A course on the Global Transport Revolution: From the Age of Sail through the Age of Steam

Dan Bogart

Department of Economics UC Irvine

December 2024: School of Economics, Tor Vergata University of Rome

A course for students doing a PhD in Economics and Finance

scheduled on Dec. 16 at 2 – 5 pm, 17 at 10 am – 1 pm, and 18 at 2 – 5 pm.

Within the course, Carlo Ciccarelli, University of Rome Tor Vergata, will give a lecture on "Infrastructure and growth" with a special focus on Italy, on Dec. 23 at 10 am – 1 pm.

- classroom ~~B (1st floor, bldg B)~~ - Sala Marini (2nd floor, bldg B)

Students are expected to attend the 2024 Rome Workshop on Transport and History, Dec. 19 and 20, https://economia.uniroma2.it/cal/2381/2024-rome-workshop-on-transport-and-history

Overview of the course by

I. The Global Transport Revolution
   a. Transport improvements led to some of the most significant changes in human history. Greater ability to trade and travel over vast distances has been fundamental.
   b. Transport improvements have been occurring since the beginning of human history, however, a key shift occurred around 1500 with improvements in ocean navigation. This led to the birth of a global economy, increasing the extensive margin of trade.
   c. From the 1500s onward, transport began to improve at a faster rate, especially following the introduction of steam power in the early nineteenth century.
   d. Transport has continued to improve through the twentieth century, for example with internal combustion engines and container ships, and up to the present with electric vehicles. The future of transport is likely to be equally revolutionary.

e. This course is going to study the Global Transport Revolution from the Age of Sail through the Age of Steam, roughly from 1500 to 1913.
f. It will focus on multiple transport modes (e.g., ships, inland barges, wagons, coaches, railways) as their effects were different.
g. It will take a global perspective, as all parts of the world were affected by major transport innovations, although not to the same degree.

II. Key themes

a. Shipping has been improving for centuries, well before the arrival of steam-power.
b. The locus of shipping innovation has typically been concentrated in a few highly developed economies. Innovators came from the public and private sectors. Yet, the gains from shipping innovations were broadly distributed. The fixed costs of introducing shipping innovations into an economy were low in the Age of Sail and competition was more the norm than the exception.
c. Internal transport was traditionally based on navigable rivers and estuaries. Internal improvements largely started with canals, where innovation accelerated in the 1700s. A few developed economies led in canal innovations and most canals were mainly built in those economies.
d. The gains from canals were more narrowly distributed from a global perspective. The high fixed costs of building canals and the political support which they required were not generally present. Canals made networks a relevant feature of transport improvements.
e. Railways exemplify how the steam-power innovations of the industrial revolution changed internal transport. They represented a dramatic improvement in speed and cost, especially where inland waterways were absent.
f. Railways were built throughout the world by the early twentieth century. Yet, the size of networks varied dramatically with the most advanced economies of the early nineteenth century having the largest. Like canals, railways required high fixed costs and political support was needed. While all economies benefitted from railways, they contributed to the divergence in incomes across the world after 1870. Railways also led to the spatial reorganization of economies, especially greater urbanization.
g. Steamships were similar to railways in bringing the revolutionary impact of steam-power. Steamships greatest advantage was in speed, giving rise to a new form of international passenger travel and migration. Steam's displacement of sail took decades but was nearly complete by World War I.
h. Steamships were built in a few economies where innovation was occurring, and their ownership was also relatively concentrated, although in a broader set of economies. Yet steamships impacted all economies as it was relatively low cost for steamships to be introduced and competition was moderate to vigorous. The

gains from steamships were broad as it was possible to scale steamship use according to the size of the economy.

III. Remarks on scope, methodology and related literature

a. Most of the literature on transport focuses on a single mode (often railways or steamships) and generally on a single economy (often the US or Britain). There are many great works along these lines, and we will learn about some here (its truly a vast literature).
b. There are relatively few works in the literature, which take an inter-modal perspective (e.g., studying canals and railways) or a long-run perspective (e.g., shipping over centuries).
c. We will compare different modes and study long-term change from the Age of Sail through the Age of Steam, roughly 1500 to 1913. It covers a period of momentous change. Of course, it leaves out the 20th century, nevertheless we can deduce general features, which might help in preparing for future transport change.
d. There are few works which take a truly global perspective on transport. Why do so? The global story helps us understand how the same transport technology can have different effects across economies, with the level of pre-innovation development being key. I believe a global perspective on the past can help us understand the distributional shifts that will come in the future.

IV. Related readings

General and methodological

Bagwell, Philip. The transport revolution 1770-1985. Routledge, 1988.

Barker, Theodore Cardwell, and Dorian Gerhold. The rise and rise of road transport, 1700-1990. Vol. 21. Cambridge University Press, 1995.

Bogart, Dan. "A global perspective on railway inefficiency and the rise of state ownership, 1880–1912." Explorations in Economic History 47.2 (2010): 158-178.

Bogart, Dan. "Clio on speed: a survey of economic history research on transport." Handbook of cliometrics (2024): 2359-2384

Mohammed, Saif I. Shah, and Jeffrey G. Williamson. "Freight rates and productivity gains in British tramp shipping 1869–1950." Explorations in Economic History 41.2 (2004): 172-203.

Taylor, George R. The transportation revolution, 1815-60. Routledge, 2015.

Innovation in the Age of Sail.

Kelly, Morgan, Cormac Ó. Gráda, and Peter M. Solar. "Safety at sea during the industrial revolution." The Journal of Economic History 81.1 (2021): 239-275.

Bogart, Dan, et al. "Speedier delivery: coastal shipping times and speeds during the Age of Sail." The Economic History Review 74.1 (2021): 87-114.

Kelly, Morgan, and Cormac Ó Gráda. "Speed under sail during the early industrial revolution (c. 1750–1830)." The Economic History Review 72.2 (2019): 459-480.

Bogart, Dan and Marco Del Angel. East Indiamen: East India Company shipping and Asian trade 1610-1830 (R&R Cliometrica, May 15, 2024 draft).

Solar, Peter M. "Opening to the East: shipping between Europe and Asia, 1770–1830." The Journal of Economic History 73.3 (2013): 625-661.

Erikson, Emily, and Peter Bearman. "Malfeasance and the foundations for global trade: The structure of English trade in the East Indies, 1601–1833." American Journal of Sociology 112.1 (2006): 195-230.

Rahman, Ahmed S. "Fighting the forces of gravity–Seapower and maritime trade between the 18th and 20th centuries." Explorations in Economic History 47.1 (2010): 28-48.

Shepherd, James F., and Gary M. Walton. "Trade, distribution, and economic growth in colonial America." The Journal of Economic History 32.1 (1972): 128-145.

Burnard, Trevor, Laura Panza, and Jeffrey Williamson. "Living costs, real incomes and inequality in colonial Jamaica." Explorations in Economic History 71 (2019): 55-71.

Dalrymple-Smith, Angus, and Ewout Frankema. "Slave ship provisioning in the long 18th century. A boost to West African commercial agriculture?." European Review of Economic History 21.2 (2017): 185-235.

Canals and the pre-steam transport revolution

Bosker, Maarten, Eltjo Buringh, and Jan Luiten Van Zanden. "From baghdad to london: Unraveling urban development in europe, the middle east, and north africa, 800–1800." Review of Economics and Statistics 95.4 (2013): 1418-1437.

Hadfield, Charles. The Canal Age, 1981.

Bogart, Dan. "Did the Glorious Revolution contribute to the transport revolution? Evidence from investment in roads and rivers." The Economic History Review 64.4 (2011): 1073-1112.

Bogart, Dan. "Party connections, interest groups and the slow diffusion of infrastructure: Evidence from Britain's first transport revolution." The Economic Journal 128.609 (2018): 541-575.

De Vries, Jan. Barges and Capitalism: Passenger Transportation in the Dutch Economy, 1632-1839, 1981.

Geiger, Reed. "Planning the French Canals: The “Becquey Plan” of 1820–1822." The Journal of Economic History 44.2 (1984): 329-339.

Bogart, Dan, Michael Lefors, and A. E. M. Satchell. "Canal carriers and creative destruction in English transport." Explorations in Economic History 71 (2019): 1-24.

Harrison, James M. "Exploring 200 years of US commodity market integration: A structural time series model approach." Explorations in Economic History 88 (2023): 101514.

Chankrajang, Thanyaporn, and Jessica Vechbanyongratana. "Canals and orchards: the impact of transport network access on agricultural productivity in nineteenth-century Bangkok." The Journal of Economic History 80.4 (2020): 996-1030.

Allen, Robert C. "The transportation revolution and the English coal industry, 1695–1842: a geographical approach." The Journal of Economic History 83.4 (2023): 1175-1220.

Eduard J Alvarez-Palau, Dan Bogart, Max Satchell, Leigh Shaw Taylor, “Transport and urban growth in the first Industrial Revolution” (conditional accept Economic Journal, Sept. 9, 2024 draft)

Railways and the steam-powered transport revolution

Crafts, Nicholas. "Steam as a general purpose technology: a growth accounting perspective." The Economic Journal 114.495 (2004): 338-351.

Leigh Shaw-Taylor and Xuesheng You, “The development of the railway network in Britain 1825-1911”

Ciccarelli, Carlo, Cosimo Magazzino, and Edoardo Marcucci. "Early development of Italian railways and industrial growth: A regional analysis." Research in Transportation Economics 88 (2021): 100916.

Ciccarelli, Carlo, and Stefano Fenoaltea. "Social-overhead construction in Italy's regions, 1861–1913." Research in Economic History. Emerald Group Publishing Limited, 2008. 1-80.

Ciccarelli, Carlo, James Fenske, and Jordi Martí Henneberg. Railways and the European Fertility Transition. No. 1477. University of Warwick, Department of Economics, 2023.

White, Richard. Railroaded: The transcontinentals and the making of modern America. WW Norton & Company, 2011.

Mercer, Lloyd J. Railroads and land grant policy: a study in government intervention. Elsevier, 2013.

Bogart, Dan, and Latika Chaudhary. "Railways in colonial India: An economic achievement?." A new economic history of colonial India (2015): 140-160.

Summerhill, William R. "Market intervention in a backward economy: railway subsidy in Brazil, 1854-1913." Economic History Review (1998): 542-568.

Lewis, Colin M. "The financing of railway development in Latin America, 1850-1914." Ibero-Amerikanisches Archiv 9.3/4 (1983): 255-278.

Huenemann, Ralph William. The dragon and the iron horse: the economics of railroads in China, 1876-1937. Harvard University, 1982.

Bogart, Dan, Latika Chaudhary, and Alfonso Herranz-Loncán. "The growth contribution of colonial Indian railways in comparative perspective." The Economic History Review 77.4 (2024): 1509-1534.

Hornbeck, Richard, and Martin Rotemberg. "Growth off the rails: Aggregate productivity growth in distorted economies." (2024).

Bogart, Dan. "Nationalizations and the development of transport systems: cross-country evidence from railroad networks, 1860–1912." The Journal of Economic History 69.1 (2009): 202-237.

Steamships: a parallel revolution to railways?

Harley, C. Knick. "Ocean freight rates and productivity, 1740–1913: the primacy of mechanical invention reaffirmed." The Journal of Economic History 48.4 (1988): 851-876.

Harley, Charles K. "The shift from sailing ships to steamships, 1850-1890: a study in technological change and its diffusion." Essays on a mature economy: Britain after 15 (1840).

Mohammed, Saif I. Shah, and Jeffrey G. Williamson. "Freight rates and productivity gains in British tramp shipping 1869–1950." Explorations in Economic History 41.2 (2004): 172-203.

Cohn, Raymond L. "The transition from sail to steam in immigration to the United States." The Journal of Economic History 65.2 (2005): 469-495.

Ojala, Jari, and Stig Tenold. "Maritime trade and merchant shipping: The shipping/trade ratio since the 1870s." International Journal of Maritime History 29.4 (2017): 838-854.

Pascali, Luigi. "The wind of change: Maritime technology, trade, and economic development." American Economic Review 107.9 (2017): 2821-2854.

Jacks, David S., and Krishna Pendakur. "Global trade and the maritime transport revolution." The Review of Economics and Statistics 92.4 (2010): 745-755.

Lynn, Martin. "From Sail to Steam: the Impact of the Steamship Services on the British Palm Oil Trade with West Africa, 1850–1890.1." The Journal of African History 30.2 (1989): 227-245.

Solar, Peter M. "Shipping and economic development in nineteenth-century Ireland 1." The Economic History Review 59.4 (2006): 717-742.

Carlo Ciccarelli – "Infrastructure and growth", with a special focus on Italy, Dec. 23

- Transport and development in Italy, 1839-1913
- Railways and the demand for industrial products
- The steam locomotive industry
- Railways and regional industrialization
- Railways and the unification of the market
- The return on investment

References

Ciccarelli, C., Magazzino, C. and E. Marcucci (2021), "Early development of Italian railways and industrial growth: A regional analysis." *Research in Transportation Economics* 88 (2021): 100916.

Ciccarelli, C., Nuvolari, A. (2015), "Technical Change, Non-Tariff Barriers, and the Development of the Italian Locomotive Industry, 1850–1913", *Journal of Economic History* 75, 3, pp. 860-888.

Fenoaltea, S. (2001), *The Reinterpretation of Italian Economic History: From Unification to the Great War*, Cambridge University Press, Chapter 5.