Economics 210A
Spring 2015

Christina Romer
David Romer

LECTURE 8
Infrastructure

March 18, 2015

I. Overview

Central Issues

- Infrastructure refers to the capital used to run the whole economy: power, roads, bridges, railroads, water, sewers, etc.

- Often thought to be important to standards of living and economic growth.

- What is the evidence from 19th century infrastructure investments?

Today's Papers

- Differ in countries and infrastructure covered.
  - Fogel discusses railroads in the U.S. at the end of the 19th century.
  - Donaldson discusses railroads in India around the turn of the 20th century.
  - Lizzeri and Persico discuss public health infrastructure in 19th c. England.
- Papers are interesting because of large differences in methodology.

II. Robert W. Fogel

Railroads and American Economic Growth

"Axiom of Indispensability"

- The railroads were essential to the economic development of the United States.

"*Escape from the confines of the past is never easy; it has been particularly difficult in this case. The evidence that must be re-examined is vast, and the economic significance of railroads is intricately intertwined with a host of social and political issues. … However, the required revisions are much more extensive than has been generally recognized.*" (Fogel, p. 1)

Fogel's Hypothesis To Be Tested:

Rail connections between the primary and secondary markets of the nation were a necessary condition for the system of agricultural production and distribution that characterized the American economy of the last half of the nineteenth century. Moreover, the absence of such rail connections would have forced a regional pattern of agricultural production that would have significantly restricted the development of the American economy.

Social Saving of the Railroads

- The difference between what it cost using railroads to ship the actual bundle of goods from primary to secondary markets, and what it would have cost using the next best alternative.

- Crucial idea of the "counterfactual."

Is it legitimate for the historian to consider alternative possibilities to events which have happened? . . . To say that a thing happened the way it did is not at all illuminating. We can understand the significance of what did happen only if we contrast it with what might have happened.

MORRIS RAPHAEL COHEN

How Does Fogel Simplify His Analysis?

- Uses only one year—1890.
- Considers only 4 commodities: corn, wheat, beef, and pork (accounted for 42% of income originating in agriculture in 1889).
- Compares distance only on a sample of routes.

A Key Technique

- Try to convince readers that any simplifications bias the results away from what you want to show.
- Examples from Fogel:
  - Using same routes and bundles of goods ignores the possibilities for re-optimization.
  - Using 1890 likely results in a larger estimate than in previous years.
- Were you convinced?

First Pass at Calculating the Social Saving

- Gets tons of grain and meat shipped west to east.
- Takes 30 routes at random and calculates distance by water and by rail.
- Multiplies by water rate and actual rate (where the actual rate includes water and rail).
- Comes up with an estimate.

TABLE 2

ESTIMATED REQUIREMENTS OF SECONDARY MARKETS
(thousands of tons)

	1	2	3
	Local Consumption Deficits	Exports	Total Requirements (Col. 1 plus Col. 2)
Wheat [a]	3,099	1,916	5,015
Corn [b]	5,415	2,320	7,735
Dressed Pork	729	347	1,076
Dressed Beef	701	304	1,005

From: Fogel, "A Quantitative Approach to the Study of Railroads in American Economic Growth," *Journal of Economic History*, June 1962.

TABLE 3

A COMPARISON OF THE ESTIMATES OF THE LOCAL CONSUMPTION DEFICITS OF WHEAT FOR TWO TRADING AREAS
(thousands of bushels)

	1	2	3
	Method One (local demand minus local supply)	Method Two (nine-year average of receipts minus exports)	Column One as a per cent of Column Two
Boston	6,996	7,215	97
New Orleans	3,504	3,070	114

From: Fogel, "A Quantitative Approach to the Study of Railroads"

TABLE 5

FIRST APPROXIMATION OF THE SOCIAL SAVING

Commodity	1 Quantity Shipped (millions of tons)	2 Millions of Ton-Miles of Water Transportation (Col. 1 × 1,574 miles)	3 Water Rate per Ton-Mile (dollars)	4 Cost of Water Transportation in Millions of Dollars (Col. 2 × Col. 3)	5 Average Actual Distance (miles)	6 Millions of Ton-Miles of Actual Transportation (Col. 1 × Col. 5)	7 Actual Rate per Ton-Mile (dollars)	8 Cost of Actual Transportation in Millions of Dollars (Col. 6 × Col. 7)	9 Social Saving in Millions of Dollars (Col. 4 — Col. 8)
Meats	3.000	4,722	.00451	21.296	926	2,778	.01071	29.752	—8.456
Grains	12.750	20,069	.00139	27.896	1,044	13,311	.00434	57.770	—29.874
Totals	15.750	24,791		49.192		16,089		87.522	—38.330

- First pass suggests that the social saving of the railroad in interregional trade in 1890 was *negative*.

From: Fogel, "A Quantitative Approach to the Study of Railroads"

Quantifying Neglected Costs of Water Transport

- How to measure different loss rates for water and rail?
    - Insurance costs.

TABLE 6

ESTIMATED COST OF INSURANCE

	1	2	3	4	5
	Tons Shipped Interregionally	Price per Ton	Value (Col. 1 × Col. 2)	Insurance Rate as a Proportion of Value	Cost of Insurance (Col. 3 × Col. 4)
1. Cattle	949,000	$ 97	$ 92,100,000	.01	$ 921,000
2. Dressed beef	503,000	138	69,400,000	.01	694,000
3. Hogs	1,008,000	79	79,600,000	.01	796,000
4. Dressed pork	538,000	110	59,200 000	.01	592,000
5. Corn	7,735,000	13	100,600,000	.01	1,006,000
6. Wheat	5,015,000	30	150,500,000	.01	1,505,000
7. Totals	15,748,000		551,400,000		5,514,000

From: Fogel, "A Quantitative Approach to the Study of Railroads"

Quantifying Neglected Costs of Water Transport

- How to measure cost of slower travel time and the fact that rivers were unusable 5 months out of the year?
    - Costs of carrying higher inventories.
    - Calculates that as an opportunity cost (uses value of higher inventories times the interest rate).
    - Says it is about $18 million.

Other Neglected Costs of Water Transport

- Transshipping.
- Supplementary wagon haulage.
- Capital costs for canals (which had been built with public funds).
- Others that Fogel didn’t think of?

Fogel's Bottom Line

- Social saving of the railroad in the interregional transportation of agricultural goods was about 6/10 of 1% of GDP.
- The rest of the book goes on to consider social saving related to intraregional trade (including in the counterfactual the construction of additional canals). These effects are larger (but still not very large, in Fogel's view).

Relation between Social Saving and Economic Growth

- Fogel's calculation is fundamentally about levels.
- Could a small social saving nevertheless be important for growth?

III. Dave Donaldson

"Railroads of the Raj: Estimating the Impact of Transportation Infrastructure"

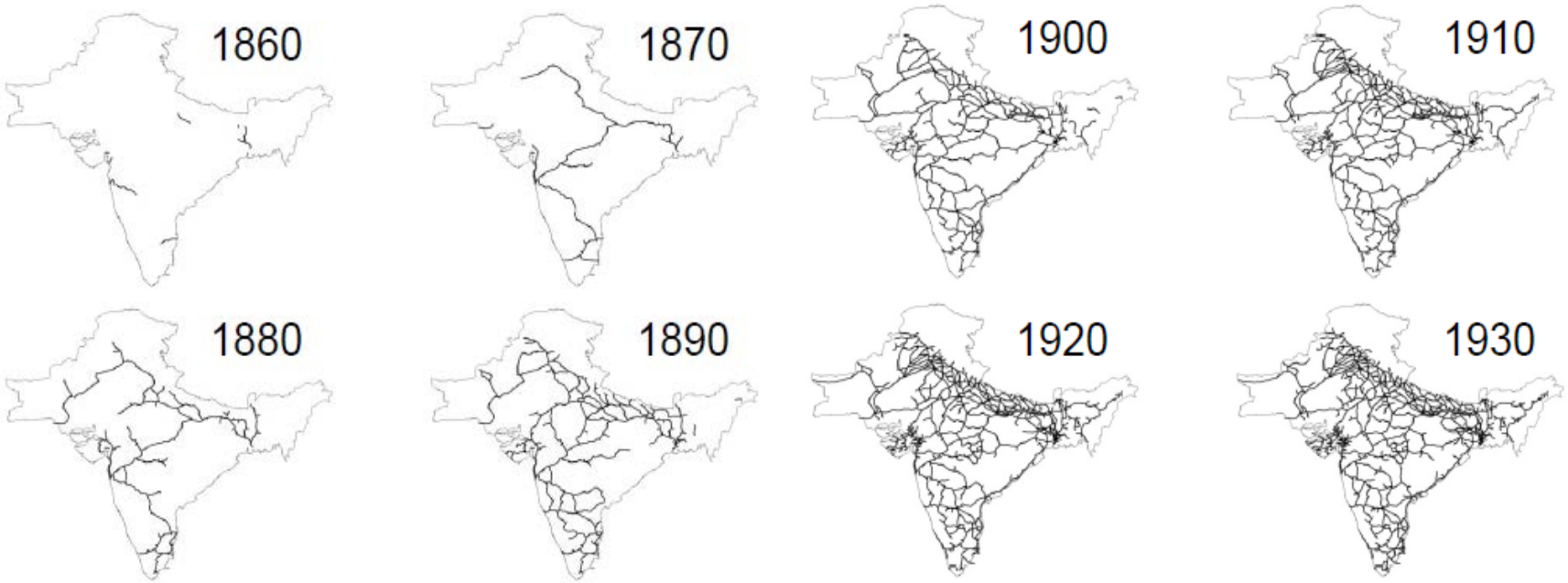

Figure 1: The evolution of India's railroad network, 1860-1930: These figures display the decadal evolution of the railroad network (railroads depicted with thick lines) in colonial India (the outline of which is depicted with thin lines). The first railroad lines were laid in 1853. This figure is based on a GIS database in which each (approximately) 20 km long railroad segment is coded with a year of opening variable. Source: Author's calculations based on official publications. See Appendix A for details.

From: Donaldson, "Railroads of the Raj"

Overview

- Impact of railroad on trade costs and trade flows – a structural general-equilibrium model that is used to guide the empirical work.

- Impact of railroad on real incomes – largely reduced-form evidence.

Some Key Features of the Model

- Static.
- Land is the only input.
- Many "commodities," each with a continuum of "varieties."
- "Iceberg" trade costs: For region *o* to supply 1 unit of a variety of commodity *k* to region *d*, it must ship $T_{od}^{k} \geq 1$ units.
- Arbitrary productivity differences by commodity across regions, and arbitrary shipping costs.
- Productivity in a given variety (relative to productivity in the commodity) iid across varieties and regions, with a particular functional form for the distribution.

The Role of Some of These Features

- Static and land-only are huge simplifiers.
- Iceberg trade costs (and other assumptions) make relationships log-linear.
- Continuum of varieties means that there will be positive flows of every commodity from every region to every other region.
- The functional form assumption for the distribution implies that "the price distribution of the varieties that any given origin actually sends to destination *d* … is the same for all origin regions."

Classic Gravity Equation for Bilateral Trade Flows

$$\ln X_{od} = a + b \ln S_o + b \ln S_d - c \ln D_{od} + e_{od},$$

where:

- X_{od} is exports from *o* to *d*;
- S_o and S_d are the economic "sizes" of *o* and *d* (as measured by real GDP, for example);
- D_{od} is distance from *o* to *d*;
- *b* is sometimes constrained to equal 1.

Modern-Style Gravity Equation from Donaldson's Model

$$\ln X_{od}^{k} = \ln X_{d}^{k} + \ln \lambda_{k} + \ln A_{o}^{k} - \theta_{k} \ln r_{o} - \theta_{k} \ln T_{od}^{k} + \theta_{k} \ln p_{d}^{k},$$

where:

- X_{od}^{k} is exports of commodity *k* from *o* to *d*;
- X_{d}^{k} is *d*'s total consumption of commodity *k*;
- λ_{k} is a commodity-specific constant;
- A_{o}^{k} is the productivity of *o* in commodity *k*;
- r_{o} is the rental price of land in *o*;
- T_{od}^{k} is trade costs for *k* from *o* to *d*;
- p_{d}^{k} is the price of *k* in *d*.

Impact of Trade Costs on Real Incomes

- Not the case that any reduction in trade costs necessarily makes all regions better off.

Impact of Trade Costs on Real Incomes (cont.)

A region's real income (per unit of land) is:

$$\Omega + \sum_k \frac{\mu_k}{\theta_k} \ln A_o^k - \sum_k \frac{\mu_k}{\theta_k} \ln \frac{X_{oo}^k}{X_o^k},$$

where:

- μ_k is the expenditure share on commodity *k*;
- A_o^k is *o*'s productivity in commodity *k*.
- X_{oo}^k is *o*'s consumption of commodity *k* produced in *o*;
- X_o^k is *o*'s total consumption of commodity *k*.

A "Sufficient Statistic"

"Because of the complex general equilibrium relationships in the model, the full matrix of trade costs (between every bilateral pair of regions), the full vector of productivity terms in all regions, and the sizes of all regions all influence welfare in region *o*. But these terms (that is, every exogenous variable in the model other than local productivity) affect welfare only through their effect on the trade share. … If railroads affected welfare in India through the mechanism in the model …, then Result 4 states that one should see no additional effects of railroads on welfare once $[\sum_k \frac{\mu_k}{\theta_k} \ln \frac{X_{oo}^k}{X_o^k}]$ is controlled for."

Empirics – Preliminary Comment

- The motivation was many of the assumptions is not that they appear to be reasonable approximations. Rather, it is that they are necessary for tractability.

- How concerned should this make us about empirical work that takes the model seriously?

Empirics: Trade Costs – Preliminaries

- If commodity *k* is homogeneous and can only be produced in *o*: $\frac{P_d^k}{P_o^k} = T_{od}^k$.
- This implies: $\ln P_d^k = \ln P_o^k + \ln T_{od}^k$.
- Note: The assumption of a homogeneous commodity that can only be produced in one region requires stepping outside the model.

Empirics: Trade Costs – Specification

- Assume $\ln T_{od}^{k}$ does not depend on *k*, and takes the form: $\beta_{od}^{o} + \delta \ln LCRED_{od} + e_{od}^{o}$,

where $LCRED_{od}$ is the lowest cost way of getting from *o* to *d* if each kilometer of travel by mode *m* costs α_m (for *m* = RAIL, ROAD, RIVER, SEA).

- Assume: The β_{od}^{o}'s, δ, and the α_m's do not depend on *t*; the P_d^k's, P_o^k's, and e_{od}^{o}'s do depend on *t*.

Empirics: Trade Costs – Estimation

- Recall: $\ln P_{dt}^{k} = \ln P_{ot}^{k} + \beta_{od}^{o} + \delta \ln LCRED(\boldsymbol{R_t}, \alpha)_{odt} + e_{odt}^{o}$.
- Treat the P_{ot}^{k}'s (and the parameters and the e_{od}^{o}'s) as unobserved.
- Minimize sum of squared residuals.
- Fitted values are a (highly!) nonlinear function of the parameters (via the α_m's). So use nonlinear least squares.

Empirics: Trade Costs – Data

- Focuses on salt.
- Annual price data for 8 types of salt (each from a different location) in 124 districts of Northern India, 1861–1930.

Empirics: Trade Costs – Possible Concerns?

- Not very transparent!
- Are there really no useful data on the P_{ot}^{k}'s?
- What if the α_m's are falling over time?
- Might trade costs vary substantially by commodity?

Table 2: Railroads and Trade Costs (Step 1)

Dependent variable: Log salt price at destination	(1)	(2)
Log effective distance to source, along lowest-cost route (at historical freight rates)	0.135 (0.038)***	
Log effective distance to source, along lowest-cost route (at estimated mode costs)		0.247 (0.063)***
Estimated mode costs per unit distance:		
Railroad (normalized to 1)		1 N/A
Road		7.880 (1.913)***
River		3.821 (1.034)***
Coast		3.942 (2.581)
Observations	7,329	7,329
R-squared	0.960	0.974

Notes: Regressions estimating equation (12) using data on 8 types of salt (listed in Appendix A), from 124 districts in 5 Northern Indian provinces (listed in Appendix A), annually from 1861 to 1930. Column 1 and column 2 estimated by OLS and NLS respectively; both include salt type x year, salt type x destination fixed effects and salt type x destination trends. 'Effective distance to source, along lowest-cost route' measures the railroad-equivalent kilometres (because railroad freight rate is normalized to 1) between the salt source and the destination district, along the lowest-cost route given relative mode costs per unit distance. 'Historical freight rates' used are 4.5, 3.0 and 2.25 respectively for road, river and coastal mode costs per unit distance, all relative to rail transport. Heteroskedasticity-robust standard errors corrected for clustering at the destination district level are reported in parentheses. *** indicates statistically significantly different from zero at the 1% level; ** indicates 5% level; and * indicates 10% level.

From: Donaldson, "Railroads of the Raj"

Empirics: From Trade Costs to Trade Flows

- Recall:

$$\ln X_{od}^{k} = \ln X_{d}^{k} + \ln \lambda_{k} + \ln A_{o}^{k} - \theta_{k} \ln r_{o} - \theta_{k} \ln T_{od}^{k} + \theta_{k} \ln p_{d}^{k} .$$

- Donaldson estimates:

$$\ln X_{odt}^{k} = \beta_{ot}^{k} + \beta_{dt}^{k} + \beta_{od}^{k} + \theta_{k} \delta \ln LCRED(\boldsymbol{R_t}, \alpha)_{odt} + \varepsilon_{odt}^{k}.$$

- 45 regions, 17 agricultural commodities, annual.
- Data on trade flows by rail, river, or sea (but not roads).
- Models θ_k as: constant; or taking the form $a + b' X_k$.; or being a different parameter for each *k*.

Empirics: From Trade Costs to Trade Flows – Possible Concerns?

- Again, not very transparent!
- Again, what if transportation costs for a given means of transportation are falling?
- How does he treat cases where X_{odt}^{k} is zero?
- Is the absence of data on trade by road a problem?

Table 3: Railroads and Trade Flows (Step 2)

Dependent variable: Log value of exports	(1)	(2)
Log effective distance beween origin and destination along lowest-cost route	-1.141 (0.203)***	-1.194 (0.446)***
(Log effective distance beween origin and destination along lowest-cost route) x (Weight per unit value of commodity in 1880)		-0.052 (0.041)
(Log effective distance beween origin and destination along lowest-cost route) x (High-value railroad freight class of commodity in 1880)		0.035 (0.053)
Observations	1,315,079	1,315,079
R-squared	0.949	0.955

Notes: Regressions estimating equation (14) using data on 17 commodities and 45 trade blocks annually from 1880 to 1920. Regressions include origin and destination fixed effects, separately for each commodity and year. 'Effective distance between origin and destination along lowest-cost route' measures the railroad-equivalent kilometres (due to the normalized railroad freight rate to 1) between the centroid of the origin and destination trade blocks in question, along the lowest-cost route given relative freight rates for each mode of transport (as estimated in Table 2). 'Weight per unit value in 1880' is the weight (in maunds) per rupee, as measured by 1880 prices. 'Railroad freight class in 1880' is an indicator variable for all commodities that were classified in the higher (more expensive) freight class in 1880; salt was in the omitted category (low-value commodities). Heteroskedasticity robust standard errors adjusted for clustering at the exporting block level are reported in parentheses for columns 1 and 2 respectively. *** indicates statistically significantly different from zero at the 1% level; ** indicates 5% level; and * indicates 10% level.

From: Donaldson, "Railroads of the Raj"

Empirics: Railroads and Real Income – Specification

$$\ln Y_{dt} = \beta_d + \beta_t + \gamma RAIL_{dt} + u_{dt},$$

where:

- *Y* is real agricultural income;
- *R* is a dummy for whether some part of district *d* was in the rail network in *t*.

Empirics: Railroads and Real Income – Possible Concerns?

- Not tightly tied to his theory!
- Omitted-variable bias?
- *RAIL* is an imperfect measure of the impact of the railroad (perhaps substantially so?).

Table 4: Railroads and Real Income Levels (Step 3)

Dependent variable: log real agricultural income per acre	(1)
Railroad in district	0.164
	(0.056)***
[...]	
Observations	14,111
R-squared	0.744

From: Donaldson, "Railroads of the Raj"

Placebo Tests

- In general, a specification where:
  - We know a priori there isn't a causal effect.
  - But if there is bias in the baseline estimation, it is also likely to be present.
- In Donaldson's case: If the estimated effects of railroads reflect omitted-variable bias, we would expect to see an estimated "effect" when we look at railroads that were almost built, but not actually constructed.
- Possible concerns?

Table 4: Railroads and Real Income Levels (Step 3)

Dependent variable: log real agricultural income per acre	(1)	(2)	(3)	(4)
Railroad in district	0.164 (0.056)***	0.170 (0.095)*	0.188 (0.095)**	0.182 (0.073)**
Unbuilt railroad in district, abandoned after proposal stage		0.008 (0.020)		
Unbuilt railroad in district, abandoned after reconnaissance stage		-0.004 (0.050)		
Unbuilt railroad in district, abandoned after survey stage		0.012 (0.037)		
Unbuilt railroad in district, abandoned after sanction stage		0.008 (0.075)		
(Unbuilt railroad in district, included in Lawrence Plan 1869-1873) x (post-1869 indicator)			0.013 (0.057)	
(Unbuilt railroad in district, included in Lawrence Plan 1874-1878) x (post-1874 indicator)			-0.051 (0.067)	
(Unbuilt railroad in district, included in Lawrence Plan 1879-1883) x (post-1879 indicator)			0.005 (0.054)	
(Unbuilt railroad in district, included in Lawrence Plan 1884-1888) x (post-1884 indicator)			0.073 (0.098)	
(Unbuilt railroad in district, included in Lawrence Plan 1889-1893) x (post-1889 indicator)			-0.096 (0.088)	
(Unbuilt railroad in district, included in Lawrence Plan 1894-1898) x (post-1894 indicator)			0.044 (0.066)	
(Unbuilt railroad in district, included in Kennedy plan, high-priority) x (year-1848)				0.001 (0.025)
(Unbuilt railroad in district, included in Kennedy plan, low-priority) x (year-1848)				-0.003 (0.029)
Observations	14,111	14,111	14,111	14,111
R-squared	0.744	0.766	0.768	0.764

From: Donaldson, "Railroads of the Raj"

TABLE VIII

PLACEBO TEST OF INSTRUMENTAL VARIABLE IDENTIFICATION

(1) IV Employs Distance From	(2) IV Estimate of Print Effect	(3) IV Estimate t Statistic
Mainz	0.58	2.03**
Amsterdam	−3.00	0.95
London	1.20	0.34
Paris	−14.25	0.12
Venice	0.08	0.55
Wittenberg	2.21	0.64

Note. The dependent variable is log population growth 1500–1600: $\ln\left(\frac{POP1600}{POP1500}\right)$. All regressions have the controls noted in Table VII. The sample is restricted to balanced panel of cities with population observed 1500–1800. The t statistics are heteroskedasticity robust and clustered by country. Significance at the 95% confidence level is indicated by **.

From: Dittmar, "The Impact of the Printing Press"

Sufficient Statistic

- Recall: The theory implies that the railroad affects income <u>through</u> its effect on $\sum_k \frac{\mu_k}{\theta_k} \ln \frac{X_{oo}^k}{X_o^k}$.
- Thus: "one should see no additional effects of railroads on welfare once $[\sum_k \frac{\mu_k}{\theta_k} \ln \frac{X_{oo}^k}{X_o^k}]$ is controlled for."
- So (very loosely speaking!) include $\sum_k \frac{\mu_k}{\theta_k} \ln \frac{X_{oo}^k}{X_o^k}$ as another right-hand side variable in $\ln Y_{dt} = \beta_d + \beta_t + \gamma RAIL_{dt} + u_{dt}$, and test $\gamma = 0$.
- Possible concerns?

Table 5: A Sufficient Statistic for Railroad Impact (Step 4)

Dependent variable:	Log real agricultural income per acre, corrected for rainfall	(1)	(2)
Railroad in district		0.169 (0.051)***	0.023 (0.054)
"Trade share", as computed in model			-0.936 (0.131)***
Observations		14,111	14,111
R-squared		0.610	0.634

Notes: OLS Regressions estimating equation (18) using real income constructed from crop-level data on 17 principal agricultural crops (listed in Appendix A), from 235 districts in India, annualy from 1870 to 1930. Dependent variable is log real income, corrected for crop-specific rainfall of each of 17 crops, weighted across crops as in equation (18). Regressions include district fixed effects and year fixed effects. 'Railroad in district' is a dummy variable whose value is one if any part of the district in question is penetrated by a railroad line. 'Trade share' is the share of a district's expenditure that it buys from itself; this varible is computed in the equilibrium of the model, where the model parameters are set to those estimated in Steps 1 and 2, and the exogenous variables (the transportation network, rainfall, and district land sizes) are as observed. Heteroskedasticity-robust standard errors corrected for clustering at the district level are reported in parentheses. *** indicates statistically significantly different from zero at the 1% level; ** indicates 5% level; and * indicates 10% level.

From: Donaldson, "Railroads of the Raj"

Comparison with the Social Saving Approach

- "A social savings calculation in my context would estimate the benefits of railroads to be a 14.8 percent rise in real agricultural income."
- The details: "Hurd (1983) performs a social savings calculation for India, which I adapt here. Hurd uses a transportation price reduction of a factor of four due to railroads; my results from Table 2 suggest that this was an underestimate, so I instead us a reduction of a factor of 5.3 (the average reduction between any pair of districts in my sample). Using this reduction of 5.3 rather than four leads to a social savings of 9.7 percent of aggregate GDP; expressed as a fraction of real agricultural income this is 14.8 percent."

Bottom Line: How Much Do We Learn about Each of the Following in British India?

- The impact of the railroad on trade costs?
- The impact of trade costs on trade flows?
- The impact of the railroad on real incomes?
- The mechanism through which the railroad affected real incomes?

IV. Alessandro Lizzeri and Nicola Persico

"Why Did the Elites Extend the Suffrage? Democracy and the Scope of Government, with an Application to Britain's 'Age of Reform'"

Lizzeri and Persico's Thesis

- The expansion of the franchise in nineteenth century England was in large part voluntary on the part of the elite.

- Changed the political equilibrium from one of rent-seeking and redistribution to public-goods provision, which helped the elite.

Other Possible Explanations for the Expansion of the Franchise

- Threat of social unrest and, potentially, revolution.
- Ideas (justice, rights, fairness, …).

Three General Comments on Political-Economy Models

- Often face problems of existence of equilibrium.
    - For example, in natural baseline models of taxes and transfers, there's no pure strategy equilibrium: For any proposal, it's easy to find an alternative that makes a majority better off.
- Often face puzzles about participation.
    - Why do so many people vote? Why do people protest (or riot, or revolt)?
- Often imply that ideas (ranging from "All men are created equal" to "Price controls cause distortions") are irrelevant.

A Little Bit on Lizzeri and Persico's Model

- The challenge they face: constructing a model where people voluntarily give up something that seems obviously beneficial to them.
- Key idea: With limited suffrage, the political equilibrium takes the form of targeted redistribution, but this is no longer sustainable with broad suffrage.
- If possible, the elites would like to broaden participation in decisions about public goods, but not about redistribution.
- L & P's task is much easier if they want to argue that these considerations greatly reduced the costs to the elite of reducing their political power, rather than arguing that they made the costs negative.

Lizzeri and Persico's Evidence – Key Propositions They're Trying to Test

- Before reform, the value to the elite of public goods was growing.
- Before reform, targeted transfers were a central electoral strategy; public-goods provision was not.
- Reform was followed by increased provision of public goods.
- Reform was followed by a shift away from electoral strategies based on targeted transfers and toward ones based on public-goods provision.
- Reform was different for decisions about public goods provision than for decisions about redistribution.

Lizzeri and Persico's Evidence – Types

- Facts (for example, about spending on public goods and voting patterns).
- Views of contemporaries.
- Views of modern experts.

Lizzeri and Persico's Evidence – Concerns?

- Organization? (Five key aspects, three types of evidence, so hard!)
- How to make systematic? How to avoid bias? (For example, one could have a clearly delimited set of contemporary sources that one considered.)
- One of their key propositions – reform was different for decisions about public goods provision than for decisions about redistribution – appears to have failed spectacularly in the long run.

Evaluation of Lizzeri and Persico?