

**-Crises in The Global Economy from Tulips to Today:
Contagion and Consequences**

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Abstract

We examine the historical record of the financial crises that have often accompanied surges of globalization in the past. The issue of contagion, the spread of financial turbulence from the crisis center to its trading partners, is confronted with historical and statistical evidence on the causes and consequences of well-known crises. Special attention is given to the gold standard period of 1880-1913, which we find useful to divide into the initial period of deflation, 1880-1896, and the following period of mild inflation, 1897-1913. We find evidence of changes in the pattern of "contagion" from core to periphery countries between the two periods, finding that apparent contagions can more readily be interpreted as responses to common shocks. Lessons for the present period can only be tentative, but the similarities in learning experiences are striking.

As the global financial system has evolved since 1971, financial historians have become increasingly struck by similarities in the stresses and setbacks that have occurred in international financial markets with those that plagued earlier attempts at creating a global financial system. The decade of the 1990s was beset by exchange rate crises in Asia and meltdowns of emerging markets in the former centrally planned economies. Likewise, the decade of the 1890s a century earlier saw a series of financial crises that threatened to become systemic at times. Just as the booming US capital markets in the late 1990s seemed to help stabilize the international financial system at the time, so did the flurry of new activity in the London Stock Exchange promote a rise of international liquidity in the late 1890s. Just as leading commentators on the state of financial markets at the end of the twentieth century argued that the provision of liquidity to financial markets by the actions of the US Federal Reserve System only made the dangers of financial fragility more serious when the markets inevitably collapsed, so did serious analysts in the 1890s criticize the actions of the Bank of England, especially R. H. Palgrave.¹

The similarity between the financial pressures and varied responses of participating countries to the emergence of global capital markets in the 1890s and 1990s has not gone unnoticed by economic historians. Bordo and Eichengreen (1999) look systematically at the characteristics of crises particularly in the gold standard period to determine the extent to which inferences may be drawn about the role of capital mobility, fixed exchange rates, and financial regulation in those earlier crises. Bordo and Schwartz (1999) have made a useful catalog of crises, distinguishing between banking crises that interrupt the internal payments system and currency crises

¹ Palgrave, p. vii.

that disrupt the external payments relations. Charles Kindleberger (2000)² has provided a checklist of financial crises going back to the tulipmania of 1636 in Holland and up to the Asian crisis of 1997 and the subsequent Russian and Brazilian crises in 1998.

The interpretations placed on these historical experiences of international financial crises by the respective authors reflect, ultimately, their judgments whether today's global financial market needs an international lender of last resort (Kindleberger) or a time-consistent set of monetary rules among the participating countries (Bordo). If contagion, the spread of a financial crisis from the country of origin to innocent trading partners or geographical neighbors whose financial fundamentals are sound, is a frequent consequence of a financial crisis, then surely a lender of last resort is a good idea. Injection of liquidity at the appropriate time in the center of the crisis could forestall scrambles for liquidity from trading partners or allies. If, on the other hand, crises spread mainly because trading partners have either weak currencies or fragile banking systems, then credible commitments to a sound currency and conservative banking practices need to be acquired by countries participating in a global financial system. Lurking behind each viewpoint is a historical judgment call: either, the consequences of financial crises are so dire they should be averted when at all possible; or, they provide useful learning experiences that can lead to ever sounder financial and monetary systems. Relying on a lender of last resort to bail out one's unwise or risky loans, by contrast, removes the incentives for developing either sound financial institutions or monetary arrangements.

² Reflecting the renewed interest in financial crises and contagion, this work came out in its fourth edition in November 2000.

The classic account of financial contagions, Charles Kindleberger's *Manias, Panics, and Crashes*, presents a standard pattern in which speculative fevers are caused by the appearance of new, unusually profitable, investment opportunities. Often, the new opportunities accompany movements toward globalization as new markets or technologies appear that can be exploited by a given country or by an economic sector in several countries. Prices of the new assets that are created in response to the new opportunity are driven to unsustainable heights, panic eventually occurs and investors then scramble to withdraw their funds, not only from the original market but also from any other market that resembles it. The renewed possibilities of contagion in the global capital markets of the 21st century have created concerns for national policymakers and for international organizations charged with maintaining order in the international market places.³

Countering these concerns with contagion in financial markets, academic economists have distinguished between "contagion" and "interdependence." Noting that recent financial crises have created increased turbulence in related markets, they ask whether the increase in correlation among, say, bond prices or stock market indices that accompanied the Asian financial crisis starting in July 1997, was due simply to the statistical effect that an increase in variance of two variables will raise their measured correlation. If, after adjusting for the effect on correlation of increased variance, there is no increase in correlation among the financial markets after a crisis, the case for

³ For example, Tamuir Baig and Ilan Goldfajn, "Financial Market Contagion in the Asian Crisis," IMF Staff Papers, vol. 46 (June 1999), pp. 167-195.

contagion disappears.⁴ So also, presumably, the case for a lender of last resort would disappear. The force of this argument depends whether one thinks that prior interdependence was a good thing, enlarging the country's production possibilities, rather than a bad thing, simply setting it up for a fallout from a crisis in any of its trading partners. If a good thing originally, then common lessons learned should be beneficial as well and not averted. Another possibility is that interconnected countries are struck by a system-wide shock that has similar effects on each country, for example, the oil shocks of the 1970s on the oil importing countries. Whether a lender of last resort would have coped better with the OPEC cartel than the learning experience that actually occurred depends on one's appraisal of the consequences of the crisis and then of the lessons learned.

Below, we consider Kindleberger's historical examples of international crises and contagion in chronological sequence, asking in each case 1) what is the evidence for contagion, judged by the standards set by analysts of the crises of the 1990s, and 2) what were the consequences of the crisis for the evolution of financial and monetary systems? The crises considered are the tulip mania of 1637, the Mississippi and South Sea Bubbles of 1719-20, the Latin American debt crisis of 1825, the international crisis of 1873, the Baring crisis of 1890, the stock market crises of 1893, the panic of 1907, the Wall Street crashes of 1929 and 1987, and the Asian crises of 1997. Kindleberger picks on the crises of 1720, 1873, 1890, and 1929 as cases of international financial crises whose consequences were especially severe and there was no lender of last

⁴ Kristin Forbes and Roberto Rigobon, "No Contagion, Only Interdependence: Measuring Stock Market Co-Movements," NBER Working Paper 7267, July 1999, NBER: Cambridge, MA.

resort. (Kindleberger, 2000, p. 207)⁵ We deal with other, minor episodes in passing, but pay special attention to the crises of 1873, 1890, 1893, and 1907 using new, high-frequency data from a wide range of financial markets in those years of the classic gold standard. These also happen to be the same international financial crises identified as yielding analogies to today's financial crises by Charles Goodhart and P. Delargy (1998). As we shall see, the evidence for contagion is mixed, as is the evidence for learning. Historical circumstances count for a great deal, today as in the past, but we insist that learning has occurred and can continue to occur.

The Tulip Mania of 1636-37

The first financial crisis of note after the European “discoveries” of the trading and exploitation possibilities in the rest of the world – especially the West Indies, the East Indies, and Africa – was the tulip mania in Holland, 1637.⁶ Despite the attention paid to this episode by the chroniclers of human folly, Peter Garber's analysis of this dramatic episode reduces it to a month's worth of idle speculation by burgers confined to bars in the city of Haarlem at the height of the Thirty Years War during an outbreak of the plague. These individuals, short of capital and long on leisure, knowingly made unenforceable bargains on common tulips for delivery in six months. In fact, their bargains were not enforced, save at 3.5 to 10% of the original amount, for those traders wishing to continue in the tulip business afterwards. Such capital as was bound up in these futures contracts, however, was seen by the authorities as a diversion from more useful investments in government bonds to continue financing the Dutch war effort.

⁵ Kindleberger also points to the domestic crises of 1882 in France and 1921 in Britain where no lender of last resort acted, but these were limited to the country of origin.

⁶ Peter M. Garber, *Famous First Bubbles: The Fundamentals of Early Manias*, Cambridge, MA: The MIT Press, 2000.

The government's hostility to such private uses of funds during wartime accounts for the negative press that the tulip mania received at the time, which has been continued by generations of historians ever since.

In Garber's economic analysis, however, the prices usually quoted as examples of speculative excess were, indeed, normal for first generation bulbs of unusual beauty that could be used to reproduce generations of subsequent blooms, which naturally fell sharply in price as production grew. Later markets for bulbs in normal times, whether for tulips or hyacinths, show similar high prices for the originals and rapid declines afterwards. Further, there seems to have been no contagion to other financial centers from the tulip speculation as such, although the financial demands of the Thirty Years War upon the commercial cities and towns of the European continent created disruptions as well.

While Kindleberger leads off his chapter on "Domestic Contagion" with a critique of Garber's analysis,⁷ the evidence he cites from other secondary works emphasizes the general prosperity of the Dutch republic after the mania had passed and prices had collapsed. The inference he draws implicitly is that building canals and luxury residences were also silly speculations by the Dutch. Most historians, and contemporaries, however, attribute the prosperity of the Dutch in this "golden age" to the profits they extracted as an entrepôt for Protestant forces in northern Europe during the Thirty Years War, 1618-48. Especially beneficial was their monopoly of the Baltic trade as they circumvented the Spanish blockade to the Mediterranean and even

⁷ Charles P. Kindleberger, *Manias, Panics, and Crashes*, 4th ed., New York: John Wiley & Sons, 2000, pp. 109-110.

established trading colonies in the West Indies.⁸ The closest thing to contagion was speculation in other commodity derivatives in the summer of 1636 in other Dutch towns, but these, like the tulip mania in Haarlem, are attributed to the outbreaks of plague and the quarantines imposed by municipal authorities on traveling merchants.⁹

The main outcome of the financial crises attending the Thirty Years' War, however, was to promote lasting financial innovations, creating perpetual or life annuities that could be easily transferred to third parties. These were issued by individual cities in northern Europe that were forced to pay "Kontributionen" to warlords maintaining armies in their vicinity.¹⁰ When the armies moved on, leaving the structures of the town intact if the payment had sufficed, the town's debts remained but were serviced indefinitely from the local tax base. Eventually, these were marketed to citizens in adjacent towns and cities as well, laying the basis for the "financial revolution" in public finance of the later 17th century.¹¹ The lessons learned by the Dutch were evident in their emphasis on promoting overseas trade by maintaining a joint stock company for the Asian trade (the Dutch East India Company), unifying the mint standards of the provinces, facilitating merchant payments through a public exchange bank in Amsterdam, and assigning specific excise taxes for the service of

⁸ Jonathan Israel, *The Dutch Republic: Its Rise, Greatness and Fall, 1477-1806*, Oxford: Clarendon Press, 1995.

⁹ Jan de Vries and Ad van der Woude, *The First Modern Economy: Success, Failure and Perseverance of the Dutch Economy, 1500-1815*, Cambridge: at the University Press, 1997, pp. 150-151.

¹⁰ Fritz Redlich, "Contributions in the Thirty Years' War," *Economic History Review*, 12 (December 1959), 247-54.

¹¹ James Tracy, *A financial revolution in the Habsburg Netherlands*, Berkeley and Los Angeles: University of California Press, 1985.

government debts issued mainly by the individual cities and provinces.¹² (Neal, 2000)
The golden age of the Dutch Republic ensued, the “contagion” of the tulip mania safely contained.

The Mississippi and South Bubbles of 1719-20

Nearly a century after the tulip mania in Holland, the French and British governments created the Mississippi and South Sea bubbles, stock market schemes designed to reduce the burden of debt service, given weak governments that lacked the authority to raise taxes. Both governments sought to swap the bulk of their outstanding debt for equity in large joint-stock trading companies with monopoly privileges – the Mississippi Company (*Compagnie des Indes*) in France and the South Sea Company in Britain. Both efforts had the full support of the government currently in power, and both were successful ultimately in reducing the respective debt burdens, at the expense of debt holders who delayed converting their debt holdings or who failed to sell out their equity holdings before the crash. The two schemes were connected through international capital movements, as investors from both the Netherlands and Britain were first attracted to John Law’s investment opportunities in France from July to December 1719, and then to the rising stock markets in London from March to September 1720. By October 1720, however, both schemes had collapsed, thanks mainly to the total disruption of the European payments system in the summer of 1720. This was caused mostly by John Law’s efforts to rescue his system from the dangers of capital flight (by letting the French currency depreciate rapidly, he hoped to induce speculative inflows in anticipation of the revaluation that would follow), but

¹² Larry Neal, "How It All Began: the monetary and financial architecture of Europe during the first global markets, 1648-1815," *Financial History Review*, 7 (2000), pp.

complicated by the last outbreak of the plague on the European continent and the quarantines imposed by municipal authorities.

Much has been made of the supposed contagion of irrational speculation that swept across northern Europe in these two years,¹³ but recent work by economists has reduced both to essentially rational, if premature, schemes to relieve pressure on government finances.¹⁴ The lesson of history is not that contagion occurred, but that the two countries suffered a common shock – the excessive debt created by the enormous expenses of the War of the Spanish Succession.

The aftermath of the bubbles, however, laid the basis for the rise of an international capital market, increasingly centered in the city of London. Most important for the future success of the capital markets in Britain, the huge mass of illiquid Irredeemable Ninety-nine Year Annuities that had constituted the major part of British national debt in 1719 had been largely converted by 1723 into liquid, easily tradable and transparently priced, South Sea annuities. This greatly enlarged mass of tradable financial assets in the secondary market for securities in London preserved an active stock market in London, more than offsetting the effects of the Bubble Act of 1720.

The Bubble Act eliminated dealing in a welter of bubble companies that had sprung up in the previous speculative boom, but does not seem to have eliminated

117-140.

¹³ Kindleberger, 2000, pp. 77-78; 122-29), Edward Chancellor, *Devil Take The Hindmost: A History of Financial Speculation*, New York: Farrar, Straus and Girous, 1999), ch. 3.

¹⁴ Larry Neal, *The rise of financial capitalism: international capital markets in the Age of Reason*, New York: Cambridge University Press, 1990; Antoin E. Murphy, *John Law: Economic Theorist and Policy-maker*, Oxford: Clarendon Press, 1997; John Carswell, *The South Sea Bubble*, rev. ed., London: Alan Sutton, 1993.

continued use of the joint-stock company for financing the continued expansion of British infrastructure – turnpikes, canals, docks, and waterworks.¹⁵ The basic outlines of the Anglo-American structure of finance were set by 1723 – a complementary set of private commercial and merchant banks all enjoying continuous access to an active, liquid secondary market for financial assets, especially government debt. The South Sea Bubble proved to be the "big bang" for financial capitalism in England. In 1726, even the Bank of England had to acknowledge the success of the South Sea Company's three percent perpetual annuity when it issued its own Three Per Cent Annuity.

Unfortunately for France, the collapse of the Mississippi Bubble there in 1720 proved to be the end of secondary markets for financial assets in that country.¹⁶ In the inflation that had accompanied Law's efforts to create a market for the Mississippi company shares, French debtors had repaid their bonds in depreciated currency, inflicting large, and long-lasting, losses on French creditors. Only a limited market for private debt arose after the currency reform of 1726, and that was a primary market mediated by the public notaries in Paris.¹⁷ Amsterdam's capital market survived the collapse of the mini-bubbles that had popped up there at the end of 1720, but continued to be fragmented among the various bonds issued by the Generalitet of the United Provinces and the individual cities and provinces. Only the shares of the new marine insurance company created in response to the financial innovations in Paris and London remained as a new investment opportunity for Dutch savers. For the most part, they

¹⁵ Ronald Harris, *Industrializing English Law: Entrepreneurship and Business Organization, 1720-1844*, New York: Cambridge University Press, 2000.

¹⁶ Philip T. Hoffman, Gilles Postel-Vinay, and Jean-Laurent Rosenthal, *Priceless Markets, The Political Economy of Credit in Paris, 1660-1870*, Chicago: University of Chicago Press, 2000.

focused first on the increasing issues of national debt created by the British government,¹⁸ and then on bonds issued by various European governments after mid-century.¹⁹ The British, French, and Dutch governments learned different lessons from the first international financial crisis.

After the bubbles

Financial crises in the remainder of the eighteenth century were caused by shocks from the aftermath of war finance, but usually had quite different effects among the financial centers of London, Amsterdam, and Paris. During the Seven Years War (1756-63) that caused bankruptcies among the public notaries in Paris and put an end to the efforts of the most enterprising to become *de facto* bankers, the most spectacular military victories won by the British were in India. The territorial gains there and rewards by grateful Indian princes yielded the promise of greatly increased profits for the East India Company. Speculation could be financed in Amsterdam by drawing bills of exchange on the basis of credits expected from the Bank of England as it remitted bills payable in Amsterdam to support its mercenary troops on the Continent, as well as the troops of Frederick the Great. This led to *wisselruiterij*, a Dutch version of check-kiting, that came to a sudden and widely embarrassing halt in 1763. A chain of bankruptcies then occurred in Amsterdam and Hamburg, where the British subsidies had been directed. According to Wilson, however, the crisis was short-lived and

¹⁷ Hoffman, Philip and Jean-Laurent Rosenthal, "Redistribution and Long-Term Private Debt in Paris, 1660-1726," *Journal of Economic History*, 55, (June 1995), pp. 256-84.

¹⁸ P. G. M. Dickson, *The financial revolution in England, a study in the development of public credit, 1688-1756*, London: Macmillan, 1967.

¹⁹ James C. Riley, *International Government Finance and the Amsterdam Capital Market*, Cambridge: at the University Press, 1980.

focused on the least reputable bankers.²⁰ London bankers, who had not been involved in *wisselsruiterij*, perhaps due to a lack of opportunity or in sophistication in the use of the Wisselbank's facilities, sent large shipments of specie to their most reliable correspondents. The London bankers and the Bank of England also suspended temporarily requests for payment of their bills in Amsterdam. The connections between the sources of public credit for the British government and the instruments of private credit for foreign trade between London and Amsterdam were thereby sustained and even strengthened.

A similar liquidity crisis, however, occurred again in 1772, also the result of speculation on East India Company stock. But the only response in the Amsterdam financial sector this time was to patch together a Loan Bank to serve as a form of deposit insurance by helping to recapitalize merchant banks that were temporarily illiquid. Even the connections with the London capital market were weakened as Dutch rentiers withdrew their holdings of British national debt in favor of seeking placements in other European government debt.²¹

The learning experience of these first stock market bubbles and crashes varied, then, depending whether we take Britain, France, or the Netherlands as our object of study. While Kindleberger asserts that the consequences were prolonged and destructive to all three economies, economic historians remark that the following quarter-century was one of remarkable prosperity for all three countries, chiefly due to the absence of major war until the War of the Austrian Succession.²² The French

²⁰ Wilson, pp. 168-69.

²¹ Riley, (1980).

²² James Tracy, ed., *The Rise of Merchant Empires, 1500-1800*, Cambridge: at the University Press, 1990.

financial system was weakened permanently, however, while the British benefited from the creation of a liquid secondary market for successive issues of its national debt and the Dutch connection with London benefited both.²³ The case for a lender of last resort is strongest in the French experience, weakest in the British, unless one thinks of the reorganization of the South Sea Company in 1723 as a delayed action of a reluctant lender of last resort – the Bank of England acting under political duress from the administration of Robert Walpole.

The First Latin American Debt Crisis in 1825

After the disruptions to financial markets caused by the French Revolution and the wars that ensued until 1815, the London stock exchange emerged as the dominant capital market in the world. The first foray of British investors into international finance, however, ended in disaster with the crash of 1825. The origins of the 1825 crisis began with the withdrawal of foreigners from the British national debt after the war. Following the final defeat of Napoleon at Waterloo in 1815, capital flowed back to the European continent from Great Britain. Foreign holdings of British debt diminished rapidly, the price of Consols rose as the supply diminished, and prices of Bank and East India stock rose in tandem. British investors used to safe returns ranging between 4 and 6 percent for the past 20 years now found their options limited to yields between 3.5 and 4.5 percent. The opportunities for investment in new issues of French five percent *rentes* were more attractive than continuing their holdings in Consols. Indeed, the *rentes* maintained a steady return over five percent throughout the crisis period and offered a stable alternative to the British funds.

²³ Neal, "How It All Began."

Baring Brothers and Co., by its successful finance of Wellington's army in 1815, had established itself as the dominant merchant bank in England. By undertaking the flotation of the first two issues of French *rentes* sold to pay the reparations and support Wellington's occupation forces, Barings became the "Sixth Power" in Europe, according to the Duc de Richelieu.²⁴ From February to July 1817, Barings disposed of three loans, the first two at a net price of 53 for 100 million francs each and the third at 65 which raised 115 million francs. Yet, according to the historian of the Baring firm, no disturbance in the British trade balance or in French reserves seems to have occurred — the inflow of capital to France from Britain from the issue of *rentes* seems to have been offset by indemnity payments and army contracts from France to Britain.²⁵ (What the historian has missed, of course, is the fall in the exchange rate of the British pound that occurred at the time; the pound was still floating after the suspension of convertibility in February 1797.) From this success for British investors in foreign investment with the French *rentes*, it has traditionally been argued, came increased enthusiasm for other forms of investment, first in the bonds issued by the new government of Spain established in 1820, and then in the bonds issued by the new states emerging in Latin America.²⁶

The collapse of Spanish control over its American empire during the Napoleonic Wars led to a variety of independent states being formed out of the former

²⁴ Jenks, p. 36. See also Ziegler, pp. 100-111.

²⁵ Jenks, p. 37.

²⁶ While the focus for foreign loans was mostly on Spain and Spanish America, literature buffs may be forgiven for thinking instead of Greece, which received a loan and much-needed publicity for its then premature efforts to break away from Turkish rule. Over 50 years later, when the Greek government was attempting to assure the international community it would go on a gold standard, part of its commitment was to resume payment on these initial bonds!

colonies by 1820. Battling one another for control over strategic transport routes, mainly rivers and ports, and over state enterprises, mainly mines, each appealed to foreign investors as a source of government finance and as a means to substitute foreign expertise and technology for the vanquished Spanish. Their government bonds and their mining shares found a ready market in the London Stock Exchange, which had become the dominant market place for finance capital in the world during the Napoleonic Wars. The loan bubble of 1822-25 ensued, eventually giving British foreign bondholders their first experience with defaults by sovereign states. None of the new Latin American states emerging from the remains of the Spanish empire (Brazil remained part of the Portuguese empire) found the means, whether by exports or taxes, to service the debts they had incurred in London. Meanwhile, they dissipated rapidly in military conflicts with neighboring states the net proceeds they received after the bonds were sold at discount and they had paid large commissions up front to the London investment houses.²⁷

From 1822, when both Chile and Colombia floated bond issues with London agents, an increasing number of Latin American governments tried to find the means for financing their transition to independence from the flush pockets of British investors. The bonds they issued, in terms of the amounts actually paid up, as distinguished from the amounts actually received by the governments, were the largest

²⁷ Dawson (1990) provides a readable account of this episode, but Marichal (1989) puts it into a longer run Latin American perspective. Brazilians point with pride that their bonds never went into default, which is why their prices remained the highest among the Latin American bonds in the late 1820s. The Brazilian bonds, in fact, were the only ones issued by the Rothschilds. None of their government bond issues for Austria, Belgium, Naples, Prussia, or Russia defaulted in this period. (Doubleday, p. 281).

single category of new investment in the London capital market in this period.²⁸ It is true, even so, that the amount was small relative to the remaining sum of the British government's funded debt -- £43 million compared to £820 million.²⁹

Figure 1 compares the prices of several bond issues of the emerging South American states, as given in James Wetenhall's semi-weekly *Course of the Exchange*. At the peak of the stock market boom, there was surprising convergence in the prices of all the Latin American bonds. It was only in the ensuing two years that information on the fiscal capacity of the individual governments and their respective economic bases enabled the London market to distinguish among them. Mexico and the Andean countries were clearly marked to be disaster cases by the end of 1828, while already Argentina and Brazil were demonstrating their attractiveness to British investors, an allure that would increase until the Baring crisis of 1890.

To see if this early financial crisis is properly another example of contagion, we have analyzed the cross-correlations of various asset prices in the London Stock Exchange during the first Latin American debt crisis in the 1820s, which led to the financial crisis of December 1825. Using the prices of the Three Percent Consol as the reference security, Table 1 shows that correlations were quite high before the crisis between the price of Consols, a general index of stock market prices, the price of French rentes (a seasoned foreign security), and the first Latin American bonds issued by Colombia and Chile. After the crisis, correlations broke down and, contrary to the recent stock market crises, the variance of the reference asset in this case actually

²⁸ Gayer, Rostow, Schwartz, vol. I, p. 189.

²⁹ Gayer, Rostow, and Schwartz, vol. I, p. 408, fn. 8 and *Abstract of British Historical Statistics*, p. 402. These are nominal values in each case, but government debt was then trading at close to par, so its market value was roughly the same.

declined. Consequently, adjusting for heteroscedasticity actually increases the likelihood of finding evidence of contagion, but even so the hypothesis of contagion from the collapse of Latin American bond prices to the stock market index, or mature bond markets, is resoundingly rejected.

The lesson learned by the British government in this case was to make major changes in the financial structure of Britain, reforming the bankruptcy law, repealing the Bubble Act of 1720, forcing the Bank of England to open branches in the major commercial and industrial cities, while maintaining the gold standard, and avoiding most Latin American involvements for another quarter-century. If the Bank of England acted as a lender of last resort, it was erratic, belated, and ultimately inadequate.³⁰ In the view of modern economic historians, however, this set the stage for the true industrial revolution in the British economy – the beginning of sustained increases in per capita income, increases sustained to the present day. It may be, then, that other reforms in the financial architecture of a country can compensate for the absence of an effective lender of last resort.

The Gold Standard Emerges

Meanwhile, European countries took note of the superiority of the British public financial system that Britain had conclusively demonstrated during the Napoleonic wars from 1803 to 1815. The lesson was clear, but adapting the British system to Continental conditions was a slow and painful process, marked by numerous setbacks as European governments clung as long as possible to their traditional fiscal regimes, monetary standards, and financial institutions. Over the course of the nineteenth century, the individual European nation-states gradually moved as best they could

toward an imitation of the obviously successful British system of public finance. Issuing perpetual annuities backed by the permanent taxing authority of an elected Parliament was a key element in the British system, but the reigning monarchs of Europe only reluctantly ceded authority over taxation to their parliaments.

Constraining the growth of the money supply with a credible rule such as the gold standard was also important, not least to maintain the market value of the debt issued by a government. But no country was willing to follow the British example of a gold standard, set in 1821, until little Portugal adopted gold as its monetary standard in 1854. Then it took the Franco-Prussian War in 1870 to get united Germany to adopt a gold standard to replace the varieties of silver standards among the various German states. France, and its major trading partners in Europe, persisted with the bimetallic standard, maintaining a mint ratio of 15.5:1 of silver to gold until 1871. Then, the flood of German silver on the market as the German Empire replaced the silver coinage with either gold or token coins led France and the other members of the Latin Monetary Union to demonetize silver, effectively adopting the gold standard as well after 1879.³¹

With the adoption by 1880 of a nearly universal regime of fixed exchange rates within Europe, a truly European – and Atlantic – wide financial market arose quickly, which came to encompass much of Latin America (Argentina and Brazil) and Asia (India) as well as Australia.³² It served well to finance an impressive surge of international trade as well as labor and capital movements that remain benchmarks for today's global market place. The trade, labor, and capital movements of the period

³⁰ Comments by Michael Bordo, on Neal (1997).

³¹ Marc Flandreau, "The French crime of 1873: an essay on the emergence of the international gold standard," *Journal of Economic History*, 56 (1996), pp. 849-72.

were clearly driven by technological revolutions in steam-driven transport, electrical communication, and agricultural mechanization.³³ All of these epochal changes placed immense new demands upon the international financial markets as well, which in turn expanded rapidly their depth and range of services.

While previous analysts have focused on either the bond market,³⁴ as an indicator of long-term capital movements, or on exchange rates as an indicator of credible commitment to the gold standard,³⁵ we have chosen to focus on the open market interest rates for three-month accommodation bills, which were reported weekly in the *Economist* newspaper. While the discount rates at the public banks of issue on the European continent remained sticky compared to the Bank of England, the open market rates were much more responsive to market conditions. Table 2 demonstrates dramatically how much more volatile were short-term interest rates on three-month trade bills than the long-term interest rates on the respective government bonds. For the five countries shown, the standard deviation of the short-term rates we use for our analysis of the transmission of financial crises were several times greater than the standard deviation of the long-term rates. In the cases of Britain and Germany, the difference was nearly ten times. In the statistical analysis below, we concentrate on correlations of movements in interest rates in this short-term capital market. It was the

³² Giulio Gallarotti, *The Anatomy of an International Monetary Regime: The Classical Gold Standard, 1880-1914*, New York: Oxford University Press, 1995.

³³ Kevin H. O'Rourke and Jeffrey G. Williamson, *Globalization and History: The Evolution of a Nineteenth Century Atlantic Economy*, Cambridge, MA: MIT Press, 1999.

³⁴ Niall Ferguson, *The Cash Nexus, Money and Power in the Modern World, 1700-2000*, New York, Basic Books, 2001, Bordo and Murshid, op. cit.

³⁵ Michael D. Bordo and Ronald MacDonald, "Violations of the 'Rules of the Game' and the Credibility of the Classical Gold Standard, 1880-1914," NBER Working Paper No. W6115, July 1997.

short-term capital market that had the greatest volume of trading activity, financing not only the continually rising volume of domestic and foreign trade arising from the transportation revolution of the steam age, but also the temporary liquidity needs of financial intermediaries. This so-called “money market” was precisely where we expect pressures from liquidity demands by banks to be expressed, raising discount rates when demands for cash surged and lowering discount rates when the supply of cash was plentiful. Indeed, even Kindleberger notes that it was the short-term capital market that was the usual, and most effective, transmission mechanism for the examples of contagion he cites, which become exceptionally numerous in this period.³⁶

The analysis below draws upon the extensive data set we have compiled specifically for this study. The data set comprises weekly observations on prices of long-term government bonds and interest rates on three month, prime quality trade bills determined in national capital markets and the discount rates charged by their public banks for fourteen countries over the period January 1, 1870 through June 27, 1914. (see Data Appendix for a full description.) Including over 100,000 observations, this rich data set, now available to researchers, can be used for detailed analyses of the transmission process of financial disturbances in the world's first global financial market. We use it in this study to focus on the issue of whether contagion characterized the financial crises of the gold standard period. Table 3 shows the dates of the crises and the periods we analyze pre- and post-crisis.

³⁶ Kindleberger, ch. 8, “International contagion.”

The Crisis of 1873

We begin with the 1873 crisis, which is considered to have started in Germany and Austria but amplified by the repercussions in the United States, still in the greenback period. Table 4 shows the correlation coefficients between the market interest rates on call money in New York and, respectively, Paris, Berlin, Amsterdam, Brussels, Vienna, Petersburg, and three-month bills in London.³⁷ Germany had just adopted the gold standard formally, but was still in the process of replacing the silver coinage. Paris, Amsterdam, Brussels and Vienna were bimetallic but suffering the aftershock of Germany's switch from silver to gold and the flood of silver coming into their mints.

The last column in Table 4 indicates whether there is evidence of contagion (C) or not (N) between the London market rate and the market rate of the country in question. None of the seven cases show contagion on the Forbes and Rigobon criterion, after adjusting for heteroscedasticity, although Austria does increase its correlation considerably while failing the one-sided T-statistic test of +1.65. While we have taken the US as the source of the crisis, Kindleberger might well argue that Austria was the source. It certainly was the weakest financial sector, with the Austria-Hungarian Monarchy struggling with the aftermath of its defeat at the hands of Prussia in 1866 and the triumph of the German Reich establishing a gold standard in 1871. Rather than a case of possible contagion, Austria's apparent response to the US crisis can also be interpreted as a defensive reaction in common with the US to maintain their gold stocks in response to German pressures.

These statistical measures of contagion are completely at odds with the standard story of the 1873 crisis. According to Kindleberger, the crisis was initiated by the speculative excesses in Germany resulting from the reparations payments extracted from France after its defeat in 1870; the German mania spilled over into Austria in 1871 and 1872. Both stock market bubbles collapsed in May 1873, with contagion spreading to Italy, Holland, and Belgium, eventually taking in the US in September 1873.³⁸ If that was a process of contagion, then we should have found the correlation of Austria and the US falling after the collapse of Jay Cook's firm in September 1873, not rising as it did. The panic in the US, which we take as the crisis point, was followed by a worldwide depression in trade and economic activity that lasted until 1879, and which encompassed France and Russia, neither of which shared in the initial euphoria and so were exempted from the crash.

The cases of Austria and the United States show that, even in the absence of a lender of last resort or any close substitute for the actions of such a lender, effective steps were taken to limit their correlations with the epicenter of the crisis, Germany in this case. Other unpleasant economic consequences followed from their respective resolves to hasten deflation and return to a fixed metallic standard (the US in 1879 when the economy picked up again and Austria not until the early 1900s when it was finally successful in shadowing the gold standard). Financial contagion, however, was not, on our reading of the statistical evidence in the short-term capital markets of the

³⁷ All interest rate data for the period 1873-1914 were de-seasonalized using the ESMOOTH facility in RATS, which is based on the Holt-Winters Exponential Smoothing Algorithm.

³⁸ Kindleberger, 2000, pp. 131-32.

time, part of the picture, but the gold standard system was incomplete, still in its formative years.

The Crisis of 1890

The Baring crisis of 1890 forced Portugal and Argentina off the gold standard, while leaving Britain breathing a collective sigh of relief in the financial sector. Governor Lidderdale of the Bank of England coordinated a swap of equity for debt among the major banking houses of London so they could take over much of the Baring business while forestalling a run on them by their clients. But as he admitted freely, his efforts would likely have failed had it not been for the pledges of support by the Banque de France and the British government.³⁹ What seems surprising at first glance is that the gold centers experienced much more volatile market and bank rates through these three crisis years than did the smaller, more vulnerable trading centers such as Vienna, Madrid, and Genoa. Figures 2a and 2b highlight the contrast in performance by the respective money markets of the core and periphery countries in Europe. The much lower volatility of both the bank and market rates in the periphery countries compared to the bank and money rates in the core countries persisted right through the crisis year of 1890, the effects of which are impossible to discern in Figure 2b.

–Figures 2a and 2b about here–

The explanation of lower volatility in the periphery than the core cannot be that only the credit markets of the large industrial countries were affected by the crisis; trade intensity among the European continental countries was still rising in the 1880s despite

³⁹ Kindleberger (2000), pp. 151-2, 184-5, drawing on the authoritative account of Leslie Pressnell, “Gold Reserves, Banking Reserves and the Baring Crisis of 1890,” in C. R.

signs of reversal in the free trade movement that had begun in the 1860s. It seems self-evident that the less advanced countries were using their public banks to limit access to trade credit through informal credit rationing. Their implicit capital controls were clearly effective, as their respective money markets mirrored faithfully both the levels and the volatility of the very stable bank rates. Arthur Bloomfield (1959, p. 28) identified the variety of informal capital controls that central banks employed when under duress in the gold standard period, although he hesitated to draw any definite conclusions about the policy implications of his anecdotal evidence. Joseph Schumpeter, on the other hand, asserted that every commercial bank was assigned a ration and “such ration was cyclically varied as well as currently revised.”⁴⁰ The question is whether the behavior of the periphery countries changed over time with experience or with changes in circumstance?

We have even more data on short-term interest rates with which to examine the possibility of contagion from the financial crisis of 1890, which may have started with a banking crisis in the US in October, leading to exacerbation of Baring’s difficulties with Argentina in November of that year. Table 5 gives the results for twelve trading partners, most of whom were on the gold standard at this point, the main exception being Portugal, which left the gold standard in 1890. The only two cases of possible contagion are Russia and the United States, but again this may be interpreted as a defensive reaction as in the earlier crisis of 1873. Russia did not formally commit to a gold standard until the reforms of Sergei Witte in 1896. The correlations of short-term interest rates in these gold standard markets with the London market were higher,

Whittlesey and J. S. G. Wilson, eds., *Essays in Money and Banking in Honour of R. S. Sayers*, (Oxford: Clarendon Press, 1968).

typically, than in 1873 both before and after the crisis of 1890, reflecting the increase in short-term capital flows that accompanied the spread of the gold standard.

Our results can be compared with those reported by Bordo and Murshid (1999), who analyzed the correlation patterns on government bond prices for eight countries before and after the first crisis in April 1890 when the Banco de la Nacion stopped dividend payments, provoking a run on all Argentine banks, and then before and after the November failure of Baring Brothers. Only in the case of Argentine and British bonds did they find an increase in correlations and then only after the April crisis within Argentina, suggesting the unlikely case that contagion spread from Argentina to Britain, or that Argentine bonds became absorbed by the reorganized and recapitalized Barings firm. Both their results and ours indicate that the actions of the Governor of the Bank of England in re-organizing Barings while supporting their depositors limited the fallout from this crisis to the English banking establishment in the short run. It may have had more widespread influences, however, in the medium and long-run, due to the interconnections of the various money markets that had arisen.

The Crisis of 1893

To see the longer-term effects of the 1890 experience we are fortunate that another, more serious and more widespread, financial crisis struck in 1893. Figures 3a and 3b show how the short-term credit markets in Europe responded to this crisis. The volatility of bank rates among the core gold standard countries was nearly as stable during this crisis as in the periphery countries, most of whom were merely shadowing the gold standard at this time. Portugal had abandoned it, Russia and Austria had not

⁴⁰ (Bloomfield, p. 29, citing Schumpeter, *Business Cycles*, New York, 1939, p. 651.

yet adopted it, Italy was about to drop it and Spain never would adopt it formally. The real contrast in this crisis came in the open market rates, which as in the previous crisis of 1890 were much more volatile in the core countries than in the periphery. We take this again as evidence that credit rationing was effectively administered in the periphery countries, implying de facto capital controls in the periphery, but exposure to external market pressures in the core.

Additional evidence in support of our interpretation of the contrasting results for core and periphery countries in Europe comes from the Australian case in 1893. For Australian economic development, the crisis of 1893 has been interpreted as a major turning point. The large number of branch banks that had financed Australia's "long boom" over the preceding quarter century had to suspend payments for varying periods during the year 1893 and to consolidate services when they resumed. Despite the internal turmoil in the domestic payments system that was occurring, the discount rates in Melbourne, Sydney, and Adelaide remained rock solid throughout the year and the following years. Indeed, the only sign of trouble that we can pick up in our financial data from the *Economist* newspaper is that it stopped reporting the Australian data altogether in 1894. It was in London's bill market, where most of the Australian banks had their headquarters, that the action occurred.

–Figures 3a and 3b about here–

The crisis of 1893, originating in the United States with a banking crisis combined with a currency crisis created by the Silver Purchase Act of 1893 included Australia, Italy, and Germany in its extent, according to Bordo and Eichengreen. In the short-term capital markets, however, it appears to have created contagion in only 3 of

the 12 cases analyzed in Table 6. Only the Netherlands, Belgium, and Switzerland were affected apparently. All three small countries had essentially no correlation at all with the very volatile call money rates of the US before the crisis, unlike Italy, France, and Austria. But after the crisis, their correlation with US call money rates shot up significantly. The odd thing about this crisis, however, is that the variance of the central capital market actually fell during the crisis period compared to the precrisis period – from 0.442 to 0.255. If we were to take the London three month bill rate as the epicenter of the crisis instead, we would still have the same problem – a decline in variance so that the adjustment of the correlation coefficient for increased variance should actually be reversed, reducing the precrisis correlation. The same conclusion, nevertheless, would emerge – somehow the crisis of 1893 increased the interdependence of the short-term capital markets in the Atlantic trading world for three of the smaller, but very open, economies in Europe while decreasing it for the major economies of France, Italy and Great Britain.

We believe this may again be a defensive reaction limited to the smaller countries with smaller gold reserves at their disposal, compared to the major countries. This may be a further demonstration that the pressures upon the gold standard's viability as an international monetary system were becoming extreme by that time as the American and German economies expanded rapidly and increased their holdings of monetary gold. While the discovery of new sources of gold in South Africa and Alaska in the following years eased the pressures overall from 1897 to the outbreak of World War I, the financial techniques developed by continental bankers in imitation of the British example were also important. We return to this point in our conclusion after

examining the case, or not, for contagion in the following international financial crises, starting with the one major international financial crisis during the period of gold inflation, 1897-1914.

The Crisis of 1907

After 1897, gold inflation relieved the pressures imposed upon monetary authorities committed either formally or informally to fixed exchange rates under the gold standard system. Not only did currency crises remain on the sideline, but the frequency of banking crises diminished as well. The crisis of 1907, however, was very serious and its effects widespread, extending from the US to Germany and Italy. Figures 4a and 4b contrast the results for the core and now a much expanded membership in the periphery. Even with the greater numbers of centers reporting to the *Economist* newspaper by this time, however, the same stability of bank rates and corresponding market rates in the periphery countries remains in sharp contrast to the volatility of market rates in the core countries. Moreover, bank rates were more responsive in the 1907 crisis as more central banks began either to imitate the practices of the Bank of England, or to take defensive measures in response to the Bank's frequent changes of discount rate.

–Figures 4a and 4b about here–

In the midst of the gold inflation period from 1897 to 1914, occurred the most severe and widespread financial crisis before World War I. No doubt that its origin was the United States, but the financial interdependence already developed within the gold standard area meant that its effects were quickly transmitted abroad. While the crisis that caught everyone's attention was the banking crisis with the failure of the

Knickerbocker Trust Company of New York in October 1907, the ultimate cause of the crisis was likely the San Francisco earthquake in April 1906.⁴¹ Naturally, the physical destruction caused by the earthquake put immediate demands upon the financial resources of first the California, then the US economy. It was not until October 1906, however, that these pressures were transmitted to London, but then the pressures were sudden and overwhelming as over £50 million of gold were shipped in that month from London to the US. The cause was the reluctant decisions by British insurance companies to pay out on the claims lodged by their San Francisco insurees. While the insurance companies had initially claimed that the losses of property in San Francisco were caused by the earthquake, and not by the fires that followed immediately, so they were not liable for payments, they realized that US courts would certainly rule against them. They began payments in October, dealing with six months of accumulated claims.

The effect was two-fold: first the Bank of England raised the discount rate sharply, and second, when it lowered the discount rate in January 1907 it refused to discount any bills originating from the United States. Ultimately, this cut off New York trust companies from their usual source of funds for financing liquidity demands in the fall. The fall of 1907 saw another large outflow of gold from London to the US, and this time the response was felt throughout the capital market, transmitting quickly to Germany, France, and Italy.

Table 7 shows how dramatic this final episode of the gold standard was for the global financial system of the time. The increase in variance of short-term interest rates

⁴¹ This paragraph draws on Kerry Odell and Marc D. Weidenmier, "Shock and Aftershock: The 1906 San Francisco Earthquake and the Panic of 1907," unpublished

in the London market was the greatest experienced in the entire gold standard period. The evidence of contagion is nearly universal in Europe – only the Scandinavian gold bloc remained impervious, along with the US, India, and Spain. Forbes and Rigobon might classify these results for 1907 as less an example of contagion, however, than of an aggregate shock affecting all the financial centers of the gold standard. The problem with that explanation, of course, is the anomalous case of the United States, the very epicenter of the crisis. But this may be another case where our statistical test is too rigorous, as the t-statistic of 1.48 is even closer to the critical value of 1.65 than the case of Austria in 1873. But if the US financial market was subjected to special discrimination in this crisis, excluded from the London discount market precisely in the year before the crisis of October 1907, the US anomaly is explained. Effectively, the UK interest rate against the US bills of exchange was infinity.

We have, then, a historical example of what can happen when a country is excluded from an interdependent financial system precisely when its financial needs are greatest, as is always the case when a major, unexpected, and unpredictable “bolt from the blue” hits an economy. When interdependence is already high, attempts to shelter the rest of international system from an idiosyncratic shock in one financial center are likely to prove fruitless. With the benefit of hindsight, we can see that the European centers might have been better off if they had come to the aid of San Francisco, or their own insurance companies, promptly. Of course, if all the governments concerned were nursing their reserves of gold in case a major war were to break out, their actual reaction is understandable.

The greatest financial crisis of all: 1929–33

The issues touched on in our discussion of historical crises are motivated, of course, by our awareness of the tragic consequences of the Great Depression of 1929-33, which all analysts agree was initiated by a truly international financial crisis and most acknowledge that the consequences – economic, political, and social – were long-lasting and dire. Here is where Kindleberger’s argument for a lender of last resort has its greatest force. Thanks to cooperation between Montagu Norman, Governor of the Bank of England, and Benjamin Strong, Governor of the Federal Reserve Bank of New York, a working version of the pre-World War I gold standard had been built up over the years 1924-28. While it worked, this “gold exchange standard” provided the financial basis for an expansion of international trade and rapid economic recovery in the major industrial economies. But when a liquidity crisis struck, basically because world agricultural prices fell making it impossible for farmers from the plains of Nebraska to the pampas of Argentina to the steppes of Hungary to make payments on the debts they had incurred, there was no lender of last resort around. The Bank of England was willing, but incapable with its limited resources, to serve in this role. The Federal Reserve System of the United States was capable, but unwilling to play that role, given its dysfunctional internal decision-making procedures.⁴²

Our view of this terminal crisis of the gold standard era is that the entire period from the outbreak of World War I in late July 1914 until the collapse of the Bretton Woods system of fixed exchange rates in mid-August 1971 was the antithesis of globalization. The work of Jeffrey Williamson on convergence of real wages, which

made substantial progress in the gold standard years and came to halt in the 1914-45 period, confirms this view. The study of capital movements and the various measures of capital market integration by Alan Taylor and Maurice Obstfeld identifies this period as one of “de-globalization” as well. Only the brief interlude of 1924-28, which W. A. Lewis called “the five good years” in his history of the interwar period, had any resemblance to the global economy and its methods of operation that had arisen in the half-century before World War I. And that was based on a flawed financial structure that could not have endured.⁴³

From this perspective, which we share with Kindleberger, the key financial crisis was not the Wall Street panic in October 1929, but the failure of the Kreditanstalt Bank in Austria, announced on May 11, 1931. The contagion effects in this crisis were the worst possible for globalization as they consisted of payment defaults that led to a widening circle of exchange controls and a downward spiral of international trade. But in terms of our indicators of contagion, there would be little or no effect, much as we found for the crisis of 1873, at the beginning of the gold standard era.

Indeed, Bordo and Murshid find a similar outcome in their analysis of correlations of bond prices for 21 countries before and after each of three crises they identify in the 1929-33 period. These are the Wall Street crash in October 1929, Britain’s departure from the gold standard in September 1931, and the US law passed in May 1933 that allowed devaluation of the US dollar. In general, they find little evidence of contagion, especially after adjusting for the increase in volatility of the

⁴² We hope this capsule summary captures the essence of Charles Kindleberger’s argument, expressed in his *World in Depression, 1919-1939* (Berkeley and Los Angeles, 1986), as well as in *Manias, Panics, and Crashes* and many other places.

British bond prices after September 1931. The only cases that seem to show contagion are Greece and Finland after the US devaluation in 1933, but these may reflect more the importance of US holdings of Greek and Finnish bonds than Kindleberger-style scramble for liquidity.

Lessons Learned from De-globalization

Nevertheless, the lessons learned are still being discussed today. The idea that the periphery countries always suffer relative to the core countries, a hint of which comes from the Bordo-Murshid findings, was articulated most effectively by Mihail Manoilescu, a Romanian economist appalled by the damage suffered by Romania as it tried to follow French advice by staying on the gold standard as long as possible while rejecting offers of markets for its oil from Nazi Germany. Manoilescu's ideas found a receptive audience in Argentina, where Raul Prebisch, a young economist in the central bank of Argentina, was similarly appalled at the damage to Argentina's export economy caused by following British advice. Prebisch's ideas persisted long afterwards, thanks to his influence in the Economic Commission of Latin America.⁴⁴

After the failure of the World Economic Conference in 1933, the world divided up into mutually exclusive trading blocs – the sterling area with its imperial preference, the reichsmark bloc based on bilateral exchange agreements, the Japanese led “Asian co-prosperity sphere”, and the autarkic economies of the Soviet Union and fascist Spain, Italy, and Portugal. These assorted regional trading blocs and the attempts by Nazi Germany and Imperial Japan to expand their regions to become entirely self-

⁴³ Eichengreen, *Golden Fetters*, is the classic analysis of the plight of the gold exchange standard.

⁴⁴ Joseph Love, “Manilescu and the development of core-periphery thought,”

sufficient led inevitably to the tragedies of World War II. Whether all this could have been avoided by a lender of last resort acting at the critical crisis (Wall Street crash? Kreditanstalt collapse? Britain leaving gold? US devaluation?) seems doubtful.

What was needed, in Kindleberger's view, was an economic and political hegemon, a role willingly adopted by the United States after World War, as it took the lead in establishing the Bretton Woods system, based on the institutions of the International Monetary Fund and the World Bank, with increasing efforts to make the patchwork General Agreement on Tariffs and Trade become effective, eventually turning into the World Trade Organization. The results of the Bretton Woods era, essentially 1958-71 when it was fully functioning as planned, were remarkably good, as shown by Bordo.⁴⁵ In particular, financial crises were limited to the occasional currency crisis when a country, usually Britain, could no longer sustain its dollar peg, but these were confined to the country of origin thanks to capital controls so there was never an issue of contagion. But the monetary basis of the Bretton Woods system, the dollar exchange standard with the dollar fixed in price relative to gold, was also fatally flawed, essentially because the costs of maintaining political hegemony for the US undermined its ability to act as economic hegemon. After its sudden collapse in 1971, the disintermediation created by the worldwide inflation that followed led to the rise once again of international capital markets, this time in a world of fiat currencies and floating exchange rates, leading to a new series of international financial crises that began to emerge in the late 1980s as capital controls were increasingly lifted.

⁴⁵ Michael Bordo, "The Bretton Woods System in Historical Perspective," ch. 1., in Bordo and Eichengreen, eds., *A Retrospective on the Bretton Woods System*, Chicago: University of Chicago Press, 1992.

The new financial crises: 1987, 1994, 1997

The Asian crises started in July 1997 with the collapse of the Thai currency, the baht, as the Bank of Thailand ran out of dollar reserves needed to maintain its peg with the dollar. They quickly spread to other East Asian countries including Malaysia, Indonesia, the Philippines and, with a lag, South Korea, making a strong case for financial contagion in the global capital market. IMF Staff Papers and the World Economic Outlook have repeatedly referred to the Asian crisis as a prime example of “contagion”. IMF loans made to Argentina and Turkey in 2001 were given credit for preventing contagion spreading from the financial difficulties in those countries. Further, recovery has been slow, complicated by political difficulties in each country, although the sharp devaluations of each currency have moderated the fall in GDP.

The most powerful statistical evidence in support of the contagion hypothesis is Baig and Goldfajn (1999). They use the criterion that if correlations among countries’ financial markets increase significantly after a crisis, contagion has occurred. Analyzing the correlations among the five afflicted countries for foreign exchange rates, equity market indexes, interest rates, and prices of government bonds, both before and after the crisis, they find strong evidence of contagion in the currency and government bond markets. They find mixed evidence of contagion in the equity markets, until they control for country-specific events and other fundamentals, whereupon contagion appears to have occurred. Certainly, the financial press drew similar conclusions and it may be that managers of emerging market mutual funds decided to cut back their exposures to all Asian markets, anticipating contagion in a self-fulfilling action.

Another argument, however, could be that all five countries were victims of a common shock, namely the sharp rise in the value of the US dollar relative to the Japanese yen, a rise that began in 1996. All five countries had pegged their currencies to the dollar and in the early 1990s, when the dollar was falling relative to the yen, all five had profited by expanding their exports into markets previously dominated by the Japanese. Several also gained from Japanese investment in their economies as Japanese firms relocated production facilities into Thailand and Malaysia. These advantages turned to disadvantages when the dollar began to rise sharply against the yen and the European currencies. This would not have caused a crisis by itself – Singapore, Taiwan, and Hong Kong also had pegged their currencies to the US dollar – but the five crisis countries also had incredibly weak banking systems caused by financing long-term property investments with short-term loans denominated in dollars.

A more substantive objection to the contagion scenario is due to the work of Forbes and Rigobon (1999). They examine the cases of the US stock market crash in October 1987, the Mexican peso crisis in 1994, and the East Asian crises in 1997.⁴⁶ Unlike Baig and Goldfajn, however, Forbes and Rigobon adjust their post-crisis correlations for the increase in volatility that also occurred and which biases upward standard measures of correlation. Making the appropriate adjustment for heteroscedasticity in their correlation measures, they conclude that for stock market indexes, at least, interdependence was already high before the crises in question and remained high afterwards, showing that contagion did not appear to have been a factor even in these cases. If it had existed, the degree of correlation among the stock markets

would have increased after the crisis, independent of the increase in variance. Moreover, they find that when correlations among stock market indices are adjusted for heteroscedasticity in the previous crises of 1987 and 1994, contagion does not appear to have been a factor then either.

For example, calculating correlation coefficients between indexes of stock market values in 27 countries during the East Asian crisis of 1997, they find evidence of contagion in 15 of the cases. Adjusting for the increase in variance that occurred in the various markets after July 1997, however, they eliminate the evidence of contagion in all but one case – Italy. And that case is more likely due to Italy’s reentry into the European Monetary System in November 1996, reducing exchange risk with the rest of European stock markets, than any psychological fears overtaking Italian investors.

Performing the same adjustment on correlation coefficients among stock market indexes before and after two other major financial crises – the October 1987 collapse of the New York Stock Exchange and the collapse of the Mexican peso in late 1994 – Forbes and Rigobon systematically eliminate statistical evidence of contagion. Their conclusion is that “Contagion is not simply a high cross-market correlation after a shock. It is a significant increase in this correlation after the shock. The high levels of co-movement across many stock markets during these three tumultuous periods reflects a continuation of strong cross-market linkages, and not a significant shift in these linkages.” [p. 35] As they find high levels of correlation before each crisis as well as after, they direct our attention to the causes of interdependence across international equity markets even in periods of relative stability. These cross-market linkages, they

⁴⁶ Kristin Forbes and Roberto Rigobon, “No Contagion, Only Interdependence: Measuring Stock Market Co-Movements, NBER Working Paper 7267, Cambridge,

suggest, make today's financial markets especially vulnerable to shocks. Kindleberger should approve of this conclusion, although he might shy away from substituting "interdependence" for "contagion" in future writings.

Bordo and Murshid also examine the behavior of long-term government bonds for the Mexican peso crisis in 1994 and the Asian banking/currency crisis of 1997. Like Forbes and Rigobon, they find little evidence of increased correlation in government bond markets after each crisis. The only case of increased correlation with the Thai government bonds after July 1997 turns out to be Brazilian bonds and US bonds. (Table 5B) Nevertheless, they do find some evidence that correlations with emerging market government bonds do increase relative to correlations with developed country government bonds after both the Mexican and Asian crises. (Tables 6A and 6B)⁴⁷ As the current debate over the IMF's role as a potential lender of last resort continues, we are obviously still extracting lessons from current experiences. What insight, then, might be taken from our findings from the gold standard period when changes in contagion occurred as the monetary environment changed from mild deflation to mild inflation?

Conclusion: Crisis Connections or Contagions?

Our formal analysis above of the correlations among the market short-term interest rates before and after the three major crises of the gold standard period leads us to doubt that contagion was an important feature then, even under a regime of fixed exchange rates and open capital markets. Rather, we conclude that different rules of

MA: July 1999.

the game were appropriate for different players. Countries that had weak specie reserves and governments prone to budget deficits were well advised not to follow the example of the Bank of England during crisis episodes. Rather than lend freely at a penalty rate when the international markets were roiled by a credit crunch somewhere in the world, they were better off maintaining their previous discount rates so they could lend judiciously with side conditions to only the most solvent of their customers. This surely inhibited risk-taking by the local banking establishment, and probably retarded economic growth, but it did preserve stability in the political sphere while coping with wrenching structural changes in their economies. It also meant that financial crises, rather than increasing correlations among capital markets, actually tended to decrease them.

Policy makers acting through the maintenance of discount rates established by their respective public banks, therefore, had different concerns, which varied from country to country. Comparing the responses of the several countries that eventually formed the basis for the first global financial market to the systemic crises that struck from time to time, contagion appeared less likely (1890) when the short-term capital markets had been allowed to operate in an interdependent, well-integrated manner before the crisis. Only when differences in interest rate patterns were attempted by countries before a crisis by whatever means – different monetary regime, informal capital controls, support of fiduciary issues – then an especially severe crisis made common responses more likely to a common shock (1893 and 1907).

⁴⁷ Michael D. Bordo and Antu Panini Murshid, “Are Financial Crises Becoming Increasingly Contagious? What is the Historical Evidence on Contagion?” NBER Working Paper, 7900, Cambridge, MA, September 2000.

Table 1. Stock Market Crisis of 1825

	Correlation Coefficients				
	Pre-crisis	Post-Crisis			
Index	0.794	0.521			
French rentes	0.848	-0.197	Precrisis		Postcrisis
Colombia 6s	0.881	0.328	UK var		UK var
Chile 6s	0.910	0.190	12.740		4.301
	Adjusted	Contagion	Contagion	Contagion	
	Correlation	SE/PreCrisis	SE Postcrisis	test	
	Coefficients				
Index	0.914	0.724	0.166	0.282	-0.423 N
French rentes	0.940	-0.327	0.139	0.386	-2.411 N
Colombia 6s	0.955	0.513	0.122	0.350	-0.936 N
Chile 6s	0.967	0.316	0.105	0.387	-1.323 N

**Table 2. Interest Rate Volatility during the Classical Gold Standard Period,
1880-1914**

Country	Standard Deviation (Long Term Bonds)	Standard Deviation (Short Term Market Bills)
Austria	.375	.712
France	.299	.682
Germany	.169	1.11
Netherlands	.317	.917
United Kingdom	.217	1.17

Table 3. "Contagious" Crises during the Classical Gold Standard Period

Panic of 1873

Pre-Crisis: September 21, 1872 - September 13, 1873

Post-Crisis: September 20, 1873 - September 12, 1874

Baring Crisis of 1890

Pre-Crisis: October 5, 1889 - September 27, 1890

Post-Crisis: October 4, 1890 - September 26, 1891

US Banking Crisis of 1893

Pre-Crisis: October 8, 1892 - October 7, 1893

Post-Crisis: October 13, 1893 - September 29, 1894

Panic of 1907

Pre-Crisis: October 22, 1906 - October 19, 1907

Post Crisis: October 26, 1907 - October 17, 1908

Table 4. Crisis of 1873, Short-term capital markets.

	Correlation		Coefficients		
	Pre-crisis	Post-Crisis		Pre-crisis	Post-crisis
France	0.665		0.429		
Germany	0.144		0.281		
Netherlands	-0.099		0.284		
Belgium	-0.016		0.476	Pre-crisis	Post-crisis
Austria	0.187		0.680	US var	US var
Russia	0.259		-0.235	0.209	0.824
UK	0.098		0.163		

	Adjusted		Contagion		Contagion
	Pre-crisis	Post-crisis	SE/PreCrisis	SE Post-crisis	test
France	0.409		0.232	0.135	0.143 -0.635 NC
Germany	0.073		0.146	0.147	0.146 0.248 NC
Netherlands	-0.050		0.147	0.147	0.146 0.674 NC
Belgium	-0.008		0.263	0.147	0.142 0.935 NC
Austria	0.095		0.423	0.147	0.134 1.168 NC
Russia	0.134		-0.121	0.146	0.146 -0.870 NC
United Kingdom	0.409		0.232	0.135	0.143 -0.635 NC

Table 5. Crisis of 1890, Short-term capital markets.

	Correlation Coefficients				
	Pre-crisis	Post-Crisis			
France	0.211	0.546			
Germany	0.442	0.698			
Netherlands	-0.164	0.280			
Belgium	0.646	0.769			
Italy	0.366	0.688			
Austria	0.578	0.608			
Portugal	0.647	0.462			
Russia	0.052	0.711			
United States	0.336	0.837			
Denmark	0.047	0.275	Precrisis	Postcrisis	
Australia	-0.162	-0.489	UK var	UK var	
India	-0.302	0.095		0.547	1.513
	Adjusted		Contagion	Contagion	Contagion
	Pre-crisis	Postcrisis	SE/PreCrisis	SE Postcrisis	test
France	0.129	0.365	0.146	0.137	0.833 NC
Germany	0.284	0.506	0.141	0.127	0.825 NC
Netherlands	-0.099	0.173	0.147	0.145	0.932 NC
Belgium	0.454	0.586	0.131	0.119	0.528 NC
Italy	0.230	0.495	0.143	0.128	0.976 NC
Austria	0.392	0.418	0.136	0.134	0.098 NC
Portugal	0.454	0.299	0.131	0.141	-0.572 NC
Russia	0.031	0.519	0.147	0.126	1.786 C
United States	0.210	0.677	0.144	0.109	1.849 C
Denmark	0.028	0.169	0.147	0.145	0.482 NC
Australia	-0.098	-0.319	0.147	0.140	-0.772 NC
India	-0.187	0.057	0.145	0.147	0.837 NC

Table 6. Crisis of 1893, Short-term capital markets.

	Correlation Coefficients				
	Pre-crisis	Post-Crisis			
France	0.475	-0.339			
Germany	0.234	0.234			
Netherlands	-0.144	0.895			
Belgium	0.098	0.706			
Italy	0.549	-0.656			
Austria	0.438	-0.792			
Portugal	0.228	0.150			
Russia	-0.077	-0.717			
Switzerland	0.045	0.573			
Australia	-0.084	0.097	Pre-crisis	Post-crisis	
India	-0.187	-0.715	US var	US var	
UK	-0.170	-0.523	0.442	0.255	
	Adjusted		Contagion	Contagion	Contagion
	Pre-crisis	Post-crisis	SE/Pre-crisis	SE Post-crisis	test
France	0.579	-0.429	0.120	0.133	-3.977 NC
Germany	0.302	0.303	0.141	0.141	0.002 NC
Netherlands	-0.188	0.935	0.145	0.052	5.702 C
Belgium	0.129	0.795	0.146	0.089	2.831 C
Italy	0.654	-0.753	0.112	0.097	-6.747 NC
Austria	0.540	-0.863	0.124	0.075	-7.063 NC
Portugal	0.295	0.196	0.141	0.145	-0.346 NC
Russia	-0.101	-0.804	0.147	0.088	-3.002 NC
Switzerland	0.059	0.677	0.166	0.123	2.138 C
Australia	-0.110	0.127	0.147	0.146	0.811 NC
India	-0.243	-0.803	0.143	0.088	-2.424 NC
UK	-0.221	-0.628	0.144	0.115	-1.574 NC

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Figure 1 Yields of Latin Bonds
1822 - 1827

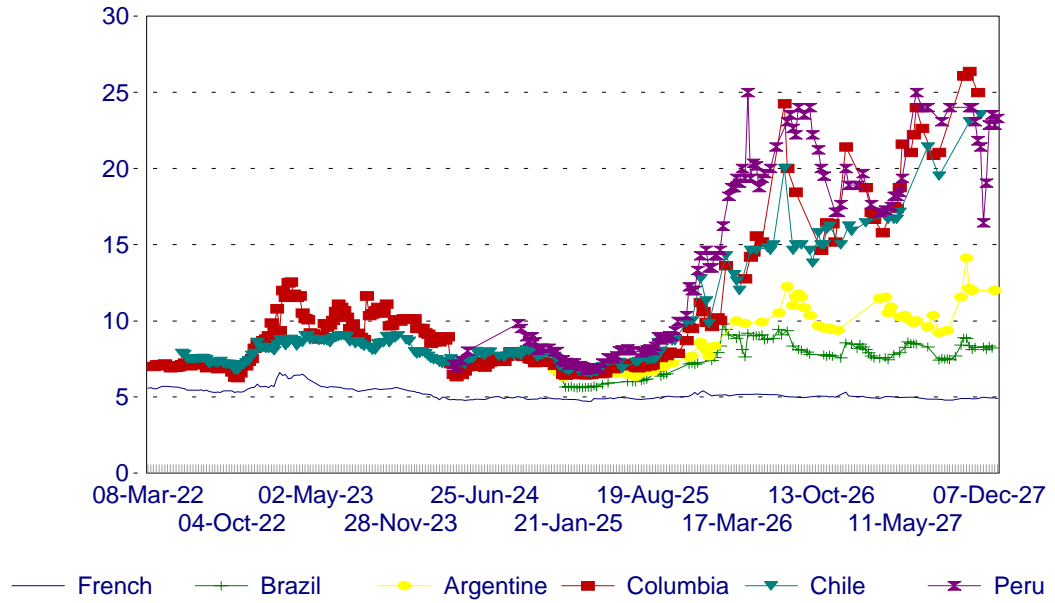


Figure 2a.
Coefficients of Variation - Core: London, Paris, Berlin, Amsterdam, Brussels
Crisis of 1890

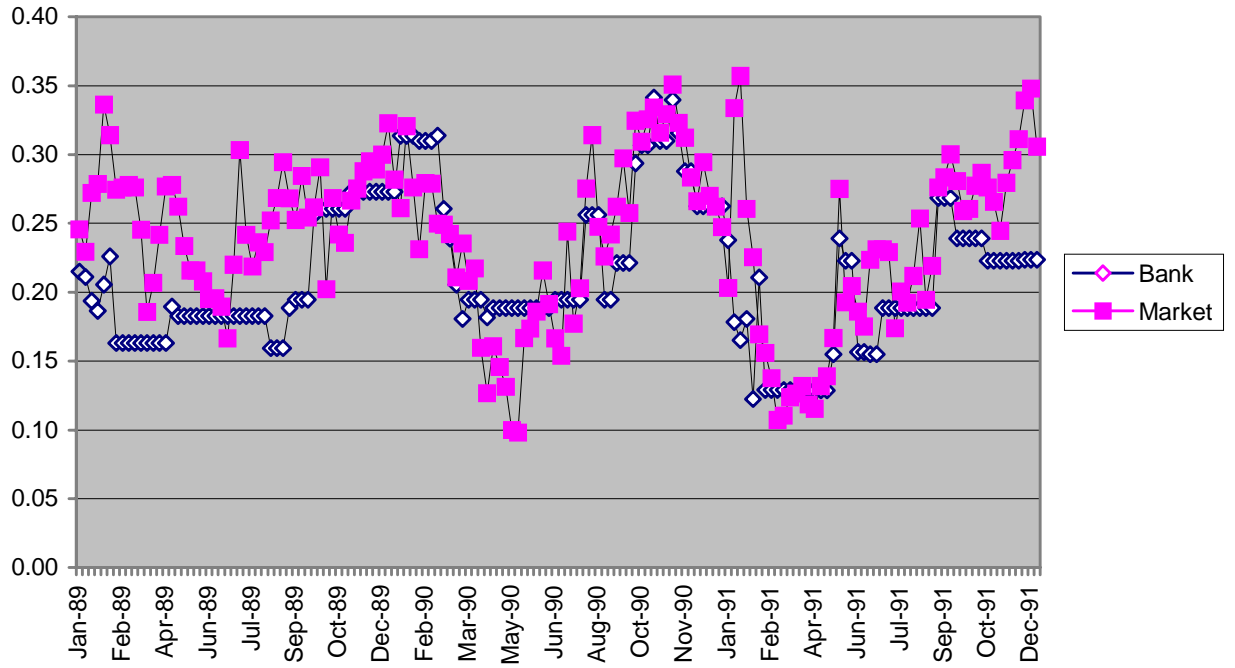


Figure 2b.
Coefficients of Variation - Periphery
Crisis of 1890

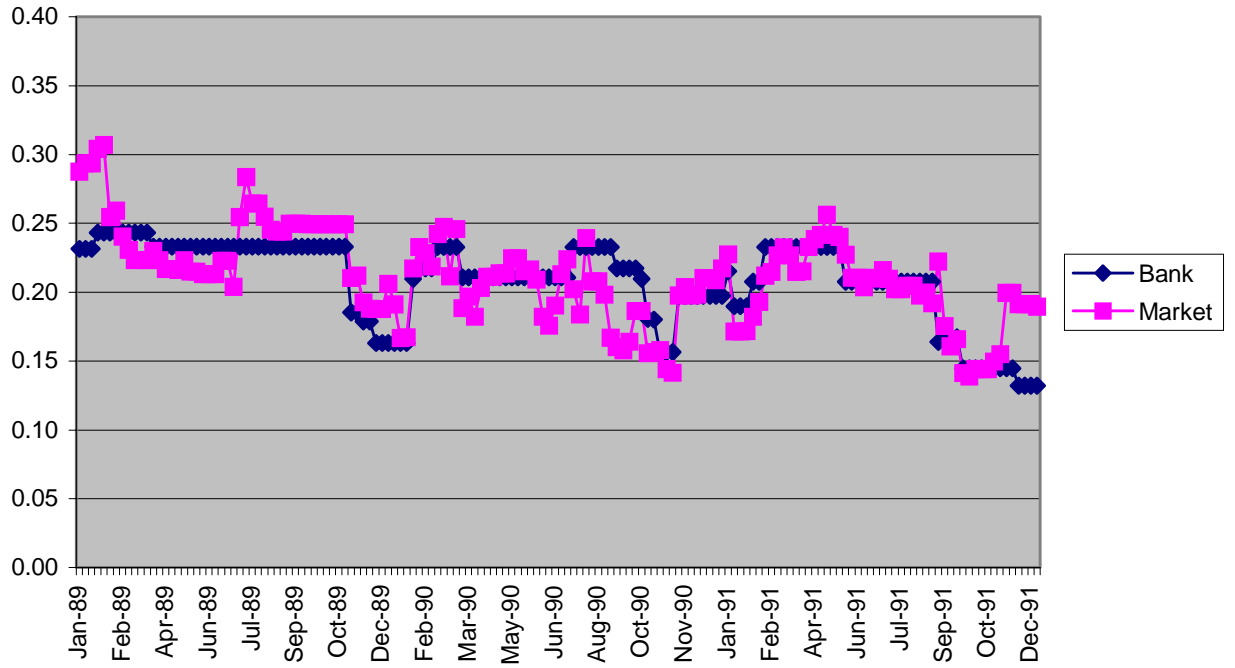


Figure 3a.
Coefficients of Variation - Core: London, Paris, Berlin, Amsterdam, Brussels
Crisis of 1893

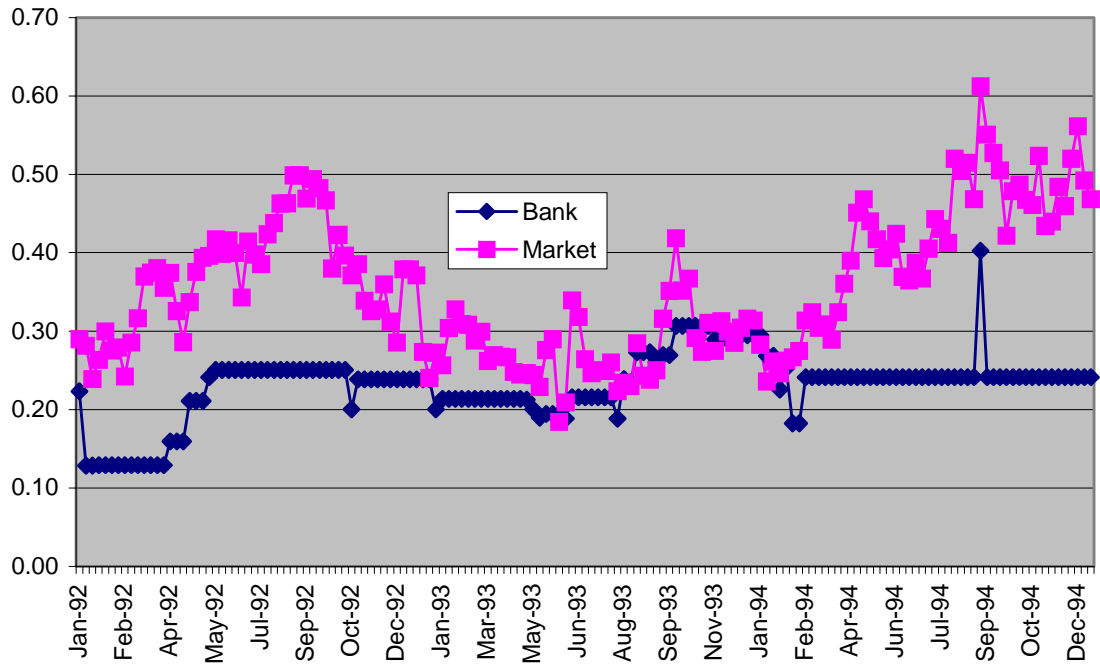


Figure 3b.
Coefficients of Variation - Periphery
Crisis of 1893

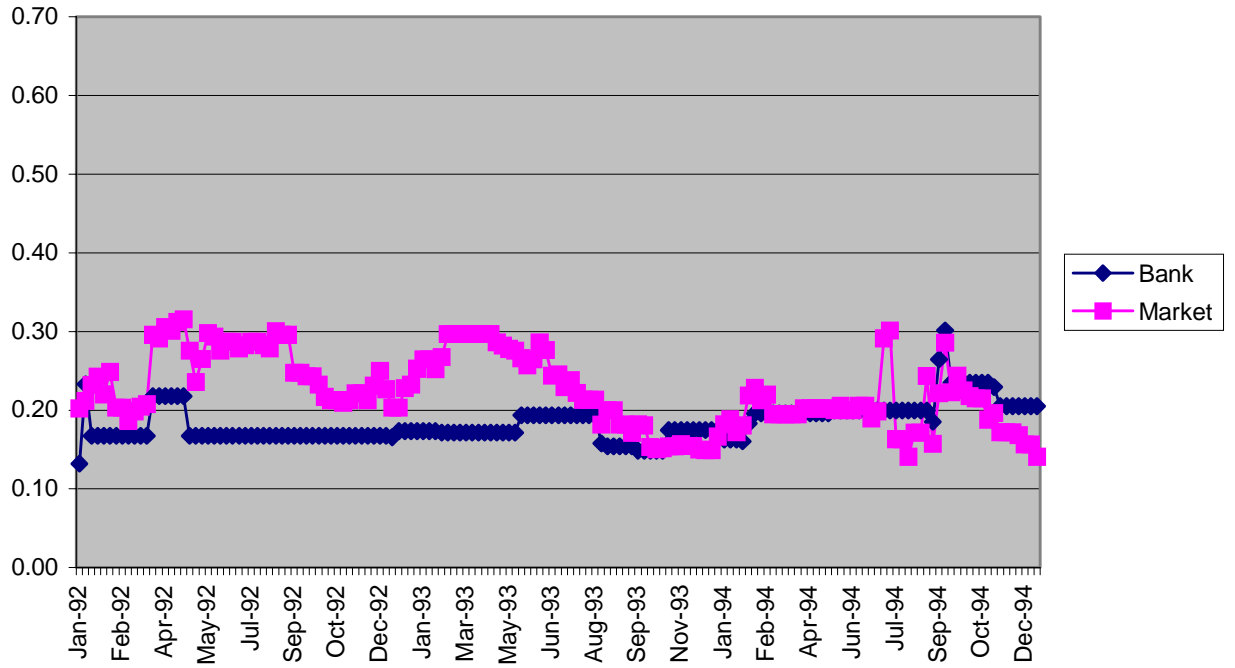


Figure 4a.
Coefficients of Variation - Core: London, Paris, Berlin, Amsterdam, Brussels
Crisis of 1907

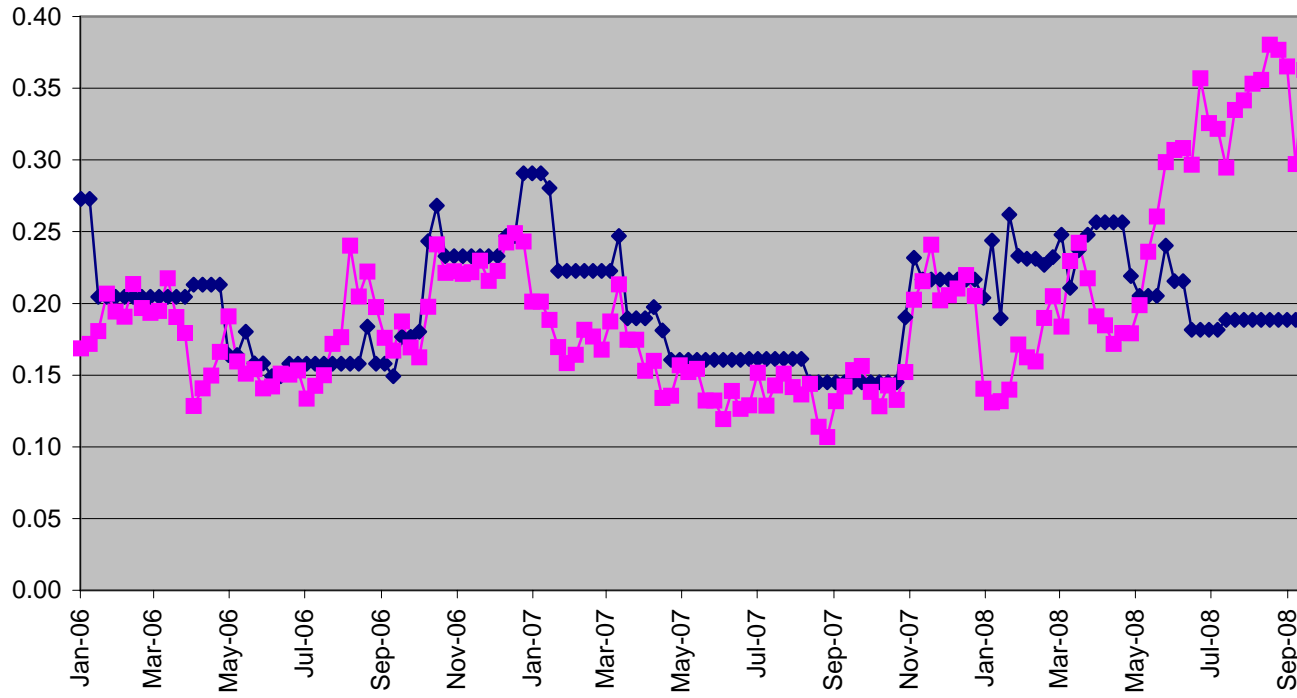
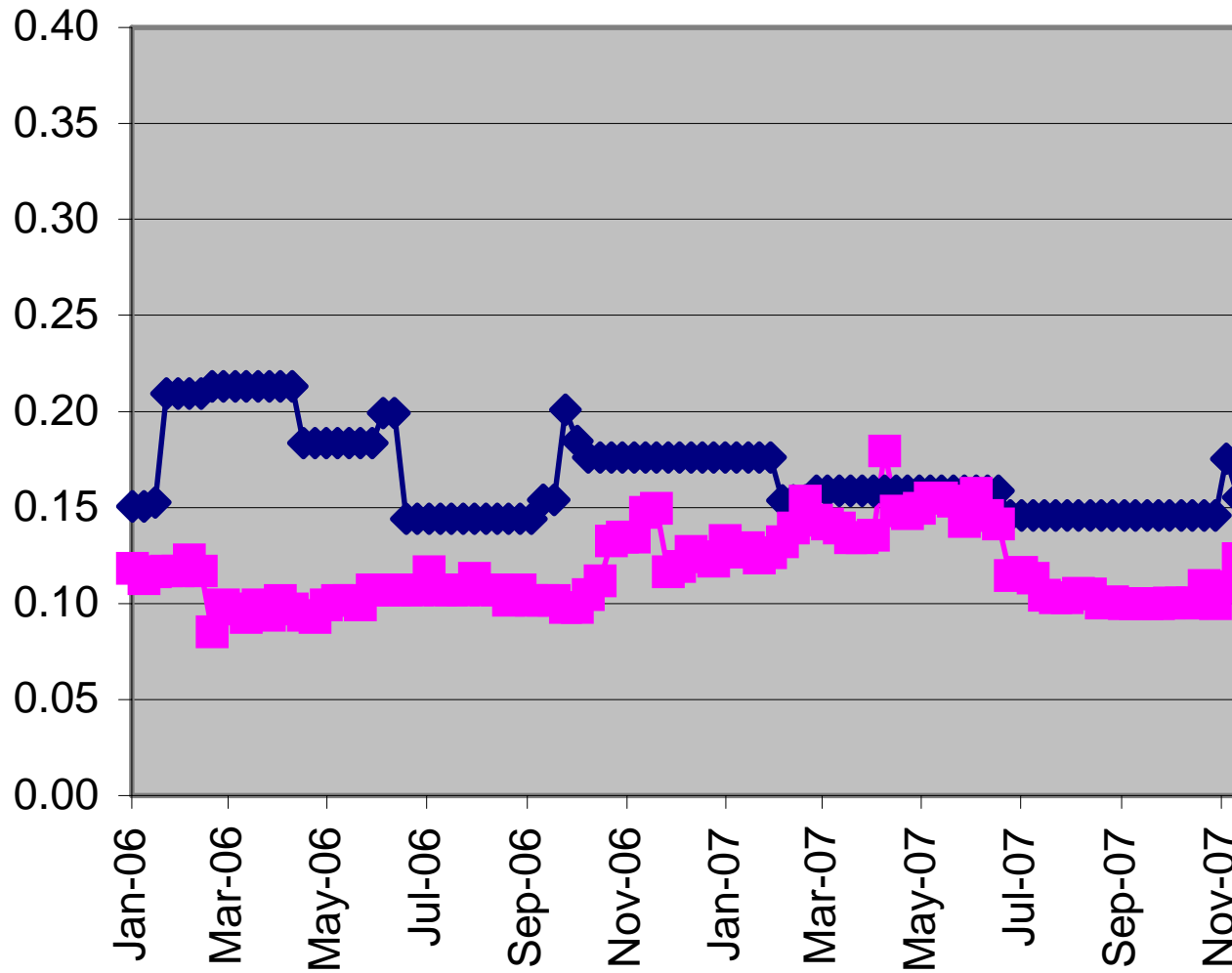


Figure 4b.
Coefficients of Variation
Crisis of 1907



Data Appendix

Data Type	Country	Description	Data Availability
Bank Discount Rates	Austria		Jan. 1, 1870 - June 27, 1914
	Belgium		Jan. 1, 1870 - June 27, 1914
	Denmark		May 10, 1884 - June 27, 1914
	France		Jan. 1, 1870 - June 27, 1914
	Germany	Berlin bank rate	Jan. 1, 1870 - June 27, 1914
	Italy	Genoa bank rate	Jan. 24, 1885 - June 27, 1914
	Netherlands		Jan. 1, 1870 - June 27, 1914
	Norway		Jan. 6, 1894 - June 27, 1914
	Portugal		Jan. 24, 1885 - June 27, 1914
	Russia	St. Petersburg	Jan. 1, 1870 - June 27, 1914
	Spain		Jan. 6, 1885 - June 27, 1914
	Sweden		Dec. 17, 1892 - June 27, 1914
	Switzerland		Dec. 17, 1892 - June 27, 1892
United Kingdom		Jan. 1, 1870 - June 27, 1914	
Open Market Rates (3 month bills)	Austria		Jan. 1, 1870 - June 27, 1914
	Australia	discount rate for Australian banks operating in London	May 10, 1884 - Dec. 30, 1893
	Belgium		Jan. 1, 1870 - June 27, 1914
	Denmark		May 10, 1884 - June 27, 1914
	France		Jan. 1, 1870 - June 27, 1914
	Germany	Berlin open market rate	Jan. 1, 1870 - June 27, 1914
	India	Bombay bank rate	May 10, 1884 - June 27, 1914
	Italy	Genoa open market rate	Jan. 24, 1885 - June 27, 1914
Netherlands		Jan. 1, 1870 - June 27, 1914	

	Norway		Jan. 6, 1894 - June 27, 1914
	Portugal		Jan. 24, 1885 - June 27, 1914
	Russia	St. Petersburg open market rate	Feb. 4, 1871 - June 27, 1914
	Spain		Jan. 6, 1885 - June 27, 1914
	Sweden		Dec. 17, 1892 - June 27, 1914
	Switzerland		Dec. 17, 1892 - June 27, 1892
	United Kingdom		Jan. 1, 1870 - June 27, 1914
	United States	call money rate in New York City	Nov. 27, 1880 - June 27, 1914
Long-Term Bond Rates	Austria	5% Silver Rentes	Jan. 2, 1880 - Dec. 29, 1899
		4% Gold Rentes	Jan 2. 1880 - Dec. 1913
	Belgium	3% Rentes	Jan. 16, 1885 - Oct. 21, 1898
	France	3% Rentes	Jan. 2 1880 - July 31, 1914
	Germany	Prussian Consols (4% converted to 3.5% April 22, 1898)	Dec. 31, 1880 - Dec. 31, 1909
		3% Imperial	Aug. 24, 1894 - Dec. 26, 1913
		4% Imperial	November 23, 1894 - Dec. 26,1913
	Italy	4%	Jan. 2, 1880 - Dec. 26, 1913
	Netherlands	3%	Aug. 25, 1882 - Dec. 26, 1913
	Russia	5%	Jan. 2. 1880 - July 31, 1914
	United Kingdom	3%/2.75% Consols	Jan. 2, 1880 - July 31, 1914
	United States	4%	Jan. 2, 1880 - Aug. 9, 1907
		4% (due 1925)	Jan. 6, 1905 - July 31, 1914

"Contagious" Crises during the Classical Gold Standard Period

Panic of 1873

Pre-Crisis: September 13, 1872 - September 13, 1873 (n=52)

Post-Crisis: September 20, 1873 - September 20, 1874 (n=52)

Baring Crisis of 1890

Pre-Crisis: September 27, 1889 - September 27, 1890 (n=52)

Post-Crisis: October 4, 1890 - October 4, 1891 (n=52)

US Banking Crisis of 1893

Pre-Crisis: September 30, 1892 - September 30, 1893 (n=52)

Post-Crisis: October 7, 1893 - October 7, 1894 (n=52)

Panic of 1907

Pre-Crisis: October 19, 1906 - October 19, 1907 (n=52)

Post Crisis: October 26, 1907 - October 26, 1908 (n=52)