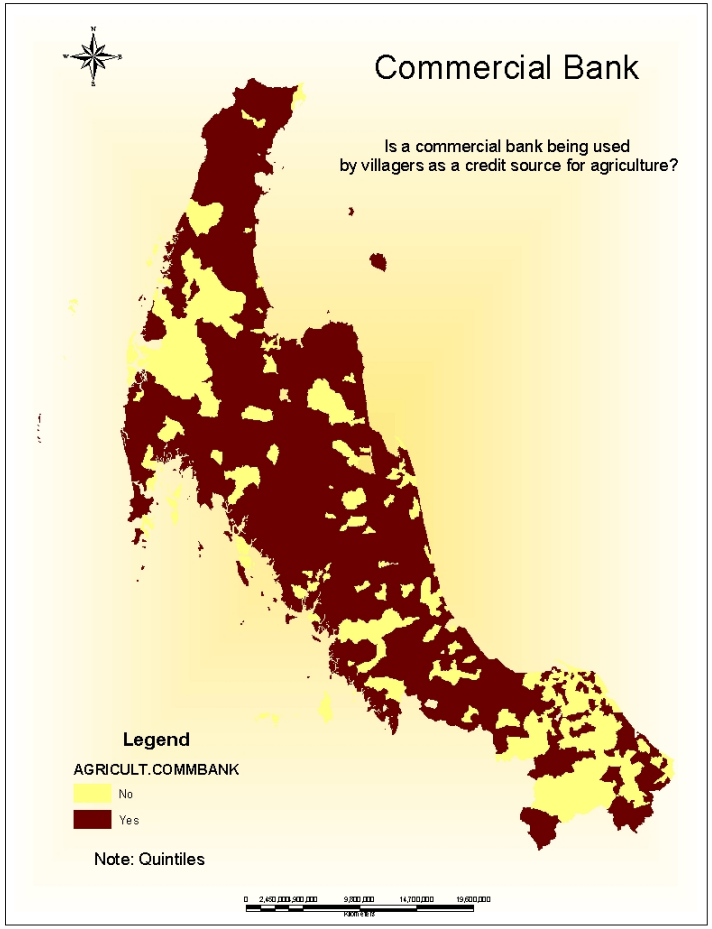
- **Nutrition Surveillance in Children (0-60 months) Report**, First Quarter/ Fiscal Year 1998 (October-December 1997), Health Department, Ministry of Public Health: In comparison to the other regions in Thailand the south, with the exception of Yala, Narathiwat, and Satun, is doing well. The North and Northeast are the trouble areas for malnourished children under 5 years of age.
  - Within the southern region Yala and Narathiwat are in the lowest quintile with 10-15% malnourished. Followed closely by Satun.



Source: CDD

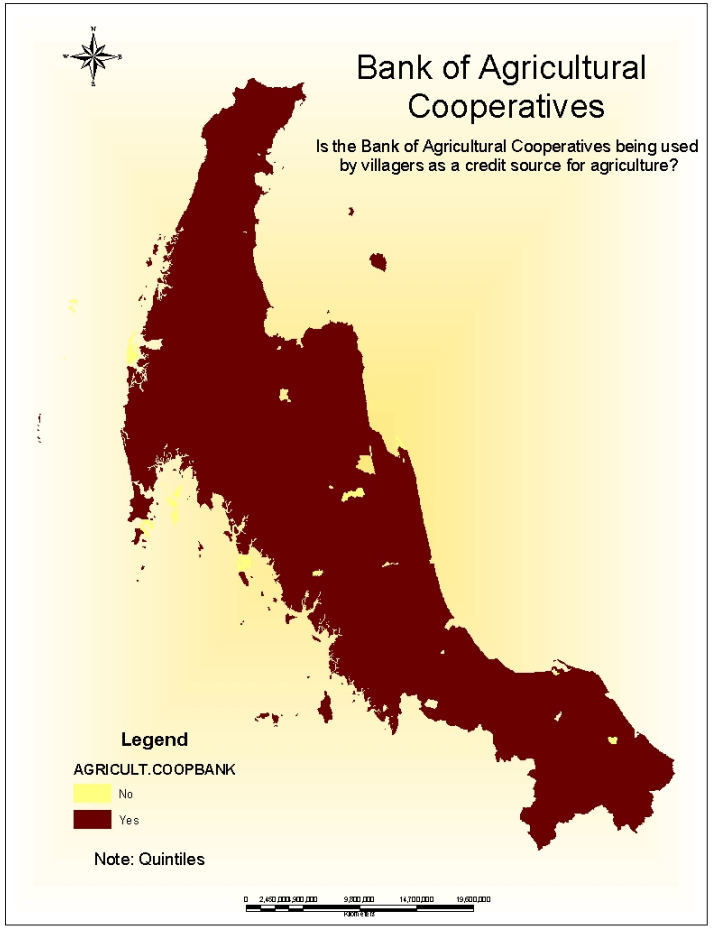
Financial Intermediation

Financial Intermediation: Use of Commercial Bank

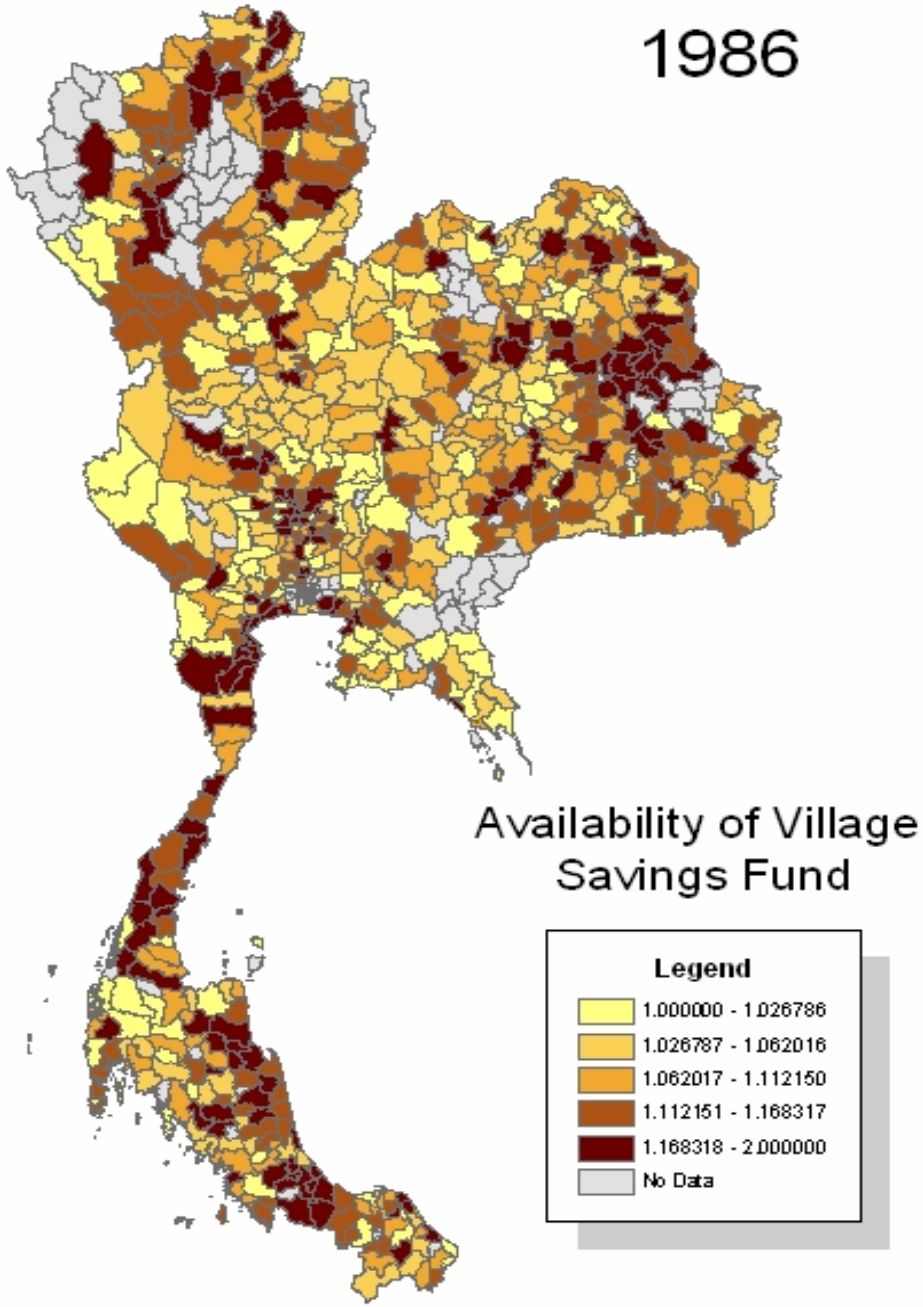


Source: CDD

Financial Intermediation: Use of BAAC



Source: CDD

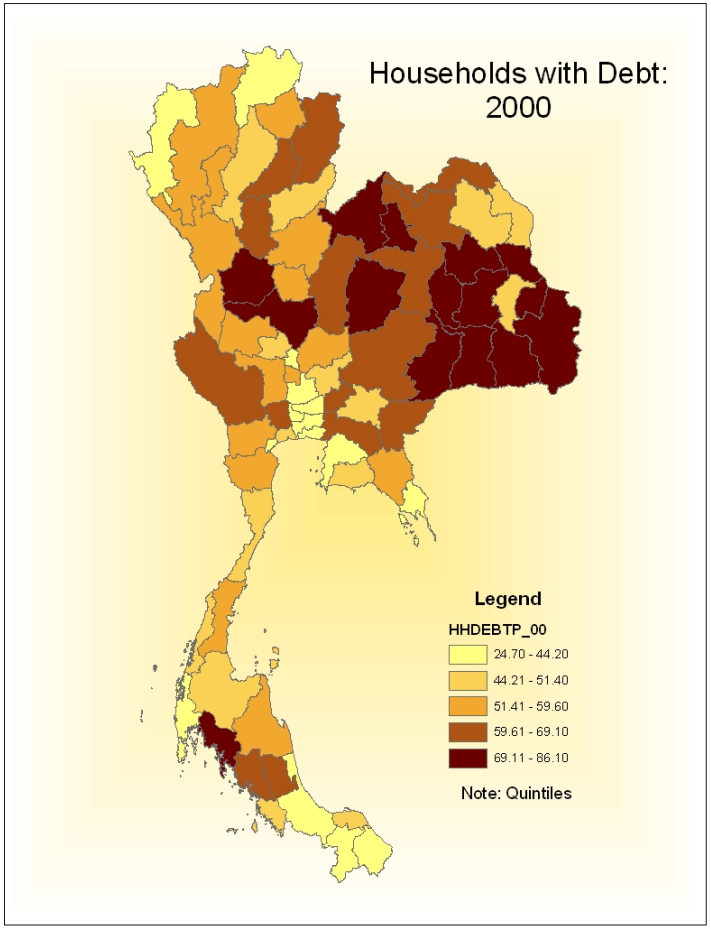

1986
Availability of Village Savings Fund
Legend
1.000000 - 1.026786
1.026787 - 1.062016
1.062017 - 1.112150
1.112151 - 1.168317
1.168318 - 2.000000
No Data


Percent that are Mem
Agricultural Cooper
Percent of sub-district that are me
agricultural cooperatives (e.g., coop of c
Legend
0.000000000
0.0001000 - 0.008876
0.008877 - 0.02332
0.02333 - 0.04969
0.04970 - 0.2028
Note: Quintiles

Percent of HH with Debt

LOW DEBT/ Low savings

- **Townsend Survey**: Savings in NE: 26,426 Savings in South: 5761
- Question: Do you or member of your HH have any of the following kind of savings?
  - Savings in cash : 99.3% in NE, 65.8% in the south
  - Savings in BAAC: 50.7% in NE, 36,7% in the south
  - Savings in Commercial banks : 29.5% in the NE, 10.4% in the south
  - Rice in storage : 57.4% in the NE, 0.4% in the south
- **Socio-Economic Survey 2000:** The northeast has the largest percent of households with debt. In the southern region only Phangnga (5th quintile), Trang (4th quintile), and Phattalung (4th quintile) have above average levels of debt.



Source: Thailand Human Development Report 2003 (UNDP)

Summary - low debt

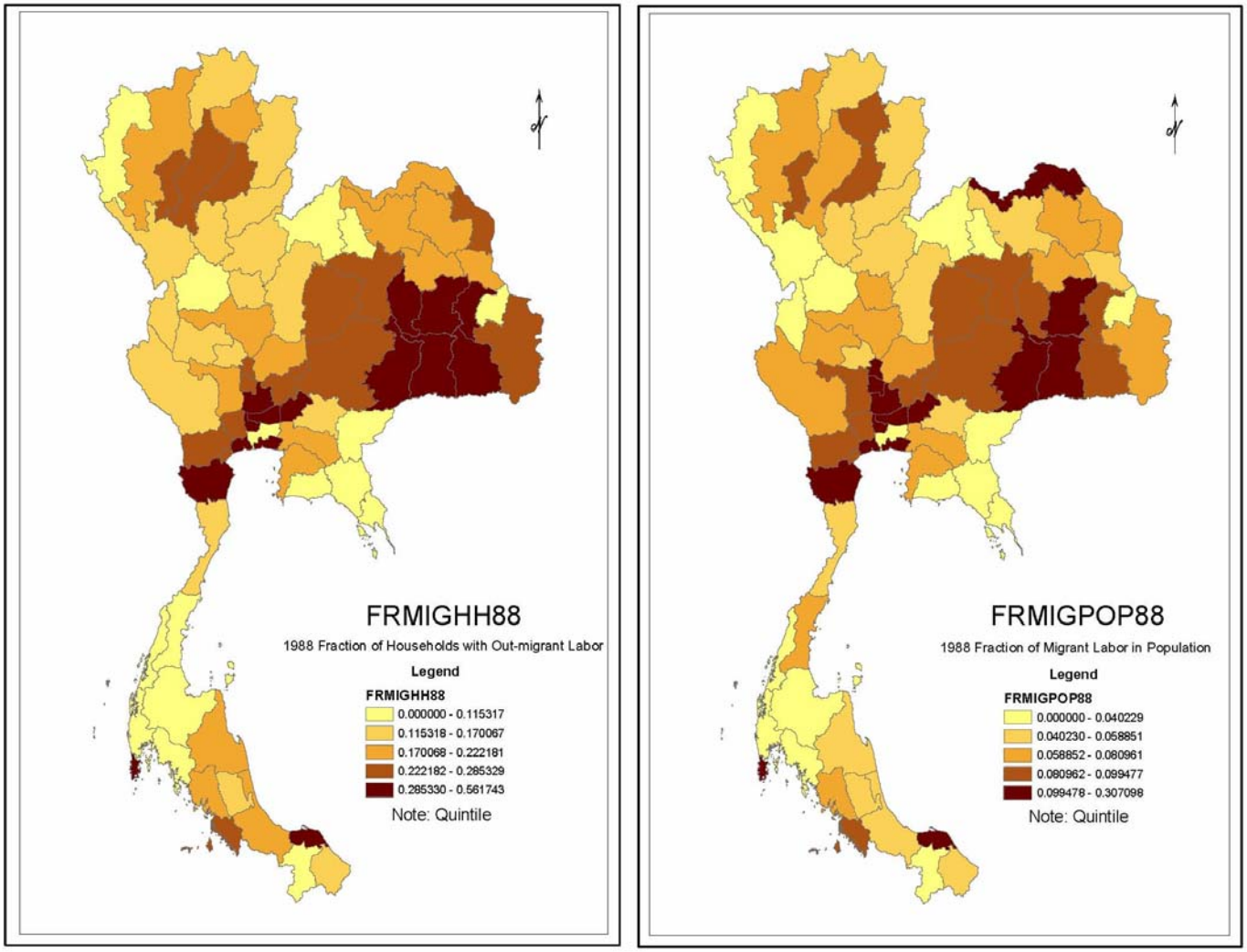
FORMAL VERSUS INFORMAL

- However the south seems to rely more on relatives that then CNE.
  - Have you help non-relatives who live in the village or tambon with money? 61% yes in the south and 25% yes in the CNE
  - Have non-relatives who live in the village or tambon helped you with money? 58% yes in the south, 26% in the CNE.
- As a special case, let's consider children living outside the house: in the south more help go to them (5,728 bath) that help came homes.
  - Sisaket money sent by kids 7772 and sent to children 1621
  - Yala money sent by kids, 335 and sent to children 7473

Special note: remittances are not incoming

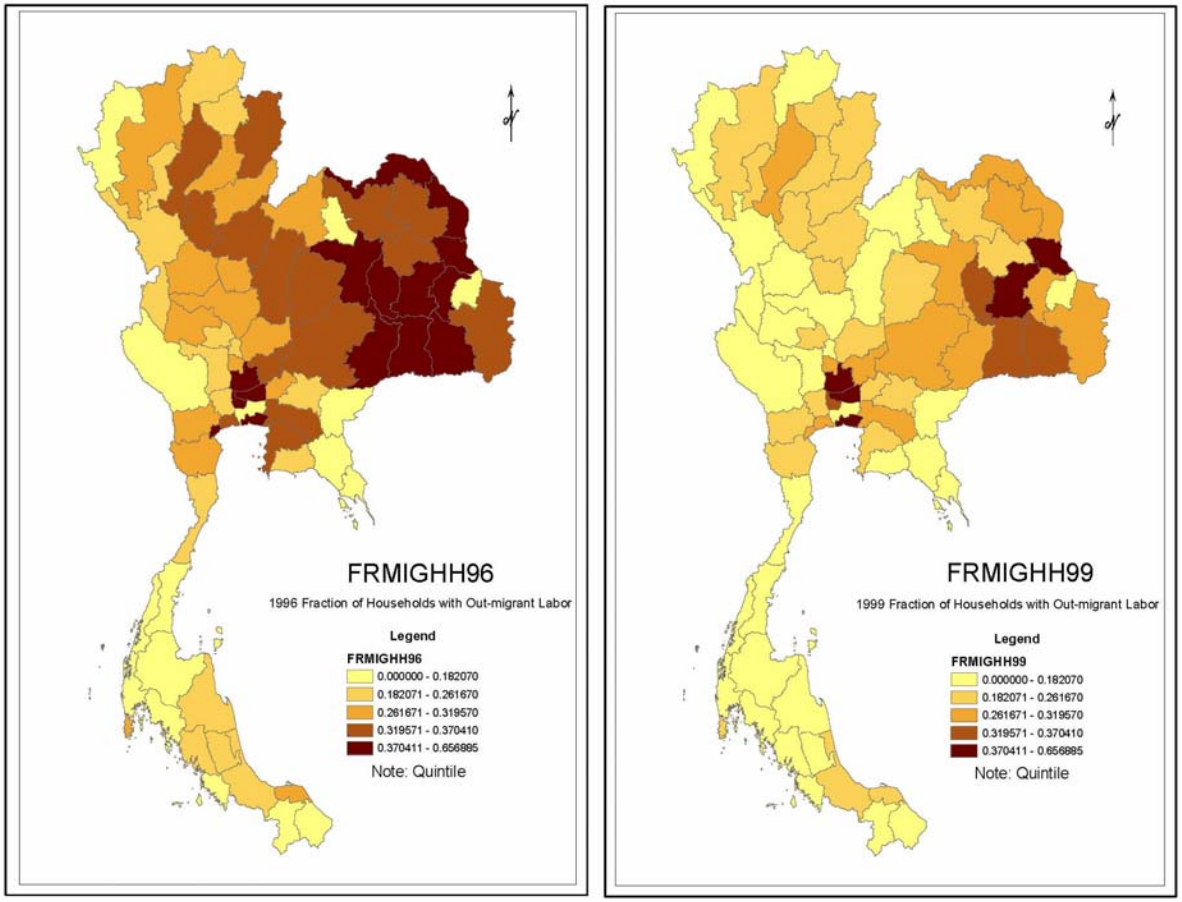
Some migration from south in l988

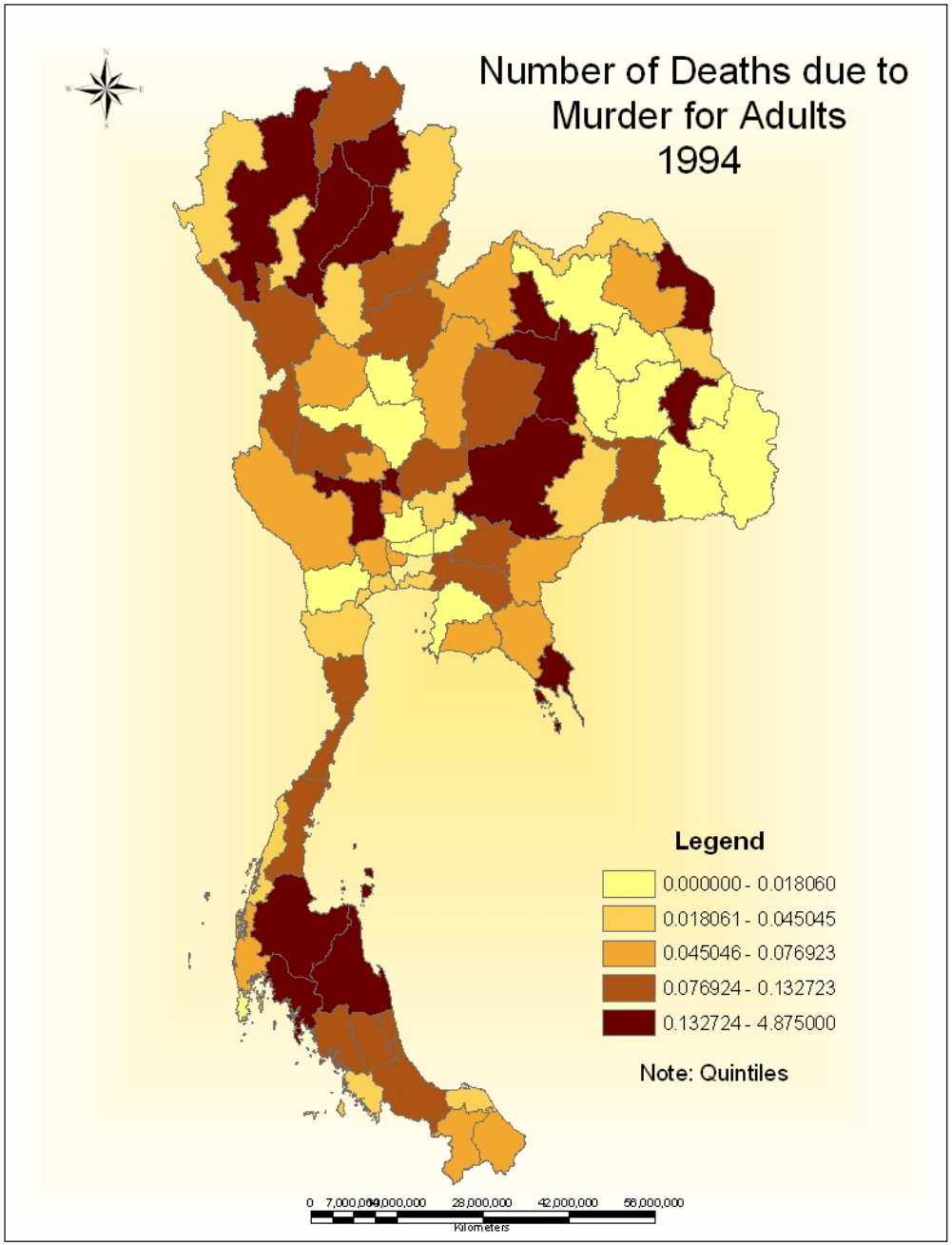
Figure 6: FRMIGHH88 VS. FRMIGPOP88

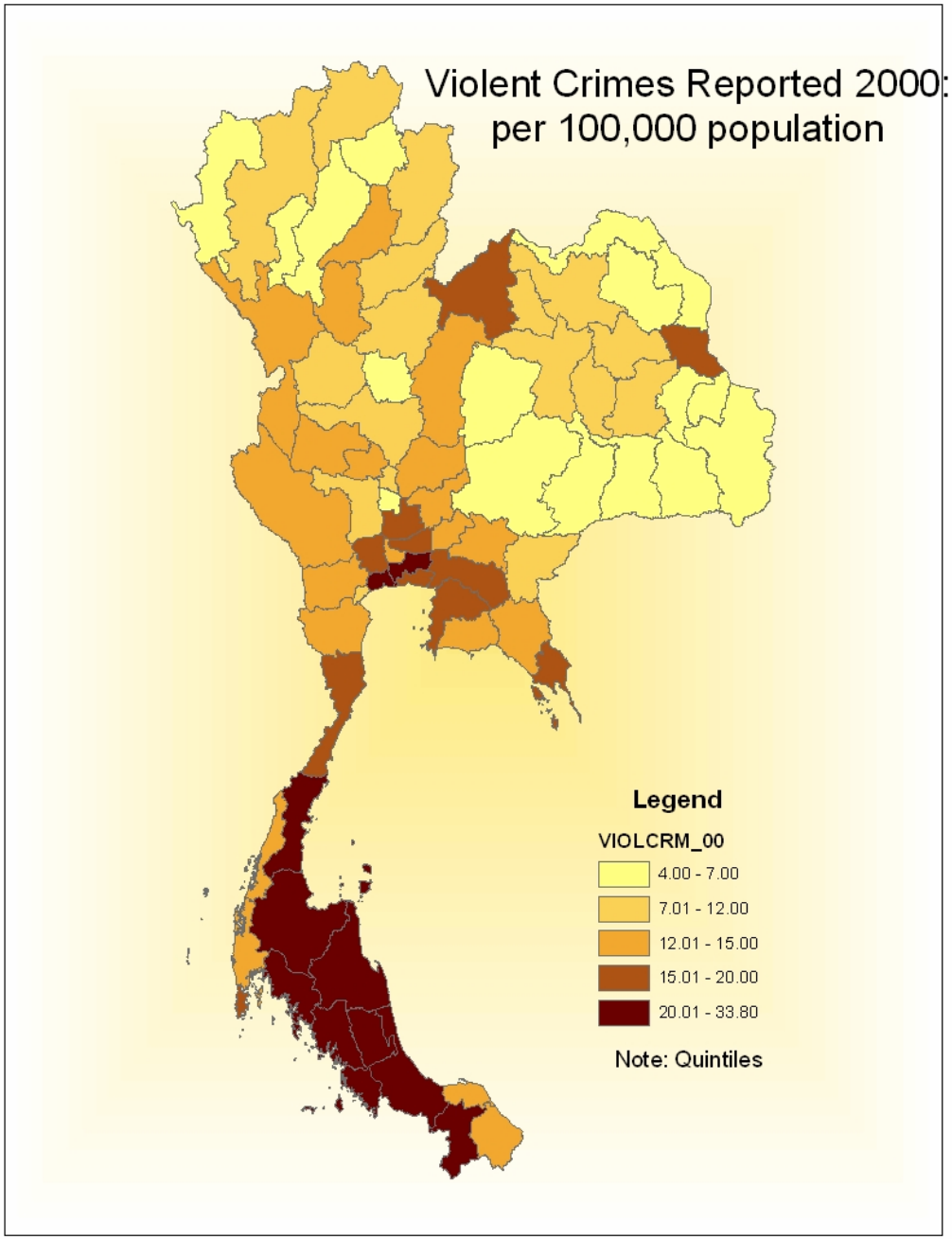


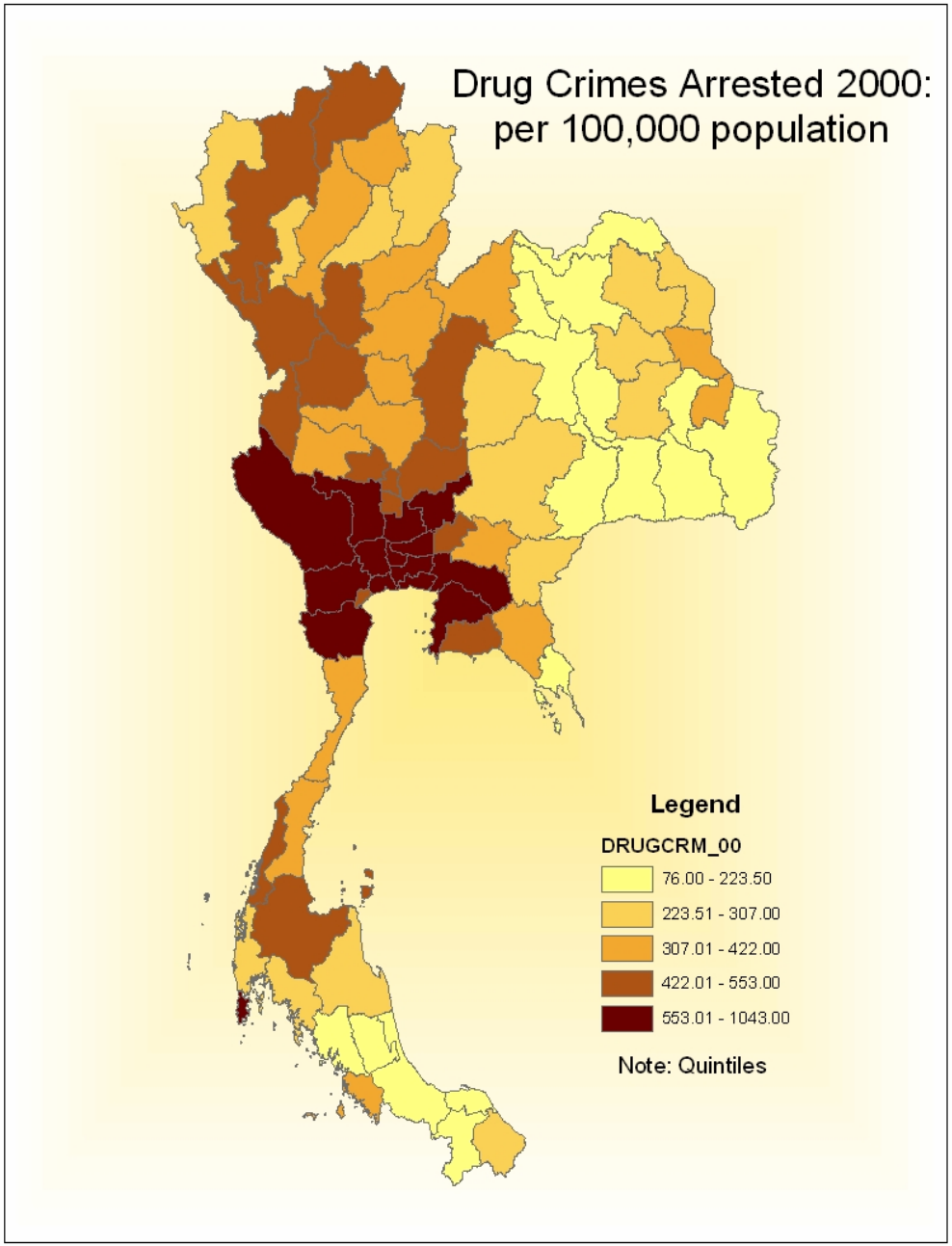
South migration very low by l996, l999

Figure 7: FRMIGHH96 VS. FRMIGHH99




Number of Deaths due to
Murder for Adults
1994
Legend
0.000000 - 0.018060
0.018061 - 0.045045
0.045046 - 0.076923
0.076924 - 0.132723
0.132724 - 4.875000
Note: Quintiles
0
7,000,000
14,000,000
28,000,000
42,000,000
56,000,000
Kilometers


Violent Crimes Reported 2000:
per 100,000 population
Legend
VIOLCRM_00
4.00 - 7.00
7.01 - 12.00
12.01 - 15.00
15.01 - 20.00
20.01 - 33.80
Note: Quintiles


Drug Crimes Arrested 2000:
per 100,000 population
Legend
DRUGCRM_00
76.00 - 223.50
223.51 - 307.00
307.01 - 422.00
422.01 - 553.00
553.01 - 1043.00
Note: Quintiles

Evaluation strategy #4

Structural models

ROLE OF THE FINANCIAL SYSTEM
IN THE ALLOCATION OF PRODUCTIVE CREDIT:
INTERMEDIATION FROM SAVERS TO BORROWERS

Evaluation of Financial Liberalization:

A general equilibrium model with constrained occupation choice

Xavier Giné (World Bank)
&
Robert M. Townsend (University of Chicago)

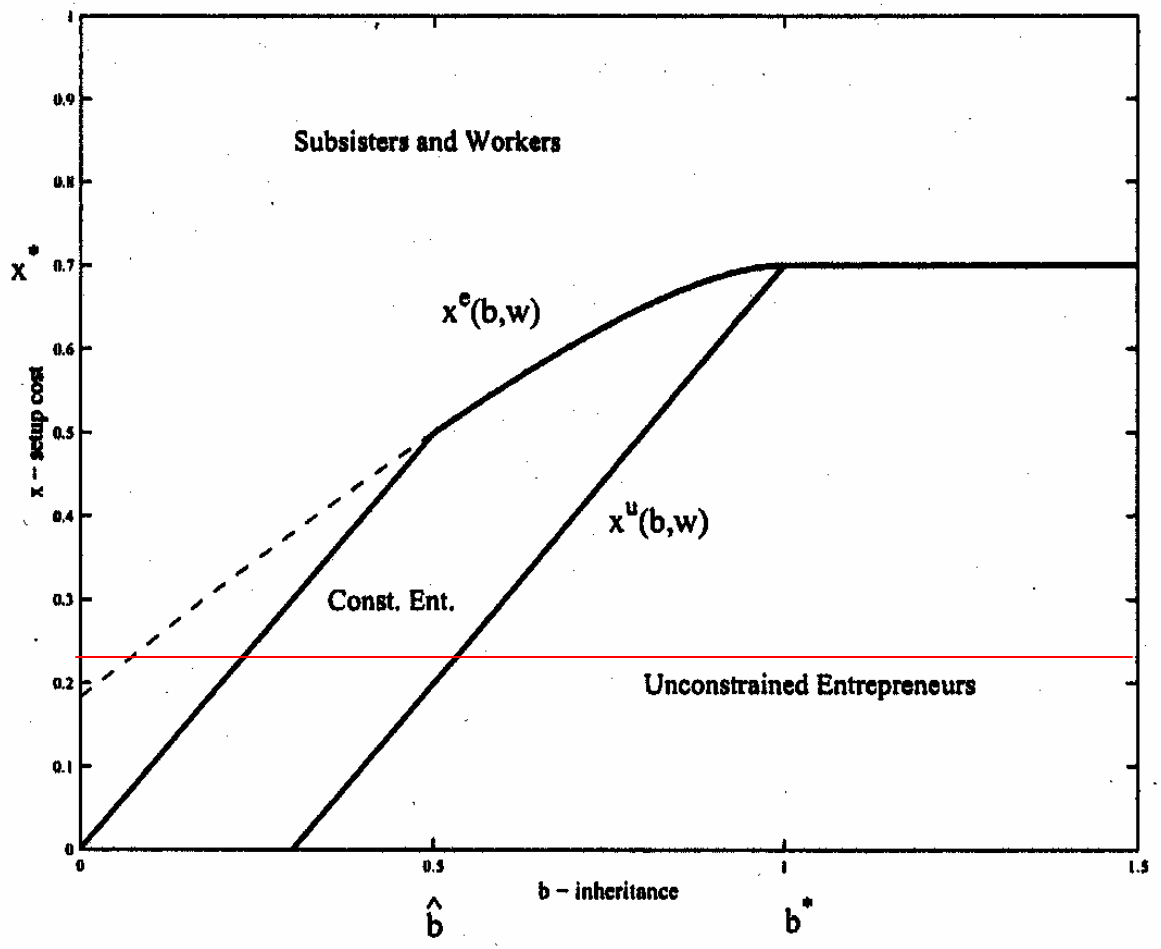


Figure 1: Occupational Choice Map

- Wealth facilitates entry into business
- Facilitates INVESTMENT of existing businesses-ROA

2 Environment – A Representative Model

Firms $q = f(k,l) = \alpha k - \frac{1}{2}\beta k^2 + \sigma kl + \xi l - \frac{1}{2}\rho l^2.$ -- Production

$$H(x,m) = mx^2 + (1-m)x, \quad m \in [-1,1].$$

-- if Talent high

investment

Setup costs are low

Profits of firms

Invest, Finance Constraint- from savings, no credit

$$\pi(b,x,w) = \max_{k,l} \quad f(k,l) - wl - k$$
$$\text{s. t.} \qquad k \in [0, b-x], \quad l \geq 0. \tag{3}$$

Occupation Choice

$$W(b,x,w) = \begin{cases} \gamma + b & \text{if a subsistence worker,} \\ w - \nu + b & \text{if a wage earner,} \\ \pi(b,x,w) - x - \nu + b & \text{if a firm.} \end{cases} \tag{4}$$

Who can go into business?

Dynamics: 'Myopic Savings'

$$\max_{C,B} \quad U(C,B)$$
$$\text{s. t.} \qquad C + B = W \tag{5}$$

$$U(C,B) = C^{1-\omega} B^{\omega}. \tag{6}$$

→ save ω

Deposit mobilization and lending

Intermediated Sector :

$$W(b,x,w,R) = \begin{cases} \gamma + Rb \text{ as a subsister,} \\ w - \nu + Rb \text{ as a worker,} \\ \pi(w,R) - Rx - \nu + Rb \text{ as an enterpreneur.} \end{cases} \tag{24}$$

Neoclassical firm

$$\pi^u(w,R) = \max_{k,l} f(k,l) - wl - Rk \tag{25}$$

which yields the optimal choices

$$k^u(w,R) = \frac{\rho(\alpha - R) + \sigma(\xi - w)}{\beta\rho - \sigma^2} \quad \text{and} \quad l^u(w,R) = \frac{\sigma k^u + (\xi - w)}{\rho} \tag{26}$$

Optimal inputs not wealth-dependent, firm can borrow for investment

Estimation: Two Data Sets

Table 1: MLE Results

	s^a	γ	m	α	β	ρ	σ	ξ
Townsend–Thai	1.4338 (0.03978)	0.01538 (0.00408)	0.00559 (0.17056)	0.97545 (0.00191)	0.00330 (0.00013)	0.00966 (0.00692)	0.00432 (0.00157)	0.12905 (0.04146)
SES	1.4236 (0.00881)	0.02744 (0.00119)	-0.59330 (0.05801)	0.54561 (0.06711)	0.39064 (0.09028)	0.03384 (0.00364)	0.10210 (0.02484)	0.25826 (0.03523)

Calibration

Cost of living η

Savings rate ω

Subsistence income growth rate γ_{gr}

6.2.1 Initial Wealth Distribution

6.2.2 Calibration - The Metric

$$C = \sum_{s=1}^{5} \sum_{t=1976}^{1996} w_{st} \left[\frac{z_{st}^{\text{sim}} - z_{st}^{\text{ec}}}{\mu_{z_s}} \right]^2 \tag{40}$$

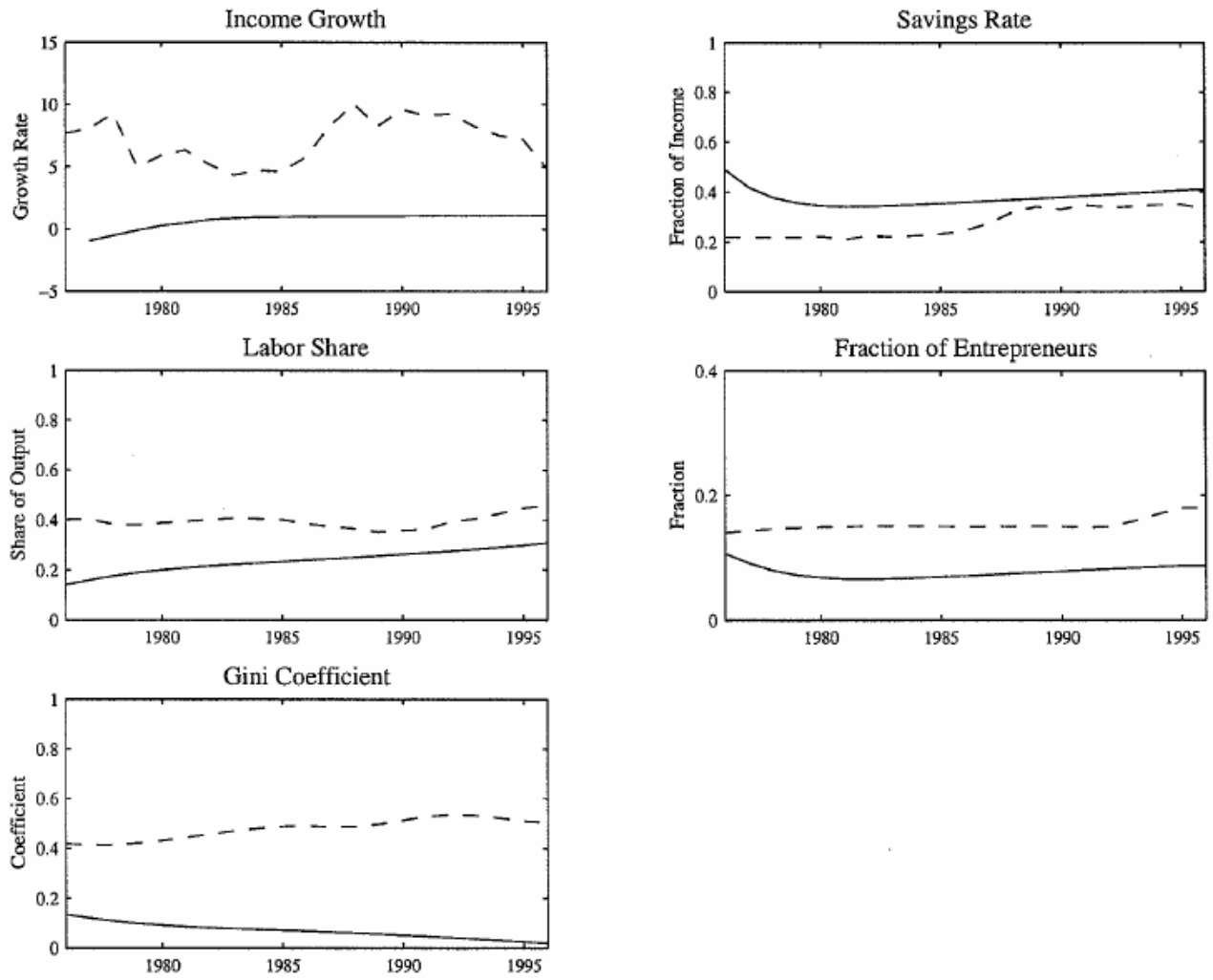


Figure 6: Benchmark Model: Best Overall Fit (SES Data).
Legend: – – Thai Economy, — Simulation.

MACRO SIMULATION:
CREDIT MATTERS

Eventual diminishing
Returns, BUT WE GET TFP

INVESTMENT WILL
MOVE TOO

DYNAMICS DUE TO
IMPROVED INTER-
MEDIATION,

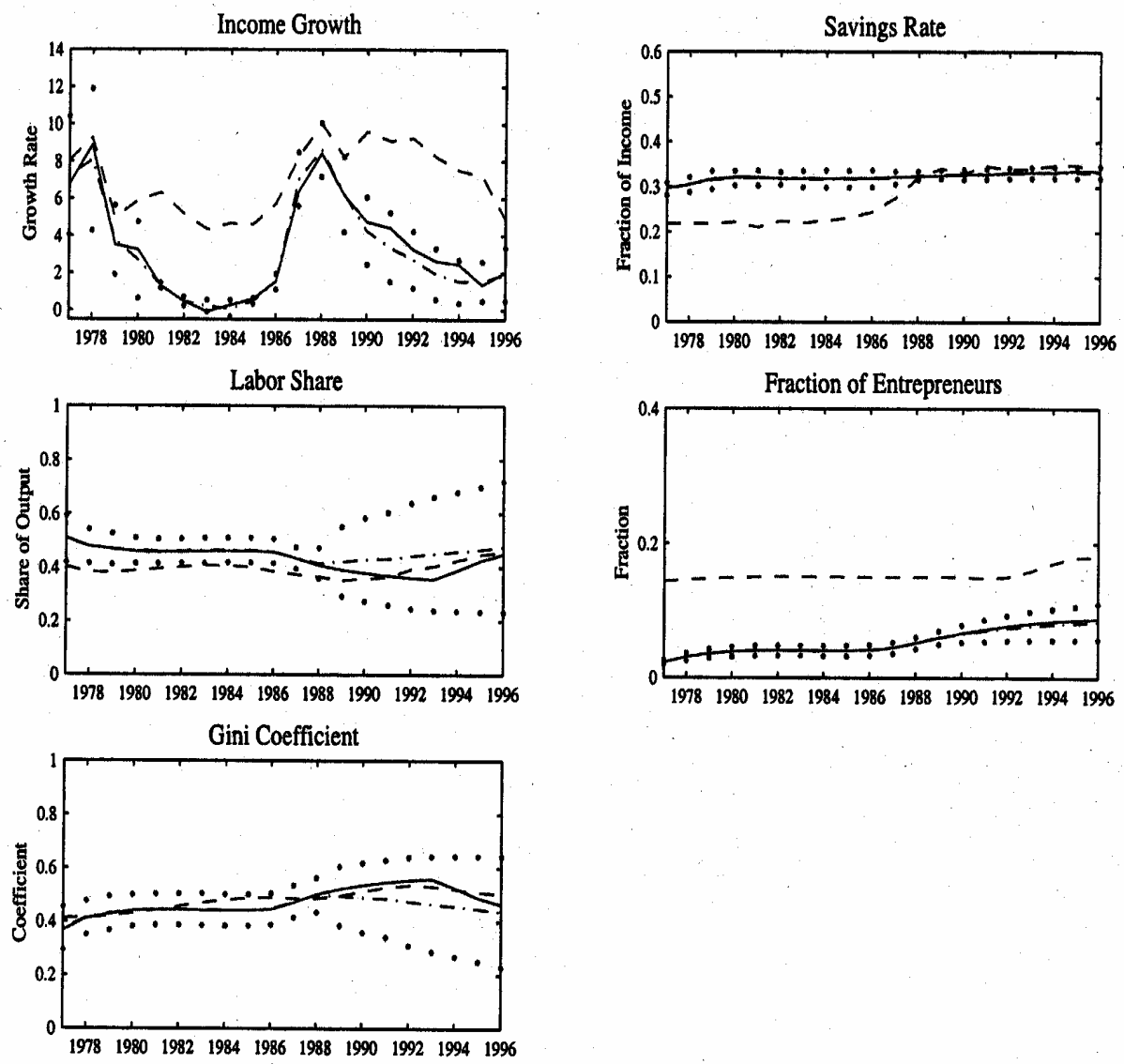


Figure 11: Robustness of the model (Townsend-Thai Data).
Legend: – – (dash-dash) Thai Economy, — (solid) Simulation at estimated parameters, –. (dash-dot) Mean Simulation, ··· (dot-dot) Confidence intervals.

COST BENEFIT ANALYSIS AT HH LEVEL !

MICRO-WELFARE
Distribution of
Gains and losses

Poverty Reduction is a Laudable Goal

Here its linked to macro

Increase in wages might hurt larger business

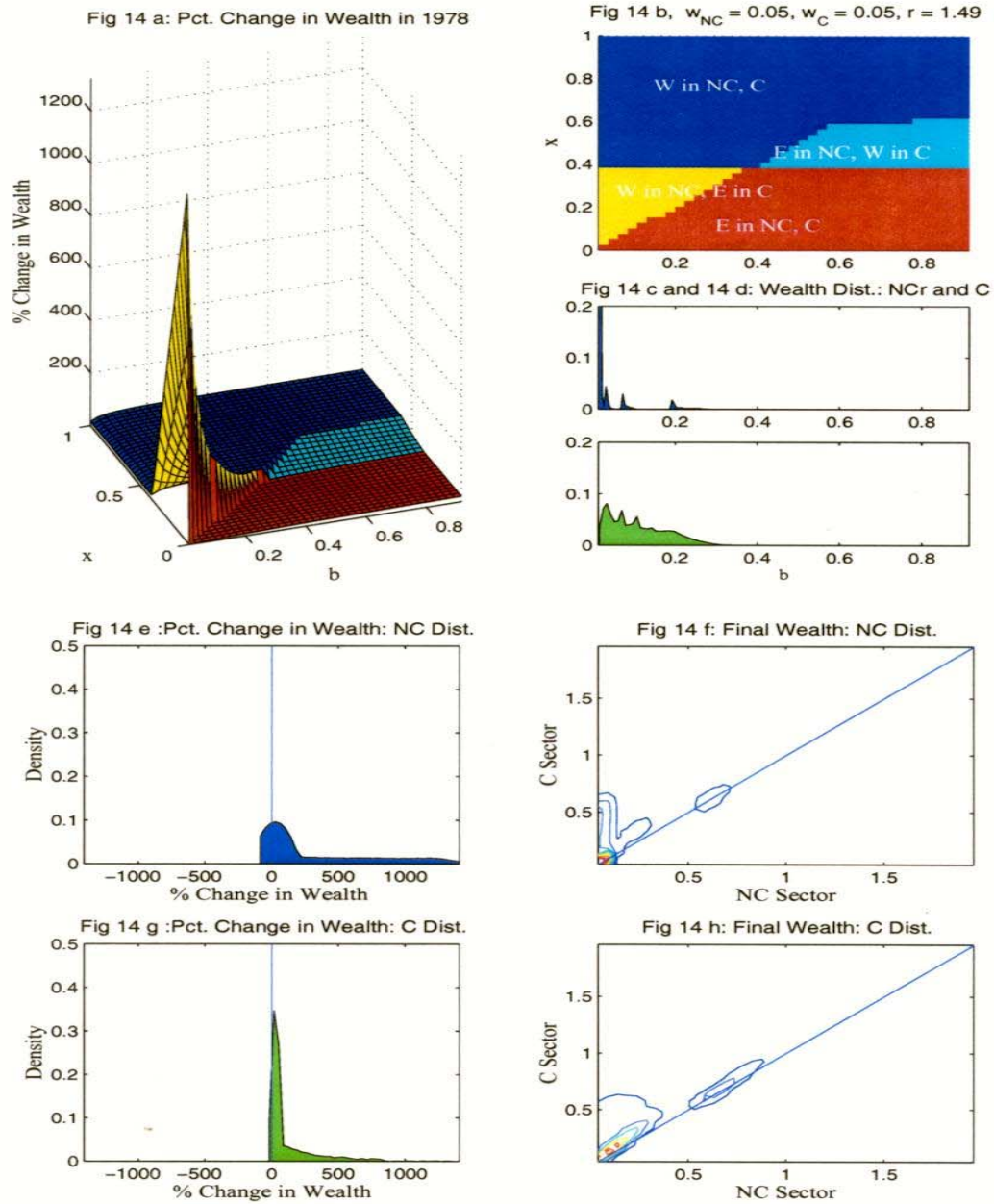


Figure 14: Welfare Comparison in 1978: SES Data

Table 2: Welfare Gains and Losses

	Intermediated Ec. Wealth Dist			Non-Intermediated Ec. Wealth Dist		
	1997 Baht	Dollar	Pct. of Inc.	1997 Baht	Dollar	Pct. of Inc.
Townsend-Thai Data, 1979						
Welfare Gains						
Mean	82,376	3,295	200.93	61,582	2,463	150.21
Median	22,839	914	55.71	3,676	147	8.97
Mode	7,779	311	18.97	6,961	278	16.98
Pct. of Population		100			100	
SES Data, 1996						
Welfare Gains						
Mean	76,840	3,074	100.54	83,444	3,338	109.18
Median	25,408	1,016	33.24	20,645	826	27.01
Mode	25,655	1,026	33.57	18,591	744	24.32
Pct. of Population		86			95	
Welfare Losses						
Mean	117,051	4,682	107.59	115,861	4,634	106.50
Median	113,705	4,548	104.51	112,097	4,484	103.04
Mode	117,486	4,699	107.99	118,119	4,725	108.57
Pct. of Population		14			5	

ESTIMATING THE IMPACT OF INCREASED ACCESS

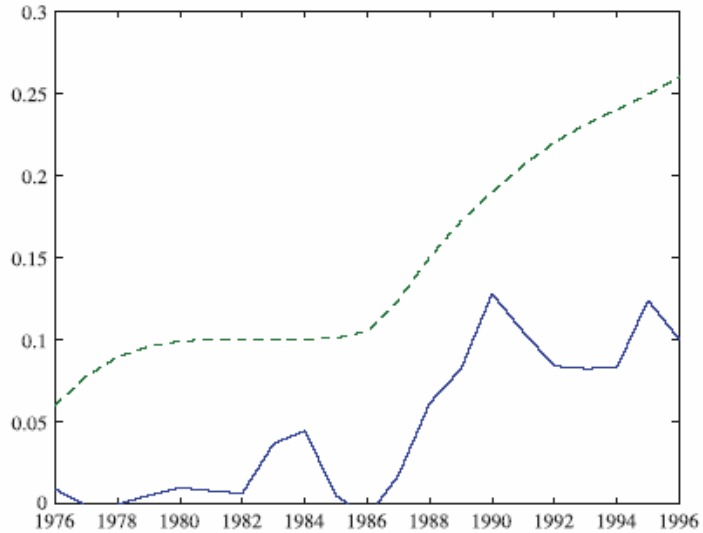


Fig. 7. Foreign capital inflows and financial liberalization. Legend: – Foreign cap. Inflows as a fraction of GDP, – – Fraction of population with access to intermediation.

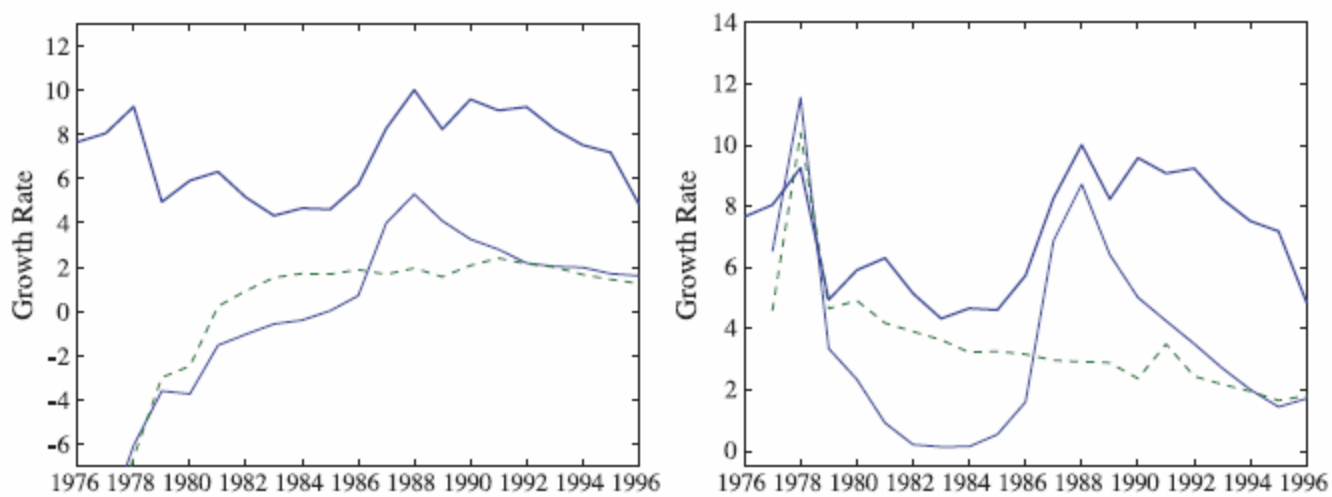


Fig. 8. Access to capital and foreign cap. Inflows: SES (left) and Townsend-Thai (right). Legend: — (thick) Thai economy , — Closed economy, – – Economy with capital flows and linear participation.

SECOND ROLE OF FINANCIAL SYSTEM -- ALLOCATION OF RISK

Transitional Growth with Increasing Inequality and Financial Deepening

Robert M. Townsend
and Kenichi Ueda(IMF)

3. Model - Environment

Objective: Discounted Expected Utility Over Infinite Horizon →

$$E_1[\sum_{t=1}^{\infty} \beta^{t-1} u(c_t)]$$

Essential staple consumption,

Technology Shocks

δ = safe return

$\theta + \varepsilon$ = risky return HIGH MEAN, HIGH RISK

Aggregate Shock + Idiosyncratic

Autarky Sector: Isolated Households and Firms

$$k_{t+1} = s_t(\phi_t(\theta_t + \epsilon_t) + (1 - \phi_t)\delta).$$

Savings rate

Share invested in Risk Technology : Limited by income today

OPTIMAL ENDOGENOUS EXPANSION

- First, there is a one time entry fee or a fixed cost q > 0 incurred at etry (infrastructure, learning something new.
- Also there is a variable cost

$$k_{t+1} = s_t r(\theta_t).$$

- Advantage - pooling all idiosyncratic risk leaving only the aggregate shock which all bear together
- Advanced information on sector, activity to invest in
- But what are these transactions costs?
- MODEL PRESUMES FINANCIAL INSTITUTIONS PLAY THIS ROLE BUT SEE BELOW FOR TESTS

Calibration/Data Sources

Table 1: Benchmark Parameter Values

σ	q	δ	θ	ϵ	β	γ
1	5	1.054	$[1.047, 1.147]$	$[-0.6, 0.6]$	0.96	0

Thai project, data on rates of return! Income/asset ratios
BIG SURVEY
MONTHLY MICRO SURVEY-- EVEN HIGHER?

MACRO SHOCKS- PART OF FLUCTUATIONS, COUNTRY RISK

MACRO
SIMULATION

Figure 8: Benchmark Best Fit

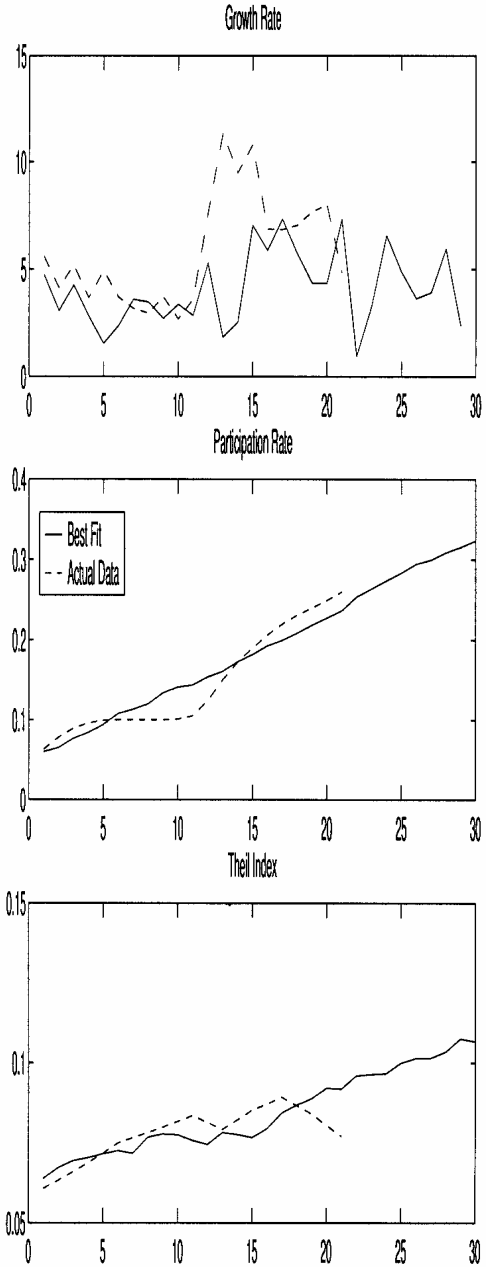
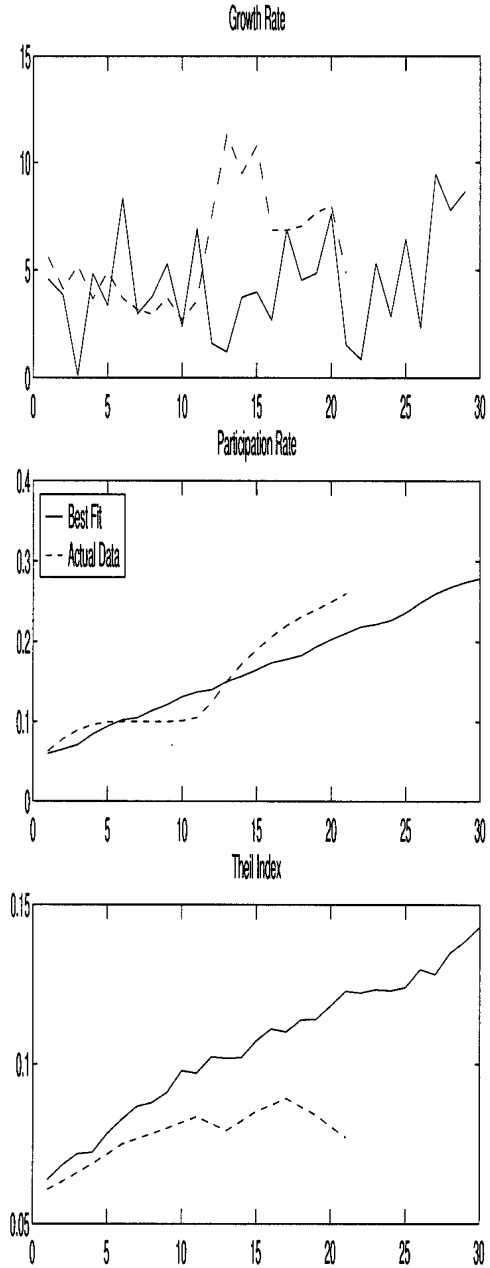


Figure 9: Alternative Best Fit



APPLICATION VILLAGE LEVEL

.

Figure 13: LEB Simulated Means Vs. Actual Means

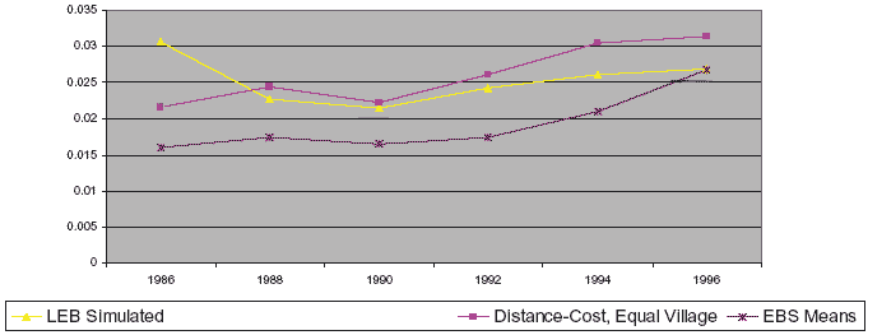


Figure 14: GJ Credit Simulated Means Vs. Actual Means

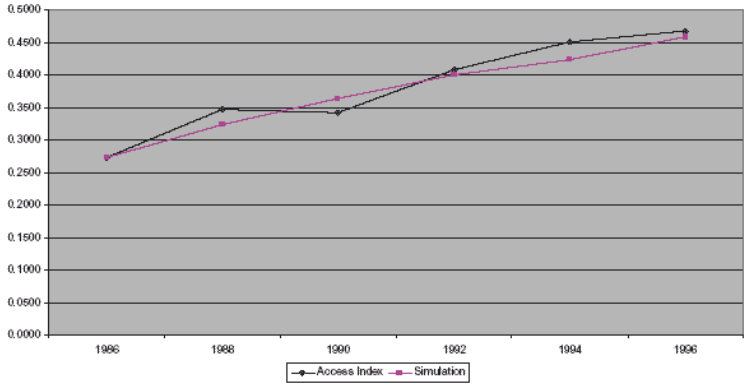
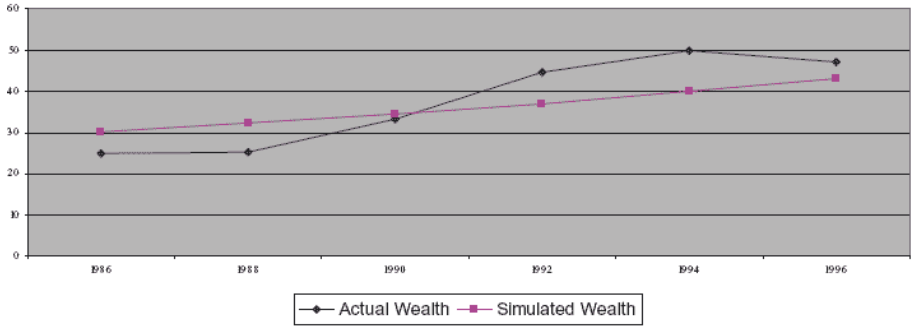
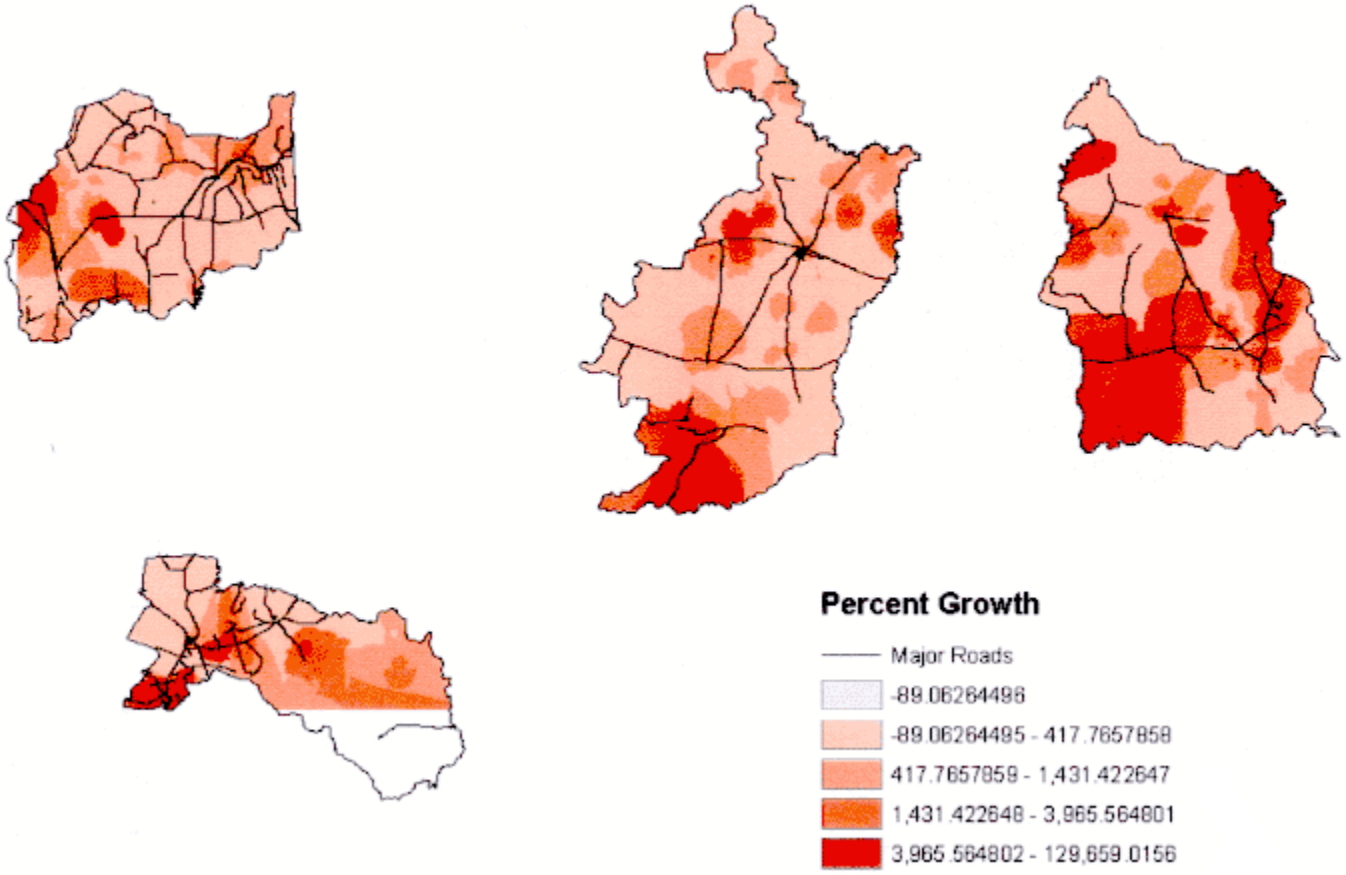


Figure 15: GJ Wealth Simulation, Actual Vs. Simulated Means



Entrepreneurial Activity Growth
Percent Change, 1986-1996
By Quintiles



LEB 5-Bin Simulated Change in Entrepreneurial Activity
Percent Change: 1986 to 1996
Growth in Entrepreneurial Activity in Reds, Decrease in Entrepreneurial Activity in Blues
(By Quantiles)

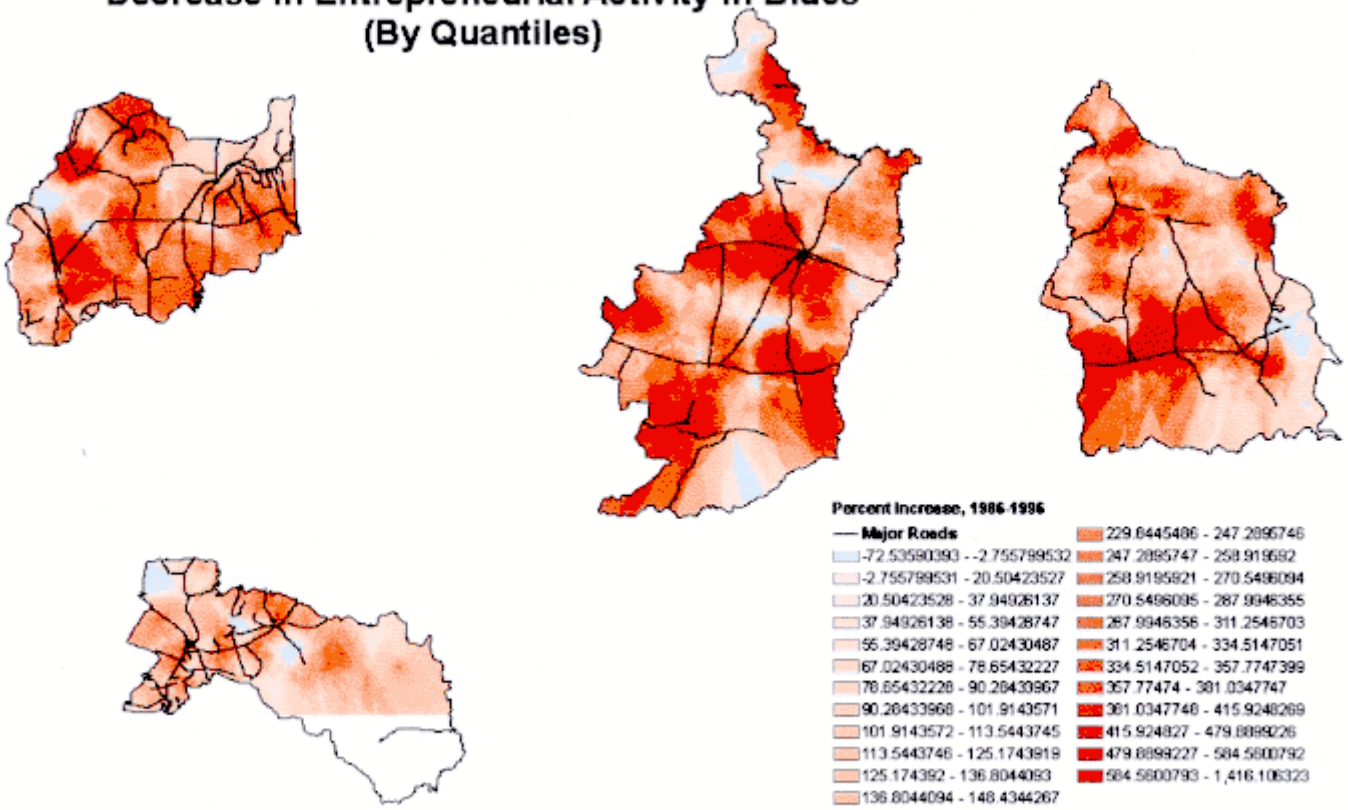


Figure 18: LEB Simulation Residuals
Local Moran Map at P=.05 Cut-Off Value

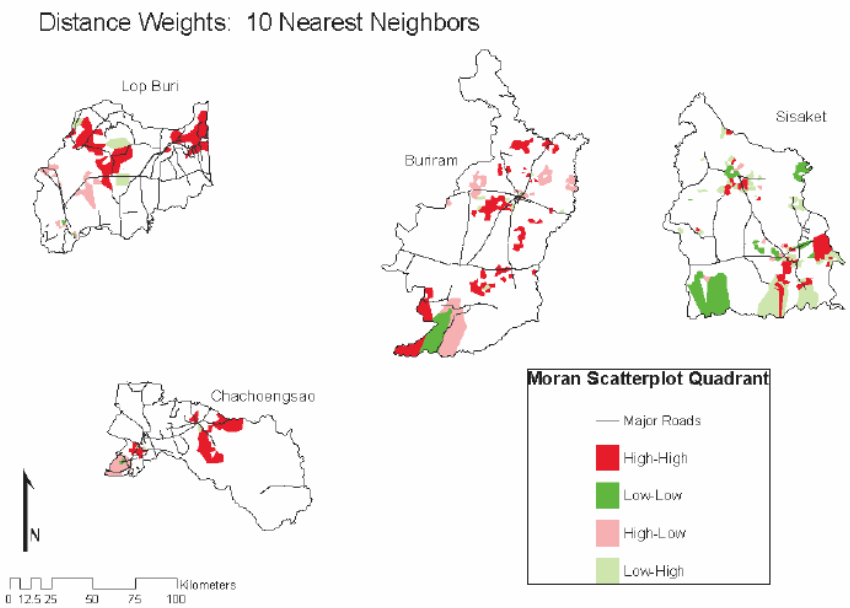
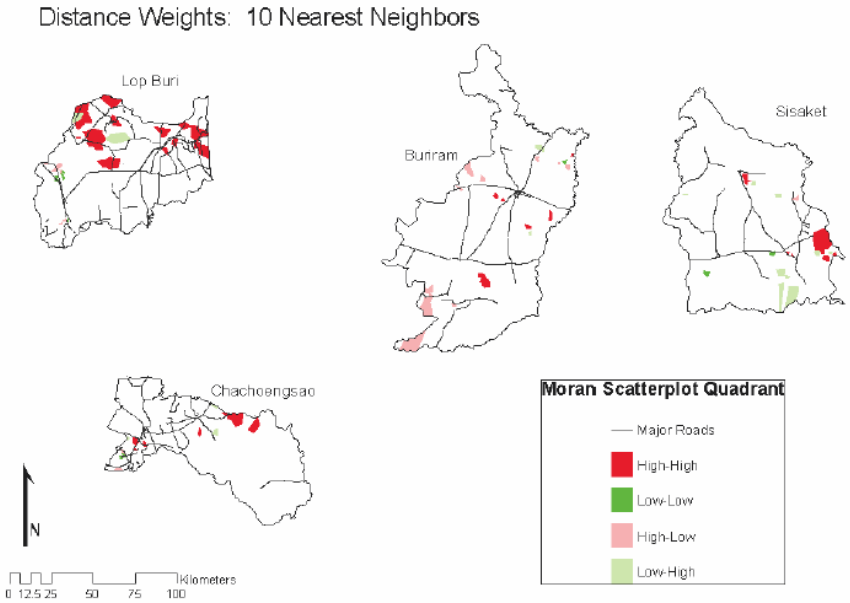


Figure 19: LEB Distance-Modified (5 Bin) Simulation Residuals
Local Moran Map at P=.05 Cut-Off Value



1996 LEB Experiment from New Intersections
Minus 1996 5-Bin LEB Simulation (Distance Modified):
Reds are areas with higher simulated fraction of entrepreneurs from LEB experiment;
Greens are areas with lower values.
10 nearest villages, divided by distance ^ 1.5. By Deciles.

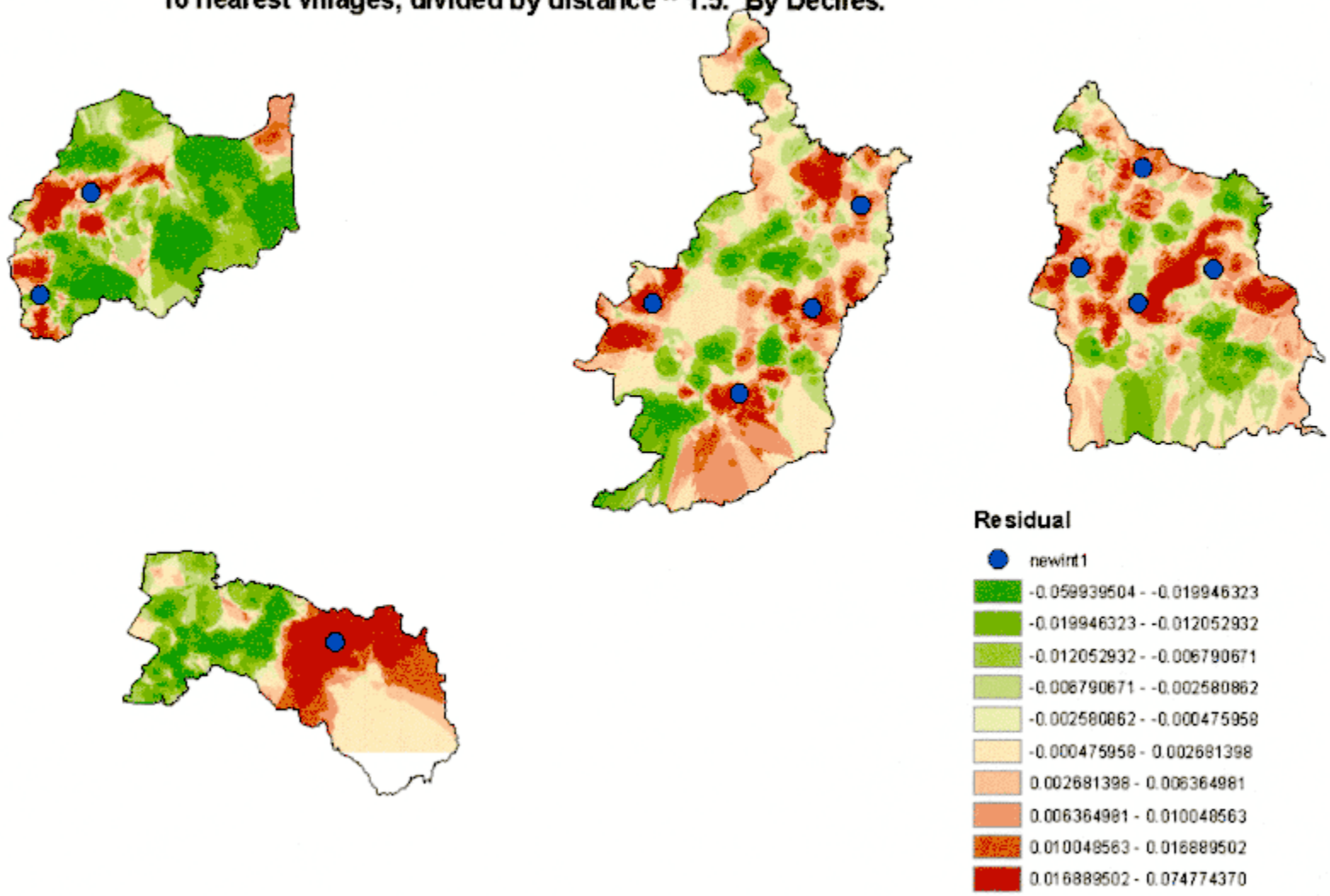


Figure 20: 1996 GJ Access Index Simulation Differences: Binary Values

Differences are Between Actual and Simulated

Reds are Areas of Model Over-Prediction,
Greens are Areas of Model Under-Prediction

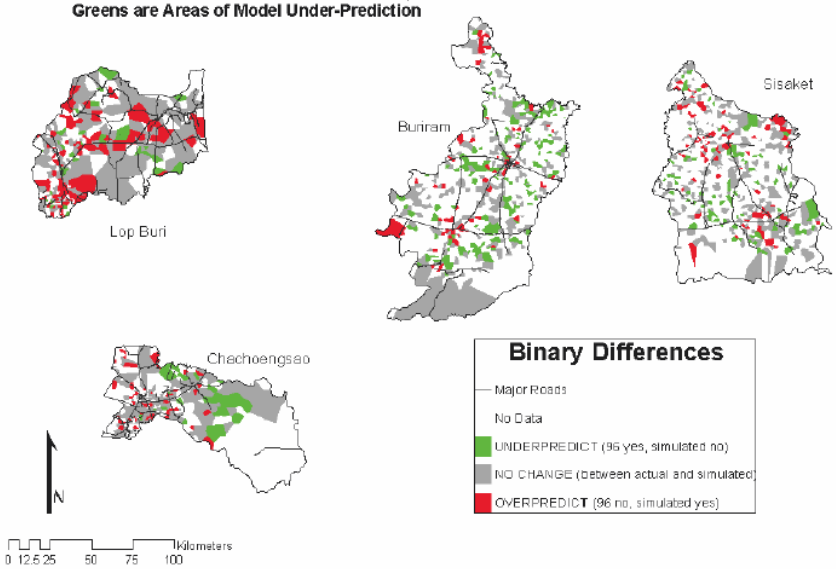
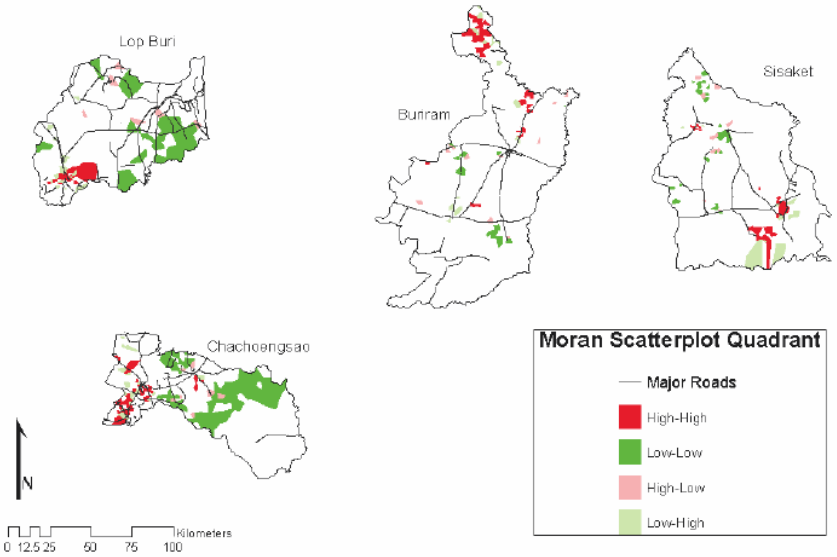


Figure 21: GJ Wealth Simulation Residuals
Local Moran Map at P=.05 Cut-Off Value

Distance Weights: 10 Nearest Neighbors



COMING ATTRACTIONS

.

- Remedy? Financing income generating activities

Figure 2: South

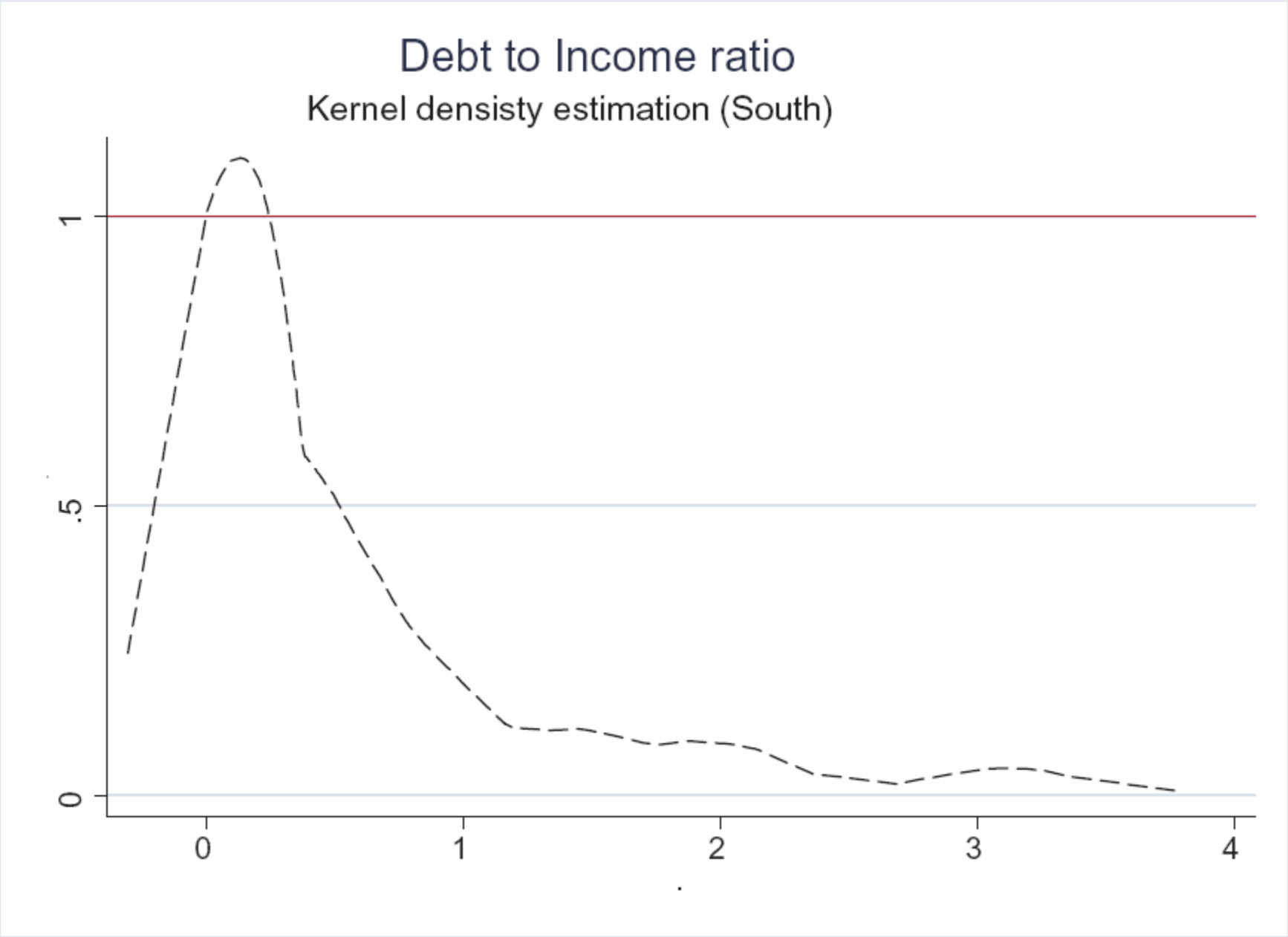


Figure 3: Poorest Quartile

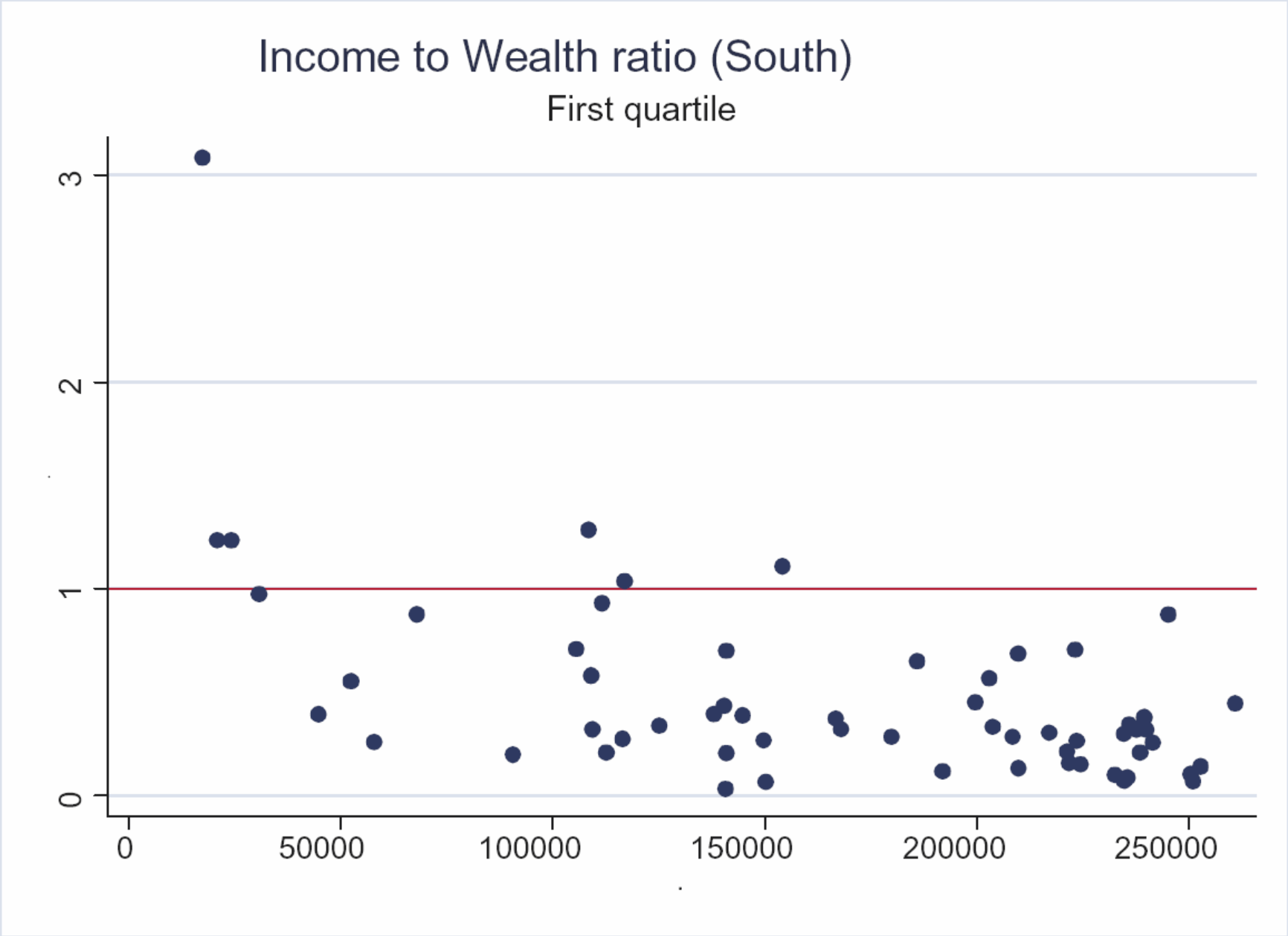
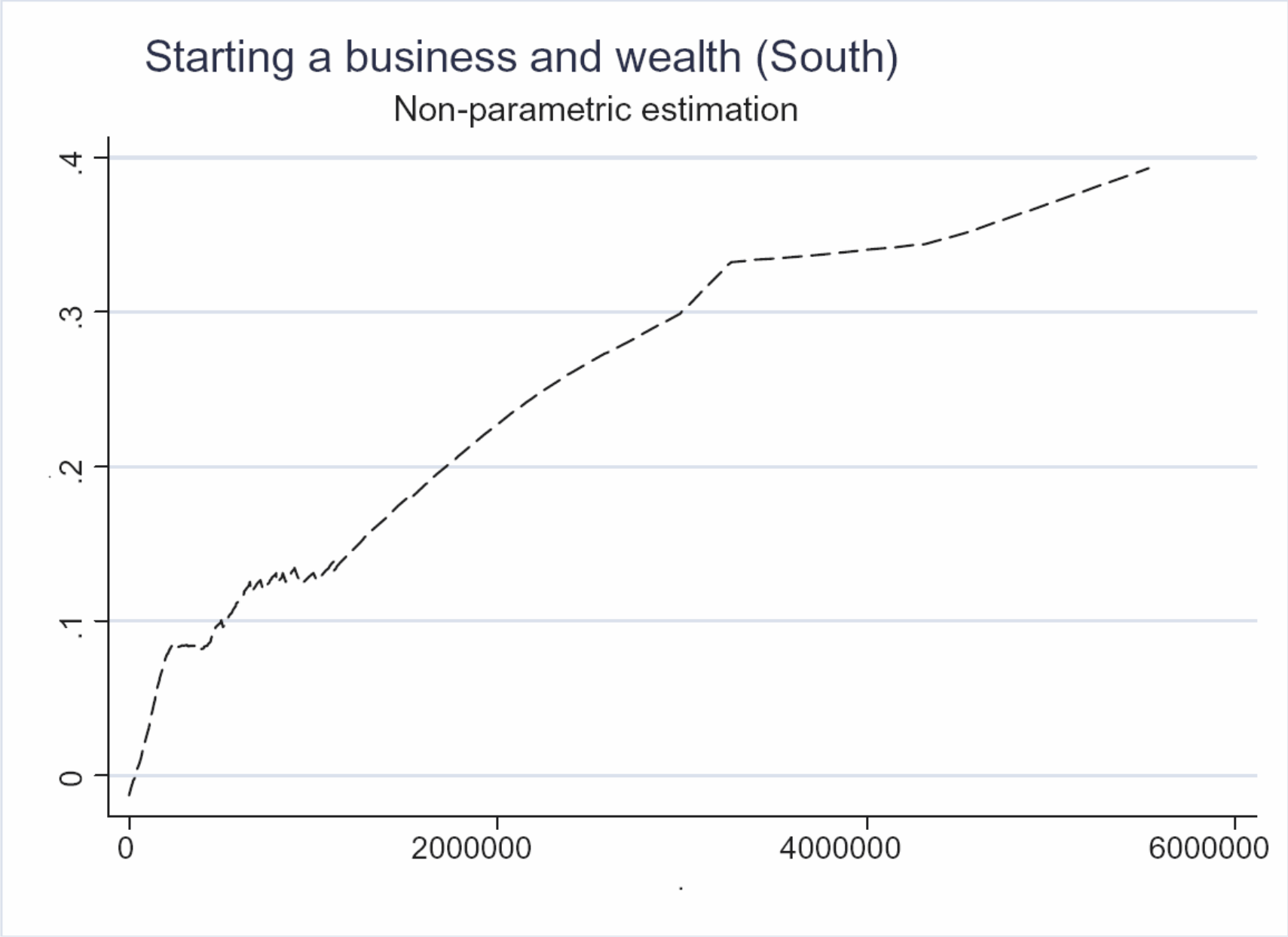


Figure 5: Becoming an entreprenuer and wealth



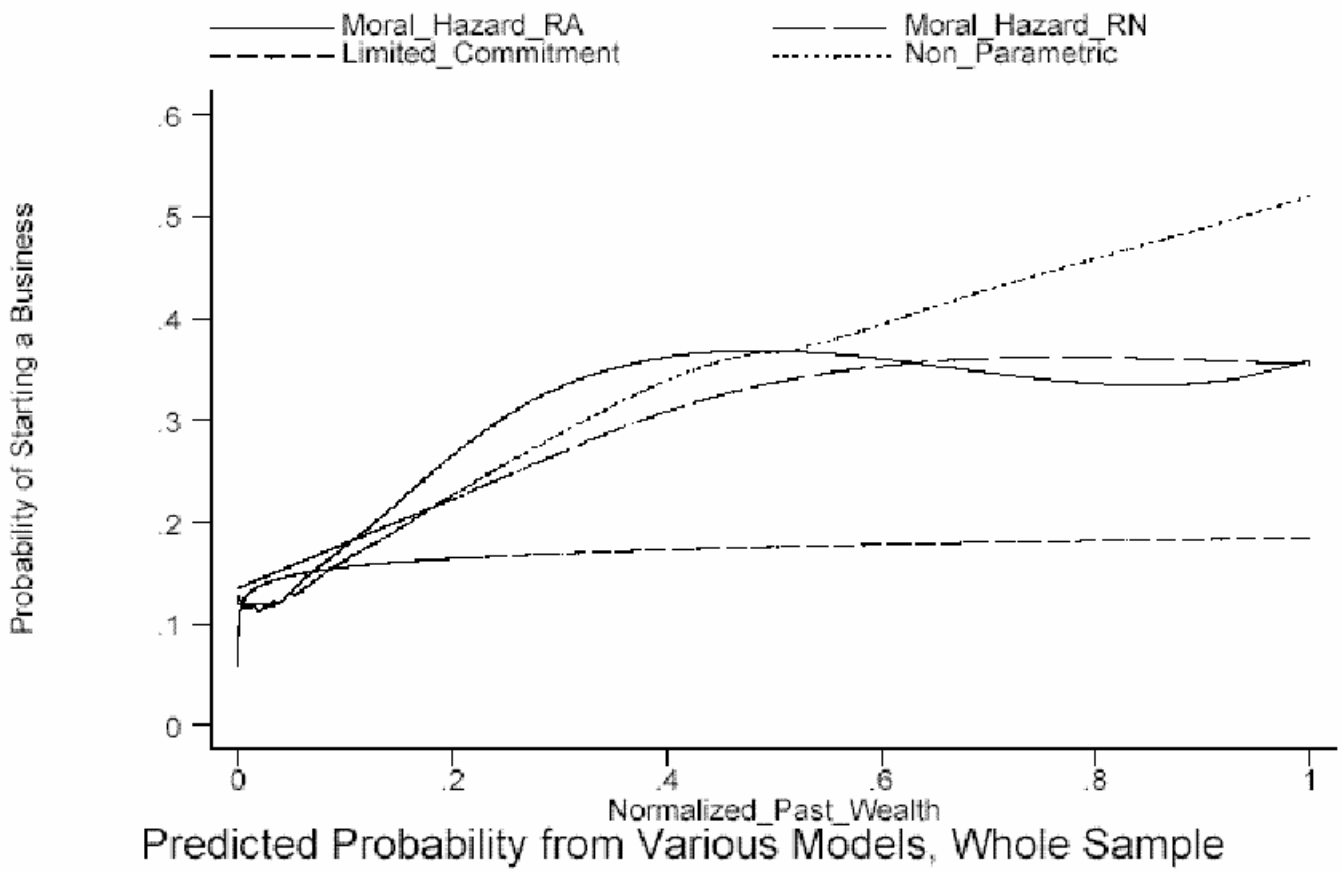


Figure 4A: Whole Sample

Notes to Figures 4A – 4C: These figures depict the likelihood of starting a business as a function of wealth six years prior to the survey. The wealth variable is normalized by dividing household wealth by the maximum value of household wealth in the sample, so that normalized wealth lies in a range from zero to one. For the structural estimates, the likelihood of starting a business is found by calculating the likelihood function for each model at the maximized parameter values as a function of wealth. See footnote 5 for details on how the non-parametric estimates of the likelihood of starting a business were created.

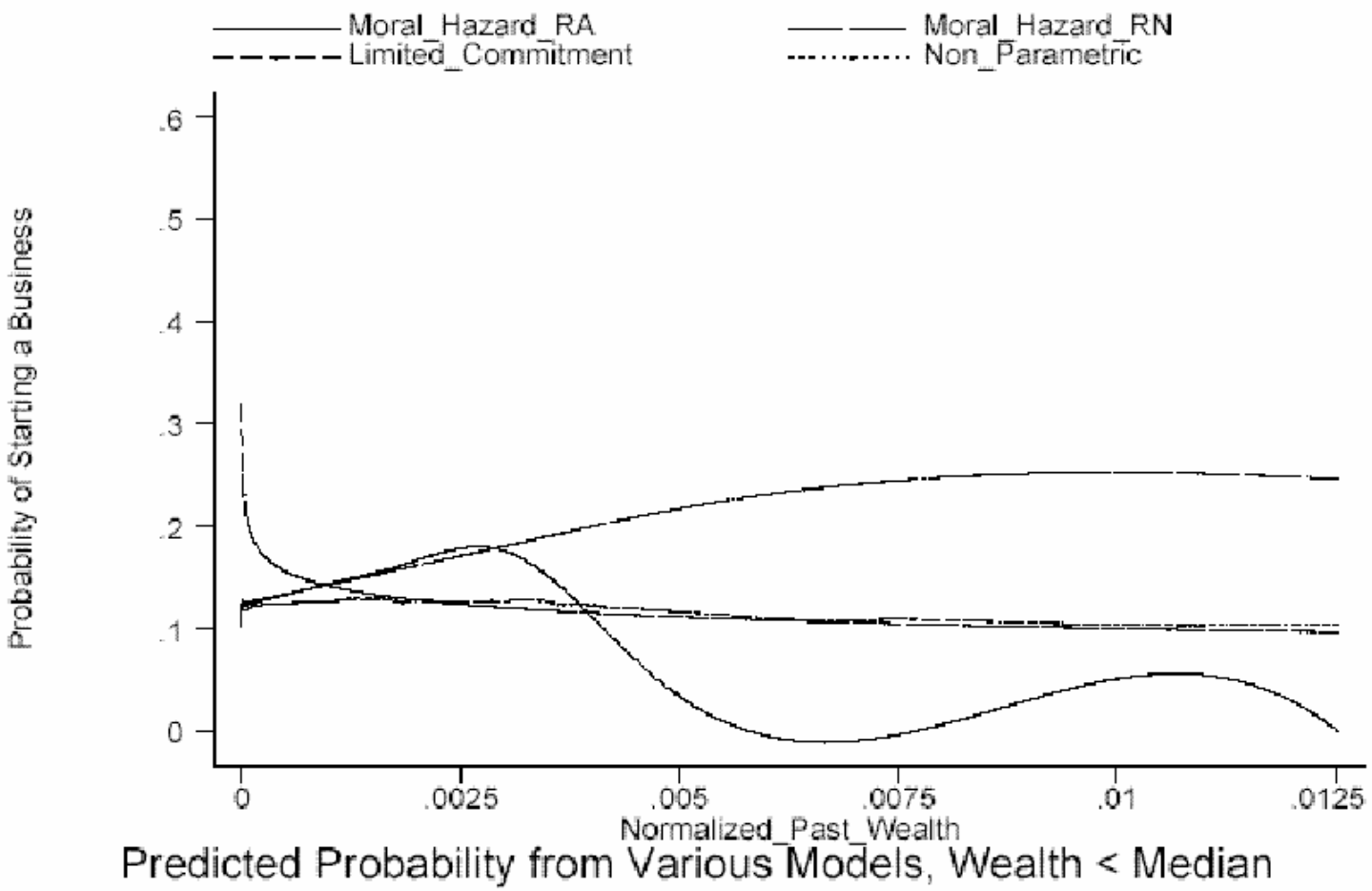


Figure 4B: Wealth < Median

REMEDY - BETTER REALLOCATION OF RISK

Table 3: **Worst year for household income**

	Number	Per cent
last year	32.0	13.3
two years ago	27.0	11.3
three years ago	29.0	12.1
four years ago	14.0	5.8
five years ago	28.0	11.7
no changes	110.0	45.8
Total	240.0	100.0

Source: Townsend South Data

Table 4: **reasons for bad year**

Item	Number	Per cent
flood	1.0	0.8
not enough rainfall	4.0	3.1
crop yield low for other reason	26.0	20.0
low price for output	63.0	48.5
high input prices	2.0	1.5
education expenses are higher	8.0	6.2
high investment costs	1.0	0.8
illness	9.0	6.9
worked fewer days	10.0	7.7
other	6.0	4.6
Total	130.0	100.0

Source: Townsend South Data

Household i's income at time t consists of a permanent component and transitory component: $y_{it} = y_{it}^P + y_{it}^T$. The permanent component is assumed to be a linear function of a vector of fixed household characteristics X_{it}, such as the age-structure composition of the household, education of household members, household landholdings, the time dates over which the household is observed, and the physical location of the household: $y_{it}^P = \alpha_0 + X_{it}\alpha_1$.

Unlike the components of permanent income, shocks to transitory income affect income in the current period, but their effect on income in future periods become arbitrarily small over time (that is y_{it}^T is a stationary process).[5] Here we use rubber price shocks as an exogenous source of variation in income, consumption and savings, so transitory income is decomposed as $y_{it}^T = \alpha_2 E_{it} R_t + \varepsilon_{it}$. R_t is the price of rubber at time t, and E_{it} indexes the household's sensitivity to rubber price shocks, while ε_{it} captures other sources of transitory fluctuations in income.

Substituting these in, household income is given by:

$$y_{it} = \alpha_0 + X_{it}\alpha_1 + \alpha_2 E_{it} R_t + \varepsilon_{it} \tag{1}$$

We also start by assuming household consumption is a linear function of the same vector of explanatory variables.[6] This is generally no more than a convenient linear approximation (see Blundell, Pistaferri and Preston, 2002 for the derivation of the approximation), although will be exactly true in a model with CARA utility and normally distributed shocks:[7]

$$c_{it} = \delta_0 + X_{it}\delta_1 + \delta_2 E_{it} R_t + u_{it} \tag{2}$$

Townsend and Vickery “Commodity Price Shocks”

$$c_t = \underbrace{\mu + (1-\beta)W_t}_{\text{permanent income component}} + \underbrace{\frac{1-\beta}{1-\rho\beta}[y_t - \mu]}_{\text{current income: deviation from long run average}} - \underbrace{\frac{\beta}{1-\beta}\frac{1}{2}\sigma^2\gamma}_{\text{precautionary savings component}}$$

$$s_t = -(1-\beta)W_t + \frac{\beta(1-\rho)}{1-\rho\beta}[y_t - \mu] + \frac{\beta}{1-\beta}\frac{1}{2}\sigma^2\gamma$$

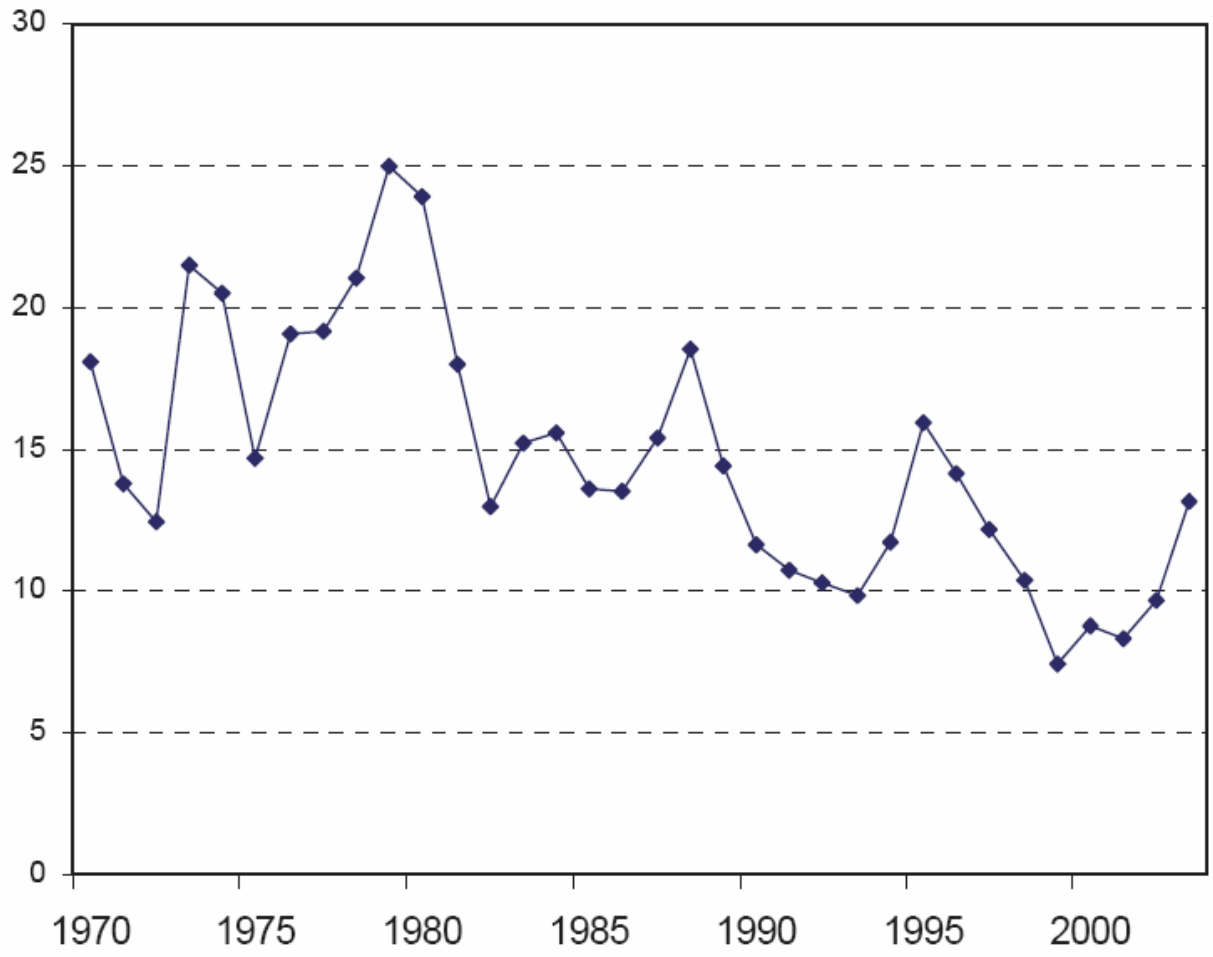
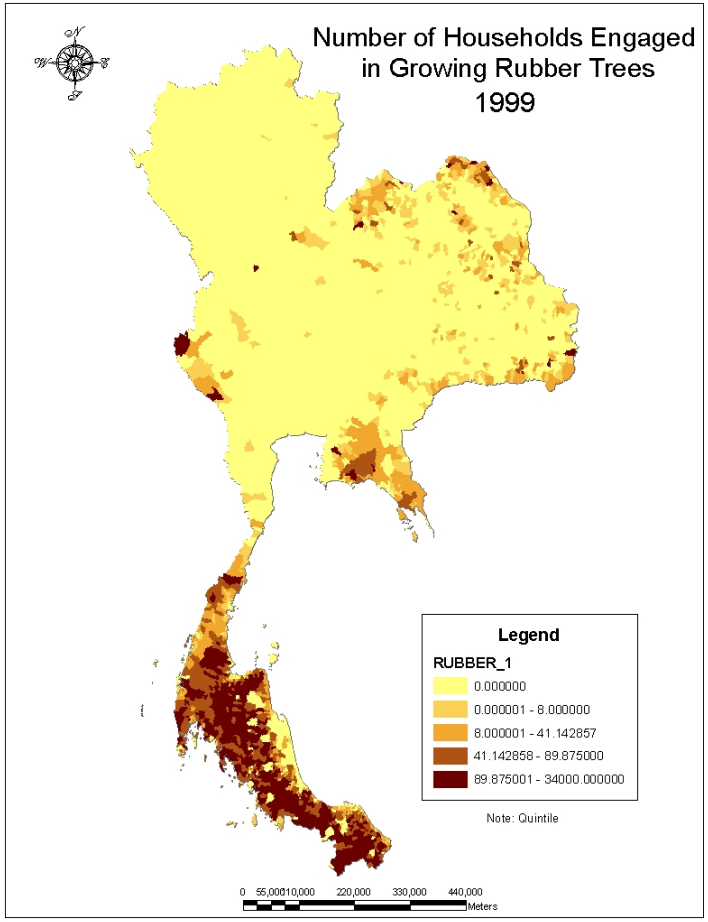


Figure 1: Real rubber price (1996 Thai baht / kg * $\frac{1}{100}$. Source IFS)

Occupation:
HH Engaged in Rubber or “other”

- **Townsend Survey**: The percentage of households involve in agricultural activities is very similar in both regions (91% in the south and 95% in the CNE), however, there is an important difference in the number of households involve in business (20% in the south and 52% in the CNE).
  - The most important primary occupation in the south is ”orchard farmer” (48%), and ”rice farmer” in the CNE (29%).
  - Most important source of income: ”rubber” with 41,796 bath (35% of gross income) in the South).



Source: CDD

Table 2
Basic results

Estimation by least squares (first part of table) and median regression (second part of table). Robust standard errors. Regresion also includes a constant and: (i) 8 dummies for the sex and education level of household head (ii) controls for number of children in 5 different sex-age categories (ii) dummies for changwat (province) location of household (iii) dummies for the year-quarter the household was surveyed (iv) 5 dummies for the amount of land held by the household and/or whether the household was a renter (v) 8 dummies for the socio-economic class of the household head (vi) 13 dummies for the type of enterprise the household head was primarily occupied with.

(A) Least squares

Dep. Variable:	**h.h.income**	**h.h.saving**	**h.h.consumption**
rubber_prop	-938.642	-371.956	-566.686
	(465.414)**	(440.771)	(265.694)**
rubber_prop * time	73.314	16.958	56.356
	(52.758)	(50.310)	(31.439)*
rubber_prop * rubber_price	521.445	37.741	483.703
	(131.282)***	(149.130)	(124.259)***
Number of observations	44009	44009	44009
R^2	0.15	0.04	0.18

(B) Median regression

Dep. Variable:	**h.h.income**	**h.h.saving**	**h.h.consumption**
rubber_prop	-139.344	-254.458	-219.973
	(163.798)	(112.071)**	(128.721)*
rubber_prop * time	28.714	40.280	4.586
	(19.532)	(13.361)***	(15.353)
rubber_prop * rubber_price	243.363	15.499	231.589
	(62.091)***	(42.473)	(48.823)***
Number of observations	44009	44009	44009

* significant at 10%; ** significant at 5%; *** significant at 1%