The Disintegration and Re-integration Of International Capital Markets in the 19th Century

Larry Neal
University of Illinois

The technological advances that occurred in transportation and communication in the late nineteenth century -- steamships, railroads, telegraph networks and telephone connections -- first made it possible to envision that markets could in fact reach their maximum extent to the farthest ends of the earth. In response, trade flows grew enormously as did international movements of labor and capital. The prospect of a global marketplace for goods, labor, and capital that appeared was dashed by the disruptions of World War I. In its aftermath, the peace treaties created a series of new nation-states intent on attaining, or maintaining, a distinctive role within well-defined trade blocs. The division of Europe after World War II permitted the gradual breaking down of the trade blocs of the 1930s for the Western countries, but left Eastern Europe and the Soviet Union out of the new trading networks that emerged. The collapse of the centrally planned economies of Eastern Europe and the Soviet Union in 1989 has raised again the possibility of a truly global economy, at the very least for capital markets. In sum, it is clear that for most of the twentieth century institutional developments have effectively thwarted the appearance of the global marketplace that the technology of the nineteenth century created.

What is not so clear is the relative importance of technological and institutional changes over the course of the nineteenth century in creating the global capital markets of 1914. These were the century-long result of recovery from a serious, nearly fatal, disruption of the integrated capital markets in Europe that had occurred at the beginning of the nineteenth century. The French Revolutionary and Napoleonic Wars (1789-1815) broke for a quarter of a century the personal and pecuniary links that had tied together a network of sophisticated capital markets existing throughout the eighteenth century. These had arisen to meet the credit needs of merchants participating in the commercial revolution that had culminated in the seventeenth century. Governments responsive to the political pressures of the cosmopolitan bourgeoisie had proven that the profits of merchants were compatible with the exercise of military and naval power [2, 6]. In short, the progress of the nineteenth century towards globalization was not merely a case of

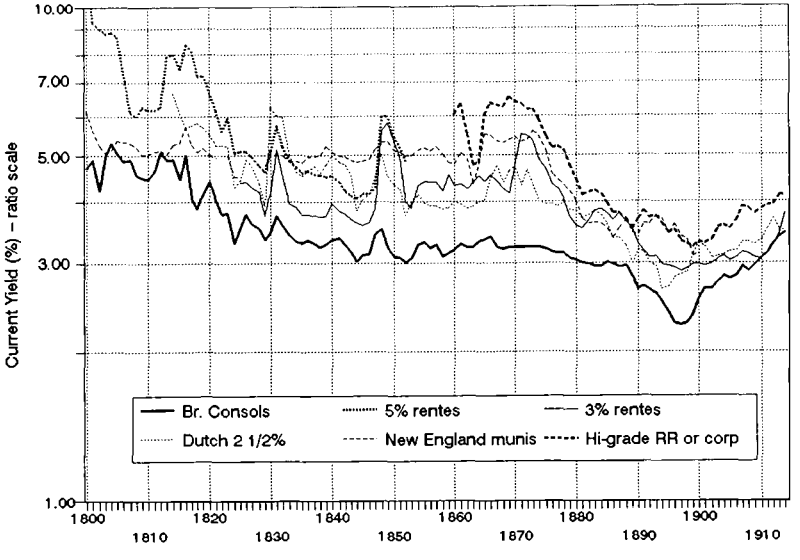
BUSINESS AND ECONOMIC HISTORY, Second Series, Volume Twenty-one, 1992.
 ISSN 0849-6825.

technological advances reducing transactions costs between geographically separate markets. It was also a case of institutional changes and adaptations made to exploit the new technologies (and new markets) or to protect vested interests or sometimes both. The international capital markets that emerged in Europe and North America over the course of the nineteenth century illustrate well the interplay of technological and institutional change that occurred. Their history may be especially useful to explore now that nation-states are attempting to reconstitute the kinds of capital flows that characterized the world before World War I.

An Overview of Nineteenth Century Interest Rates

One way to grasp the progress of integration of international, or at least transatlantic, capital markets in the nineteenth century is to observe the course of yields over the period 1800-1914 for long-term bonds issued by responsible governments. Figure 1 puts together the series presented in Homer and Sylla's *History of Interest Rates* [3] for Great Britain (3% Consols until the conversion to 2½% Consols in 1888), France (5% *rentes* to 1824; 3% rentes 1825-1900), the Netherlands (2½% perpetual annuities, 1814 on), and

Figure 1. Long Term Interest Rates on Gov't Bonds
Britain, France, U. S., Netherlands



Source: Sidney Homer and Richard Sylla, A History of Interest Rates, 3rd ed., New Brunswick, NJ: Rutgers University Press, 1991.

the United States (New England municipal bonds to 1860, long term railroad bonds to 1898, and high grade, long-term corporate bonds thereafter). While Homer's original work has been superannuated by more recent scholarship in

particular countries and certain time periods, there is still no replacement for the broad overview he provides of comparable long term rates. Homer was persuaded that capital markets were always integrated, at least in the sense that comparable conditions in different places and times would yield comparable interest rates. This vision of integration suggests that competitive societies will eventually imitate the most successful institutional arrangements they have among them. It does not rely much upon actual movements of funds occurring among the societies, much less that the same securities be available for investors in the various interrelated markets. Rather, it merely requires that comparable securities be available in each country on the same terms to investors both domestic and foreign. Competition can then be assumed to be feasible among the securities of each society and convergence will eventually emerge in their prices, regardless of who holds them or whether cross-border trades actually occur. Information flows must occur, of course, but it is not really necessary that funds move for prices to move in concordance. It must be a live possibility, however, that funds will move if prices do not converge. In this view of the integration and convergence process, the underlying securities displayed in Figure 1 must have similar terms and conditions for the common pool of potential investors, and to the extent they vary, the superior security overall will consistently have the lowest yields. This may be called the level concept of integration -- the important thing is how close together are the price levels of the good or service (long term government debt, in this case) in the various markets where it is available.

The consistently lower yield on British consols compared to the best bonds produced by the other leading capitalist economies in the nineteenth century simply confirmed for Homer the leadership of British society in this period. Against this benchmark the French and Dutch made relative progress until the revolutions of 1830. The French resumed their convergence with the July Monarchy while the Dutch were repulsed by the independence of a dynamic Belgium. But it was only after the universal adoption of the gold standard at the end of the 1870s that widespread convergence took place. (Homer does not draw this conclusion explicitly, preferring here as throughout simply to present his data and let the reader devise his own explanations of the patterns.) Despite the obvious superiority of the British system and the successful imitation of its virtues by the Dutch and French governments, the U. S. government insisted throughout on maintaining a distinctly different system. In place of perpetual and non-callable annuities, the U. S. issued fixed term bonds with the option of calling them in after a much shorter period if they reached par. During the Jackson presidency, the government debt disappeared entirely. When it reappeared on a large scale during the Civil War, it entered a market distinctly different from the European due to the National Banking System and the requirement that notes issued by the National Banks be backed by holdings of Federal government debt. Homer argues that the American securities that came closest to offering investors the same kinds of terms and conditions as the European perpetual annuities were New England municipal bonds, at least until the Civil War, and then high grade railroad and industrial corporation bonds until 1914.

Another view of market integration, more commonly used by economists today, is to see if price rates of change are closely correlated. This seems to be the case for the American, Dutch, and French bond yields in the period up to the American Civil War, when the fluctuations in each are much more marked than in the British Consols. Table 1 summarizes some crude pairwise regressions among the four series. These confirm that from this perspective on market integration the silver standard governments were most closely integrated in the period between the Napoleonic and Crimean Wars.

In sum, Homer's results convey the impression of disjointed capital markets in Europe at the beginning of the nineteenth century. The basic long term interest rates in each country compiled by Homer derive their significance from serving as the benchmark for all other credit operations in the respective economies. Certainly, the differences in bond yields reflect also, as Homer implies in his narrative, differences in the perceived qualities of the respective governments as well as technical differences in the terms each security. The French *rentes* and the Dutch perpetual bonds were both modeled upon the highly successful Three Per Cent Consols in Britain and both countries had sound fiscal systems for paying regularly the promised dividends to holders, both at home and abroad. · Only the U. S. government bonds, with their fixed terms and call provisions, backed by a very weak central government until the Civil War, were so different in nature as to be non-comparable for the first half of the nineteenth century. For the Dutch and French securities, a good part of the difference is due to the nature of the markets of the time. The capital markets of Europe were no longer as closely integrated as they had been before the French Revolution.

The reasons for this seem clear. The French Revolution irrevocably eliminated the tax preferences for the nobility and clergy throughout continental Europe, enlarging enormously the implicit tax base for each nation's goverment. But this in turn meant that investors were more aware of the taxes they would have to pay to the central government and necessarily became more nationalistic in their behavior. We are speaking in matters of degree of course, and the extent to which tax-hungry new governments discouraged foreign investors at the beginning of the nineteenth century was perceptible only by eighteenth century standards. Nevertheless, it appears that within Europe cross-national holdings of government "stock" diminished in the second quarter of the nineteenth century. Some evidence to support this conjecture will now be presented.

The Disintegration of Capital Markets at the Beginning of the 19th Century

To gain some insights into the process of re-integration after a long period of dis-integration of capital markets, it is useful to compare the disruptive period at the beginning of the nineteenth century with that of the eighteenth century after the South Sea Bubble [6, Ch. 11]. From the accession of William III, Prince of Orange and Stadthouder of Holland, to the throne of England in 1688, the financial markets of London and Amsterdam were closely linked. After the South Sea Bubble of 1720, a large stock of English securities were held by Dutch investors and traded among them on the

TABLE 1. REGRESSIONS OF VARIOUS BOND YIELDS ON YIELDS OF BRITISH CONSOLS

French *rentes* on British consols

Period	Constant	Coeff.	R^2
1799-1827 (5%)	-0.06	0.22	.01
1827-1852 (5%)	0.01	1.06	.27
1826-1852 (3%)	0.01	1.33	.28
1852-1870 (3%)	-0.01	1.31	.27
1871-1893 (3%)	0.01	0.71	.06
1894-1914 (3%)	0.00	0.38	.19

Dutch perpetual annuities on British consols

Period	Constant	Coeff.	R^2
1815-1848 (2.5%)	-0.00	0.63	.15
1849-1873 (2.5%)	-0.00	0.84	.19
1874-1896 (2.5%)	-0.02	-0.21	.01
1897-1914 (2.5%)	0.00	0.46	.10

Dutch perpetual annuities on French *rentes*

Period	Constant	Coeff.	R^2
1815-1848 (2.5%)	-0.00	0.58	.21
1849-1873 (2.5%)	-0.01	0.18	.05
1874-1896 (2.5%)	-0.01	0.27	.06
1897-1914 (2.5%)	0.01	-0.02	.00

U.S. analogous bonds* on British consols

Period	Constant	Coeff.	R^2
1799-1825 (NE)	-0.01	0.21	.21
1826-1852 (NE)	0.00	0.22	.24
1853-1879 (rr)	-0.01	0.90	.10
1897-1914 (rr)	-0.02	0.05	.00
1898-1914 (corp)	0.00	0.41	.12

*New England municipals to 1860; U.S. railroad bonds to 1898; high grade corporate bonds to 1914.

All series are taken from [3]. First differnces of the natural logarithms are taken to yield annual percentage changes in the yields.

TABLE 2.

Panel A. Regression results, 3% Consols, Amsterdam-London price differences, 1802-25[1]

	DAYSDIVD[2]	AMEXPM[3]	PAYTIME[4]	CONSTANT	R^2	DW Observations
1802-07[5]	.006 (2.32)[6]	-0.46 (-1.17)	.002 (1.05)	0.52 (0.380	.02	2.31 301
(adjusted for serial correlation, rho = 0.525)						
1808-09[5]	.003 (0.50)	-0.18 (-0.38)	-0.003 (-1.05)	0.019 (0.11)	-.02	2.15 103
(adjusted for serial correlation, rho = 0.795						
1808-09[5]	.008 (3.77)	-0.13 (-1.22)	0.007 (2.90)	-.171 (-.93)	.07	2.12 240
(adjusted for serial correlation, rho = 0.379						
1808-25[5]	.005 (2.92)	-.028 (-1.22)	-.001 (-.36)	.232 (1.53)	.02	2.12 373
(adjusted for serial correlation, rho = 0.449						

Panel B. Regression results, East India Co., Amsterdam-London price differences, 18th century

	DAYSDIVD[2]	AMEXPM[3]	PAYTIME[4]	CONSTANT	R^2	DW Observations
1783-90[5]	.020 (7.33)	-0.28 (-2.99)	.839 (1.55)	.359 (1.34)	.33	1.79 185
1790-4[5]	0.16 (2.92)	-0.10 (-0.50)	1.776 (0.71)	.709 (1.11)	.19	1.69 75

[1]Dependent variable is Amsterdam - London price on same day

[2]DAYSDIVD = days to next dividend payment

[3]AMEXPM = changes in the exchange rate.

[4]PAYTIME = whether the London price was with (0) or *ex* dividend (1).

[5]Subperiods:

1783-90 [Peace];1790-94 [French Revolution, war]; 1802-07 [Peace of Amiens, Continental Blockade];

1808-09 [Peninsular War]; 1814-18 [Peace, war, final peace]; 1819-25 [Resumption of gold standard]

[6]*t*-statistics are in parentheses under respective coefficients.

Amsterdam Beurs. In 1795, this link was broken by the invasion of French revolutionary forces into Amsterdam and the establishment of the Batavian Republic under their surveillance. Mail service was disrupted so that quotes of English security prices on the London market, which from 1723 through 1794 had appeared in Amsterdam papers with a 3 day lag, now appeared with lags up to two weeks. The drawing of bills of exchange in London on Amsterdam or in Amsterdam on London, a business that had flourished since Elizabethan times, ceased altogether.

The Amsterdam exchange resumed in 1802, with the signing of the Treaty of Amiens, the *termijnhandel* (forward trading) it had developed over the previous century in English government securities. The volume of such trade, however, after a quarter century of deteriorating Anglo-Dutch relations, was merely a pathetic remainder of a once-blooming traffic. Nevertheless, it stayed in place even as the war resumed and continued steadily on to at least 1825. The results of this diminished trade were reported faithfully in the *Amsterdamsche Effekten Pryslist*. These quotes, combined with the spot quotations we have from Wetenhall's *Course of the Exchange* (through 1810) and *Lloyd's List* (through 1823), enable us to replicate for that period of disruption the tests of market integration I have performed previously for the eighteenth century [6, ch. 7, or 5].

Table 2 summarizes in Panel A the results for the trade in the British Three Per Cent Consols for various sub-periods over the interval 1802-1825, while Panel B contrasts the results for trade in East India Company stock over the periods 1782-90 and 1790-94. The Amsterdam price is generally above the London price because it is always a time price, the price of the stock for forward delivery at the quarterly rescounter, or settlement, dates on the Amsterdam Beurs. Twice a year it is much higher when the London price is quoted ex dividend.

Two striking differences between the late eighteenth and early nineteenth century results appear immediately: one concerns the very low coefficients of determination (R^2) for each subperiod from 1802 to 1825 compared with those in the periods from 1783 to 1794, despite roughly comparable numbers of observations in the two cases. More disturbing is the presence of serial correlation in the nineteenth century series, which requires some major adjustments in each case to estimate the coefficients. (The size of the adjustment in each case can be gauged by the first-order autocorrelation coefficient, r, which is given below the summary statistics for each period.) Both features indicate that our specification of the differences between the Amsterdam prices (time) and London prices (spot), which captures only the strictly technical reasons for time-spot differentials, is sadly inadequate for the Napoleonic period. The specification used relates the time price in Amsterdam to the spot price in London, the number of days until the dividend on the English security will be paid in London, the exchange rate between Amsterdam and London, and whether the London price is quoted ex dividend.

Another way to grasp the extent of integration between the Amsterdam and London markets during the Napoleonic era and the decade following is to examine the relationship between spot and time prices for Three Per Cent

Figure 2. Amsterdam - London Prices
3% Consols, 1814-1818.

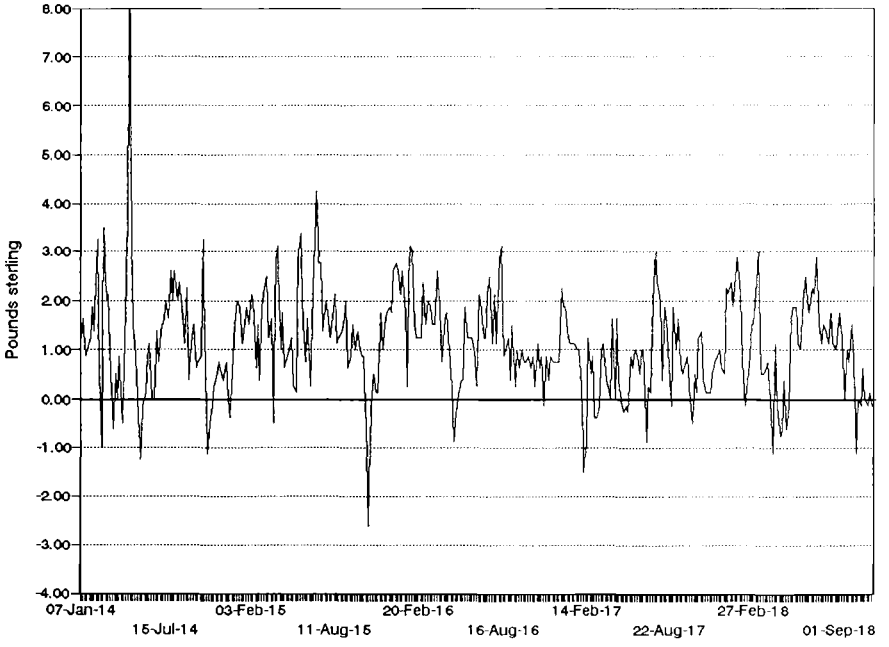
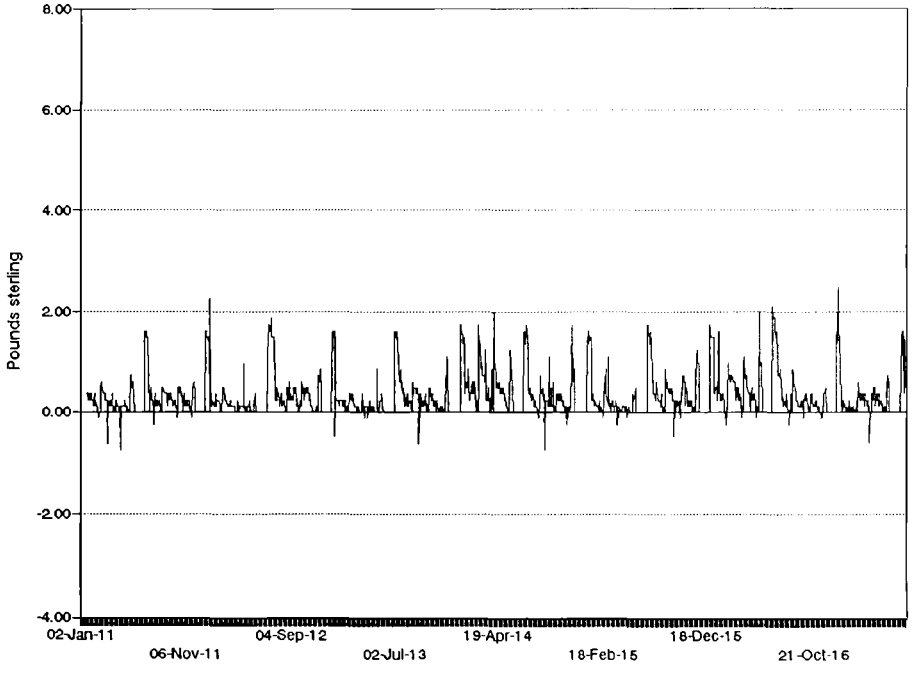


Figure 3. Forward Premium on 3% Consols
London, 1811-1817



Consols as they appeared on the London Stock Exchange. Starting in 1811, the official stock price list, Wetenhall's *Course of the Exchange*, began to appear in a greatly expanded format, including many more stocks and bonds in its regular listing than previously. Among these were the "time", or "on account", prices of the main government stocks, including the Three Per Cent Consols. Figure 3 graphs the differences in the time and spot prices, showing clearly the steady decline of the forward premium as the settlement and dividend days drew near, and the spikes when the time price included the dividend and the spot price did not (a regular occurrence twice a year when the dividends were being paid out, as this took a couple of weeks for the clerks to manage). It is useful to compare the ranges of fluctuations there with those observed between the Amsterdam time price and the London spot price as shown in Figure 2. The patterns in London are remarkably similar during the worst years of the war and the readjustments immediately following with those in the peaceful and largely tranquil period from mid-1825 to the end of 1834. But even in these conditions the forward premium averaged nearly ¾ pound as we should expect on a perpetual bond yielding exactly 3 pounds, payable in semi-annual installments. The Amsterdam premium averaged higher, but mainly due to a number of disturbances that carried it above the minimum level expected. These graphs, then, give us a visual impression of the extent to which the Amsterdam-London connection was disturbed during the height of the Napoleonic wars and the limited degree to which it was re-established afterwards.

This specification works well in the eighteenth century periods, but in the early nineteenth century it is clear that other factors not included in the regression equations, factors less technical but evidently more important, were moving the differentials. What were these? Clearly, the difficulties of communication were greater with the disruption of mail service, and the uncertainties of a war characterized by major battles in distant arenas created irregular and large shocks in the information flows to each market. Examination of the residuals from each regression indicates that the major battles did create clusters of positive residuals, meaning that the Amsterdam prices of the English securities rose well above their predicted levels on receiving news of most battles. But they also rose above the predicted level at rescounter dates, indicating that when the Amsterdam traders cleared their accounts with each other, there remained excess demand for British securities. It appears that the relative uncertainty of institutional arrangements in Amsterdam was inducing general capital flight into more liquid assets abroad throughout this period of political uncertainty for the Dutch burghers. The French dominated the revolutionary Batavian Republic (1795-1806), then Napoleon installed his brother Louis as ruler of the Kingdom of Holland (1806-10), finally incorporating it as part of France (1810-15). To cap off the political confusion of the Dutch, the Congress of Vienna decided to combine them with the Austrian Netherlands to form the Kingdom of the Netherlands (1815-30) after the wars.

It may be worth remarking that the best regression results are not for the postwar period, when mail service was resumed and the battles were over, but are found for the most disturbed period, 1814-18. Perhaps this is due to

regression bias caused by extreme observations in 1815, when Napoleon terrorized the allies for the famous Hundred Days before Waterloo. But it is possible that the weakness of the government in Amsterdam in the early years of Willem I (installed as monarch of both the United Provinces and the Austrian Netherlands by the first Congress of Vienna in 1814) permitted the Amsterdam market to operate more effectively than when it was under French rule. Ironically, the stabilization of his rule, and of the foreign exchanges with England, served to impair rather than improve the integration of the two capital markets. We cannot carry this comparison on further because the Amsterdam market simply failed to trade in the Three Per Cent Consols after the conversion of 1824. To see the process of further integration, it is necessary to turn to other data.

How Disintegrated Were the Capital Markets?

The next set of securities to be traded jointly on the Amsterdam and London stock exchanges were American railroad bonds and stocks. These begin to appear in the 1840s, and by the eve of the American Civil War several were listed in London according to the *London Times* although none yet appeared in the semi-official stock price list, Wetenhall's *Course of the Exchange*. Meanwhile, the Amsterdam exchange listed the Illinois Central's stocks and bonds as well as the bonds of the Galveston Railroad. The quotes are erratic in appearance, reflecting thin markets in the years 1859 and 1860 and are especially disparate in the year 1860. It is easy, however, to exaggerate the extent to which the early nineteenth century capital markets were disjointed, and thereby exaggerate the effect of the technological revolutions in communications and transport that occurred in the latter half of the century.

One possibility has recently been expounded at length by R. C. Michie [4], who argues that the markets of Amsterdam and London were never well-integrated, merely generally correlated for securities traded in common, until the establishment of telegraph connections at mid-century and telephone links at the end of the century. This thesis relies upon the dominating power of exogenous telecommunications advances created by the telegraph in the 1850s and the telephone in the 1880s, advances similar in nature and impact to those that have generated the worldwide financial revolution of the 1980s. This similarity is so striking that most readers will probably be convinced of Michie's argument despite the very casual and inconclusive empirical testing he performs of changes in market integration with the introduction of telegraphic links.

The New York and London markets were linked by telegraph in 1866 so Michie compares the quotes for stock traded on both the London and New York markets for 1860 and then for 1870. For 1860, he compares shares of two American railroads -- the New York Central and Hudson River Railroad and the recently formed Illinois Central Railroad. Discrepancies were frequent (92% of the time) and significant (4.8% of the average price in the lower market). In 1870, he compares quotes on U. S. government bonds (the 6%, 20 year bonds issued in 1867) on the two exchanges and finds prices

overlapping 73.6% of the time and only a 0.52% differential when they do not [4, pp. 47-8].

The 1870 results certainly seem reasonable but the 1860 discrepancies are not merely striking, they are implausible. To begin, 1860 does not seem the appropriate year for this kind of comparison. A severe financial panic occurred in New York within the week following Lincoln's election. This was caused by large withdrawals of gold from Northern banks by the South, withdrawals which also caused large changes in the exchange rate on Britain. According to *Banker's Magazine*,

> New York banks lost over $3 million in specie in the week following Lincoln's election, leading to full panic on November 12. The extreme difficulty of negotiating foreign exchange, the withdrawal of large amounts from the discount market, and the entire break-down of credit and confidence, combined to make our financial affairs appear almost appalling [1, p. 515].

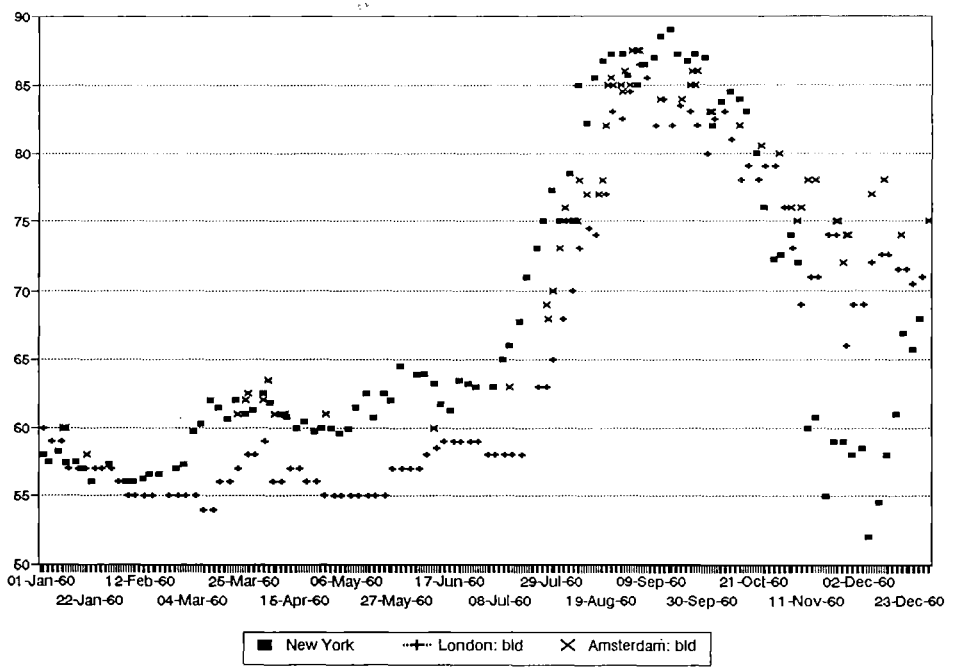
Moreover, the railroad stocks are not the appropriate securities to use for comparison. One would always want what today's bond traders call "well-seasoned" securities -- financial assets whose relationship to the underlying fundamentals is transparent and whose management is conducted in the most responsible fiduciary manner. By contrast to these criteria, Illinois Central stock was one of the most volatile on the New York market, and most of it was owned by foreigners anyway so that the market in New York was actually thinner than in London [8, pp. 96-8]. In the panic that occurred on the New York Stock Exchange after Lincoln's election, for example, its stock declined from 74½ on the 6th to a low of 51⅞ on the 21st, and closed the year at 57 [1, p. 518].

The New York Central RR was being re-organized as the New York Central and Hudson River RR. Stock issued at the early stages of a company was generally issued at a fraction, 10 to 25%, of par value and successive calls were made as construction and expansion proceeded. The two exchanges could not have synchronized their switch to the quotes on the stock after a new call had been met, since that would occur first on the New York market. It, too, suffered in the November panic, the stock falling from 82½ on November 2 to its lowest point, 70, on the 17th. Then, according to the U. S. *Banker's Magazine*, at these low prices,

> very large amounts of this stock were taken off the market. The action of the bears was more stubbornly resisted by it than any security on the list, and the scarcity of cash stock with which to make their deliveries, caused serious inconvenience to sellers. Large differences were paid for a few days' time to deliver, and after the measures of relief were adopted by the banks, this stock was among the first to receive an upward impetus [1, p. 517].

For these reasons, one should examine more intensively the question of market integration between the London and New York Stock Markets and with some of the other foreign stock exchanges, especially Amsterdam. Figure 4 shows the course of prices in 1860 for Illinois Central stock in the New York, London, and Amsterdam markets. From these it is evident that the stock market crash in New York following the news of Lincoln's election was

Figure 4. Illinois Central Stock Price
New York, London, Amsterdam: 1860



very dramatic indeed, especially for Illinois Central securities, but had not affected either the London or Amsterdam markets. But it is also clear that the New York market was rebounding very quickly on its own without intervention from abroad. Moreover, it seems clear that when the news of the New York market collapse reached London, the information that it would quickly rebound was also conveyed, so that by the end of December we see all three markets converging again at the lower level that persisted into the middle of the 1861 by which time Lincoln had been inaugurated and had established his authority.

Considering the disruptions to the New York market caused by the election of Lincoln in 1860 and the events of the Civil War that ensued in 1861, it seems more reasonable to take the preceding year of 1859 for comparing the pricing of the U. S. railroad securities in New York, London, and Amsterdam. This was a year of gradual decline in the prices of the

western, more speculative U. S. railroad stocks overall, including the Illinois Central, continuing the decline from 1858 that had set in after the rapid rebound from the sharp drop that occurred in 1857 [7, p. 110, Chart 39 and p. 112, Chart 40]. Meanwhile, the central Atlantic, more speculative stocks, including the New York Central, had leveled off before resuming their recovery from the 1857 panic during the year 1860. The figures for 1859, in fact, show a much closer relationship than in 1860 between all three markets for the Illinois Central stock.

Conclusion

In sum, the interplay of institutional and technological developments has a long and rich history. They have left a detailed record in the form of daily prices of well-defined and actively traded assets. The price record, itself, however, has to be used warily, because this was one of the obvious ways in which entrenched personnel enjoying positions of privileged information could maintain their income in the face of technological changes that were otherwise reducing the value of their positions. The compensating aspect for investors that eventually enabled them to take advantage of the new information technology was that there were a number of markets operating under a variety of rules which were competing for their business. Nevertheless, if we are to take the patterns of converging bond yields shown in Figure 1 at face value, it appears that it took another institutional change -- the widespread adoption of the gold standard by governments -- to enable the benefits of the new technology to be captured fully in the capital markets. The lessons to be drawn from this today for the new governments in the Eastern European economies and for potential investors located in the rest of the world are not as encouraging as one would like, but perhaps they can be helpful.

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