

Financial markets and cliometrics

Abstract

The study of financial markets is a growing part of cliometrics for at least three reasons. First, appreciation of the role financial markets played in the rise and spread of capitalism has grown, along with concerns about financial crises. Second, accessibility to the immense amount of data generated by financial markets keeps improving thanks to continued advances in digital communications technology. Third, analytical techniques for determining the behavioral patterns of time series have advanced. While typically only price data for financial assets are available without the corresponding volume of the assets being traded, the consequences of sharp, or sustained, changes in the price of financial assets can be detected in other economic data. Interesting insights on fundamental historical issues are also possible by applying economic and political theory to cliometric studies of financial markets.

Introduction

The repeated occurrence of financial crises, especially the unexpected length of recovery from the global crisis that began in 2007, continues to generate interest in historical studies of financial markets. Each crisis seems to elicit the reaction of what went wrong this time? Then, why didn't we learn the right lesson from the last one? Trying to extract lessons from the history of past crises drives financial historians (as well as policy makers, speculators, and journalists) in their research on financial markets. Beyond the narrow concerns raised by financial crises, however, financial history can also shed new light on fundamental historical issues. Examples include how long-distance trade was sustained among ancient and medieval societies, how fiscal states arose in early modern times, and, ultimately, how societies move from economic relationships underlying personal exchanges to institutions that allow impersonal exchanges to be sustained. Once scholars recognized the importance of finance for enabling these important transitions in human history to occur, the opportunities for meaningful research into financial markets by cliometricians kept expanding. Further, data generated by financial markets in the past can serve as useful measures of the

success or failure of previous economic efforts, provided, of course, that they are interpreted correctly by modern cliometricians. To illustrate just a few of the possibilities for getting illuminating insights as well as for making mistaken inferences, this essay surveys two different literatures that have arisen over the past half-century, first on financial markets for sovereign government bonds and then on financial markets for bills of exchange. Bringing the two strands of analysis together for a better appreciation of the interplay between short-term finance and long-term assets is the next step in a research agenda that keeps expanding.

Sovereign government bonds

An extensive and growing literature has arisen from the realization that financial markets for sovereign government debts can be analyzed from a variety of perspectives, and that governments issuing these debts kept records that are increasingly accessible to modern researchers equipped with digital cameras and laptop computers. The classic study by P. G. M. Dickson (1967) introduced the term “financial revolution” to the profession and also provided a useful finders guide to the wealth of material readily available in British archives. That material, combined with the daily price data on British funds from January 1698 on available in John Castaing’s *The Course of the Exchange, &c.* (1698-1907) enabled Neal (1990) to demonstrate weak form efficiency¹ of the securities market for sovereign bonds issued by the British government in London. Combining these data with pricing of British funds in Amsterdam, Neal also showed that these two preeminent financial markets were closely integrated, especially after the bubble year of 1720. Later work by Koudijs (2011) expanded these data to determine

¹ Weak form efficiency of efficient financial markets: all past prices of a stock are reflected in today’s stock price, which typically follows a random walk.

more precisely whether “news” affecting the securities widely traded in both Amsterdam and London arrived first in London or Amsterdam, depending on the arrival of the mail packet boats that sailed regularly between the two cities. The combined results from the London and Amsterdam markets suggest semi-strong efficiency² for these early stock markets, with news affecting the prices of English government securities typically reaching Amsterdam first. Beach et al. (2013) further examined the Amsterdam prices of British securities to argue that they were spot, not time, prices as Neal had inferred in his original work.

Beyond such technical issues concerning the efficiency and integration of the eighteenth century financial markets through analysis of the prices of widely held and traded securities, the enthusiasm of Dickson for finding an early “financial revolution” corresponding to the Glorious Revolution of 1688/89 in England became the basis for new ideas for economic policy generally. North and Weingast (1989) took Dickson’s finding of a sharp, sudden fall in the interest rates offered on new debt issues after 1688 as strong evidence that the constitutional arrangements between the new monarchs of Great Britain, William III and Mary, and the Parliament had created a “credible commitment” that the British government would no longer interfere with private property rights. This constitutional arrangement, according to North and Weingast, laid the basis for the eventual industrial revolution in England and the initiation of the current era of modern economic growth. The appeal of this argument has spawned a growing literature on its own, both pro and con.³ Assessing the price evidence from private banking

² Semi-strong efficiency: all public information available is incorporated into a stock’s price.

³ See (Coffman and Neal 2013) for an extended analysis and review.

accounts before and after the Glorious Revolution, Quinn (2001) found that interest rates on short-term bankers' loans actually rose after 1688. Sussman and Yafeh (2006) argued that the bulk of government debt issued to finance the two subsequent wars over the next twenty-five years had to pay higher interest rates than during peacetime. This, they argued, showed the importance of war finance over constitutional commitments, an argument they extended to later periods and other cases (Mauro, Sussman, and Yafeh 2006). Wells and Wills (2000) tested for robustness of the later fall in long-term yields and found that the "credible commitment" of William III and the Whigs in 1688 was subject to severe shocks for at least 50 years after 1688 due to the persistence of the Jacobite threat to restore the Stuart dynasty.

Because these analyses that cast doubt on the North and Weingast interpretation of Dickson's findings relied simply on price data, the question does arise whether the quantity data, which were of most interest to Dickson, might give different results? Sussman and Yafeh disputed whether interest rates fell for British sovereign debt after 1688 as the demands of war finance forced the government to sell fresh issues of both short-term and long-term debt at increasing discounts, forcing up the actual market yield above the nominal interest rate. Nevertheless, they could not overturn Dickson's evidence on the huge sustained increase in the volume of sovereign debt issued and the eventual rise in its market price as the government continued to pay the promised interest. Even Quinn in his examination of private finance before and after the 1688 revolution found that the size of banking business expanded sharply and permanently. The increased volume of sovereign debt that continued to be serviced by whichever party was in power

laid the basis for a remarkable expansion of banking business in London, and later throughout the kingdom.

MacDonald (2013) argued in fact that it was the 1710 election of Tory party to power in Parliament that confirmed the commitment of the Stuart monarch (now Queen Anne) and Parliament to continue service of the outstanding debt, both short- and long-term. Stasavage (2003) used the price data on sovereign debt for Britain to show that interest rates fell when the Whig party was in power and rose whenever the Tory party replaced it. Moreover, yields on British sovereign debt fell after each war without defaults, unlike the case for French sovereign debt (Luckett and Lachaier 1996; Velde and Weir 1992).

Using game-theoretic constructs to find useful political variables in addition to the standard “fundamentals” used by economists as determinants of yields on sovereign bonds, Stasavage searched for evidence on bond yields from other political entities in Europe before the financial revolution in England. Stasavage (2011) concluded that in early modern Europe smaller cities, governed by more cohesive merchant elites, generally paid less interest on their sovereign debts. This helped explain Epstein’s earlier finding (Epstein 2000), that Italian city-states paid much lower rates on their public debts for centuries before the constitutional commitment in England that had fascinated first Dickson, then North and Weingast. Epstein argued that the Italian success was due to solving coordination problems over a larger range of market activities, exemplified by the success of Milan in recovering from the effects of the Black Death.

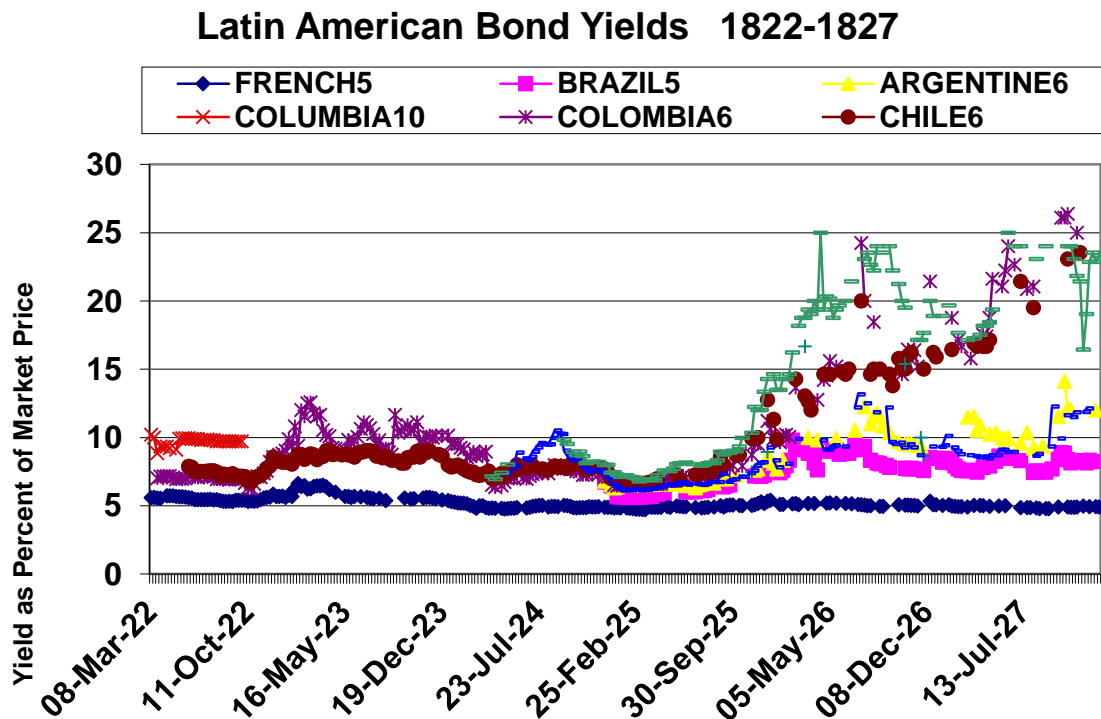
City-states that maintained their own mints, tax systems, and financial records proliferated in Western Europe from the 11th century on and their records become

increasingly available after 1400. The Italian city-states of Venice, Florence, and Genoa in particular kept detailed records that have been the subject of studies by quantitative historians, economists, and sociologists. Luciano Pezzolo (2003, 2013, 2014) has compared the market interest rates paid by those three leading Italian city-states with those paid by the papacy in Rome in an effort to determine which political structure conveyed the most confidence for its creditors through the vicissitudes of state-building to 1700. Republics did best, until they fell under the rule of a prince (Florence) or of a closed oligarchy (Venice). David Stasavage expands the sample of sovereign city-states beyond Italy to include others in Spain, Germany, and the Low Countries (Stasavage 2011) to find that smaller city-states with more cohesive merchant groups did best of all.

Tomz (2007) enhanced the game theory underlying government commitment mechanisms for servicing their debt by adding the possibility of learning and political change to standard models for building and sustaining reputations. These modifications to cooperative game theory allowed him to predict uncertainty premiums on issues by new governments, seasoning effects on prices of bonds that continue to be serviced by established governments, exclusion from existing markets for defaulters, and reentry of governments when compensation is offered to previous lenders, all with specific historical examples. His qualitative search for evidence of the factors that determine a government's reputation at any given time helped him explain apparent anomalies in the historical pricing of various sovereign bonds. Exploring the sources of reputation building opens up further avenues of research for cliometricians.

One of the most interesting episodes for testing various economic and political theories for explaining the attractiveness of sovereign bonds is the first so-called Latin

American debt crisis, which occurred in London from 1822-30. The new Latin American states that emerged from the collapse of the imperial authority exercised from Spain and Portugal at the end of the Napoleonic Wars all attempted to finance their new governments by issuing bonds on the Paris, Amsterdam, and London markets. All of them offered 6 percent interest on their bonds, and London investors willingly bought them at discounts up to 20 percent to get yields between 7 and 7.5 percent – until they learned more about the inability of the new governments to cover their current expenses with taxes, much less pay interest due on their outstanding debts. This was a classic early example of the “lemons” problem being solved by lenders assigning an arbitrary risk premium to the loans sought by new, untried borrowers. When news arrived of the shortfalls suffered by the various governments, the prices plummeted, implying sharp rises in yields as shown in Figure 1.



Tomz (ch. 2) uses these data to illustrate both the lemons problem (solving adverse selection with risk premium from 1822 to late 1825) and seasoning (maintaining prices for French bonds as well as a new price level for Brazil bonds, while varying risk premiums for other Latin American bonds). Later work by Flandreau and Flores (2009) examined the role of the respective investment banks that took the lead in marketing each of the bonds to find out why yields stabilized for the Brazil and Argentine bonds. The answer, they found, was in the way Rothschilds (who handled the Brazil bonds) and Barings (who dealt with Argentina's bonds) imposed conditions upon those governments before lending their reputations to the issue. Indeed, Rothschilds issued bonds for a variety of new European governments – Austria, Belgium, Naples, Prussia, and Russia in the decades following 1815 without any defaults, even during the revolutions of 1848. One may speculate on how the Rothschilds accomplished this, perhaps through monitoring the respective country mints and public banks for each country and imposing effective conditionality. Whatever was the secret to the success of the bonds underwritten by the Rothschilds, Flandreau and Flores argue that their effective “branding” of a country's debt enabled each government to save on future interest payments and cover the underwriting premium charged by the House of Rothschild.

Led by the merchant bankers Rothschilds and Barings, London and Paris became the centers for international sovereign bonds for the remainder of the nineteenth century. The faithfully recorded prices of the numerous government bonds have gradually been encoded and analyzed by an increasing number of cliometricians, for a wide variety of purposes. One study focused on the case of Peru, whose bonds stabilized marvelously in mid-century despite being one of the “lemons” in the 1825 crisis and despite enduring a

series of unstable governments. Vizcarra (2009) explained this was due to the role of the British merchant banker Gibbs and Sons, who also managed the sale of guano in London and made sure that their clients who had purchased the bonds were given first claim on the guano revenue. A similar arrangement turned out to be the case for the kingdom of Denmark when it borrowed from Dutch merchant bankers at the end of the eighteenth century. In that case, the Dutch banking houses collected the tolls in advance from shippers leaving Amsterdam for Baltic ports. In that way they could assure these payments were applied to the interest due on the Danish bonds (Van Bochove, 2014). An even earlier example of using tax collection authority to maintain reliable payment of interest on long-term sovereign debt was the bonds issued by the city of Paris to provide their occasional tributes to help finance the wars of François Ier (Vam Malle Sabouret 2008).

Over the course of the nineteenth century, however, states gradually took control of their own revenues to free themselves from external domination. Dincecco (2009) analyzes the bond yields for 11 European governments for varying periods from 1750 to 1913. He then tests for the relative importance for creditworthiness of each government of 1) centralized control over tax revenues versus 2) limitations on executive power. He considers these to be the two essential elements of the commitment mechanisms used so adroitly by the British throughout the eighteenth century to create a permanent market for their sovereign bonds. He finds that both effects are important individually, but most effective when they are combined, as was the case for Britain after 1688. Ending with this anodyne conclusion, Dincecco managed to avoid confronting directly the contentious

issues raised by earlier scholars who had used the evidence of bond yields to validate their preconceptions.

Probably the most stimulating work was Bordo and Rockoff (1996), who argued it was the adoption of the gold standard as “a Good Housekeeping seal of approval” that allowed countries to increase their creditworthiness. This would be further confirmation of earlier work by Bordo and Kydland (1995) that the gold standard as such was a powerful commitment device to restrain governments from excessive, much less unwarranted, issues of debt or money. Ferguson and Schularick (2006), however, took evidence on bond yields from a larger group of countries during the classical gold standard period, 1880-1913, to argue that it was the rule of law, specifically British law, that allowed countries under the sway of Britain to assure creditors, regardless of their formal commitment to a gold standard. Then, Accominotti, Flandreau, and Rezzik (2011) showed that it made a lot of difference within the British Empire whether the colony was settled by British emigrants or simply ruled by British civil servants. The British guaranteed payment on bonds issued by the settlement colonies but not on bonds issued by non-settlement colonies with local rulers, which created yield spreads favoring the white settlement colonial government bonds. Similar effects of third party guarantees were also found for debt issued by the Ottoman empire during the Crimean War, which enjoyed low rates of interest when jointly guaranteed by the British and French governments.

Later issues of Ottoman debt without such guarantees, however, suffered badly until ad hoc international financial commissions finally took control of the Ottoman revenues dedicated to service of the bonds in the 1890s (Tuncer 2011; Pamuk and

Karaman 2010). Formal sanctions against defaulting governments, enforced by so-called “gunboat diplomacy during the nineteenth century, seem not to have been very effective and were seldom used. Private initiatives by European stock exchanges to refuse formal listing of new bonds by previous defaulters were coordinated by non-governmental institutions such as the Council of Foreign Bondholders (Esteves 2013). The Roosevelt Corollary of 1904 (to the Monroe Doctrine of 1823 that defended decolonization in the Western Hemisphere) reinforced the reluctance of the British government to undertake military measures against defaulters, especially in Latin America. Nevertheless, the Roosevelt Corollary had a noticeably positive effect on the markets for Latin American government bonds given the willingness of that American administration to use force (Mitchener and Weidenmier 2005; 2010).

Thanks to the ongoing revolution in information and communications technology, there is an overwhelming quantity of historical data on financial markets available for continued research and controversy. For example, Global Finance Data (<https://www.globalfinancialdata.com/index.html>) is a for-profit provider of the data sets created by various academics (including Neal 1996), at <http://www.icpsr.umich.edu/icpsrweb/ICPSR/studies/1008>) as well as by governments and other commercial firms. Individuals can subscribe for a limited free trial, or use their academic affiliation to access many of the 20,806 data series available as of February 14, 2014. The provenance of those data, however, has to be taken on faith, whereas for sovereign bonds, the European State Finance Database, (<http://www.esfdb.org>) provides the academic sources for each of the data sets available there. These data were originally collected under the auspices of a project on “The Origins of the Modern State in Europe,

13th to 18th centuries,” directed by the Rev. Professor Richard Bonney with the assistance of Dr. Margaret Bonney from 1989 to 1992. It is now maintained by D’Maris Coffman at the Centre for Financial History housed in Newnham College, Cambridge University and new data sets are added regularly from various academic studies. As most of these data are in nominal prices, investigators wishing to make current comparisons can access the database at *Measuring Worth* (<http://www.measuringworth.com>), which has price conversions as well as additional long-run data. Many scholars are making their data available as well at <http://eh.net/databases/>, which is constantly adding new series underlying published, and sometimes unpublished, work.

Short-term commercial finance

The regular publication of discount rates on commercial bills of exchange for the major cities in Europe and the Americas starting in the nineteenth century allows this kind of statistical analysis to complement analysis of movements in yields of government bonds, especially during financial crises or wars or changes in political regimes. For earlier periods, some cliometricians have taken advantage of the regular publication of exchange rates among major financial centers to extract the implicit interest rate from the difference between spot and forward rates. The pioneering study by Eagly and Smith (1976) focused on just the London quotes for bills on Amsterdam. Nevertheless, they were able to show a high level of financial integration between the two dominant money markets of 18th century Europe. Further, if the gap between the time price of foreign exchange and the spot price widens, the intensity of the crisis can be measured as well. The first mark of a scramble for liquidity in London, which was the sudden, but short-lived, spike in the price of the pound sterling, I labeled “the Ashton effect” (Neal 1990, p.

67). Sometimes a reaction followed quickly to produce an offsetting spike in the price of *schellingen banco* as merchants in Amsterdam scrambled for liquidity in response to the difficulties in London. This movement I termed “the Kindleberger effect,” as it was a clear marker of contagion in Kindleberger’s view (Kindleberger 2000), but interdependence as Forbes and Rigobon (2002) would see it. Schubert (1989) demonstrated the initial integration of the exchange markets in the 18th century and their increasing disruption from the Seven Years War on as both Ashton and Kindleberger effects increased in magnitude and frequency. Later work by Quinn (1996) highlighted the disruption caused by the pressures of war finance on the Amsterdam-London markets for bills of exchange after the currency reform in England in 1696. While restoring the previous value of the pound sterling in terms of gold, the reform also set the pound at a value in silver that made gold more valuable than silver in England relative to the Netherlands or France. Through the use of bills of exchange, Quinn showed how exports of silver from London to Amsterdam were often covered by imports of gold from Amsterdam to London, both financed by issuing bills of exchange.

More extensive work on these markets for commercial finance by Flandreau, Galimard, Jobst, and Ngues-Marco (2009a) covered a wider range of exchange rate markets but focused on the comparative interest rates for merchants in the three major mercantilist countries. Their findings also showed the effects of wars and occasional financial crises on private interest rates, but while London rates became lower than Amsterdam rates, which were also lower than Paris rates generally, none of the three were constrained by the usury laws that limited rates to 5 per cent annually. They did

find generally rising rates in the last quarter of the eighteenth century for all three cities, and more variance among them as did Schubert.

The intensive study of the European market for Mexican silver in the 17th and 18th centuries by Nogués-Marco (2013) reflects the incentives both for encoding more financial data from previously underexploited resources and for extracting more analytic insights from applying more sophisticated statistical techniques. While Nogués-Marco only confirmed that Great Britain was on a de facto gold standard even while maintaining it had a de jure bimetallic standard throughout the eighteenth century, she also managed to demonstrate why the Netherlands could be so closely connected financially with Britain while maintaining both a de facto and de jure bimetallic standard at a different ratio between gold and silver (14.65 for Amsterdam and 15.21 for London). She was building in part on the path-breaking work done by her thesis advisor, Marc Flandreau, on the sustainability of the bimetallic system in the nineteenth century (Flandreau 1996; 2004), as well as implementing the theoretical analysis of Velde and Weber (2000). It was Flandreau's intensive empirical work on the public and private actions in France over the tumultuous period of 1840-1878 that demonstrated how the stock of both monetary metals could be maintained at sufficient levels to warrant continuation of the bimetallic standard despite the huge increases in gold supplies entering world markets after 1849.

The theoretical work of Velde and Weber demonstrated that bimetallism could have been maintained indeed well into the 20th century. The elimination of bimetallism in 1873 was probably due to the French decision not to subsidize Germany's plans to convert its diverse silver standard areas into a unified gold standard for the empire by

buying up the excess silver released from German mints while decreasing French gold supplies. While general deflation followed globally, with much of the pain suffered by a defeated and diminished France, Velde and Weber's theoretical analysis suggested that both France and Germany were better off by adopting a single metal standard, whether it would have been gold or silver. US legislation in 1873 also made the fastest growing economy in the world committed to a gold standard thereafter, replacing its original de jure bimetallic and de facto silver standard before the Civil War and its fiat money inflation during the War Between the States.

The gold standard then became the dominant monetary standard for the world economy after 1873, the combined result of US legislation and French policy action. Lawrence Officer (1996) set the standard for empirical work on the operation of private bankers dealing with the exchange of dollars and sterling over the period 1791-1931. Officer's extensive studies were stimulated in turn by the seminal work by Davis and Hughes (1960), two of the co-founders of the cliometrics meetings while they were both assistant professors at Purdue University. Most recently, Canjels, Prakash-Canjels, and Taylor (2004), took the cliometric study of exchange rates yet another step forward, by increasing the quantity of data to obtain higher-frequency exchange rate quotes from the printed sources of the late 19th century and then applying more sophisticated econometrics, threshold autoregressive (TAR) time series analysis, than was available for earlier researchers.

TAR was developed to determine the price bands within which prices of a given good could vary without affecting the prices for the good in an adjacent or distant market. Used successfully to determine the degree of market integration for commodities

over space and time, they could also be used to examine what were the effective gold points for arbitrage between London and New York when both countries were committed to a gold standard. Canjels et al. further extended their analysis to see if actual gold movements did occur when exchange rates hit or exceeded their estimated gold points, and found enough confirmations to reassure them. But the most reassuring aspect of their findings was that their estimates of the gold points were very much the same as those determined by the more tedious efforts of Officer (1996) and Flandreau (2004), namely to find historical evidence of the actual costs of shipping, insurance, and interest payments incurred by operators in the foreign exchange markets of the time.

The demonstrated usefulness of TAR econometrics overall have stimulated other work on exchange rates in historical settings of financial markets for short-term commercial credit. Volckart and Wolf (2006), for example, use TAR to derive the implications for the extent of market integration and the speed of adjustment to changes in mint ratios for 14th and 15th century Flanders, Lübeck, and Prussia. They find that it took about eight months for deviations between Flanders and Lübeck to fall back within bullion points but twice as long for adjustments to occur between Flanders and Prussia, showing the importance of sea-borne trade for northern and central Europe. Following up on this study, Chilosì and Volckart (2011) apply TAR analysis to the 13,092 exchange rates that Volckart (1996) collected mainly from account books of guilds, merchants, ecclesiastical organizations, and city authorities in central Europe for the period 1400-1520. They used these data to determine which cities were integrated with each other and how integration changed over time. The results show that long-term trends toward improved financial integration dominated the cycles of debasements that occurred

regularly, but also that integration seemed driven more by rising trade than by political unification. Work on the dominant role of Genoese bankers in the 16th and 17th centuries by Pezzolo and Tattara (2008) uses cointegration analysis of interest rates on rechange bills marketed in the Bisenzone fairs dominated by the Genoese. They find that the Genoese money market was directly affected by news from Spain about the war expenses or arrival of silver from America, but these shocks also affected the money markets in Florence and Milan, while Venice remained unaffected. The risks of dealing with short-term Spanish *asientos* by the Genoese therefore explain why short-term interest rates in Genoa were consistently higher than the yields on long-term Genoese government debt.

While Volckart's data are accessible on his web site, [14th to 16th century exchange rates](#), perhaps the most extensive data set is maintained at Rutgers University as *The Medieval and Early Modern Data Bank* (Bell and Howell, 1998), <http://www2.scc.rutgers.edu/memdb/>. Researchers at the University of Reading (Bell, Brooks, and Moore, 2013a) have applied times series analysis to the exchange rates recorded there as well as higher frequency rates recorded by the Tuscan merchant, Francesco Datini (downloadable from the [Datini Archive](#)). They find evidence of seasonality, occasional trend breaks associated with debasements and military conflicts, and overall an inverted term structure of interest rates for early modern Europe. Long-term sovereign bonds appear to have been guaranteed against debasements in monetary regimes based on precious metals while commercial credit was subject to higher idiosyncratic risks for specific trades (Bell, Brooks, and Moore, 2013b).

Next steps

As useful and insightful as these studies have proven to be so far, the next step – in addition to continuing to extract and encode ever more data from historical financial markets and continuing to apply ever more sophisticated statistical techniques to the data – should be to see how the markets for long-term sovereign debt interact with the markets for short-term commercial credit. Practitioners in finance have long acknowledged the importance of the existence of long-term government debt for facilitating the short-term finance of commercial activities but it took the work by Gelderblom and Jonker (2004) to document precisely how this occurred at the start of financial capitalism. Using the accounts of the Amsterdam merchant Hans Thijs in the period 1595-1611, they found that the interest rates he paid to investors in his various ventures dropped permanently once he invested in the permanent shares of the Dutch East India Company, founded in 1602. This was because he could now pledge the shares as collateral for loans from a much wider range of potential investors than before. Marketable financial assets backed by the commitment of revenue by the issuing government or corporation provide merchants with reusable collateral that can be posted repeatedly against short-term loans from any potential investor. This insight provides the logical link between the markets for sovereign bonds and short-term commercial credit, but one still has to determine how to test for the reciprocal effects between the two sets of financial markets.

One approach, taken by Neal and Weidenmier (2003) was to take financial crises as given and then to see whether contagion occurred during the subsequent crisis, all to indicate what kind of learning process might have been going on among policymakers in major industrial countries during the classical gold standard era. As with all the studies covered in this survey, this approach required the two steps of acquiring new data (high-

frequency short-term interest rates) and applying new statistical techniques (adjusting standard deviations for heteroskedasticity). Given the interest in financial crises, which always start with a shock to the supply of short-term commercial credit somewhere in the payments system, and the possibility of contagion to other parts of the financial system, whether domestic or international, short-term interest rates are equally interesting for cliometricians. Mishkin (1991) reviewed the financial crises in the US from 1857 through 1987 to show that rises in short-term interest rates preceded each crisis. Increased spreads between the yields of lower rated commercial or corporate securities and government securities for both short- and long-term assets then accompanied each financial crisis.

Neal and Weidenmier (2003) found similar results for international financial crises dating from 1825 to 1907, although in their methodology contagion was limited to only the 1907 crisis. That corresponded to the similar rejection of the contagion thesis found by Forbes and Rigobon (2002) for the Asian financial crises in the late 1990s as well as for the Mexican crisis of 1994 and the US stock market crash of 1987. Their argument, which hasn't yet entered conventional wisdom, is that increased volatility of asset prices during a financial crisis increases standard measures of correlation across markets, which may or may not have been interdependent before the crisis. Adjusting for heteroskedasticity in standard deviations that accompanies financial crises allows one to determine if correlations among markets really did increase and therefore to differentiate between interdependence and true contagion. For Neal and Weidenmier, the anomaly of 1907 came when previous interdependence of the New York and London markets for short-term finance was disrupted by the decision of the Bank of England to prohibit

dealing with American commercial paper earlier that year. Odell and Weidenmier (2004) traced this decision back to the gold outflows needed to cover the payouts by British insurance companies for the losses from the 1906 earthquake in San Francisco.

A complementary approach to combining analysis of markets for short-term and long-term financial products is taken by Schularick and Taylor (2012). They also take crises as given from a consensus of the profession, but they then extend the number of crises from 1870 through 2008. Further illustrating the theme of this essay, they both collect new data and apply new statistical techniques. Their new data are measures of bank credit (loans by financial institutions of all kinds and their total balance sheet assets) for 14 major countries, which they can compare with previously developed measures of money supply. Next, they apply new statistical techniques (and a new acronym, AUROC – area under receiver operating characteristic) to test which of their measures of financial markets, credit or money, do the best job of predicting financial crises, country-by-country and overall. The interesting finding is that both the credit and money measures perform equally well in predicting financial crises from 1870 up to World War II, but thereafter the credit measures become increasingly more powerful as predictors of crises. While the importance of credit booms for generating following crises even in the nineteenth century is not surprising for financial historians,⁴ the failure of money measures to correlate closely with credit changes after 1948 is disappointing for economists trained in the monetarist school. Both the increased willingness of public authorities to inject high-powered money into the economy during a crisis and the

⁴ See, for example, Davis and Gallman 2001; Kindleberger and Aliber 2011.

increased reliance of private banking firms upon repo borrowing in place of deposits suggest that this is a permanent change.

The classic work of Friedman and Schwartz (1963) created a master framework for studies ever since by measuring the supply of money, broken into various components, over the near-century that included financial crises before the Great Depression and the financing of the US role in the two World Wars of the twentieth century. But the authors saw the role of financial markets as at best secondary to the driving role of the public's demand for money interacting with the government's control over the supply of money, even during the Great Depression. Nevertheless, the "monetarist" movement among economists that they fostered was a necessary step away from the economics profession's focus on the "real economy," measured by adjusting for adventitious movements in monetary prices. Later work on the balance sheets faced by banks led to emphasis on the problem of debt deflation (Bernanke 1995; 2000; Calomiris 1993). By pointing out "just the facts," cliometricians not only force other historians to re-evaluate their interpretations of economic development in the past, but also encourage economists to re-think their theories and policy prescriptions.

Concluding remarks

Financial markets and cliometrics have a checkered history despite their obvious complementarity. Financial markets have always generated and publicized masses of data and quantitative historians supposedly desire lots of data to process and analyze. Why, then, have there not been more studies to draw on to date? The problem seems to be two-fold: first, secondary markets for securities often produce far too much data for the lone investigator to process readily; and, second, the analysis will always be

challenged for its usefulness, even theoretically much less practically. The first problem is well on the way to being overcome thanks to the continued technological progress in digitizing and encoding data from printed sources onto electronic formats, which in turn can be used to carry out any number of statistical analyses. The second problem has only gradually succumbed to acceptance that price data alone, even without measures of trading volume for the underlying securities, can yield interesting insights into historical issues of consequence. Do the movements in prices of financial assets in organized markets reflect simply the “madness of crowds” or the workings of efficient markets? Even if financial markets are efficient, what “real” fundamental factors determine the prices?

The efforts of financial historians, as well as historians in general, tend to separate them into those who hope that patterns can be found and those who resign themselves to human folly. In financial history, these alternative narratives are between those who hope that market participants jointly can learn to devise time-consistent rules for self-governance and those who are convinced that financial markets need prudential regulators and lenders of last resort. Cliometricians enter these ideologically and politically driven disputes with trepidation, but find that their focus on the past is no refuge from the conflicts of the present. Indeed, issues raised in each new crisis help pose new questions for analysis of previous episodes, whatever the personal predilection of the historian may be. The meltdown of global financial markets with the unexpected bankruptcy of Lehman Brothers investment bank in September 2008, for example, brought renewed attention to the way banks finance their long-term loans with short-term debts as well as with demand and time deposits. The investigative report by the US

Senate (2011) pinpoints the causes of the crisis as high-risk behavior by mortgage lenders, regulatory failure, inflated credit ratings, and investment bank abuses. The individual case studies provide the justification for many elements of the Dodd-Frank bill that were specifically designed to remedy the practices that led to the financial crisis of 2008. But as Gorton (2010) notes, every financial crisis has a unique pattern of events leading to a crisis that first shows up in the market for short-term credit but the unwinding of the crisis takes a particular course depending on historical circumstances and the responses made by governments, banks, and capital markets.

Gorton's unique analysis of the panic of 2007 remains a standard for cliometricians to emulate, eschewing the temptation to generalize found in works like Reinhart and Rogoff (2009) or Kindleberger and Aliber (2011). But using the evidence from the 2007 panic, cliometricians have found new interpretations for earlier crises that are enlightening, starting with the Mississippi Bubble of 1719-20 (Neal 1990, ch. 4; Velde 2009; 2012) and the South Sea Bubble of 1720 (Neal 1990, ch. 5; Carlos, Moya and Hill 2002; Carlos and Neal 2006; Shea 2007 and 2009; Frehen et al. 2013; Kleer 2013). Even the little known financial crisis of 1763 in Amsterdam and affecting all of northern Europe has had fresh interpretations in light of modern analysis of financial markets. Schnabel and Shin (2004) show how the chain of short-term credit based on acceptances covered by various commodity contracts broke down with a sudden price shock at the end of the Seven Years War. Quinn and Roberds (2012) go further by showing how the Bank of Amsterdam acted as an early lender of last resort in response to the crisis, letting one merchant bank fail while supporting the others with repo finance based on silver coins and bullion as collateral. Their earlier work (Quinn and Roberds

2009) explained how the Bank of Amsterdam in the seventeenth century had created “inside” or “high-powered” money so it could play the role of a central bank in the future. Carlos and Neal (2011) argue, nevertheless, that the 1763 crisis marked the eclipse of Amsterdam by London as the center of European finance thereafter. Flandreau et al. (2009a) found that the combined effect of the Seven Years War and the crisis of 1763 raised all short-term interest rates throughout commercial Europe leading up to the French Revolution. After the end of the French Revolutionary and Napoleonic Wars, the defining moment for British finance in the 19th century was the government’s regulatory response to the crisis of 1825 (Neal 1998) with ripple effects in the US (Hilt 2009).

One of the most intensively studied episodes that is still generating new scholarly findings by cliometricians is the international crisis of 1907, which started in the US with the failure of the Knickerbocker Trust Company, much as the crisis of 2008 started with the bankruptcy of Lehman Brothers. Neal (1971) lauded the benefits of trust companies, while later work by Moen and Tallman (1992; 2012) pieced together the way the crisis propagated after the initial collapse of a leading trust company and then how the private organization of the New York Clearing House intervened to limit the possibility of contagion. More recent analysis of balance sheet detail from the existing banks and trust companies in New York by Frydman, Hilt, and Zhou (2012) goes even further to show how information about the specific trust companies affected the pressures placed on them, much in the spirit of Gorton’s plea for attention to information flows and content before, during, and after a crisis in financial markets.

Of course, the Great Depression has generated most of the work by cliometricians including dealing with the international aspects, often overlooked by American

economists. The key role of bank borrowings to finance their foreign loans caught the original attention of economists at the time, as reported in the Hoover Commission reports at the time (President' Conference on Unemployment, 2 vols., 1929), but has recently been reevaluated by cliometricians, first for the US (White 1984, 1990; Calomiris 1993; Wheelock 1991), Germany (Schnabel 2009) and then for Great Britain (Accominotti 2012). The initiating role of France in undermining the newly established gold exchange standard by resuming its prewar demand for monetary gold was also appreciated at the time, but subsequent work focused on the futile efforts of the US to cooperate with the UK as financial hegemons (Kindleberger 2000). While Eichengreen (1992) basically blamed the obsession with gold for the general dysfunction of the international financial markets, Irwin (2011) reprised the UK-American argument at the time that France's obsession with gold brought on the Great Depression. Only by reducing the prices of export goods could the rest of the world meet the excess demand for gold created by French policy. Worldwide deflation, as in the 1870s-1880s, again undercut the ability of emerging countries to service the sovereign bonds they had issued. Work by Wandschneider (2008; 2009) shows how differing central bank policies in central Europe created different responses to the challenges of servicing sovereign bonds while maintaining domestic output.

Work continues by cliometricians to pursue Gorton's plea for more in-depth studies of particular crises to see how information flows are disseminated among the various players in each case. Atack and Neal (2009) is one effort to collect deep historical case studies united by a common theme. Atack motivated the introductory chapter by the September 2007 run on Northern Rock's branches throughout the United

Kingdom and Neal's concluding chapter assessed the evolving sub-prime crisis in the US. Echoing the theme of Reinhart and Rogoff, we argued that this crisis had its historical antecedents, going back at least to seventeenth century Amsterdam. But each author developed his own interpretation of a particular episode. At the heart of each story was the severing of the personal ties that had always been the basis of banking and then substituting reliance upon government agency oversight of the impersonal financial markets that allowed effective securitization for assets in secondary capital markets. The individual authors argued that credit institutions, capital markets, and governments always had difficulty in learning how to coordinate effectively the role of all three sets of organizations in the financial sector whenever financial innovations occurred, usually from the pressures of war finance upon governments. The concluding chapter, *mea culpa*, argued pessimistically that policymakers usually misread the supposed lessons derived from previous crises. But it also noted optimistically that the current set of policymakers both in the US and Europe had studied a number of past crises, some quite recent, and perhaps they could learn more quickly from their mistakes than was often the case in the past.

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