The effects of rural land right security on labour structural transformation and urbanisation: Evidence from Thailand

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Plan

- Motivation
- Related literature
- Framework and mechanisms
- Data
- Empirical results
- Conclusion and caveats

Motivation

- The link between development process and labour structural transformation (change in the pattern of employment of the population).

- Divergence in the composition of economic activities/ employment allocation across different sectors between richer and poorer economies.

Cross-country correlations between share of agricultural labour and per capita income
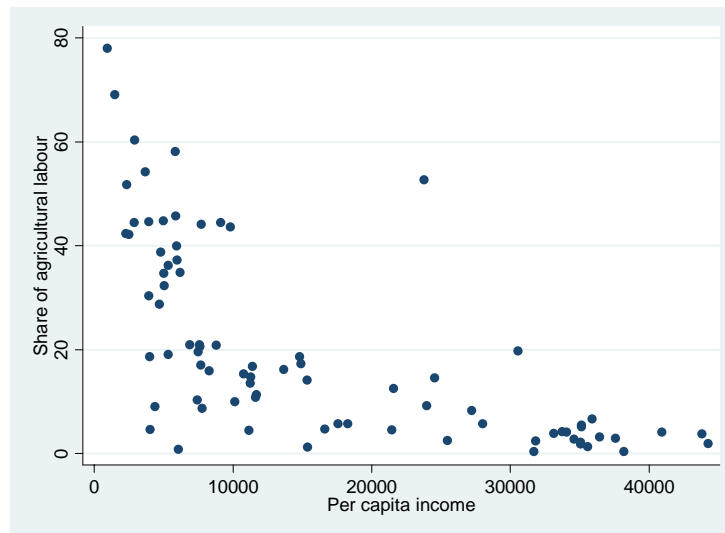
- Why?
- What could be factors preventing or facilitating labour structural transformation from agriculture to non-agriculture?
- Could the 'quality' of rural institutions such as that of agricultural land right security be one of the factors?

Related literature

- **Pull factors:** Lewis (1954), Harris and Todaro (1970), Fields (1975), Fay and Opal (2000), Davis and Henderson(2003), Grogger and Hanson (2010)
- **Favourable-farm-condition push factors:** Gollin, Parente and Rogerson (2002), Nurkse (1953), Rostow (1960)
- **Adverse-farm-condition push factors:** Rose (2001), Paulson (2003), Barrios (2006), Giles (2006), Poelhekke (2010)
- **Government policies:** Gugler and Flanagan (1978) Becker and Morrison (1988), Fafchamps and Shilpi (2009), Emran and Shilpi (2010)

- **Rural land institution –> labour structural transformation:** Rozelle et al. (1999) and Mullan et al. (2010).
- China
- Mechanism 1: Tenure insecurity acts as a tax on outmigration (Rozelle et al., 1999).
- Mechanism 2: Complementarity between land and labour depresses rural outmigration (Mullan et al., 2010).
- Cross-sectional household and village data

Mechanisms: How partial land right security in Thailand can affect labour structural transformation

I: Facilitate structural transformation through productivity improvement

$$U(c,a) = \begin{cases} \log(c) + \bar{a} & if\, a \geq \bar{a} \\ a & if\, a < \bar{a}. \end{cases}$$

For N representative consumers/workers. a is the agricultural good and c is the non-agricultural product.

Assumption: The demand for agricultural product is inelastic (Gollin et al., 2002)

Agriculture: N_a workers. Each produces
$$y_a^i = e l_a A_a,$$
where e is the effort.

- The optimal effort choice satisfies
$$\max_e \pi e l_a A_a - \frac{1}{2}e^2,$$
where $0 < \pi < 1$ represents the security of land rights.

- $e^* = \pi l_a A_a$

- Agricultural output per capita, $y_a^* = \pi l_a^2 A_a^2 n_a,$

where n_a is the share of workers in agriculture.

- Preference implies that labour will be allocated entirely to the agricultural sector until $\pi l_a^2 A_a^2 n_a \geq \bar{a}$.
- In other words,

$$n_a = min\left\{\frac{\bar{a}}{\pi l_a^2 A_a^2}, 1\right\},$$

and $n_m = 1 - n_a$, where n_m is the share of labour outside agriculture.

- Thus, $\frac{\partial n_a}{\partial \pi} < 0$.

II: Depress structural transformation by reducing risks/shocks within the agricultural sector

- ⬆ tenure security → ⬇ land expropriation risk → ⬇ need to diversify out of agriculture

III: Facilitate structural transformation by reducing the opportunity cost of working outside agriculture

- e.g. ⬇ time cost for guarding the land or solidifying the claim on agricultural land → ⬆ diversification of labour out of agriculture

IV: Depress structural transformation by restricting land mortage, land sale and land inheritance to family members outside agriculture

- 4 mechanisms – some of which are working in opposite directions

- To determine the overall impact, thus, is by and large an empirical question.

Data

- **Measures of labour structural transformation**

(1) Workers in agriculture
(2) Population residing in agricultural household

o Province level
o Data obtained from Office of Agricultural Economics

SUMMARY STATISTICS OF SHARE OF AGRICULTURAL POPULATION

provinces	share			provinces	share		
	mean	min	max		mean	min	max
KHON KAEN	56,613	52,768	63,856	RANONG	38,865	32,92	46,85
UDON THANI	61,241	50,497	77,703	PHANGNGA	45,991	41,838	51,338
LOEI	62,746	59,326	65,424	KRABI	53,485	46,254	62,717
NONG KHAI	61,104	41,509	74,609	CHUMPHON	56,348	52,784	57,957
MUKDAHAN	63,773	55,606	71,011	NAKHON SI THAMMARAT	53,784	39,609	74,507
NAKHON PHANOM	64,262	57,347	68,479	SONGKHLA	38,688	31,933	47,164
SAKON NAKHON	65,855	58,852	75,908	SATUN	57,217	47,991	68,512
KALASIN	71,187	59,399	86,735	YALA	45,138	39,416	55,167
NAKHONRATCHASIMA	47,084	36,144	59,866	TRANG	42,874	37,937	48,973
CHAIYAPHUM	69,712	55,182	85,68	NARATHIWAT	45,061	39,95	49,263
YASOTHON	65,085	59,997	71,269	PHATTHALUNG	63,858	51,04	74,197
UBON RATCHATHANI	59,94	49,548	73,379	PATTANI	48,544	42,293	53,019
ROI ET	69,65	54,651	90,167	CHON BURI	11,935	9,999	13,898
BURI RAM	58,567	44,482	70,22	CHACHOENGSAO	37,718	33,318	46,316
SURIN	61,731	53,211	74,155	RAYONG	25,252	20,188	30,68
MAHA SARAKHAM	70,54	62,353	90,087	TRAT	34,437	30,752	39,617
SI SA KET	64,236	59,53	76,769	CHANTHABURI	51,201	43,499	66,939
NONG BUA LAM PHU	64,626	41,926	87,04	NAKHON NAYOK	32,452	18,061	45,718
AM NAT CHAREON	58,178	40,424	74,928	PRACHINBURI	34,05	31,231	37,171
CHIANG MAI	40,243	36,138	44,913	SA KAEO	56,473	31,592	81,12
LAMPANG	47,85	39,27	54,362	RATCHABURI	31,506	27,821	35,259
UTTARADIT	53,729	46,863	61,795	KANCHANABURI	36,332	29,058	43,809
MAE HONG SON	68,286	52,807	84,052	PHACHUAP KHIRI KHAN	37,341	30,991	41,261
CHIANG RAI	47,678	43,938	54,913	PHETCHABURI	34,135	27,477	39,75
PHRAE	53,07	40,903	64,059	SUPHAN BURI	44,288	35,038	56,837
LAMPHUN	51,614	37,485	67,28	SAMUT SONGKHRAM	20,946	17,108	27,644
NAN	70,623	58,407	92,902	SARABURI	22,281	16,999	25,695
PHAYAO	54,672	37,604	66,49	SINGBURI	30,325	24,951	36,817
NAKHON SAWAN	39,727	35,184	44,001	CHAI NAT	38,88	33,246	49,412
PHITSANULOK	42,124	34,347	53,42	ANG THONG	25,785	2,739	36,578
KAM PHAENG PHET	44,791	33,681	67,043	LOP BURI	31,629	26,494	35,346
UTHAI THANI	55,728	42,748	78,104	NONTHABURI	4,856	3,284	5,492
SUKOTHAI	46,193	38,128	53,124	AYUTHAYA	23,777	19,691	27,808
TAK	46,787	41,674	56,547	BANGKOK METROPOLIS	0,685	0,592	0,787
PHICHIT	44,366	37,33	51,837	SAMUT PRAKAN	5,481	3,237	7,884
PHETCHABUN	42,456	37,845	47,269	SAMUT SAKHON	10,722	9,998	11,511
PHUKET	10,228	6,235	17,117	PATHUM THANI	11,587	8,061	18,046
SURAT THANI	48,795	41,815	54,168	TOTAL	44,795	0,592	92,902

• **Measure of urbanisation**

Population in cities and towns, at

(1) province level

(2) municipality level

o Data obtained from Department of Provincial Administration
→ drawbacks: Household registration may not reflect the
actual residing place.

- **Measure of land right and tenure security**

  o **Land right structure in Thailand**
  - Full ownership
  - Partial land right (full security but with limited pledgeability and no tradability)
  - Claimant right (no exclusion right against claim from public bodies)

  o **Interested in the issuance of SPK 4-01 titles**
  - To farmers who were squatting on public forests
  - Upgrade right from claimant to partial land rights
  - Variation over time and across provinces
  - Tease out tenure security from other aspects of land rights

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SUMMARY STATISTICS OF SHARE OF CULTIVATED LAND UNDER SPK 4-01 TITLES

provinces	share of SPK 4-01			provinces	share of SPK 4-01		
	mean	minimum	maximum		mean	minimum	maximum
KHON KAEN	6,898	1,204	13,63	RANONG	16,672	8,121	39,61
UDON THANI	19,707	17,287	22,49	PHANGNGA	16,857	7,527	42,49
LOEI	28,856	24,062	33,343	KRABI	15,733	9,023	33,475
NONG KHAI	28,854	16,112	38,204	CHUMPHON	22,122	15,268	31,54
MUKDAHAN	20,277	9,2	28,068	NAKHON SI THAMMARAT	7,598	5,674	9,621
NAKHON PHANOM	10,579	8,861	11,793	SONGKHLA	5,817	4,03	9,368
SAKON NAKHON	16,063	8,218	24,71	SATUN	4,841	1,116	9,22
KALASIN	9,664	1,399	18,34	YALA	3,491	0,518	7,75
NAKHONRATCHASIMA	12,273	7,438	14,272	TRANG	14,553	8,04	18,401
CHAIYAPHUM	14,098	9,809	21,1	NARATHIWAT	0,141	0	0,282
YASOTHON	7,673	2,41	13,492	PHATTHALUNG	4,717	2,041	9,68
UBON RATCHATHANI	23,336	20,42	26,189	PATTANI	1,381	0	2,807
ROI ET	7,957	3,006	12,32	CHON BURI	14,588	5,807	33,71
BURI RAM	14,408	10,623	18,893	CHACHOENGSAO	13,676	7,649	21,76
SURIN	18,398	14,73	24,071	RAYONG	4,211	0,443	7,363
MAHA SARAKHAM	6,251	3,175	10,21	TRAT	24,591	19,72	28,994
SI SA KET	14,157	11,59	19,97	CHANTHABURI	14,106	7,143	20,021
NONG BUA LAM PHU	39,039	25,531	56,121	NAKHON NAYOK	2,793	0,543	7,264
AM NAT CHAREON	11,516	5,032	16,405	PRACHINBURI	3,148	1,008	6,231
CHIANG MAI	4,031	2,2	8,501	SA KAEO	26,28	20,21	32,63
LAMPANG	10,826	7,616	16,123	RATCHABURI	5,72	0,48	15,44
UTTARADIT	10,12	3,67	14,387	KANCHANABURI	11,577	3,042	22,24
MAE HONG SON	2,007	0,306	3,83	PHACHUAP KHIRI KHAN	4,486	0	12,061
CHIANG RAI	11,162	8,11	16,656	PHETCHABURI	3,835	1,145	6,89
PHRAE	18,5	10,942	25,361	SUPHAN BURI	4,144	1,403	8,24
LAMPHUN	13,144	8,351	20,05	SAMUT SONGKHRAM	0	0	0
NAN	20,568	12,365	28,667	SARABURI	10,434	3,81	15,593
PHAYAO	10,462	4,283	18,93	SINGBURI	0	0	0
NAKHON SAWAN	11,653	8,55	15,736	CHAI NAT	3,337	2,55	4,408
PHITSANULOK	7,484	1,68	10,82	ANG THONG	0	0	0
KAM PHAENG PHET	16,164	10,714	25,15	LOP BURI	4,824	2,479	8,995
UTHAI THANI	18,572	12,869	22,074	NONTHABURI	1,338	1,338	1,338
SUKOTHAI	5,937	0,166	11,26	AYUTHAYA	1,094	0,044	2,678
TAK	23,06	12,55	31,903	BANGKOK METROPOLIS	0	0	0
PHICHIT	7,994	5,487	13,123	SAMUT PRAKAN	2,255	0	4,51
PHETCHABUN	13,219	1,292	27,83	SAMUT SAKHON	0	0	0
PHUKET	5,819	2,773	8,196	NAKHON PATHOM	0	0	0
SURAT THANI	15,53	8,417	21,89	PATHUM THANI	8,181	2,848	21,84
				TOTAL	11,214	0	56,121

Empirical strategies

- **Baseline specifications: FE –** province level
$$y_{it} = \alpha_i + \beta_t + \gamma r_{it} + \boldsymbol{\theta}' \boldsymbol{x}_{it} + u_{it}$$
- **Instrumental variable strategy: IV/GMM**
○ Concerns: Omitted variables and reverse causality
○ IVs: Lagged degraded forests
- Construction: Differences between official forests announced by the decree and actual forests from satellite pictures
- Validity of the IVs
- Demeaning transformation:
$$y_{it} - \bar{y}_{it} = (\beta_t - \bar{\beta}) + \gamma(r_{it} - \bar{r}_i) + \boldsymbol{\theta}'(\boldsymbol{x}_{it} - \bar{\boldsymbol{x}}_i) + (u_{it} - \bar{u}_i)$$

Empirical results: Structural transformation

RURAL LAND RIGHTS AND AGRICULTURAL LABOUR

	FE [1]	FE [2]	IV [3]	IV [4]	IV [5]
Share of land under SPK 4-01 titles	-25,495	-186,006	-4764,576	-5631,253	-4097,827
	[832.937]	[836.92]	[1689.823]***	[1594.016]***	[1489.032]***
Share of land under full titles		165,333		-324,82	-158,303
		[576.979]		[415.566]	[381.326]
Population or workforce		0,053		0,106	0,168
		[0.069]		[0.058]*	[0.073]**
Average GPP per capita over past 5 years		-0,028		-0,026	-0,082
		[0.094]		[0.088]	[0.109]
Average growth of GPP per capita over past 5 years		-101505,7		-64019,84	98012,76
		[177429.6]		[133357.2]	[128526.5]
Relative average productivity over past 5 years		6492,614		9375,52	9820,342
		[4443.138]		[2945.672]***	[2832.731]***
Relative average productivity growth over past 5 years		-36,113		-1,338	10,675
		[184.435]		[106.682]	[104.262]
Volatility of farm productivity over past 5 years		13,878		15,271	1,433
		[15.68]		[13.054]	[14.781]
Volatility of non-farm productivity over past 5 years		-2,339		-2,139	-3,271
		[1.374]*		[0.948]**	[0.814]***
Covariance of productivity over past 5 years		45,47		26,754	48,395
		[24.421]*		[18.881]	[15.933]***
Present agricultural productivity					-777,86
					[214.935]***
Year Dummies	YES	YES	YES	YES	YES
Province Dummies	YES	YES	YES	YES	YES
Observations	285	279	257	254	254
Number of Groups	75	75	70	69	69
Adjusted R-squared	0,867	0,867			
Underidentification test: p-value			0,1741	0,032	0,057
Overidentification test: p-value			0,487	0,62	0,469

Note: Standard errors, clustered by province, are in parentheses. *, **, *** denote significant levels at 10%, 5% and 1% respectively

RURAL LAND RIGHTS AND AGRICULTURAL POPULATION

	FE [1]	FE [2]	IV [3]	IV [4]	IV [5]
Share of land under SPK 4-01 titles	-243,647	-662,519	-5265,702	-4744,265	-3942,481
	[882.24]	[891.406]	[2083.11]***	[2148.648]**	[2073.822]*
Share of land under full titles		-118,925		-515,565	-401,478
		[687.976]		[430.171]	[417.417]
Population or workforce		0,296		0,0458	0,117
		[0.076]		[0.061]	[0.073]
Average GPP per capita over past 5 years		-0,142		-0,029	-0,062
		[0.107]		[0.099]	[0.113]
Average growth of GPP per capita over past 5 years		16236,62		70892,54	192518,3
		[186018.7]		[145718.8]	[143721.6]
Relative average productivity over past 5 years		9416,535		11502,95	11781,01
		[4333.181]**		[3004.23]***	[2917.242]***
Relative average productivity growth over past 5 years		12,686		65,003	70,267
		[197.975]		[125.646]	[123.966]
Volatility of farm productivity over past 5 years		17,69		15,796	3,253
		[14.804]		[13.515]	[13.871]
Volatility of non-farm productivity over past 5 years		-3,175		-2,941	-3,968
		[1.008]***		[0.778]	[0.902]***
Covariance of productivity over past 5 years		39,615		25,463	43,736
		[22.295]*		[17.707]	[17.794]**
Present agricultural productivity					-639,59
					[187.534]***
Year Dummies	YES	YES	YES	YES	YES
Province Dummies	YES	YES	YES	YES	YES
Observations	285	279	257	254	254
Number of Groups	75	75	70	69	69
Adjusted R-squared	0,9395	0,944			
Underidentification test: p-value			0,1741	0,032	0,057
Overidentification test: p-value			0,3546	0,394	0,325

Note: Standard errors, clustered by province, are in parentheses. *, **, *** denote significant levels at 10%, 5% and 1% respectively.

- **Statistically significant but also economically significant?**

A one standard deviation of an increase in the average provincial share of land under SPK 4-01 titles (i.e. 9.67%) **reduces** the number of agricultural workers by approximately 54,454 persons (rougly 21% of the average provincial agricultural workers under the period of study).

- **Mechanisms:** Columns(5)
- The productivity channel accounts for 27% of the overall tenure security effect.

SPK4-01 entitlement and productivity improvement

- Second rice productivity - a one standard deviation (i.e. 9.67%) increase in land under SPK4-01 titles raises the intensity of land use for cultivation by approximately 46%.

- MCI (Multi-cropping index) - a one standard deviation (i.e. 9.67%) increase in land under SPK4-01 titles raises the intensity of land use for cultivation by approximately 10%.

TABLE 4.11: PARTIAL LAND TITLING AND PRODUCTIVITY IMPROVEMENT

LABOUR PRODUCTIVITY OF SECOND RICE

Panel A: Panel Data with Fixed Effects and Year Dummies

	FE [1]	FE [2]	FE [3]	FE [4]	IV [5]	IV [6]	IV [7]	IV [8]
Share of land under SPK4-01 titles	0.023 [0.014]*	0.0217 [0.013]*	0.023 [0.013]*	0.023 [0.013]*	0.028 [0.017]*	0.03 [0.017]*	0.039 [0.017]**	0.048 [0.018]***
Share of land under full titles		-0.004 [0.008]	-0.004 [0.008]	-0.004 [0.008]		0.0003 [0.005]	0.001 [0.005]	-0.0003 [0.005]
Share of land with public irrigation access			0.004 [0.004]	0.004 [0.004]			0.004 [0.002]*	0.006 [0.003]**
Loans for agricultural production				0.0003 [0.0007]				0.0006 [0.0005]
Year Dummies	YES	YES	YES	YES	YES	YES	YES	YES
Province Dummies	YES	YES	YES	YES	YES	YES	YES	YES
Observations	259	259	259	259	235	235	235	235
Number of Groups	70	70	70	70	65	65	65	65
Adjusted R-squared	0.928	0.928	0.928	0.928				
Underidentification test: p-value					0.15	0.065	0.066	0.116
Overidentification test: p-value					0.332	0.361	0.39	0.5

Panel B: Panel Data with Fixed Effects and Linear Time Trend

	FE [1]	FE [2]	FE [3]	FE [4]	IV [5]	IV [6]	IV [7]	IV [8]
Share of land under SPK4-01 titles	0.027 [0.014]**	0.027 [0.014]**	0.027 [0.013]**	0.026 [0.013]**	0.061 [0.016]***	0.061 [0.016]***	0.058 [0.016]***	0.058 [0.016]***
Share of land under full titles		0.0005 [0.008]	0.0004 [0.008]	0.0008 [0.008]		0.008 [0.005]*	0.0008 [0.005]	0.008 [0.005]
Share of land with public irrigation access			-0.003 [0.005]	-0.003 [0.005]			-0.002 [0.003]	-0.001 [0.003]
Loans for agricultural production				-0.0003 [0.0006]				-0.00003 [0.0003]
Time Trend	YES	YES	YES	NO	YES	YES	YES	NO
Province Dummies	YES	YES	YES	YES	YES	YES	YES	YES
Observations	259	259	259	259	235	235	235	235
Number of Groups	70	70	70	70	65	65	65	65
Adjusted R-squared	0.922	0.921	0.921	0.921				
Underidentification test: p-value					0.144	0.025	0.026	0.089
Overidentification test: p-value					0.951	0.986	0.987	0.987

Note: Standard errors, clustered by province, are in parentheses.
 *, **, *** denote significant levels at 10%, 5% and 1% respectively.

TABLE 4.13: PARTIAL LAND RIGHTS AND LAND USE

MULTIPLE CROPPING INDEX – IV RESULTS

Panel A: Panel Data with Fixed Effects and Year Dummies

	[1]	[2]	[3]	[4]	[5]
Share of land under SPK4-01 titles	0.918	0.864	0.931	0.899	1.004
	[0.551]*	[0.468]*	[0.453]**	[0.461]**	[0.479]**
Share of land under full titles		0.136	0.134	0.142	0.155
		[0.113]	[0.115]	[0.114]	[0.101]
Share of land with public irrigation access			0.056	0.062	0.056
			[0.09]	[0.09]	[0.088]
Share of (land under SPK4-01) * (land with public irrigation access)				0.021	0.017
				[0.007]***	[0.008]**
Loans for agricultural production					0.007
					[0.011]
Year Dummies	YES	YES	YES	YES	YES
Province Dummies	YES	YES	YES	YES	YES
Observations	257	257	257	257	257
Number of Groups	70	70	70	70	70
Underidentification test: p-value	0.2112	0.077	0.065	0.056	0.077
Overidentification test: p-value	0.736	0.815	0.808	0.821	0.814

Panel B: Panel Data with Fixed Effects and Linear Time Trend

|	[1]	[2]	[3]	[4]	[5]
Share of land under SPK4-01 titles	0.732	0.814	0.87	0.875	1.005
	[0.484]	[0.466]*	[0.45]**	[0.448]**	[0.456]**
Share of land under full titles		0.144	0.157	0.156	0.177
		[0.112]	[0.111]	[0.111]	[0.098]*
Share of land with public irrigation access			0.013	0.034	0.021
			[0.087]	[0.089]	[0.088]
Share of (land under SPK4-01) * (land with public irrigation access)				0.018	0.014
				[0.007]***	[0.008]*
Loans for agricultural production					0.008
					[0.009]
Time Trend	YES	YES	YES	YES	YES
Province Dummies	YES	YES	YES	YES	YES
Observations	257	257	257	257	257
Number of Groups	70	70	70	70	70
Underidentification test: p-value	0.191	0.042	0.041	0.035	0.098
Overidentification test: p-value	0.732	0.786	0.752	0.812	0.774

Note: Standard errors, clustered by province, are in parentheses.
*, **, *** denote significant levels at 10%, 5% and 1% respectively.

- Having controlled for productivity, the estimated SPK 4-01 co-efficient can be interpreted as capturing the net effect of the remaining mechanisms.

- Out of these, only mechanism 3 (the reduction of opportunity cost of working outside agriculture) is predicted to have a negative impact of titling on agricultural population/employment, the results suggest that this mechanism must be particularly strong.

Empircal results: Urban population

- Cross-country link between the allocation of labour between agriculture and non-agriculture, and the allocation of population between rural and urban areas.
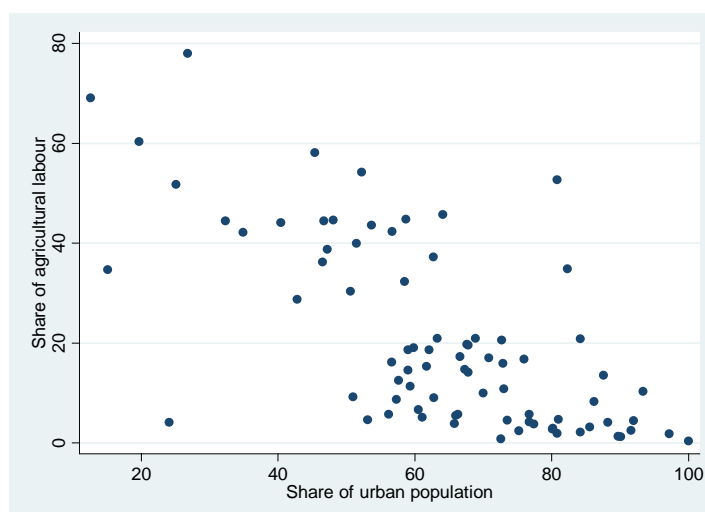
- Does this relationship also hold in the Thai panel data set?
- It breaks down once the province fixed effects are controlled for.

CORRELATION BETWEEN THAI URBAN POPULATION AND AGRICULTURAL LABOUR FORCE

Urban population	[1]	[2]	[3]
Agricultural labour force	-0,4539	-0,49	-0,0038
	[0.0463]***	[0.0479]***	[0.0461]
Year Dummies	NO	YES	YES
Province Dummies	NO	NO	YES
Observations	285	285	285
Number of Groups			75
Adjusted R-squared	0,251	0,263	0,998

Standard errors, clustered by province, are in parentheses. The analysis covers the four periods of 1996, 1999, 2002 and 2005.

*, **, *** denote significant levels at 10%, 5% and 1% respectively

RURAL LAND RIGHTS AND URBAN POPULATION

	FE [1]	FE [2]	IV [3]	IV [4]	IV [5]
Share of land under SPK 4-01 titles	71,018	-143,078	1095,396	983,891	1070,754
	[419.594]	[477.546]	[919.791]	[963.701]	[972.704]
Share of land under full titles		-467,666		-110,787	-131,29
		[407.407]		[212.652]	[212.094]
Population or workforce		-0,013		0,012	0,013
		[0.014]		[0.012]	[0.012]
Average GPP per capita over past 5 years		0,052		0,012	0,002
		[0.085]		[0.055]	[0.057]
Average growth of GPP per capita over past 5 years		-132152,5		-110347,9	-89126,65
		[70028.59]*		[41467.14]***	[44105.49]**
Relative average productivity over past 5 years		155,177		-53,039	-52,651
		[503.88]		[303.881]	[290.744]
Relative average productivity growth over past 5 years		194,858		84,893	78,367
		[243.831]		[112.287]	[112.955]
Volatility of farm productivity over past 5 years		20,833		18,494	19,323
		[16.888]		[14.543]	[13.214]
Volatility of non-farm productivity over past 5 years		-0,964		-0,858	-1,128
		[0.517]*		[0.399]**	[0.53]**
Covariance of productivity over past 5 years		13,793		18,435	23,671
		[12.324]		[9.332]**	[11.609]**
Present agricultural productivity					-106,375
					[78.602]
Year Dummies	YES	YES	YES	YES	YES
Province Dummies	YES	YES	YES	YES	YES
Observations	285	279	257	254	254
Number of Groups	75	74	70	69	69
Adjusted R-squared	0,998	0,998			
Underidentification test: p-value			0,1741	0,041	0,048
Overidentification test: p-value			0,7455	0,664	0,7

Note: Standard errors, clustered by province, are in parentheses. *, **, *** denote significant levels at 10%, 5% and 1% respectively

- No statistically significant relationship between rural land right security (proxied by SPK 4-01 entitlement) and the level of urbanisation.
- Divergence between labour structural transformation and urbanisation
- **Rural non-agricultural diversification instead of urban non-agricultural diversification?**
- Or poor quality of urbanisation data?
- Or driven by other determinants of urban concentration, such as transport infrastructure and road networks?

RURAL LAND RIGHTS AND URBAN POPULATION

	FE [1]	FE [2]	IV [3]	IV [4]	IV [5]	IV [6]	IV [7]
Share of land under SPK 4-01 titles	99.956	-143.078	991.283	542.472	571.94	609.74	645.0825
	[422.813]	[477.546]	[1193.844]	[955.542]	[954.973]	[966.895]	[943.927]
Population or workforce	0.014	0.013	0.01	0.008	0.008	0.008	0.01
	[0.017]	[0.014]	[0.012]	[0.011]	[0.011]	[0.011]	[0.01]
Share of land under full titles		-467.666		71.879	22.52	37.399	21.703
		[407.407]		[219.57]	[226.934]	[235.683]	[215.731]
Average GPP per capita over past 5 years		0.052		0.026	0.016	0.01	-0.002
		[0.085]		[0.063]	[0.066]	[0.066]	[0.061]
Average growth of GPP per capita over past 5 years		-132152.5		-165473.4	-119513.9	-142012.7	-132144.4
		[70028.59]		[157433.4]	[168021.3]	[167435.8]	[171443.6]
Relative average productivity over past 5 years		155.177		-361.971	-316.647	-304.057	-479.745
		[503.88]		[623.286]	[619.805]	[628.741]	[609.734]
Relative average productivity growth over past 5 years		194.858		-10.951	-6.909	-10.91	-14.563
		[243.831]		[41.045]	[41.209]	[41.044]	[41.494]
Volatility of farm productivity over past 5 years		20.833		17.957	19.084	19.789	19.205
		[16.888]		[13.409]	[12.629]	[12.531]	[12.57]
Volatility of non-farm productivity over past 5 years		-0.964		-0.829	-1.068	-1.019	-1.055
		[0.517]**		[0.397]**	[0.503]**	[0.513]**	[0.516]**
Covariance of productivity over past 5 years		13.793		18.073	22.855	22.345	23.574
		[12.324]		[11.463]	[13.054]**	[13.225]*	[13.323]*
Present agricultural productivity					-85.973	-69.377	-78.323
					[74.135]	[82.01]	[87.119]
Investment in road system						0.414	0.128
						[0.345]	[0.335]
(Share of land under SPK4-01 titles)*(Investment in road system)							-0.337
							[0.11]***
Year Dummies	YES	YES	YES	YES	YES	YES	YES
Province Dummies	YES	YES	YES	YES	YES	YES	YES
Observations	284	279	257	254	254	253	253
Number of Groups	74	74	70	69	69	69	69
Adjusted R-squared	0.998	0.998					
Underidentification test: p-value			0.1702	0.041	0.048	0.043	0.061
Overidentification test: p-value			0.7702	0.72	0.762	0.717	0.75

Note: Standard errors, clustered by province, are in parentheses. *, **, *** denote significant levels at 10%, 5% and 1% respectively

- Share of land under SPK4-01 titles and investment in road density, independently, have no impact on urbanisation.

- Improvement in rural land right security increases urbanisation more, in provinces with poorer road infrastructure.

- It leads to urbanisation only when it is hard to commute within the province.

Conclusion and caveats

- Rural land tenure security also has a sizeable impact on the changing of the structure of employment in the economy, besides its effect on agricultural performances covered extensively in the literature.

- An improvement within the agricultural sector can facilitate the transformation of the country from agricultural-based to non-agricultural-based economy.

BUT

- Constrained by data availability, this paper ignores the reallocation of labour across provinces → potentially underestimate the true impact.

- The results also suggest the possibility of labour structural transformation without urbanisation.