Reform, Rails, and Rice: Thailand's Political Railroads and Economic Development in the 20th Century

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Christopher Paik, Ph.D.
Division of Social Science, New York University Abu Dhabi

Jessica Vechbanyongratana, Ph.D.
Faculty of Economics, Chulalongkorn University

Research Question

- What is the economic impact of Siam's colonial period "political railroads" on Thai regional economic development in the north and northeast in the 20th century?

Related Literature

- Growing economic history literature quantifying the impact of large transportation infrastructure projects on various economic outcomes
  - Agriculture
    - Atack and Margo (2011) – 25% increase in farmland in US Midwest attributed to 19th century rails
    - Donaldson and Hornbeck (2016) – (+) 19th century agricultural land prices US
    - Donaldson (2018) – (+) agricultural income colonial India
  - Industry/aggregate economic activity/population
    - Banerjee, Duflo, and Qian (2012) – (+) regional GDP in China
    - Bogart and Chaudhary (2013) – (+) TFP in India
    - Tang (2014) – Industrialization/agglomeration economies
    - Berger and Enflo (2017) – (+) population in towns crosscut by rails in Sweden

Related Literature

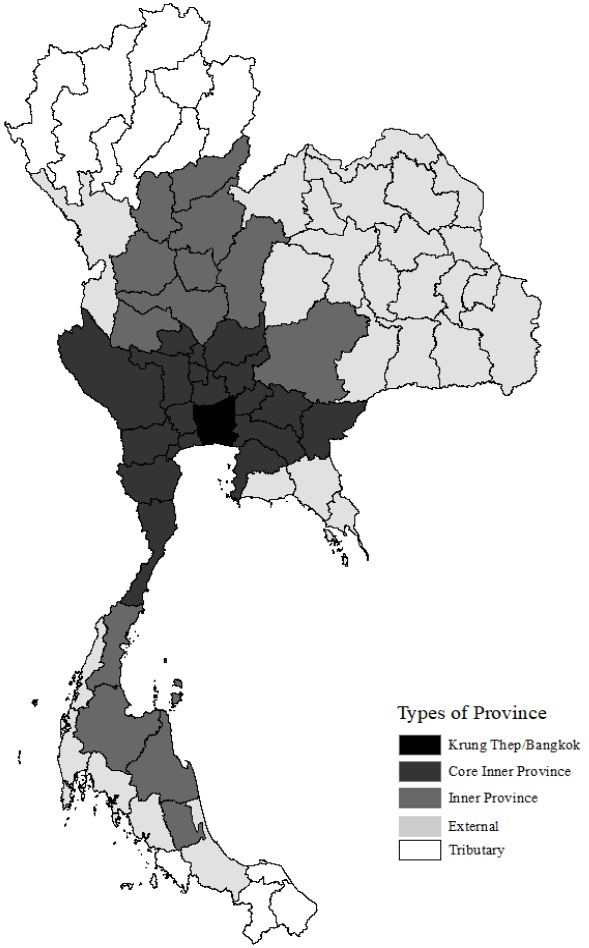
- Transportation infrastructure, market access, and economic development in Thailand
  - Kakizaki (2005) – Descriptive work on the economic impact of rail infrastructure in Thailand
  - Chankrajang and Vechbanyongratana (2018) – Impact of canal infrastructure on 19th century Bangkok orchard cultivation
- Paik and Vechbanyongratana (2019)
  - Colonial pressure → centralization and early transportation/communications infrastructure and human capital investments in some areas and not others → long-run divergent economic outcomes at the provincial level (infrastructure, education, GPP).
- This current paper is an extension of Paik and Vechbanyongratana (2019)
  - Explores a specific channel through which colonial pressure led to long-run uneven economic outcomes across Thailand.
  - Specifically look at the impact of late-19th and early 20th century railway construction on mid-20th century economic and agricultural outcomes using newly compiled data at the district level in northern and northeastern Thailand.

Historical Political Context

Siam's Political Geography Prior to 1892 Government Reforms

- Siam's traditional governance system is a Southeast Asian "mandala"(core-periphery) system (Tambiah 1977; Wolters 1999)
- Boundaries based on social hierarchy/tribute, not on a Western concept of geographic space and boundaries (Bunnag 1977; Winichakul 1994; Larsson 2012)
- Provinces were classified based on the strength of relationship with Bangkok and was closely related to proximity.
  - Core inner provinces (Class 4): Direct control by Bangkok
  - Inner provinces (Class 1,2,3): Strong central control by Bangkok
  - External provinces
  - Tributary states

Siam's Provinces Prior to the Establishment of the Thesapiban System in 1892



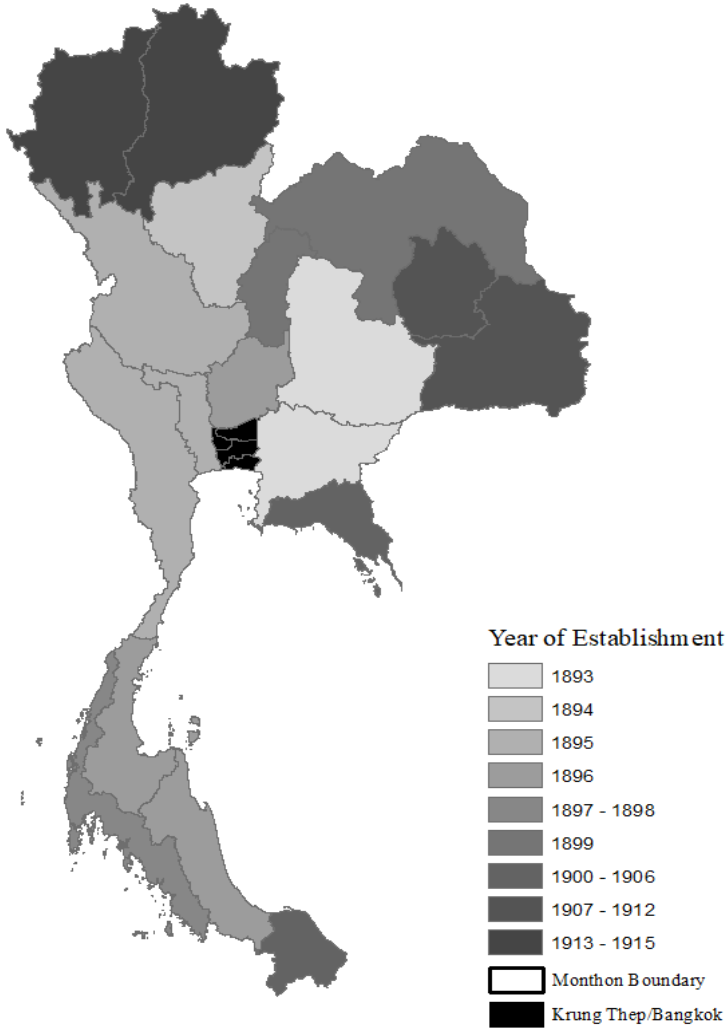
Colonial Pressure and Centralization

- Thailand was never colonized, but government reforms introduced by King Chulalongkorn were precipitated by French and British colonial pressures in the second half of the nineteenth century (Vella 1955; Wyatt 1969; Bunnag 1977; Winichakul 1994; Larsson 2012).
- Indirect control over peripheries and no demarcated geographical borders meant that these areas were at risk of annexation by the French and the British.
- Siam lost about half the territory under its influence to the French and British between 1867 and 1909.

Centralization

- Created “monthon” (administrative circles)
  - New second-level administrative unit with superintendent commissioner assigned by Bangkok
  - Demarcated geographical boundaries of both provinces and monthons
- Monthons were created over a 23-year period between 1893 and 1915
  - Location and local autonomy jointly determined the order of integration
  - Areas under direct threat of colonization and within Siam’s direct rule were centralized first

Timing of Monthon Establishment



Link between Centralization and Economic Development

- Growing literature on external threat, centralization, and economic growth (Acemoglu, 2005; Besley and Persson, 2009; Dincecco and Katz, 2014)
- External threat → centralization → fiscal innovation and increased fiscal capacity → productive investments in public goods

Siam's Centralization Process and Fiscal Constraints Led to Uneven Investments

- Centralization *did* lead to higher fiscal capacity for Siam, but faced constraints
  - Increased domestic tax revenue (15,378,119 in 1892 to 28,496,029 THB in 1898)
  - Limited foreign trade revenue (outcome of unequal treaties)
  - Little borrowing from abroad due to colonial fears → balanced budget policy through 1950s (Ingram 1971; Swan 2009)
- The *monthons* that were centralized first enjoyed higher levels of public goods provision and railway investment (Paik and Vechbanyongratana 2019)
- Little government investment in *monthons* centralized later, even up until the 1960s and 1970s

Railway Development

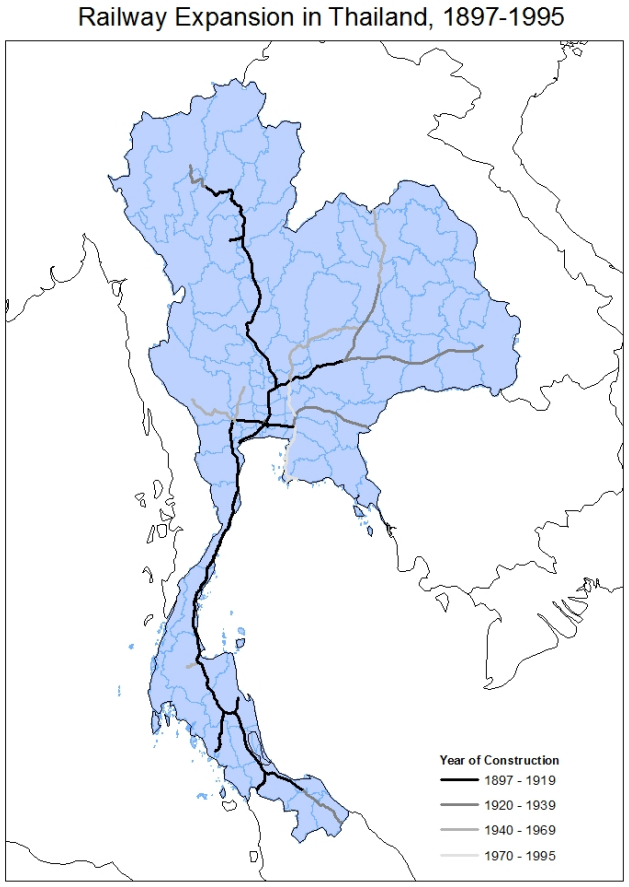
Proposals for Railway Development

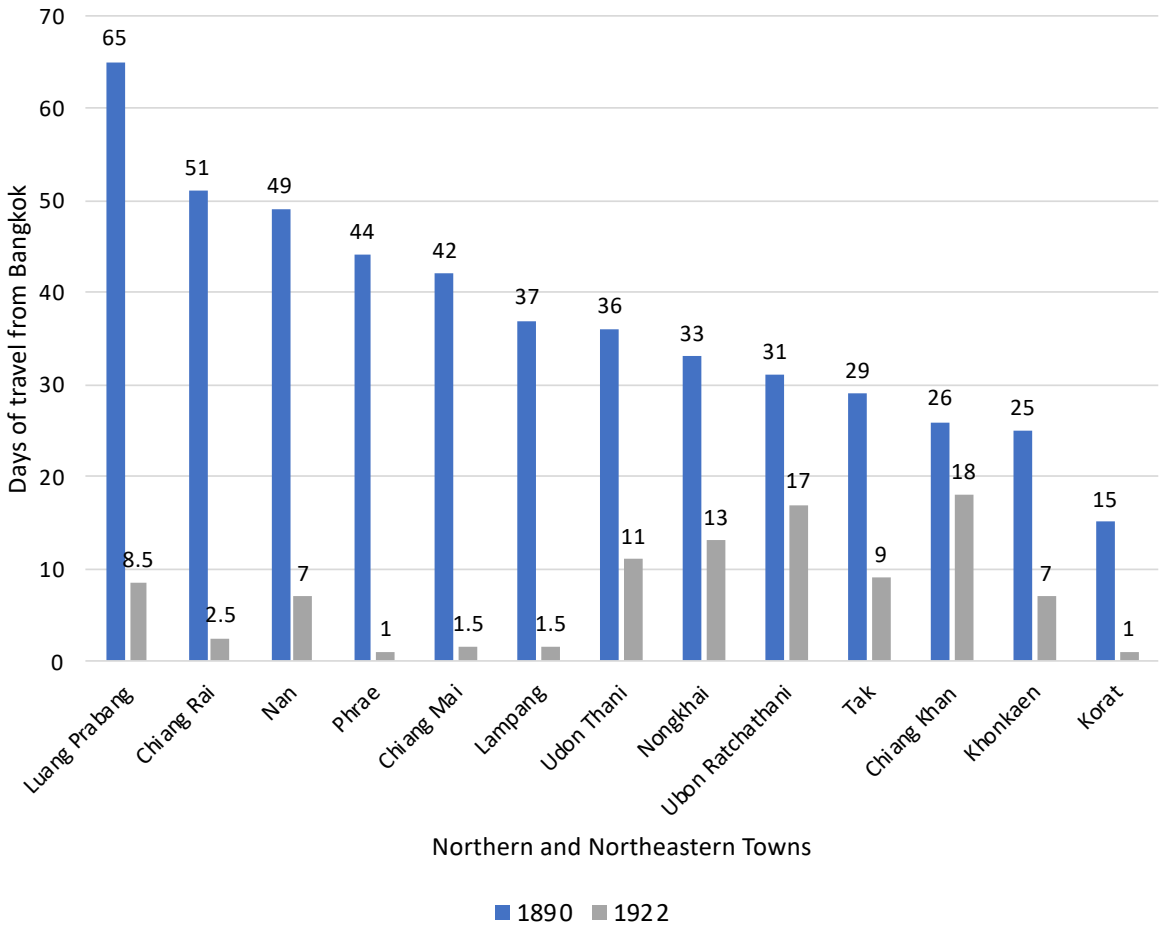
- In the 1880s, the French and British both proposed railways through Siam's external provinces and tributary states to connect their holdings in British Burma and French Indochina with China.
- Due to security concerns, the Siam's government refused permission to build the rail lines, and decided to pursue its own railway development.

“Political Railroads”

- Siam commenced construction on 3 strategic rail lines:
  - Northeast to Khorat (1892)
  - North to Chiangmai (1898)
  - South to British Malaya (1900)
- “Political railroad” routes chosen based on strategic concerns, not for economic reasons
  - Routes went out far enough to facilitate Bangkok's consolidation of power and communication with the frontier, but not far enough for the rails to be used strategically by colonial powers to annex areas under Siamese influence
  - First rail line to the northeast ended in Khorat near French holdings
  - The route north avoided Tak, an important town for British teak trade

Time-distances from Bangkok in Dry Season, 1890 and 1922





Sources: Whyte (2010); Kakizaki (2005, 42-3; 156-7)

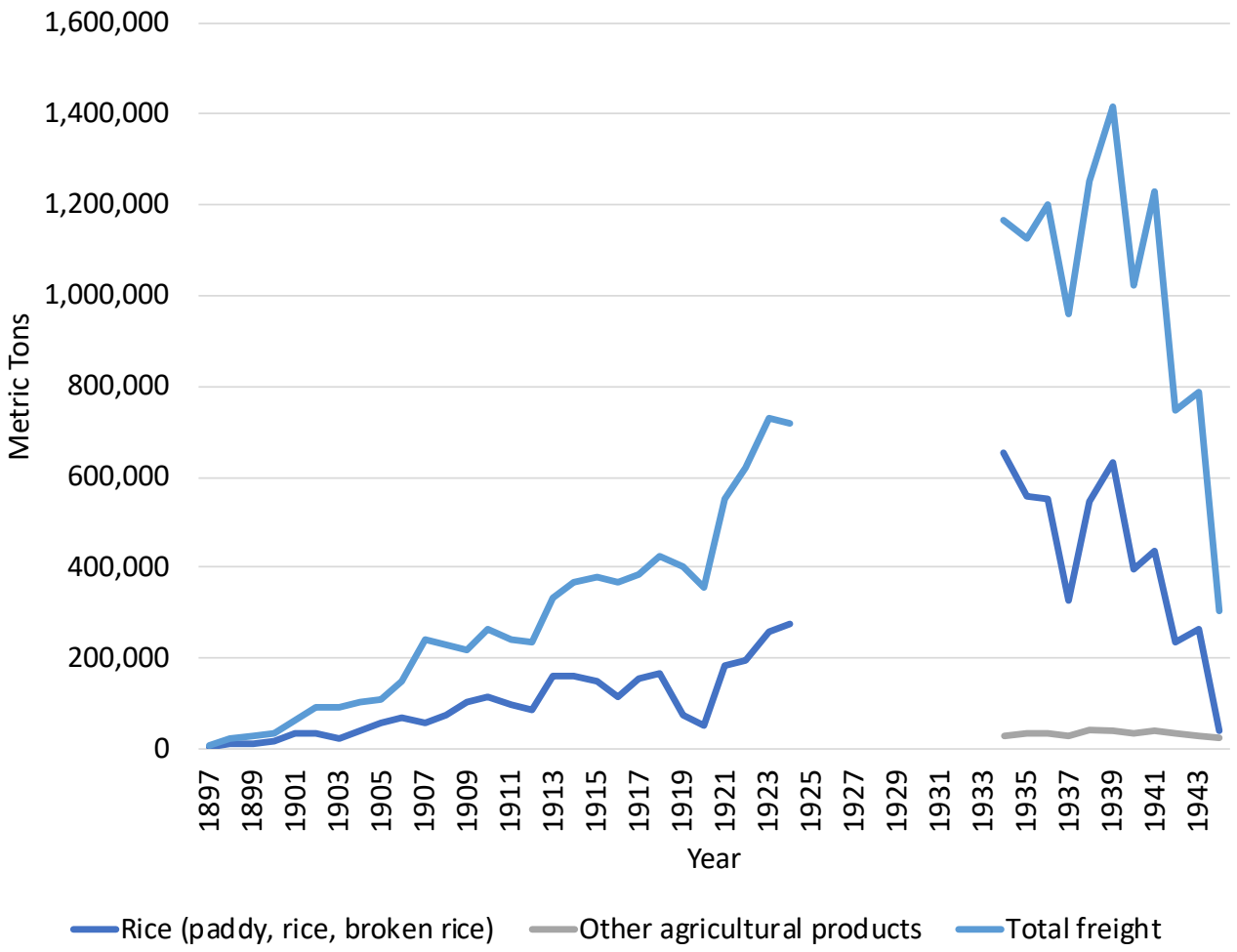
Importance of the railways for achieving centralization

- King Chulalongkorn in 1908: “By bringing the different parts of a country within close communication the railway renders possible that close and beneficial supervision which is necessary to effective administration” (quoted in Graham 1924, 145).
- “For purposes of administration the value of the railways cannot be overrated and, in fact, the present system of rural Government could hardly exist without them” (Graham 1924, 152-3).
- Areas that did not have rail infrastructure and remained difficult to reach both physically and administratively “received nothing at all in the way of social, economic or administrative benefit from the State” (Graham 1924, 124).

Economic value of the railways in question

- Using Siam's limited government revenues to expand the irrigation system at the turn of the 20th century would have been more beneficial to Siam's economy than building the railways. (Van der Heide (1906); Ingram (1971); Feeny (1982))
- Despite views or previous scholars, Kakizaki (2005) argues that the railways were economically beneficial
  - Increased intraregional trade
  - Rice market integration and price convergence
  - The railways were the vehicle for overall economic development in north and northeast regions

Rail Tonnage North and Northeastern Lines (Metric Tons), 1897-1944



Data and Methodology

Methodology

$$y = \beta_0 + \beta_1 NoRailN + \beta_2 NoRailNE + X'\gamma + \delta + \epsilon \quad (1)$$

$$y = \beta_0 + \beta_1 NoRailN + \beta_2 DistRailN + \beta_3 NoRailNE + \beta_4 DistRailNE + X'\gamma + \delta + \epsilon \quad (2)$$

$$y = \beta_0 + \beta_1 10kmRailN + \beta_2 20kmRailN + \beta_3 10kmRailNE + \beta_4 20kmRailNE + X'\gamma + \delta + \epsilon \quad (3)$$

- y = ln(district population); ln(rice area planted/harvested) for 1947 and 1966
- NoRailN/NE = 1 if district has no direct access to the N/NE rail line
- DistRailN/NE = Distance to N/NE rail line
- 10kmRailN/NE = 1 if district located 10-20km to N/NE rail line
- 20kmRailN/NE = 1 if district located > 20km to N/NE rail line
- X = vector of district geographic controls (longitude, latitude, area, agri suitability, mean/std elevation, distance to river, distance to Bangkok)
- δ = provincial fixed effects

Summary Statistics
North and Northeastern Districts, 1947

Variable	Mean	Std. Dev.	Sources
District Population 1947 ('000)	49.58	28.17	1947 Census
Planted Area of Rice 1947 (Rai)	114,848	86,286	1947 Census
No Northern Rail Access	0.87	0.34	Whyte (2010); MoT
Dist to N 1941 (Km)	130.85	143.40	Whyte (2010); MoT
District 10-20km from N Railway	0.08	0.27	Whyte (2010); MoT
District More than 20km from N Railway	0.66	0.48	Whyte (2010); MoT
No Northeastern Rail Access	0.90	0.31	Whyte (2010); MoT
Dist to NE 1941 (Km)	136.45	142.10	Whyte (2010); MoT
District 10-20km from NE Railway	0.09	0.28	Whyte (2010); MoT
District More than 20km from NE Railway	0.76	0.43	Whyte (2010); MoT
Dist to Railway Planned by British	256.45	183.75	Kakizaki (2012); MoT
Dist to Railway Planned by French	240.27	149.88	Kakizaki (2012); MoT
Dist to Proposed Paklai Line (Km)	157.90	97.27	Kakizaki (2012); MoT
Dist to Proposed Chiang Saen Line (Km)	261.53	161.40	Kakizaki (2012); MoT
Observations	221		

Summary Statistics
North and Northeastern Districts, 1966

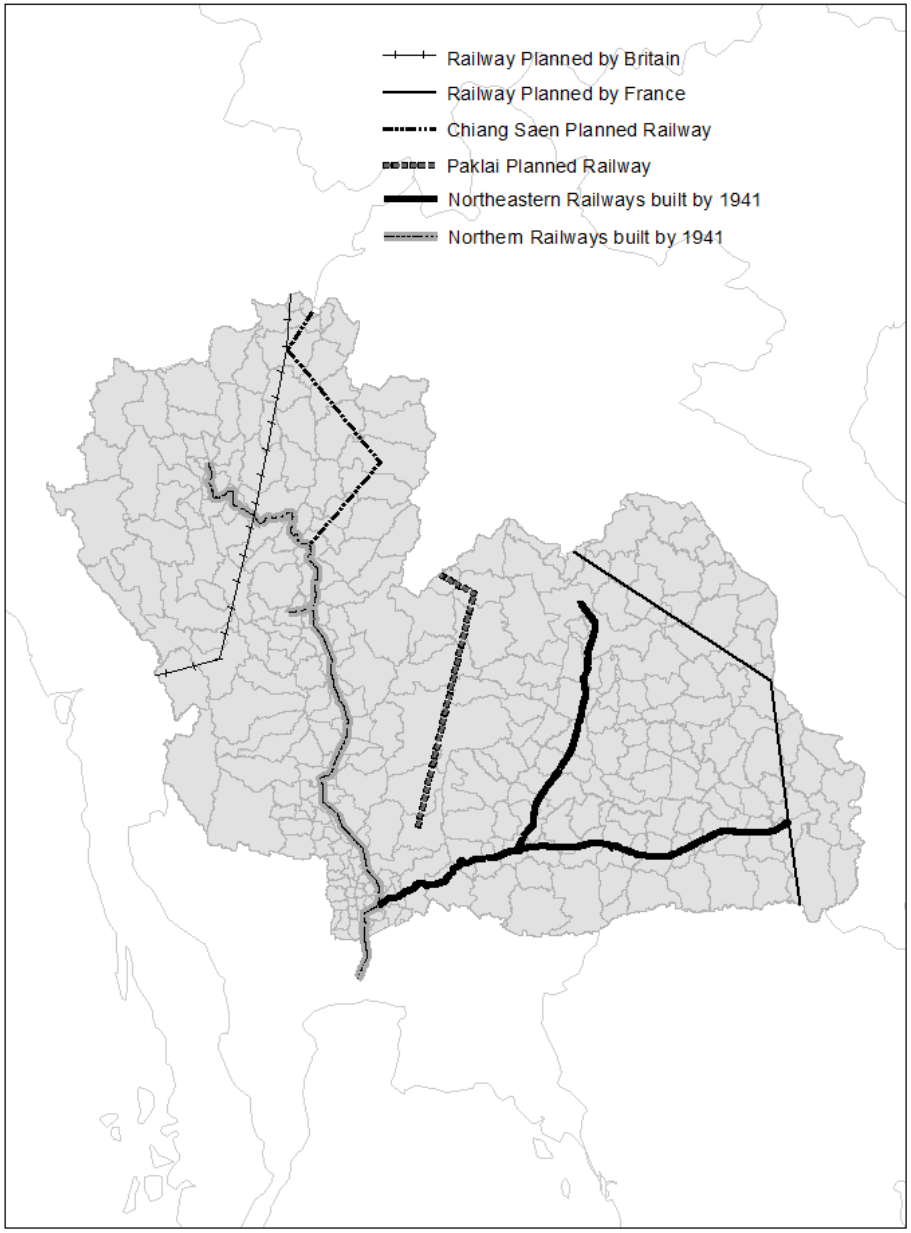
Variable	Mean	Std. Dev.	Sources
District Population 1966 ('000)	60.78	37.38	1966 Provincial SYB
Harvested Area of Rice 1966 (Rai)	102,012	108,405	1966 Provincial SYB
No Northern Rail Access	0.90	0.30	Whyte (2010); MoT
Dist to N 1941 (Km)	143.65	146.24	Whyte (2010); MoT
District 10-20km from N Railway	0.08	0.27	Whyte (2010); MoT
District More than 20km from N Railway	0.71	0.45	Whyte (2010); MoT
No Northeastern Rail Access	0.90	0.30	Whyte (2010); MoT
Dist to NE 1941 (Km)	137.47	143.98	Whyte (2010); MoT
District 10-20km from NE Railway	0.07	0.26	Whyte (2010); MoT
District More than 20km from NE Railway	0.77	0.42	Whyte (2010); MoT
Dist to Railway Planned by British	268.12	189.00	Kakizaki (2012); MoT
Dist to Railway Planned by French	239.86	149.11	Kakizaki (2012); MoT
Dist to Proposed Paklai Line (Km)	166.04	99.63	Kakizaki (2012); MoT
Dist to Proposed Chiang Saen Line (Km)	271.87	163.31	Kakizaki (2012); MoT
Observations	310		

Results

Population, Rice Cultivation, and Access to Railways, 1947

	(1)	(2)	(3)	(4)	(5)	(6)
	Natural Log District Population 1947			Natural Log Paddy Planted (Rai)		
No Northern Rail Access	-0.407***	-0.405***		-0.374***	-0.404***	
Dist to N 1941 (Km)		-0.000			0.002	
No Northeastern Rail Access	-0.402***	-0.387***		-0.393***	-0.375***	
Dist to NE 1941 (Km)		-0.001			-0.002	
District 10-20km from N Rail			-0.096			-0.065
District More than 20km from N Rail			-0.337**			-0.283*
District 10-20km from NE Rail			-0.308***			-0.233*
District More than 20km from NE Rail			-0.342**			-0.325**
Constant	-3.681	3.369	-5.596	35.487	54.720*	33.628
Provincial Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Geographic Controls	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R-Square	0.541	0.537	0.501	0.697	0.697	0.680
Obs.	221	221	221	221	221	221

Notes: *** p<0.01 ** p<0.05 * p<0.1; Robust standard errors in parentheses.



Placebo Tests: Completed Versus Planned but Never Completed Railways

Placebo Test: Population, Rice Cultivation, and Access to Railways, 1947

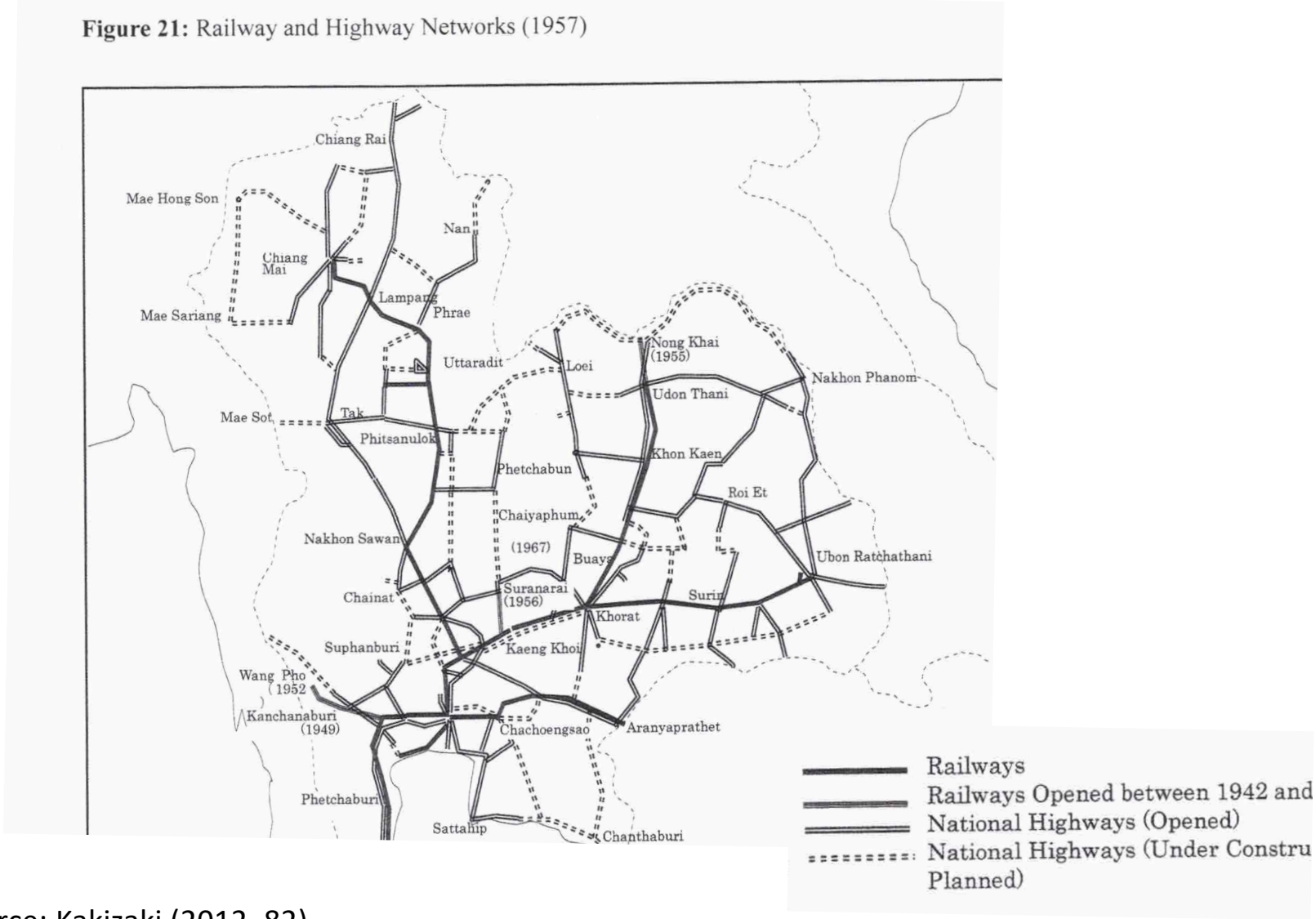
	(1)	(2)	(3)	(4)
	Natural Log District Population 1947 ('000)		Natural Log Paddy Planted (Rai)	
No Northern Rail Access	-0.412***	-0.414***	-0.410***	-0.420***
Dist to N 1941 (Km)	0.001	-0.001	0.004	-0.001
No Northeastern Rail Access	-0.393***	-0.366***	-0.377***	-0.309**
Dist to NE 1941 (Km)	-0.000	-0.002	-0.002	-0.005**
Dist to Railway Planned by Britain (Km)	-0.003		-0.006*	
Dist to Railway Planned by France (Km)	-0.003		0.000	
Dist to Paklai Line (Km)		0.003		0.008**
Dist to Proposed Chiang Saen Line (Km)		-0.002		-0.004
Constant	8.483	-7.124	28.979	23.390
Provincial Fixed Effects	Yes	Yes	Yes	Yes
Geographic Controls	Yes	Yes	Yes	Yes
Adj. R-Square	0.544	0.535	0.699	0.702
Obs.	221	221	221	221

Notes: *** p<0.01 ** p<0.05 * p<0.1; Robust standard errors in parentheses.

Infrastructure Development after 1947

- Little railway construction after World War II
- Road and highway development, especially in the northeast
  - Strategic development by PM Sarit Thanarat to mitigate growing unrest in the provinces (Hewison 1997)
  - “Friendship Highway” from Saraburi to Khorat (1958), and to Nong Khai (1965) represents first high-standard highway in Thailand, made possible through foreign aid
  - Rise of automobiles (Kakizaki 2012)
    - Industrial Investment Promotion Act (1960) promoted auto industry; 8 auto assembly plants open in the 1960s
    - 100,000 autos in 1960; 359,000 autos in 1970

Figure 21: Railway and Highway Networks (1957)



Source: Kakizaki (2012, 82)

Population, Rice Cultivation, and Access to Railways, 1966

	(1)	(2)	(3)	(4)	(5)	(6)
	Natural Log District Population 1966 ('000)			Natural Log Paddy Harvested (Rai)		
No Northern Rail Access	-0.441***	-0.375***		-0.162	-0.103	
Dist to N 1941 (Km)		-0.004***			-0.004	
No Northeastern Rail Access	-0.296**	-0.269**		-0.088	-0.047	
Dist to NE 1941 (Km)		-0.001			-0.003	
District 10-20km from N Rail			-0.164			-0.239
District More than 20km from N Rail			-0.418***			-0.333*
District 10-20km from NE Rail			-0.168			-0.081
District More than 20km from NE Rail			-0.334***			-0.285**
Constant	-27.948**	-30.441*	-26.866**	17.069	22.949	17.971
Provincial Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Geographic Controls	Yes	Yes	Yes	No	Yes	Yes
Adj. R-Square	0.493	0.504	0.482	0.557	0.559	0.563
Obs.	310	310	310	308	308	308

Notes: *** p<0.01 ** p<0.05 * p<0.1; Robust standard errors in parentheses.

Placebo Test: Population, Rice Cultivation, and Access to Railways, 1966

	(1)	(2)	(3)	(4)
	Natural Log District Population 1966 ('000)		Natural Log Paddy Harvested (Rai)	
No Northern Rail Access	-0.387***	-0.368***	-0.118	-0.084
Dist to N 1941 (Km)	-0.003*	-0.006***	-0.002	-0.008**
No Northeastern Rail Access	-0.295**	-0.247**	-0.054	0.015
Dist to NE 1941 (Km)	0.000	-0.003	-0.002	-0.007**
Dist to Railway Planned by Britain (Km)	0.000		-0.005	
Dist to Railway Planned by France (Km)	-0.003**		-0.001	
Dist to Paklai Line (Km)		0.004*		0.012***
Dist to Proposed Chiang Saen Line (Km)		-0.001		-0.004
Constant	-11.102	-43.672**	9.128	-15.383
Provincial Fixed Effects	Yes	Yes	Yes	Yes
Geographic Controls	Yes	Yes	Yes	Yes
Adj. R-Square	0.510	0.505	0.560	0.572
Obs.	310	310	308	308

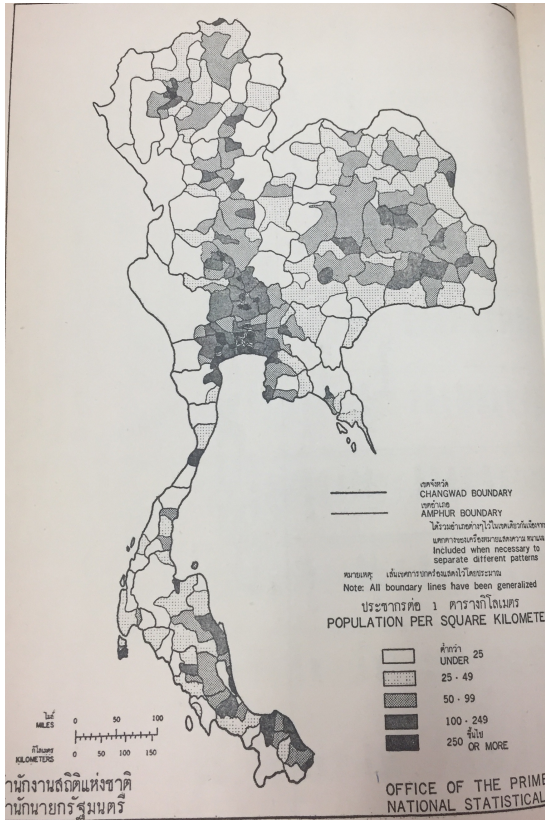
Notes: *** p<0.01 ** p<0.05 * p<0.1; Robust standard errors in parentheses.

Conclusions

- Although the northern and northeastern rail lines were built primarily political purposes, districts directly on the railways saw positive economic benefits in 1947
  - ≈40% greater population
  - 37-39% more area under rice cultivation
  - Benefits were localized around railways likely because of lack of connecting transport routes
- By 1966, the road network has greatly expanded
  - Still see persistent higher population in districts with rail lines
  - Association with rice cultivation disappears
- Siam's "political railroads" were important for regional economic development in the north and northeast through the mid-20th century, but the localized nature of the impact meant an uneven distribution of benefits across the region.

Just leaving everyone with a little “ocular regression”…

Amphoe Population Density, 1960



Railway Expansion in Thailand, 1897-1995