The Great Telegraph Breakthrough of 1866

The transatlantic telegraph cable amounted to the information revolution of the day, tying global markets together in unprecedented ways

BY HELEN FESSENDEN

At the height of summer in 1866, U.S. newspapers were abuzz with the news of a technological marvel: A transatlantic telegraph cable successfully linked the United States with Great Britain. Completed on July 27, the cable generated congratulatory headlines across the country and ushered in a new era of "real-time" journalism.

"Since Sunday morning we may say that America has been in direct telegraphic communication with Europe," announced the *New York Herald* on July 31. "Intelligence of vast importance to the interests of the latter continent ... has reached us on the submarine wire."

Rather than taking a week or more by ship, this information was transmitted within a day. And it wasn't just about war and foreign intrigue but about the markets connecting the two continents. In record time, the prices of commodities traded on both sides of the ocean could be transmitted to merchants who needed that information to buy or sell their product. Newspapers at the time noted this particular salience for commerce, with the *New York Herald* commenting that the "cable and the news which was flashed over it exerted a controlling influence in business circles," including in grain, coffee, cotton, and gold.

What the *Herald* called a "controlling influence" has relevance for economists today in understanding how technology and information intersect in the context of information frictions. These frictions occur when buyers and sellers lack timely access to information that enables markets to function efficiently, such as prices or the drivers of supply and demand. In the context of trade, these frictions can lead importers and exporters to misjudge markets and misprice goods. This can produce a deadweight loss, when diminished efficiency means that both sides are unable to maximize the gains from trade — similar to the effect of formal trade barriers, such as tariffs.

Economists have been increasingly studying the role of technology, in particular, as a way to break down information frictions and make markets more transparent. This field of inquiry applies not just to trade but to any kind of economic activity, especially when real-time information is critical but difficult to find. For example, economists have looked at the effect of Internet shopping on life insurance markets — cheaper on net for consumers, according to Jeffrey Brown of the University of Illinois at Urbana-Champaign and Austan Goolsbee of the University of Chicago. As these and other studies suggest, the speed and ease of online shopping can reduce these frictions for consumers.

To anyone who surfs websites to shop, these insights are intuitive. But as the case of the transatlantic telegraph cable shows, history is rich with examples of how earlier breakthroughs had similar effects. In a stroke, the cable helped reshape many U.S. industries, including one of the biggest exports, raw cotton, ultimately growing U.S. exports through increased efficiency.

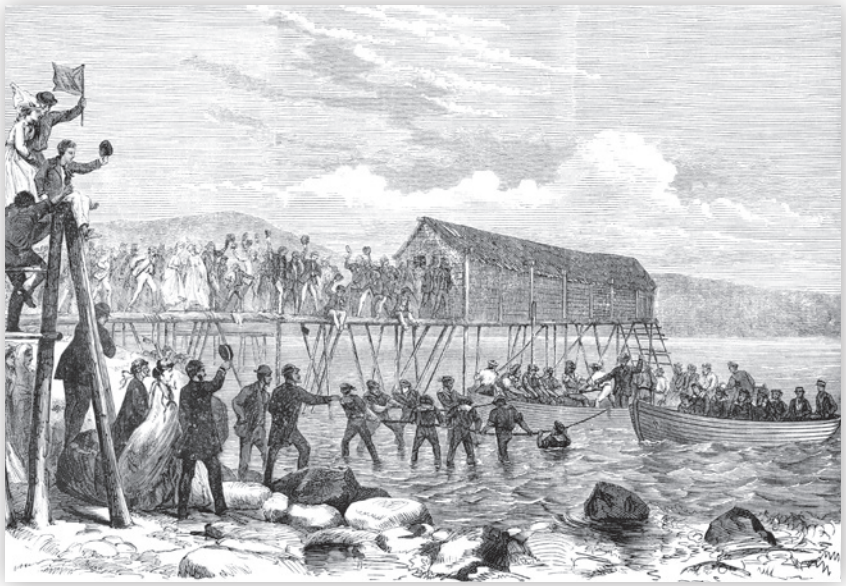
This story has special resonance in the Fed's Fifth District, especially in the Carolinas, where the cotton industry recovered with surprising speed in the years following the Civil War. Even though cotton production and exports sharply fell during the war, both rebounded to prewar levels by 1870. In particular, the communication revolution that the telegraph ushered in helped turn splintered local markets into a national network, leading to the 1871 founding of the New York Cotton Exchange.

Missed Connections

By the time the cable joined the two sides of the Atlantic, the telegraph's reach had been expanding in the United States for more than two decades. In 1844, inventor Samuel Morse attempted an experiment to see whether electromagnetism could be applied to telecommunications, resulting in the first telegraph line, between Washington, D.C., and Baltimore, on which he famously clicked "What hath God wrought?" By 1851, there were 75 companies that connected major U.S. cities through multilateral monopolies, in which different lines often competed on the same links but cooperated via connecting lines. This hodgepodge of networks led to poor and overlapping service, which was gradually resolved through greater system integration and horizontal integration by the late 1850s.

Despite this progress on the domestic front, it took multiple attempts, starting in 1857, for engineers to succeed in laying the transatlantic cable amid challenges posed by bad weather and deep-sea terrain. The string of failures fed growing public pessimism; there was even speculation that the idea of a working connection was a hoax. But on the fifth try, under the supervision of financier Cyrus Field, a cable between Newfoundland and Ireland finally linked the two continents. The first messages transmitted included a congratulatory note from Queen Victoria, news of Otto von Bismarck's victory over the Austrian army — and cotton prices, which were quoted in both New York and Liverpool.

Why were cotton prices so prominent in those initial reports? Most cotton was sent to U.S. ports for export, with New York City as the most important hub linking U.S. producers to importers in England. In turn, British textile workers spun raw cotton into finished cloth, which was sold for domestic consumption and for export. Prior to the transatlantic cable, however, there was often a lag between the price of cotton quoted in Liverpool and what was quoted in New York, often by a week or more, depending entirely on ship travel. One common problem was that the information on foreign demand that New York merchants got from Britain was outdated, so it was difficult to make accurate purchasing decisions. Moreover, foreign demand fluctuated considerably, especially on the European continent. (Building up storage capacity could only partly address this issue, due to the fire hazard posed by cotton and prohibitive construction costs.) In short, this was a classic case of information frictions causing inefficiencies in trade.



Transatlantic telegraph cable arrives at Heart's Content, Newfoundland, July 27, 1866. Engraving by unknown artist.

At the same time, the cotton trade was adjusting to profound shocks on both the supply and demand side. Prior to the Civil War, U.S. cotton production — supported almost entirely by African-American slave labor — rapidly expanded to meet growing demand abroad for textiles. In 1860, about 70 percent of U.S. raw cotton was shipped to Britain, which came to almost 60 percent of all U.S. exports in terms of dollar value. On Britain's side, U.S. cotton was an overwhelming share (almost 90 percent) of all cotton imports and highly favored due to its strength and high quality.

This changed abruptly with the onset of the Civil War and the highly effective Union blockade, which caused cotton exports to drop by more than 90 percent within a year. One solution for Britain was to cultivate new sources for cotton, including India, which soon became a leading supplier. But once the war and blockade ended, foreign demand for U.S. cotton rebounded. With the abolition of slavery, sharecropping became the dominant labor arrangement in the South. Postwar production and exports grew quickly enough that by 1870 they reached their volumes of the late 1850s.

What Hath Morse Wrought?

In several recent papers, Massachusetts Institute of Technology economist Claudia Steinwender has studied the effects of the transatlantic telegraph breakthrough of July 1866, as a critical positive shock to cotton markets. The fact that this shock was instant and independent of outside economic conditions, she notes, makes it easier to see how it affected prices and markets right away. And indeed, by comparing prices on both sides of the Atlantic, she found there was an abrupt change. Whereas the average difference between New York and Liverpool prices was 2.56 pence per pound of cotton prior to the cable, it fell to 1.65 pence per pound — a drop of more than a third — right after. Furthermore, the transatlantic price differences were much less subject to major swings.

In turn, thanks to more timely and accurate information, New York traders were better able to adjust export volumes to meet fluctuations in foreign demand. Rather than spend money on costly storage, which required leaving some of their product idle, exporters could calibrate their shipments more efficiently. In Steinwender's calculations, this boosted average daily cotton exports by 37 percent. The variance in daily volume increased even more, by 114 percent — reflecting the fact that exporters were able to make these adjustments quickly. Overall, she concluded, the cotton trade experienced an 8 percent efficiency gain in annual export value, mostly from the reduced variations in price differences due to the cable. Put another way, this efficiency gain was equivalent to a 20 percent drop in storage costs, or the elimination of a 7 percent ad valorum tariff.

"This is a case of how a technological breakthrough addressed a classic puzzle in trade," says Steinwender. "Information about foreign demand is not a given. Exporters don't know how much those markets need and how much they will pay. So how do you know how much you can supply those markets?"

In a recent paper co-authored with Columbia University's Réka Juhász, Steinwender extended this analysis to see how the telegraph's information revolution affected the global textile industry's supply chain. They found that its impact was especially concentrated in boosting trade in intermediate goods like yarn and plain cloth, for which information could be most easily transmitted by telegraph rather than require the inspection of physical samples. More broadly, the telegraph helped diffuse information about the technology used in the production process.

The Real-Time Effect

As this work suggests, the transatlantic telegraph cable had a profound impact on the cotton trade. But even before 1866, the telegraph was reshaping domestic markets as well.

To be sure, the telegraph was too pricey for frequent personal use. One reason why prices stayed relatively high was that they were largely set by Western Union, which had become the dominant provider during the Civil War and consolidated its monopoly status by 1866; until 1900, it enjoyed a market share of 90 percent or more in each state. In those decades, rates fell from $1.09 to $0.30 per message, but Western Union still netted $0.30 to $0.40 per dollar of revenue. (For comparison, mail postage was only pennies, while the average hourly wage in 1901 was around $0.25.)

Because of the telegraph's real-time value, however, certain industries — notably railways, newspapers, and finance — quickly found important applications in the 1840s and 1850s. The instant transmission of prices in commodities markets and financial assets, for example, helped cut out middlemen who used to benefit from arbitrage, while wholesalers and retailers became more tightly linked in a truly national economy. The telegraph also aided the railway industry by allowing single tracking through timely signaling, rather than requiring two tracks to avoid collisions. This innovation facilitated the transport of goods across the country as it became linked by rail; by the estimation of economist Alexander Field, the efficiency gain came to around 7 percent of GDP by 1890.

Meanwhile, beyond cotton, the transatlantic cable's effects could be seen in other pockets of global markets. One case in financial markets was the common shares of the New York and Erie Railroad, which were traded in both Britain and the United States. Economist Christopher Hoag of Trinity College has studied how the advent of the cable equalized share prices, finding the telegraph was correlated with a reduction in the transatlantic difference in prices from 5 percent to 10 percent before to 2 percent to 3 percent after. U.S. bonds that traded in U.S. and London markets also saw their prices converge. More broadly, the telegraph cable played a direct role in stimulating trade in general in the latter part of the 19th century, especially in the years immediately after 1866, due to improved coordination of shipping and timelier transmission of market-sensitive information, according to Trent University economists Byron Lew and Bruce Cater.

Cotton's Revival

Postwar cotton production and exports in the South, including in the Carolinas, both rebounded quickly even as other cotton-producing countries expanded their reach.

Did the efficiency gains in exports resulting from the telegraph cable play a role in this domestic recovery? According to Steinwender, a very rough estimate is that the United States benefited more on net than Britain, receiving perhaps 75 percent of efficiency gains. "But as to how this was distributed across producers, middlemen, and speculators is harder to resolve," she adds. "The data don't provide a clear answer on how the gains from higher exports and higher prices were distributed domestically."

More broadly, however, the telegraph's information revolution was one of the factors behind another market innovation — the introduction of futures trading in 1871 with the New York Cotton Exchange. With a telegraph network connecting London with New York and the major cotton centers in the South, merchants could conduct spot and futures trading based on multiple reports a day. The exchange played a leading role in cotton market integration in the following years in its function as a clearing house, reducing the role of local middlemen (who charged commissions) and helping regional growers market crops nationally. Notably, the exchange also allowed merchants to hedge through futures trading, which was especially important given the volatility of cotton prices; once a commodity was hedged, it was easier for merchants and shippers to secure credit. In turn, the growth of a nationally integrated cotton market helped spur the development of North Carolina's textile sector in the late 19th century as raw cotton from across the South was diverted to domestic textile production.

The disruptive role of technology in this era did not go unnoticed by one observer at the time. In an 1870 report, William Forwood, a Liverpool Chamber of Commerce official, addressed the Civil War's effects on supply, demand, and prices and the broader global response. Amid the turmoil in the cotton market, he concluded, the higher prices resulting from the wartime drop in U.S. supply brought in new producers, while advances in communication and transportation encouraged activity in previously quiet markets, not to mention more efficient cultivation. "As water finds its level, so will price regulate supply," he wrote. "[B]ut these maxims have never been so fully demonstrated as during the crisis through which the greatest trade of the world has gone during the past 10 years." **EF**

Readings

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