FINANCIAL SYSTEMS, ECONOMIC GROWTH, AND GLOBALIZATION

by

Peter L. Rousseau and Richard Sylla

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DEPARTMENT OF ECONOMICS
VANDERBILT UNIVERSITY
NASHVILLE, TN 37235

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Richard Sylla

Abstract

This paper brings together two strands of the economic literature -- that on the finance-growth nexus and that on capital market integration -- and explores key issues surrounding each strand through both institutional/country histories and formal quantitative analysis. We begin with studies of the Dutch Republic, England, the U.S., France, Germany and Japan that span three centuries, detailing how in each case the emergence of a financial system jump-started economic growth. Using a cross-country panel of seventeen countries covering the 1850-1997 period, we then uncover a robust correlation between financial factors and economic growth that is consistent with a leading role for finance, and show that these effects were strongest over the 80 years preceding the Great Depression. Next, we show that countries with more sophisticated financial systems engage in more trade and appear to be better integrated with other economies by identifying roles for both finance and trade in the convergence of interest rates that occurred among the Atlantic economies prior to 1914. Our results suggest that the growth and increasing globalization of these economies might indeed have been "finance-led."

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What is the relationship between a country's financial development and its economic growth? And how do a country's financial development and economic growth relate to the extent of its participation in the global economy? In particular, is there a relationship between domestic financial development and participation in global capital markets? Few would doubt that countries with highly developed financial systems might well export capital to other countries. But are there conditions under which having such a system might also promote imports of capital? These are the broad questions that motivate our paper.

To address the questions and attempt to answer them, we draw on insights from two bodies of research that have developed independently of one another, but that in our view are quite related. One includes the work of economic historians on the development of financial systems--especially banking systems--in various countries, and the impact of financial developments on economic growth within those countries. Also included in this historical work is a vast body of literature on aspects of globalization: cross-border financing and capital flows, international banking and financial crises, and the integration of the world's money and capital markets. Among economic historians, these two strands of literature, one dealing with domestic and the other with international developments, are not always related to one another. Both, however, are elements of the story of financial globalization.

The other body of research on which we draw is the work of contemporary economists on the relationship between measures of financial development and such variables as the growth of real per capita income and investment. Typically these are cross-country analyses based on models of the finance-growth nexus for the postwar period, when broadly consistent data for a large number of countries at varying levels of economic development became available. They are the economists' equivalent of the economic historians' comparative studies of national financial and banking systems and their relationship to economic growth. They do not say much about financial globalization.

Our goal here is to integrate and extend these two bodies of existing research, the historical and the economic, in a longer-term investigation of financial globalization during the past two centuries. Our operating hypothesis is that countries with well-functioning financial systems have one of the conditions, perhaps a key one, conducive to economic growth and also a set of institutions that give confidence to foreign investors and thus promote financial globalization by allocating the world's capital more efficiently.

We begin with a discussion of what we mean by a good or well-functioning financial system (Section 1). Next (Section 2) we develop several historical case studies of countries that built such systems early in their modern economic histories: the Netherlands, Great Britain, the United States, France, Germany, and Japan. For each case, we consider when and how a modern financial system emerged, how it contributed to economic growth, and what relationship it had to the country's participation in international finance. With some lessons of financial history drawn from the cases in mind, we then investigate, in the context of a larger set of countries for which we have data covering the period from the middle of the 19th century to the present, the finance-growth nexus, and the finance/growth/globalization nexus. This 1½-century period encompasses two eras of economic globalization that others have identified, that of the late 19th and early 20th centuries, and that of the late 20th century extending now into the 21st century. After discussing data sources and methodological considerations (Section 3, with a Data Appendix in Section 6), we present and discuss our econometric results (Section 4), and conclude (Section 5).

1.1 What is a Good Financial System?

History appears to indicate that a good financial system is one that has five key components. These components are (1) sound public finances and public debt management, (2) stable monetary arrangements, (3) a variety of banks, some with domestic and others with international orientations,

and perhaps some with both orientations, (4) a central bank to stabilize domestic finances and manage international financial relations, and (5) well-functioning securities markets.[1] Such an articulated financial system, once it is in place and functioning, can mobilize capital domestically and thereby promote a country's economic development and growth. In a financial globalization context, it can also serve, either directly by the facilities it offers or indirectly by enhancing growth prospects, to attract the interest of foreign investors.

To place our vantage point here in perspective, we make two comments. First, academic specialization being what it is, contemporary scholars and those of previous generations often focus their attention on one or a subset of the components. Some economists are public finance experts, while others study money, banking, and central banking. Securities markets and company finance are usually the provinces of finance departments in business schools. Even economic historians, who often take a longer and broader view of economic development than economists and finance specialists, tend to concentrate on one component--usually banking--or a subset of them. Our view is that in a well-functioning financial system, there are numerous interactions among all of our five components. Hence, we think that the unit of observation for studying finance's role in economic modernization should be the financial system as a whole, and not just one or two of its components.

Second, whenever one peels back the layers of the great onion of history, stopping at a layer that seems important for later developments, the question inevitably arises, "But what made that layer possible?" In our case, what makes a good financial system possible? What are its prerequisites? Without going into detail, we would say that the prerequisites would likely include a

[1] Insurance might well be added to our list, as a sixth component. We leave it out here, in part because it involves a function—risk management—similar to that in which another component, banking, engages, and in part because, in a global historical context, it could be and often was supplied by insurers in other countries. Nonetheless, we recognize that the leading economies to be discussed in Section 2 did develop the insurance component of their financial systems early in their financial and economic modernizations.

combination of good government, including representative political institutions, an independent judiciary or court system, clearly defined and secure property rights, and financial savvy on the part of leaders--finance ministers, central bankers, and so on–among the components of a good system.

We place sound *public finance* first in our list of financial-system components largely for historical reasons. In modern history, good financial systems emerged out of the needs of the nation-state for financing, often to fight its wars with other nation-states.[2] Sound public finance includes setting and controlling public expenditure priorities, raising revenues adequate to fund them efficiently, and if--as is often the case--that involves issuing public debt, then provision must be made for servicing the debt to gain and keep the confidence of the investors who purchase it.

The historical primacy of public finance in the development of financial systems, to be documented below, serves another purpose. It reminds us that much of finance, historically and now, and especially when finance has global dimensions, is inextricably bound up with politics. It is both naive and a misreading of history to assume that capital moved throughout the world solely, or even mostly, in search of the highest available return commensurate with the risks taken. It is equally naive to assume that capital usually moved in response to the demands of users who want to make productive economic investments. In a world without governments and foreign policies, that might have been the case. But ours is not such a world. This is a reality that needs to be kept in mind in any discussion of economic globalization. Nonetheless, it should also be kept in mind that the needs of governments to raise and deploy funds internationally for reasons of state (typically, wars) resulted in the creation of financial systems that could mobilize capital and deploy it for

[2] Unless one subscribes to an economic theory of war, the importance of war in shaping financial systems in modern history argues for treating the origins of modern financial systems as economically exogenous rather than endogenous. Later in the chapter, we discuss the debate between those who say real-sector economic changes lead to financial-developmental responses and those who, like us, would give more primacy to financial development as leading to real-sector development.

productive economic purposes (Ferguson 2001).

Stable money is desirable for the usual textbook reasons. Money is useful as a medium of exchange, a store of value, and a standard of deferred payments. All three uses, but especially the latter two, are harmed if money fluctuates and depreciates in value in unpredictable ways.

Banks and banking have played large roles in modern economies. Once a monetary base is specified, banks of deposit, discount, and note issue amplify it into a money stock that consists largely of bank money convertible into the monetary base. They do this by granting credit to entrepreneurs and other users of funds. The credit-granting function turns banks into risk managers, the essence of their role as financial intermediaries. A lot of the risk that banks manage arises from borrowing short and lending long. Individual banks and banking systems become troubled, even fail, when recipients of bank credit are unwilling or unable to repay on schedule (illiquidity and default problems) or at all (insolvency and repudiation problems). If depositors, the holders of bank money from whom the banks borrow short, learn of such problems, they may compound them by attempting *en masse* to convert their bank money to base money.

Central banks, the fourth of our key components of a modern financial system, can prevent such problems from arising, or at least alleviate them when they do arise. They do this by monitoring and regulating the operations of individual banks in a banking system with the goal of preventing problems. And they do it to alleviate problems when they do arise by acting as lenders of last resort. Central banks also act in the areas of other financial-system components. For example, they often serve as the government's bank, that is, as an adjunct of public finance. And they act to stabilize the value of a country's money, both domestically and internationally.

Securities markets, the last component, facilitate the issuance of public and private debt securities and private equity securities. Specialized banks--investment or merchant banks--serve

here as financial intermediaries between the borrowers/issuers (governments and business enterprises) of bonds, stocks, and other forms of securities, and the lenders/investors who purchase securities. Once securities are issued, trading markets provide them with transferability and liquidity that enhance their appeal to investors, be they domestic or foreign.

One could arrive at the above list of key financial-system components as an inference from observing the financial systems of highly-developed national economies today. Such financial systems are one of the characteristics of these countries that distinguish them from the far larger number of less developed economies. We turn now to the historical origins of such systems.

2. Good Financial Systems in History: Case Studies

The foregoing discussion of a good financial system in terms of its key components and their connections to one another raises several questions. When, where, and how did such articulated financial systems appear in modern economic history? And did it matter for the countries concerned in terms of their economic growth and their participation and status in the world economy?

Our reading of modern economic history is that countries that developed such good financial systems early in their histories grew rapidly thereafter and often attracted foreign capital inflows that served to enhance their growth. The Netherlands, Great Britain, and the United States are leading examples. In succession, these three countries after their financial emergence went on to become *the* economic leaders of the past four centuries and also leaders in the export of capital.

The Dutch Republic was the first country to develop such a system early in the 17th century. Despite its small size, the country became a leading political and economic power of the 17th century, and its economic leadership continued into the 18th century.

Great Britain developed such a system at the end of the 17th century and in the first decades of the 18th century. It went on to have the first industrial revolution later in the century, to build a

worldwide empire, and to succeed the Dutch Republic as the leading world economy during the 18th and much of the 19th century.

At the end of the 18th century, the newly independent United States also developed such a system. It was then a small country on the periphery of a world system dominated by Europe, with about half a percent of the world's population. A century later, with about 5 percent of world population, the United States had become the world's largest economy, a position it maintains after the elapse of another century.

In each of these three cases, financial innovation led to economic leadership, and then to the Dutch, the British, and the Americans successively becoming world leaders in the export of capital to other countries.

During the second half of the 19th century, France and Germany in Europe, and Japan in Asia also became financial innovators, with beneficial results for their economic growth and their ability to become major exporters of capital. In 1914, at the end of the first era of globalization, the four European countries and the United States accounted for about 90 percent of the world's capital exports. Together with Japan, now the world's second largest economy, their share in the second era of globalization at the end of the 20th century has not changed much from what it was nine decades earlier. Even peculiarities of the earlier era remain, with the United States again--as in 1914--being a net importer of capital even as it exports a great deal of it.

We now examine these countries' early financial development in more detail. There are many similarities among them, but also some differences. The United States and Japan are of special interest because their financial revolutions were far separated in time and space from the European home-ground of modern finance and because they have become the two largest national economies.

2.1. The Dutch Republic

The Republic or United Provinces was born late in the 16th century when the northern provinces of the Spanish Netherlands revolted against Spanish Habsburg rule and, over several decades of protracted warfare extending well into the 17th century, established independence from Spain. Even before Dutch independence, provincial governments in the Spanish Netherlands developed a permanent public debt market, likely the world's first, when annuities were issued as a means of lightening tax burdens in response to the revenue demands of Spanish overlords (Tracy 1985). This would now be termed tax-smoothing. At roughly the same time, the Spanish Netherlands perfected a continuing market in negotiable international bills of exchange to finance trade without necessitating large movements of hard money across borders (Van der Wee 1963; Neal 1990).

The Dutch revolt maintained the public-debt and money market innovations in the United Provinces. When coupled with the new republic's tolerance of minorities in the southern Netherlands, the revolt also led to an inflow of both capital and financial expertise to Dutch cities, particularly Amsterdam (De Vries and Woude 1997, p. 669). In 1609 came two additional and major financial innovations. One was the *Wisselbank*, or Bank of Amsterdam, an exchange bank for merchants and the government whose bank money was better than gold, or at least better than the motley collection of gold and silver coins then in circulation. Similar banks were established in other Dutch cities, as were local private banks (*kassiers*) and, somewhat later, merchant banks. The other innovation of 1609 was the common stock, created when the Dutch East India Company decided to make its capital permanent and issued dividend-paying, tradable shares to its owners instead of liquidating each of its trading expeditions at its conclusion and distributing all of the proceeds to the owners. As warfare with Spain wound down in the early decades of the 17th century, and with the aid and example of *Wisselbank* money, the Dutch guilder became stable in value and remained so until the end of the 18th century (Neal 1990; Hart et al. 1997; De Vries and Woude 1997).

Thus, by the early 17th century, the Dutch Republic had established a version of each of the key components of a modern financial system: strong public finances, stable money, banks, a central bank of sorts, and bond and stock markets. There followed an era of great development and prosperity variously described as "the first modern economy" (De Vries and Woude 1997), "the golden age," and "the embarrassment of riches" (Schama 1988). The Republic could not long keep the dominating political power that by the mid-17th century it had derived from its strong economy. It was too small a country and too decentralized a state to accomplish such a feat in a world increasingly dominated by larger, more centralized states. But Dutch wealth continued to accumulate, Dutch capital sought returns all over the world, and Dutch financial expertise was exported to other countries.

2.2. Great Britain

Dutch expertise in finance was introduced directly to England after the Glorious Revolution of 1688, when the Dutch stadhouder, Willem of Orange, was invited to become King William III of England. After generations of erratic financial behavior of previous monarchs, the British, envious of Dutch economic and financial power and hoping to surpass it, passed control of their country's finances and monetary system from king to Parliament.

Adopting Dutch finance, the British also improved upon it. The Bank of England was formed in 1694 as a bank of discount, deposit and note issue capitalized by public debt, and was thus closer to the modern concept of a central bank than the Amsterdam *Wisselbank*. The metallic currency was recoined and paper issues such as Bank notes were made convertible into the metallic base. England thus achieved a stable money (Capie 2001a, 2001b). In subsequent decades the public finances were also stabilized, in part by the introduction of standardized perpetual annuities that became the basis for a liquid public debt market. A domestic money market in bills of exchange appeared. Even

earlier, the British East India Company followed its Dutch counterpart by making its capital permanent and issuing tradable shares against it, and an active equity market in company shares was present by the 1690s (Neal 1990; Chancellor 1998). These developments have been described as an English "financial revolution" (Dickson 1967), and as "the sinews of power" that enabled the British state to win wars and build an empire (Brewer 1988).

After the mid-18th century, note-issuing country banks began to dot the English and Welsh countryside, joining the long-existing private bankers of London and the Bank. The banking system was knit together via the London money market, through which capital surpluses of English agriculture could be recycled to finance the capital deficits of areas industrializing in the first industrial revolution (Pressnell 1956). In Scotland, large banking co-partnerships with branches and freedom of note issue joined several corporations chartered with banking privileges earlier in the century (Cameron et al. 1967, Checkland 1975).

Larry Neal's (1990) study of the 18th-century London and Amsterdam capital markets documents the manner in which these developments promoted a flow of capital to England, mainly from the Dutch Republic but also from other continental financial centers. Foreign holdings of shares in leading British companies (East India, South Sea, and the Bank of England) reached nearly 20 percent of the total by mid-century, and foreigners also held about 14 percent of the English national debt. Neal also demonstrates that the two markets across the North Sea from each other were remarkably integrated, with nearly equivalent prices and price changes for the same securities. Even the famous French and English bubbles of 1720 were synchronized in ways that were probably orchestrated by Dutch investors (Neal 1990, pp. 101-15, 147). At the end of the century, during the French Revolution and the Napoleonic Wars, Neal argues that the ability of these markets and institutions to transfer flight capital from the continent to England enabled the industrial revolution

there to proceed. Because of international capital market integration, heavy British government borrowing to finance war efforts did not crowd out private investment.

If one is willing to consider northwestern Europe as the world, the 18th century surely was the first era of financial globalization. It was the result of two modern financial systems, most likely the only two such systems existing then, linking up with each other across the North Sea, to the advantage of borrowers and investors in both the Dutch Republic and Great Britain. These systems had a version of each of the five key components of a good financial system.

2.3. The United States.

If one thinks that true financial globalization must link continents separated perhaps by an ocean, and not merely two countries separated by the North Sea, history does not stand in the way with much of a delay. That is because the United States in the early 1790s engineered a financial revolution quite like the earlier ones of the Dutch Republic and Britain (Sylla 1999b). The engineer was Alexander Hamilton, first Secretary of the Treasury (1789-1795) of the new federal government that assembled in 1789 under the Constitution. Hamilton's earlier writings indicate that he had absorbed many of the key lessons of Dutch, English, and French financial history. In office, with the backing of the president, the Congress, and the private sector, he applied them.

First, Hamilton set up a federal revenue collection system based on import tariffs and domestic excise taxes authorized by Congress, as well as hoped-for revenues from land sales that were slow to materialize. While proceeding with that, Hamilton in 1790 proposed and Congress adopted a plan for restructuring the par value of the national debt from the American Revolution. The debt included state debts assumed by the new federal government and arrears of interest on it that the previous government had been unable to pay. The restructuring took the form of three new issues of new federal securities with varying interest-rate terms. The new securities were payable,

principle and interest, in hard-money dollars to be collected by the revenue system. These provisions applied to the domestic debt of some $65 million; an additional $12 million owed to foreigners, mainly the French government and Dutch investors, was rolled over with fresh loans from Dutch bankers (Perkins 1994).

Also in 1790, Hamilton proposed a Bank of the United States modeled on the Bank of England, but with several innovative features including a large capital ($10 million), the possibility of branches and partial (20 percent) government ownership. Like the Bank of England, it was to be the government's bank and it could also engage in private-sector banking. There were only three other banks, small state institutions, in the country at the time. Congress enacted the Bank proposal early in 1791. The Bank had its initial public offering in July of that year; it was quickly oversubscribed. The Bank opened in Philadelphia at the end of 1791, and branches were established in other cities starting in 1792. Fearing that the federal bank with its branches would dominate U.S. banking, the states moved quickly in the 1790s to charter more banks of their own. A country with no banks prior to1782 became one a decade later with a rapidly expanding banking system, and one that by 1802 had 35 chartered banks (Fenstermaker 1965, p. 111).

With the Bank proposal enacted, Hamilton next produced a report on a mint, which defined a new U.S. dollar in terms of both gold and silver (i.e., a bimetallic monetary base), and proposed establishing a mint to make a variety of coins based on the decimal system, also an innovation, albeit one earlier proposed by Hamilton's cabinet colleague, Thomas Jefferson. Banknotes convertible into a specie base gradually replaced the early fiat paper issues of state governments.

The new federal debt securities appeared late in 1790, followed by the stock of the Bank in mid-1791. So many new and putatively high-quality securities energized the informal trading markets of Philadelphia, New York, and Boston. Trading was vigorous, speculative spirits were

unleashed, and new private issues joined those of the government. Government debt that had sold at 15 cents on the dollar in 1789 reached par in 1791, and 120 percent of par in early 1792, just before Wall Street's first crash knocked 20 percent off their value in two months. New York State enacted a law to end speculation in the streets, causing brokers to meet under a buttonwood tree in Wall Street in May 1792, and draw up an agreement to trade indoors. This was the origin of the New York Stock Exchange.

In roughly three years, from 1789 to 1792, the United States was transformed from a bankrupt country with a primitive financial system to a country servicing its debts and equipped with a modern financial system like the ones that the Dutch and the British had developed earlier over many decades. What were the effects of that system? In keeping with the general approach of our paper, we discuss them under growth and globalization.

In an earlier paper (Rousseau and Sylla 1999), we analyzed relationships between financial developments and real growth in the period 1790 to 1850. Although good data do not become available until late in this period (and show the U.S. economy growing at modern rates), it is the consensus of economic historians that real growth, total and per capita, accelerated over the six-decade period. Our work developed several annual time series measures of financial development (money stock, bank numbers and capital, and the number of securities listed in major securities markets), and measures of real growth and development (investment, imports, and an index of the cumulative stock of business corporations chartered, which we regard as a measure of entrepreneurial activity). A set of VAR models indicated that in general causality ran from the financial to the real variables, with an occasional feedback effect of real developments on finance. These results led us to conjecture that the acceleration of U.S. growth that occurred in the 1790-1850 period was "finance led."

What does "finance led" mean? The discussion above suggests the possibility that Dutch and British economic growth may also have had roots in financial development. In the Dutch case, a modern financial system was in place before the Golden Age and the rise of the Dutch economy to 17th-century preeminence. In the British case, a modern financial system was in place before the first Industrial Revolution and the rise of the English economy to 18th-century preeminence. In the U.S. case, a modern financial system was in place before the U.S. industrial and transportation revolutions and the westward movement of the 19th century, by the end of which the United States was the pre-eminent economy. We see a pattern emerging in this history.

What about globalization? Does having a good financial system mean that foreign capital is more likely to flow to that country? Although residuals from balance of payments data indicate only modest net capital inflows during the period from 1790 to 1812 (Davis and Cull 1994, 2000), more detailed data on foreign holdings of U.S. securities tell a different story. Benchmark estimates of such holdings in 1789 and 1803, a period encompassing the financial revolution of the Hamiltonian Federalists, indicate that foreign investors increased their holdings by $48-52 million from a 1789 base of $17-18 million, the majority of which consisted of Revolutionary War debts owed to France and the Dutch (Wilkins 1989, Table 3.1, p. 50). The inflow of portfolio capital implied by Wilkins's data is fairly consistent with U.S. Treasury and other records for 1803 on total U.S. securities issuance and the amounts in domestic and foreign hands. Foreign investors held 53 percent of the U.S. national debt in 1803, and 62 percent of the stock of the Bank of the United States. With shares of state banks, insurance and transportation companies added in, there was a grand total of $122 million in public and private securities issued, almost all after 1789 as state chartering of corporations took off. Foreign investors held nearly half of these securities, or $59 million (Sylla, Wilson, and Wright 1997, Tables 4 and 5).

The modern concept of an emerging market involves the generation of confidence among foreign investors. The ingredients of confidence include fiscally responsible governments, stable money, and sound domestic financial institutions, markets, and instruments. Confidence in a country's securities increases, we think, when there are domestic stock and bond markets to enhance their liquidity. Two centuries ago the United States was such an emerging market and, with an occasional slip, it has remained a Mecca for foreign investors ever since. A century earlier, Dutch and other foreign investors saw something similarly attractive in England. A century before that, foreign investors saw it in the Dutch Republic. Emerging markets are not new in history.

2.4. France and Germany.

After Great Britain, France and Germany were the leading foreign lenders in the era of globalization during the late 19th and early 20th centuries. Even then, however, these two large and relatively prosperous European countries lagged well behind Britain, another large country, in international lending, and, on a per capita basis, even behind the Netherlands. Moreover, the Dutch and the British became foreign lenders and international investors long before the French and the Germans. This raises two questions. What accounts for the French and German lag? And why did the two countries then play major roles in the financial globalization that of the late 19th century?

We would answer both questions by saying that until the middle of the 19th century neither France nor Germany had developed all of the components of a good financial system that the Netherlands developed two centuries earlier, Britain a century earlier, and the United States half a century earlier. In the case of France, while England was having its financial revolution in the decades around 1700, the country's public finances were chaotic, and the collapse of John Law's scheme in 1720 made the French public suspicious of paper money and banking for a century or more (White 2001, Murphy 1997). Nonetheless, after the end of the Napoleonic Wars in 1815,

France's public finances and currency were stabilized and the central Bank of France had been present since 1800. There were also a variety of bankers, but nothing like the extensive banking systems that existed in the United States and Britain. Paris had a stock exchange, but it listed just a few securities, mostly government debt. France's relative financial backwardness during the early 19th century resulted from the state's strict controls on, and limitations of, banking and securities market development (Cameron et al. 1967). Kindleberger (1984, pp.114-115) provides an extensive list of reasons for concluding that "France lagged a hundred years behind Britain in money, banking, and finance … this was both a reflection and a cause of its economic retardation." More recent research drawing attention to loan-market substitutes, such as loans arranged by notaries that France developed to compensate for its lag, serves to confirm the country's relative backwardness in financial development (Hoffman, Postel-Vinay, and Rosenthal 2000). The substitutes gradually gave way to modern forms of finance in the 19th century.

In the case of Germany, the country was of course not unified in fact until the middle of the 19th century, or in law until 1871. When the United States began its financial revolution in 1790, there were hundreds of separate German states, each with its own ruler. By the early 19th century (if not before), the major German states had stable public finances and stable money, but in other financial-system components respects they lagged even behind France. The Prussian Bank, forerunner of the central Reichsbank that came in 1875, was not founded until 1846. There were a variety of private bankers, including such famous houses as the Rothschilds that began in Germany, and other public and private financial institutions. But as in France, state controls limited banking development. Securities markets were slow to develop, and the ones of the early decades of the 19th century were more adjuncts of the private bankers' businesses than independent sources of finance.

In both France and Germany financial systems began to take on a more modern form around

1850. The capital needs of large enterprises such as railways and the growing perception that the two countries were lagging behind Britain provided reasons for change. Change came in more liberal state approaches to banking development, in particular the innovation (for these countries, although it had existed in the United States for 6-7 decades and in England for 2-3 decades) was joint-stock banking. The French leader Louis Bonaparte, after declaring himself Emperor Napoleon III in 1851, sought to justify his authoritarian regime by fostering rapid economic development. With his backing, the joint-stock Credit Mobilier bank was formed in 1852; it combined commercial and investment banking. Although the Credit Mobilier failed in 1868, it had an impact in and outside of France. With the French Credit Mobilier as an example, the Germans founded similar institutions (Landes 1965; Cameron et al. 1967; Born 1983; Kindleberger 1984). During the middle decades of the 19th century, France and Germany thus added missing elements of a good financial system. As their financial systems mobilized capital more effectively, the two economies grew faster and their financiers began to invest large sums of capital in other countries.

2.5. Japan

Japan until the 1850s was almost totally "out of the loop" of western economic development. Yet it quickly became a major economic and political power during the era of globalization a century ago, and then within a century became the world's second largest national economy. That makes Japan perhaps the most interesting of the cases studied here. How did it happen?

Among the important reasons is that Japan, like the other cases here but unlike so many of the world's countries, had a financial revolution that resulted in a good financial system. After the Meiji revolution toppled the isolationist shogun regime in 1868, there were in the 1870s both bold initiatives and false starts in building a modern financial system. The bold initiative included commuting feudal dues paid in rice to government bonds paid in money. This created a securities

market, and the Tokyo and Osaka stock exchanges formed in 1878 to trade the new issues. The false starts included excessive issues of fiat currency and an attempt to copy the U.S. national banking system with bank notes backed by government bonds. The banks purchased large amounts of government bonds and issued large amounts of bank notes against them, without much attention to the specie reserves they were supposed to maintain. Fiat money and bank-created money led to rampant inflation from 1876 to 1881 (Tamaki 1995).

Financially, Japan turned the corner during the 1880s. The Yokohama Specie Bank was founded in 1880 and given the task of accumulating specie through financing the countries exports so that a currency convertible to specie could in time be established. The alternative of gaining specie by means of a foreign loan was rejected on grounds that foreign lenders could not be trusted or given influence in Japanese affairs. The Specie Bank's operations were clever. It paid Japanese exporters in Japanese currency advanced from the government when goods were exported, then drew bills of exchange collectible in specie on the foreign purchasers and collected them at branches it established in foreign cities, and finally remitted the specie to the government to repay for the government's advance (Tamaki 1995; Sylla 1999a). Financial innovation thus encouraged exports and the government's accumulation of specie.

In 1881, Masayoshi Matsukata became Japan's finance minister, an office he held for many years. Matsukata played a role in Japan's financial revolution comparable to that of Hamilton in the United States. In 1882, he established the central Bank of Japan. He also instituted a regime of fiscal austerity and deflation to end the inflationary excesses of the 1870s. By 1885, paper-money circulation was reduced enough, and the government's specie accumulations had increased enough, for the Bank of Japan to introduce silver-convertible bank notes. Private bank note issue rights were taken away in 1883, and the government's fiat issues were gradually retired. Bank of Japan notes

were 2 percent of Japan's note circulation when they were introduced in 1885; by 1897 they had increased to 75 percent. Along with these changes, Matsukata instituted reforms of Japan's banking system (Sylla 1999a).

With fiscal and currency stability achieved by the mid 1880s, Japan recovered quickly from the deflation of the decade's first years. Company formation tripled between 1885 and 1890. During a credit crisis in 1889, the Bank of Japan found a way to aid these companies and the Japanese securities markets. The bylaws of the Bank forbade lending on securities, but it could increase market liquidity by "special discounting" of bills covered by high-quality public and private securities. The innovation allowed companies to repay the banks during the credit crunch, and it thus cemented ties between companies, banks, and the Bank of Japan by encouraging the banks to hold company shares (Morikawa 1992). Although this might seem to indicate the origins of modern Japan's strong bank-firm relationships, we now know that securities markets and equity finance were important independent sources of firm financing from the 1880s to the 1920s (Miwa and Ramseyer 2000a, 2000b, 2001).

In 1897, aided by an indemnity in gold paid by China after the Sino-Japanese War of 1894-1995, Japan adopted the gold standard and started the system of long-term credit banks. These banks were joint stock companies, although under the supervision of the Ministry of Finance. Issuing debentures, most of which were purchased by the Ministry with surplus government funds and postal savings deposits, the new banks invested the proceeds in infrastructure and other investments (Cameron et al. 1967).

Once on the gold standard maintained by the world's leading economies, Japan lost its earlier aversion to borrowing abroad and quickly became an emerging market. Loans were raised in London in 1897 and 1899. Foreign loans totaled 140 million British pounds from 1899 to 1907,

enough to cover 70 percent of the costs of the Russo-Japanese War of 1904-1905 (Suzuki 1994, Tamaki 1995; Sylla 1999).

It is often wondered why, of all the possible candidates, Japan was the one non-western country to modernize its economy and join the ranks of the wealthy western countries. We think an important part of the answer, and one supported by Rousseau (1999) with time series evidence, is that early in its history, during the Meiji era, Japan developed a sophisticated financial system like that of the western leaders. As in the other cases essayed here, that financial system included stable public finances, sound money, banks, a central bank, and securities markets. It enabled Japan, a poor and relatively isolated country in 1870, to become an emerging market and a rapidly growing economic and political power by the early 20th century. As Herbert Feis long ago put it,

> Japan, of all the countries of the Orient, proved itself capable of using to good advantage the capital of Europe. Its government succeeded in the threefold task of promoting internal industrial development, extending and reinforcing Japanese economic interests in Korea and China, and adjusting its plans to the political rivalries of the European continent …. The growing strength obtained from the use of that capital made Japan a better credit risk for investors and a more important ally. By 1914 the small island empire had become a great power in its own right and might (Feis 1930, p. 429).

Japan had learned an important lesson of history, namely that financial development can be the basis of economic growth and participation as a major player in the global economy. With all the elements of a good financial system in place before the 20th century, Japan's economic success seems less an exception to the rule of West-dominated economic modernization and more a confirmation the key role of financial development in promoting economic modernization.

3. Data and Methodology

3.1. Overview

In Section 2, we identify a well-functioning financial system as central to the economic

growth of five Atlantic economies and Japan at various times over the past three centuries. We next ask whether the available data support a leading role for finance in the growth of incomes for a broader set of countries, and whether financial development promoted globalization by facilitating trade and reducing international dispersion in long-term interest rates. We do this using the cross-country regression framework of Barro (1991), with the availability of appropriate data over a long historical period limiting our sample to seventeen countries from 1850 to the present. The study is to our knowledge the first to apply recent cross-country regression techniques in a systematic study of the finance-growth nexus that includes the period before 1960.[3] The results, which we describe below, support the view that finance affects growth most emphatically in the earlier stages of economic development. In this respect, they are consistent with Cameron (1967) and Rousseau and Wachtel (1998), who conducted comparative analyses on smaller sets of countries. We also find a role for both financial development and trade in reducing interest rates and promoting their convergence across the Atlantic economies in the pre-1914 period.

Before presenting these findings, however, we observe that macroeconomic theory has made much progress over the past decade in laying the analytical foundations for scientific discussion of the finance-growth nexus.[4] Greenwood and Jovanovic (1990) and King and Levine (1993b), for example, formulate general equilibrium models in which banks and other financial intermediaries arise endogenously to improve the allocation of available credit. This so-called "total factor productivity" (or TFP) channel thus operates through the selection and funding of projects with high private and social returns. Other models, such as those of Bencivenga and Smith (1991) and

[3] This part of our study can thus be viewed as the historical analogue to the cross-country analysis of King and Levine (1993a).

[4] Earlier, more descriptive studies of the relationship between financial factors and growth include, among others, Gurley and Shaw (1955), Goldsmith (1969), and McKinnon (1973).

Rousseau (1998), emphasize "debt accumulation" or the ability of a well-functioning financial system to mobilize resources for projects that would otherwise have remained in the drawer. Empirical investigations, including Levine and Zervos (1998) and Bell and Rousseau (2001), offer evidence on the TFP and debt accumulation channels, respectively, with the latter suggesting accumulation as even a precondition for improved allocation in developing countries. If this is indeed the case, the confidence of potential market participants, as enhanced by the first four characteristics of a good financial system that we describe in Section 2, is critical to achieving a threshold level of lending activity from which a fuller menu of financial institutions can emerge.

Our study does not distinguish empirically between these complementary yet distinct channels of finance-led growth due to the limitedness of measures of financial development that are available over the past century and a half for the broad set of countries that we consider. Since emerging financial institutions are likely to have affected both the accumulation and allocation of resources in the economies that we study, however, we do not view our joint tests for both channels as particularly limiting.

Finance, some would argue, perhaps should not be considered a truly exogenous component in the growth process. Indeed, the consensus view of economists some fifty years ago, and which to some degree persists, can be summarized by Joan Robinson's (1952) assertion that "By and large, . . . where enterprise leads, finance follows." In the long-run, increases in economic activity will undoubtedly generate demand for financial services and lead to a larger intermediating sector. This channel might be important in the later stages of development when financial systems have matured, and possibly in providing one of the impulses needed to develop a financial system in the first place.[5]

[5] Our historical survey of financial system development in Section 2 indicates that the politics of war, if anything, was more important than the economics of enterprise and growth as an impulse for financial modernization.

In contrast, the TFP and debt accumulation channels are likely to operate most emphatically in the early to middle stages of a country's economic modernization, with the TFP channel retaining importance as the economy matures. In the formal analysis, we will address the endogeneity of financial institutions by using instruments and predetermined variables in our cross-country regression models.

3.2. The Data

To study relationships between the financial and real sectors, we first identify measures of financial development, outward orientation and real-sector performance that can be constructed with the available historical data. To this end, we build a panel using annual data for 1850-1997 from three main sources. From 1960, we use the World Bank's *World Development Indicators* database. For earlier years we use data from worksheets underlying Bordo and Jonung (1987) and Obstfeld and Taylor (2000), and supplement with financial, trade, and public sector aggregates from B.R. Mitchell's (1998a, 1998b, 1998c) volumes of *International Historical Statistics*. The resulting data set includes seventeen countries. The Data Appendix describes the sources in detail.

Table 1 lists the seventeen countries along with their average annual growth rates of real per capita income and financial depth (as measured by the ratio of the broadest available monetary aggregate to output) for the 1850-89, 1890-1929 and 1945-94 periods.[6] It also includes the level of real per capita income measured in 1960 U.S. dollars at the midpoints of these periods (i.e., 1870,

[6] The starting years of the averages that appear in Table 1 under the column headings "1850-1889" are as follows: Argentina 1884; Australia GDP growth 1870; Australia Money/GDP 1880; Brazil 1880; Canada 1870; Denmark 1850; Finland 1860; France 1850; Germany 1850; Italy GDP growth 1862; Italy Money/GDP 1872; Japan 1878; Netherlands 1850; Norway 1865; Portugal 1880; Sweden GDP growth 1861; Spain GDP growth 1858; Spain Money/GDP 1875; Sweden Money/GDP 1870; U.K. GDP growth 1850; U.K. Money/GDP 1870; U.S. 1850. Data from 1914-24 and 1945-48 are unavailable for Germany and thus are not included in the relevant averages. The same applies to France for 1914-20 and 1945-48.

Table 1
Selected Macroeconomic Indicators

	Per Capita Income (1960 US$)			% Growth Real Per Capita Income			Broad Money (% of GDP)		
	1870	1910	1970	1850-1889	1890-1929	1945-1997	1850-1889	1890-1929	1945-1994
Argentina	.	516	977	5.79	1.08	1.42	49.2	32.0	30.0
Australia	684	1067	2284	1.65	0.42	2.06	38.1	45.0	60.6
Brazil	.	93	529	0.52	2.58	3.63	42.2	30.1	38.3
Canada	417	976	2427	1.50	2.25	1.58	20.7	40.0	56.0
Denmark	319	608	1953	1.90	1.74	3.02	34.8	76.8	53.5
Finland	274	368	1751	1.37	1.83	3.20	41.3	96.9	47.5
France	388	560	2062	1.20	3.37	3.22	28.8	43.3	60.2
Germany	98	176	4474	1.63	1.57	3.89	18.2	47.6	33.7
Italy	207	236	1285	-0.22	1.34	4.20	34.3	50.1	72.3
Japan	.	156	1152	6.11	1.75	5.48	30.1	60.7	121.7
Netherlands	280	451	1501	1.39	2.02	2.94	30.7	62.3	76.8
Norway	170	273	2022	1.12	1.88	3.14	35.1	82.4	57.3
Portugal	.	153	582	3.05	0.99	3.95	21.6	19.6	86.0
Spain	188	243	689	0.83	0.76	3.41	8.7	26.5	74.9
Sweden	203	486	2759	1.82	2.57	2.62	62.6	77.8	61.5
United Kingdom	607	747	1725	1.04	0.51	2.41	48.7	56.2	43.8
United States	413	1087	3641	1.91	1.82	1.66	30.1	60.3	70.4

See appendix for data sources. Per capita incomes are reported for 1870, 1910, and 1970. Income growth rates and the ratio of broad money to GDP are averages of the available annual observations over the 1850-89, 1890-1929 and 1945-97 periods.

1910, and 1970).[7] The remarkable feature of the table is the growth in the ratios of the broad money stock to GDP in all but three of the seventeen economies between 1850-89 and 1890-1929 periods, with the ratio rising by more than 50 percent in nine of the countries. In contrast, financial depth grew in only ten of our countries between the 1890-1929 and 1945-94 periods, and only three countries experienced growth in the ratio of more than 50 percent.

Bordo and Jonung (1987) examine the behavior of the velocity of circulation, which is roughly the inverse of our measure of financial depth, for five of the countries (Canada, Norway, Sweden, the U.K., and the U.S.) in our study and observe a U-shaped pattern from 1870 to 1975.assets.[8] They then present evidence that the downward portion of the curve can be explained by financial development in the form of monetization, as measured by the changes in the agricultural/industrial mix of the economy and the ratio of financial assets to total assets, while the upward portion may reflect an availability of substitutes for money as an asset. The evidence in Table 1 is consistent with this interpretation for our broader sample in the pre-1930 period. The ratio of the money stock to output may thus be a particularly useful proxy for financial development in the earlier decades of our study in that it reflects industrialization as well as an increased use of financial assets.

Turning to the potential real effects of finance, for which we are most interested, we observe that among the nine countries in Table 1 that saw financial depth rise by 50 percent or more, six of them saw real per capita GDP also rise by more than 50 percent. Interestingly, all three of the countries that saw financial depth rise by more than 50 percent in the postwar period also had

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[7] When computing output growth rates, we use GDP in real local currency units. When computing levels in 1960 U.S. dollars, we use the U.S. dollar equivalents from the *World Development Indicators* database for 1960-1997. For earlier years, we use official exchange rates to convert local currency output into U.S. dollars and then deflate the result using the U.S. implicit price deflator.

[8] Bordo and Jonung extend their study of velocity to more than 80 countries after 1950.

income growth of more than 50 percent. The data thus indicate wide disparities in the growth experiences of the economies in our sample but also suggest a correlation between financial depth and real incomes. We now proceed to investigate these relationships more formally.

3.3. Methodology

Our examination of links between financial development, trade and income focuses on the broad implications that can arise in a cross country framework. This type of analysis has become a near-tradition in the empirical study of growth and its determinants since Barro (1991) isolated key variables, such as education and political stability, as members of a benchmark set of robust correlates. Given that most studies of financial factors in growth are extensions of this framework (see, for example, King and Levine 1993a, and Levine and Zervos 1998), we begin by exploring partial correlations between growth and the ratios of broadly-defined money and international trade to output from 1850 to the present and over two sub-periods covering 1850-1929 and 1945-94.

The ratio of the liquid liabilities to output is a common measure of the size and possibly the sophistication of the financial sector in an individual country, yet it is imprecise because of nonbank intermediaries such as insurance and investment companies whose liabilities do not wind up in the broad money aggregate. These omissions are likely to be far less important in the prewar period, but quite substantial in recent years. Further, a financial system should be characterized by all of the institutions that promote the accumulation of capital, including securities markets. Rousseau and Sylla (1999) show that securities markets played an important role in early U.S. growth presumably because they attracted foreign capital, while Levine and Zervos (1998) and Rousseau and Wachtel (2000) present evidence of their importance in cross-country models that use recent data. Unfortunately, we do not yet know the extent of securities market development in the prewar period for most of the countries in our sample, and so to conduct an analysis that allows for consistent

comparisons across time periods we must for now be satisfied with the ratio of broad money to GDP.

A reasonable way to measure economic performance is through growth in real per capita incomes. Although such a measure ignores the impact of the distribution of income on welfare, it nevertheless provides a convenient summary of economic conditions in a given country and has the important advantage of being readily available for a fairly large set of countries as far back as the mid-19th century. We use it here as the primary measure of economic outcomes.

Measures of economic "globalization" are even more difficult to identify for a large set of countries. It is clear, however, that the degree to which a country has an "outward orientation" is related to the extent of its integration with other markets, and trade data is readily available for most of the counties in our sample – in most cases even farther back in time than output. To participate in trade arrangements, short-term finance is critical, and much of this financing is provided through the banking sector in the form of credits and acceptances. When seen in this light, banks can contribute to economic globalization by providing the credits needed to promote trade. To examine the importance of these effects, we also consider models in which the ratio of trade (the sum of imports and exports) to GDP enters either as a regressor or as the dependent variable.

Existing empirical studies of the relationship between trade and growth have reached mixed conclusions, presumably because most measures of openness are themselves endogenous and influenced by non policy factors (see Edwards 1998 for a useful survey). This has led to sensitivity of trade effects in cross-country regressions to the choice of conditioning variables. Frankel and Romer (1999) have recently shown, however, that geographic characteristics are good instruments for isolating the impact of the predetermined component of trade on the level of real income, and that this effect is large but not always significant statistically. Such an effect is likely to be more elusive in our study, where the focus is on growth rather than levels. We nevertheless attempt to extract the

predetermined component of the ratio of trade to output with instruments and then examine its explanatory power when added to our cross-country specifications.

The tendency for real interest rates to converge in the Atlantic economies prior before 1914 and again more recently is documented by Obstfeld and Taylor (1997), and has been interpreted by them as an indicator of the extent of economic integration. What remains unstudied is the role of financial institutions, and primarily banks, in promoting interest rate convergence. Since Homer and Sylla (1996) and Obstfeld and Taylor (2000) together make annual interest rate series for long-term debt available for twelve of the countries in our study well into the 19th century, we conclude by examining the roles of finance and trade in the process of convergence in the pre-1914 period.

4. Results and Discussion

4.1 Finance, Trade, and Growth

Our first set of specifications use decadal average growth rates of real per capita GDP from 1850 to 1997 as the dependent variable and condition on the level of real per capita income (in 1960 U.S. dollars) at the start of each decade.[9] The "convergence" or "catch up" effect, as manifested by a negative sign for the coefficient on initial income, has been shown to be quite strong in cross-country regressions for the post-1960 period (see, for example, Barro 1991). By including initial income in our baseline specification, we can determine if it is important in the pre-Depression period as well. Placing the ratio of broad money to GDP on the right-hand side allows us to evaluate the role, if any, that finance plays in the conditional growth process. Since the levels variables are trending in nature and we would like to control for other business-cycle related effects, we include (but do not report coefficients on) dummy variables for each decade.

[9] We compute a "decadal" average for a country in any decade for which observations are available for seven or more years. When we divide the sample and work with five-year subperiods, observations must be available in at least three years before computing a five-year average.

Table 2
Cross-country OLS growth regressions, 1850-1997

	Dependent variable: % Growth of per capita real GDP			
	(1)	(2)	(3)	(4)
Constant	6.113**	6.279**	7.463**	7.542**
	(1.434)	(1.471)	(1.500)	(1.507)
Log of initial real per capita GDP	-0.672**	-0.699**	-0.706**	-0.718**
	(0.178)	(0.183)	(0.179)	(0.180)
Initial ratio of broad money to GDP	1.293**	1.245**	0.949*	0.899*
	(0.557)	(0.567)	(0.541)	(0.547)
Initial ratio trade to GDP		0.161		0.213
		(0.330)		(0.318)
Initial ratio government expenditure to GDP			-5.280**	-5.591**
			(2.299)	(2.349)
R^2	.336	.339	.359	.361
(No. observations)	(214)	(211)	(200)	(200)

The table reports coefficients from OLS regressions with standard errors in parentheses. The dependent variable is the growth rate of real per capita GDP averaged for each decade from 1850 to the present. Initial values are taken from the first year of each decade. Decade dummies are included in the regression but are not reported. * and ** denote statistical significance at the 10 percent and 5 percent levels respectively.

Table 2 presents the regressions, which use the first observations of each decade as regressors to ameliorate the impact of possible reverse causality from growth to additional finance. This technique cannot fully eliminate the simultaneity problem due to autocorrelation in the time series for financial depth, but it does ensure that all regressors are predetermined and thus plausible determinants of *subsequent* growth. The first column of Table 2 presents our baseline, which includes only initial income, financial depth and time effects on the right hand side, while columns (2)-(4) report results for specifications with the ratios of international trade and/or government expenditure to GDP as additional conditioning variables. We include the ratio of trade to output to control for direct effects of international trade on growth that do not operate indirectly through

finance. We include the government expenditure variable because it is likely that the resource requirements associated with large public expenditure "crowd out" private investment and lead to less efficient resource allocations than the private sector might be able to provide.

A strong convergence effect, as indicated by negative and significant coefficients on initial income, and a positive and significant role of financial depth in subsequent growth is common to all four regressions that we report in Table 2. When included with financial depth on the right-hand side, trade is not significant and government expenditure, as expected, is negative and significant. The inclusion of the conditioning variables in equations (2)-(4) all tend to reduce the measured effect of finance on growth, yet significance of the broad financial aggregate persists. The R^2 from the regressions suggest that a large portion of the cross-sectional variation in output growth can be explained by our simple models.

Table 3 presents a similar set of specifications, but instead of using initial values of the data in each period as regressors, we use contemporaneous averages and control for simultaneity with instruments. By including the initial values of the complete set of regressors as well as initial inflation as instruments, these two stage least squares regressions extract the predetermined (i.e., explainable through information in the initial information set for each period) components of the right-hand side variables and use them in place of the actual regressors in the estimation. This alternative yields results that are quantitatively very similar to those presented in Table 2. As a group, the regressions reported in Tables 2 and 3 are thus consistent with a leading role for financial factors in growth for our seventeen country sample over a 150-year period.[10]

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[10] Our findings are consistent with growth being "finance-led," but do not preclude the possibility that growth may also be promoting further financial development. In fact, when we momentarily set the relevant growth theory aside by moving finance to the left-hand side of our regressions and placing the growth rate of output on the right, we find that output growth enters with a positive and significant sign in the pre-1930 period, though not over the full sample or in the postwar period. This result is consistent with, though not overwhelmingly supportive of, the priors of generations of

Table 3
Cross-country instrumental variables growth regressions, 1850-1997

	Dependent variable: % Growth of per capita real GDP			
	(1)	(2)	(3)	(4)
Constant	6.424**	6.427**	6.776**	6.821**
	(1.457)	(1.462)	(1.477)	(1.985)
Log of initial real per capita GDP	-0.697**	-0.700**	-0.603**	-0.610**
	(0.179)	(0.180)	(0.179)	(0.180)
Ratio of broad money to GDP	1.056**	1.042**	0.956*	0.903*
	(0.542)	(0.549)	(0.540)	(0.548)
Ratio trade to GDP		0.071		0.234
		(0.364)		(0.368)
Ratio government expenditure to GDP			-5.915**	-6.286**
			(2.583)	(2.658)
R^2	.355	.355	.372	.370
(No. observations)	(199)	(199)	(197)	(197)

The table reports coefficients from two-stage least squares regressions with standard errors in parentheses. All data items are decadal averages covering the 1850's through the 1990's. Instruments include initial values of the full set of regressors as well as the inflation rate, with initial values taken as the first observation of each decade. Decade dummies are included in all regressions but are not reported. * and ** denote statistical significance at the 10 percent and 5 percent levels respectively.

Tables 4 and 5 evaluate the robustness of the OLS and IV results in subperiods covering 1850-1929 and 1945-94. To make more observations available for each estimation, we work with five-year rather than decadal averages of the data. In the pre-1929 period, we note again the significance of the convergence and finance effects on growth and the robustness of the results to

economists who have stressed what we would call "reverse causality" in the finance-growth nexus. Indeed, in time series analyses of five countries in our sample (Canada, Norway, Sweden, the U.K., and the U.S.) from 1870 to 1929, Rousseau and Wachtel (1998) do not find a role for growth in promoting additional finance in the short to medium term. Our main cross-sectional results, which reduce simultaneity problems by using initial values of finance as regressors in OLS specifications and as instruments in IV specifications, are meant to suggest that finance plays an important leading role in the growth process-- a role that is likely to be central.

Table 4
Cross-country growth regressions, 1850-1929

	Dependent variable: % Growth of per capita real GDP			
	OLS (initial values)		IV	
	(1)	(2)	(3)	(4)
Constant	4.829**	6.506**	4.804**	6.342**
	(1.728)	(2.060)	(1.821)	(2.059)
Log of initial real per capita GDP	-0.587**	-0.755**	-0.568*	-0.737**
	(0.275)	(0.311)	(0.289)	(0.307)
Ratio of broad money to GDP	2.593**	2.158*	2.273**	2.113*
	(1.067)	(1.104)	(1.048)	(1.070)
Ratio trade to GDP		0.113		0.120
		(0.386)		(0.403)
Ratio government expenditure to GDP		-6.713*		-6.595
		(3.919)		(4.216)
R^2	.136	.136	.124	.147
(No. observations)	(208)	(185)	(185)	(185)

The dependent variable is the growth rate of real per capita GDP averaged for each five-year period from 1850-54 through 1925-29. Initial values are taken from the first year of each five-year period. Standard errors are reported in parentheses. Period dummies are included in the regressions but not reported. * and ** denote statistical significance at the 10 percent and 5 percent levels respectively. The left panel of the table reports coefficients and standard errors from OLS regressions using initial values as regressors. The right panel reports coefficients and standard errors from two-stage least squares regressions. The IV regressions use the five-year averages of the data as regressors. Instruments include initial values of the full set of regressors as well as the inflation rate.

the choice of estimation technique. Government expenditure remains negative but less significant in the pre-Depression period, perhaps because the government, in the absence of a less sophisticated financial system, must play a more central role in delivering resources to productive projects.

A less prominent role for finance in the postwar period is the striking feature of Table 5. Financial depth retains significance when appearing alone on the right hand side, but this effect vanishes when trade is included in the regressions either explicitly or in the instrument set. King Levine (1993a) find the effects of finance on growth robust to the inclusion of trade using post-1960

Table 5
Cross-country growth regressions, 1945-94

	Dependent variable: % Growth of per capita real GDP			
	OLS (initial values)		IV	
	(1)	(2)	(3)	(4)
Constant	9.941**	9.275**	10.064**	9.366**
	(2.316)	(1.821)	(1.738)	(1.861)
Log of initial real per capita GDP	-1.404**	-0.968**	-1.153**	-0.961**
	(0.283)	(0.247)	(0.211)	(0.269)
Ratio liquid liabilities (M3) to GDP	3.570**	0.372	0.321	0.299
	(0.663)	(0.591)	(0.578)	(0.587)
Ratio trade to GDP		-0.089		-0.045
		(0.723)		(0.765)
Ratio government expenditure to GDP		-3.794		-4.348
		(2.860)		(4.108)
R^2	.416	.370	.362	.361
(No. observations)	(166)	(162)	(162)	(162)

See note for Table 4. The dependent variable is the growth rate of real per capita GDP averaged for each five-year period from 1945-49 through 1990-94.

data for a wider group of industrialized and emerging economies, and that the trade variable itself is not statistically significant. We attribute this difference to the industrialized nature of nearly all of the countries in our sample by 1960.

On the face of it, the results imply that the effects of finance on modern growth may arise primarily through indirect trade effects. It is in this sense that our results are also consistent with the "export-led" growth hypothesis that has emerged from the literature on economic development. Macro economists, on the other hand, hesitate to draw strong conclusions because of potential problems of collinearity between trade and the other regressors. It is also possible that the trade aggregate in recent decades has proxied for a concept much broader than trading volume, namely the degree to which an economy is integrated internationally. In mature economies, a banking system

Table 6
Cross-country trade regressions

	Dependent variable: Ratio of Trade to GDP			
	OLS 1850-1997	IV 1850-1997	IV 1850-1929	IV 1945-1994
Constant	-0.077	-0.054	0.100	-0.102
	(0.291)	(0.316)	(0.360)	(0.203)
Log of initial real per capita GDP	0.050	0.049	0.004	0.064**
	(0.036)	(0.039)	(0.057)	(0.025)
Ratio of broad money to GDP	0.247**	0.214*	0.605**	0.096
	(0.111)	(0.118)	(0.207)	(0.071)
R^2	.100	.093	.055	.128
(No. observations)	(211)	(199)	(185)	(164)

The dependent variable is ratio of trade (exports plus imports) to gross domestic product averaged for decades from 1850's through the 1990's (cols. 1 and 2) and for five-year periods for 1850-1929 (col. 3) and 1945-94 (col. 4). Initial values are from the first year of each period. Period dummies are included in the regressions but not reported. Standard errors are in parentheses. * and ** denote statistical significance at the 10 percent and 5 percent levels respectively. The first column reports results from OLS regressions that use initial values as regressors. The others report results from two-stage least squares regressions that use the periodic data averages as regressors. Instruments include initial values of the ratio of government expenditure to output, the inflation rate, and the full set of regressors.

may indeed be a less important factor in such integration.

We move toward disentangling these effects by exploring the degree to which finance affects "outward orientation" across sample periods in Table 6. In these regressions, the ratio of trade to output serves as dependent variable, and we again control for initial income. The financial variables are significant over the full sample and the 1850-1929 period but are not significant in the postwar period. These results suggest that financial systems do play a role in promoting trade in the earlier stages of financial and economic development, and that to the extent that trade promoted growth, finance was a leading sector in making such expansions possible.

4.2 Finance and Interest-Rate Convergence

In this section, we examine the possible roles of finance and international trade in promoting the decline and convergence of long-term interest rates among the economies in our sample over the 1850-1914 period. Figure 1, which presents nominal interest rates for ten of the truly "Atlantic" economies in our sample indicates that decline and convergence is indeed the general pattern of long-term rates.[11] The convergence is most striking among the European and North American countries, whose capital flows as a share of GDP over this period exceeded those achieved at any point in the postwar period,[12] and for which financial deepening over the period was particularly vigorous. To examine more explicitly whether these factors contributed importantly to the pattern in Figure 1, we turn again to cross-country regression analysis.

In our first specification, for which we report results in Table 7, the dependent variable is the nominal interest rate averaged over 5-year periods for each country. Such a regression allows us to test for the role of finance and openness in one of the characteristics that is clear from Figure 1, namely the decline in interest rates. To control for Fisher-type effects, we include current period inflation on the right-hand side. Since economic theory also suggests a long-run link between the growth rate of the economy and the real rate of interest, we include, as in cross-country growth regressions, the initial log level of per capita real GDP on the right-hand side. The left panel of Table 7 presents regression results for all 12 countries for which we have interest rate data (i.e., the 10 countries from Figure 1 plus Japan and Australia), while the right panel excludes the non-"Atlantic" economies. We use initial values of financial development as regressors for the OLS

[11] Figure 1 includes interest rates for 10 countries, including Argentina 1884-1913, Brazil 1899-1912, Canada 1870-1914, Germany 1870-1914, France 1850-1914, Italy 1880-1914, Netherlands 1850-1914, Sweden 1880-1914, the U.K. 1850-1914, and the U.S. 1857-1914.

[12] See Obstfeld and Taylor (1998), p. 359-60.

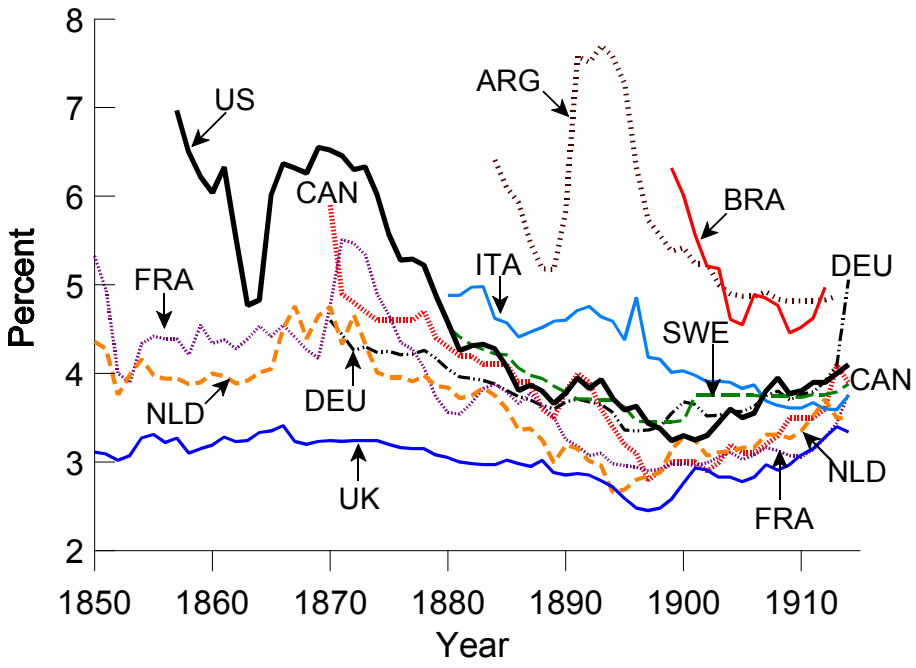

Fig. 1 Nominal interest rates, 1850-1914. Sources: Homer and Sylla (1996) and Obstfeld and Taylor (2000).

regressions, and contemporaneous averages of finance and trade for the IV models, with initial values of all regressors and the ratio of government expenditure to output as instruments.

The results indicate a negative partial correlation between initial financial depth and subsequent interest rates, but the results for trade and initial income (right panel) are larger when we exclude Japan and Australia. These countries were far more isolated both economically and geographically from the others, and it is thus likely that convergence would have been slower for them. The regressions in the right-hand panel seem to fit the conditional convergence model more snugly, with initial income entering with the expected negative and significant coefficient, and inflation entering with an expected positive coefficient that is significant at the 10 percent level. The final IV specification reveals a partial correlation between trade and subsequent interest rates that is negative and significant at the 5 percent level. These results are consistent with roles for finance and

Table 7
Interest rate regressions, 1850-1914

	Dependent variable: long-term interest rate					
	12 countries			exclude Australia and Japan		
	OLS	IV	IV	OLS	IV	IV
Constant	4.401**	4.665**	4.665**	6.724**	7.162**	7.358**
	(0.862)	(0.962)	(0.958)	(0.936)	(0.974)	(0.940)
Log initial real per capita GDP	0.059	0.041	0.038	-0.297*	-0.353**	-0.390**
	(0.137)	(0.154)	(0.154)	(0.152)	(0.159)	(0.154)
Ratio broad money to GDP	-2.138**	-2.437**	-2.147**	-2.290**	-2.512**	-1.971**
	(0.815)	(0.885)	(0.913)	(0.775)	(0.810)	(0.808)
Ratio trade to GDP			-0.192			-0.343**
			(0.158)			(0.137)
Inflation rate	0.023	0.020	0.017	0.053	0.055*	0.052*
	(0.033)	(0.034)	(0.034)	(.033)	(0.033)	(0.031)
R^2	.268	.294	.309	.355	.394	.447
(No. obs.)	(101)	(93)	(93)	(87)	(84)	(84)

The dependent variable is the average nominal long-term interest rate over a 5-year period. Period dummies are included in the regressions but not reported. Standard errors are in parentheses. * and ** denote statistical significance at the 10 percent and 5 percent levels respectively. The OLS regressions use initial values in each 5-year period as regressors. The IV regressions use the periodic data averages as regressors, and the initial values of the ratio of government expenditure to output and the full set of regressors (except inflation, which enters as a periodic average) as instruments.

trade in the the regressions, and it is likely that they also reflect a combination of decreasing returns to capital as globalization succeeded in directing resources to the most productive uses and reductions in risk premiums that were made possible by the improved risk-sharing arrangements which accompany increasingly sophisticated financial systems.

In Table 8, we present regressions that examine the other key feature of Figure 1 – absolute convergence in nominal long-term rates. To do this, we subtract the mean of the average interest rates of countries with observations in a given 5-year period from the individual country average, and

Table 8
Interest rate convergence regressions, 1850-1914

	Dependent variable: absolute value of long-term interest rate less cross-country average					
	12 countries			exclude Australia and Japan		
	OLS	IV	IV	OLS	IV	IV
Constant	1.818**	1.914**	1.913**	0.381	0.633	0.626
	(0.610)	(0.671)	(0.672)	(0.686)	(0.712)	(0.720)
Log initial real per capita GDP	-0.145	-0.151	-0.152	0.091	0.060	0.061
	(0.097)	(0.107)	(0.108)	(0.111)	(0.116)	(0.118)
Ratio broad money to GDP	-1.022*	-1.136*	-0.985	-1.145**	-1.273**	-1.292**
	(0.577)	(0.617)	(0.641)	(0.568)	(0.592)	(0.619)
Ratio trade to GDP			-0.100			0.013
			(0.111)			(0.105)
Inflation rate	0.030	0.027	0.025	0.026	0.026**	0.026
	(0.023)	(0.024)	(0.024)	(.024)	(0.024)	(0.024)
R^2	.122	.156	.164	.147	.191	.191
(No. obs.)	(101)	(93)	(93)	(87)	(84)	(84)

The dependent variable is the absolute value of the difference of the average nominal long-term interest rate for a country over a 5-year period and the cross-country average for that period. Period dummies are included in the regressions but not reported. Standard errors are in parentheses. * and ** denote statistical significance at the 10 percent and 5 percent levels respectively. The OLS regressions use initial values in each 5-year period as regressors. The IV regressions use the periodic data averages as regressors, and the initial values of the ratio of government expenditure to output and the full set of regressors (except inflation, which enters as a periodic average) as instruments.

use it as the dependent variable. The right-hand sides, estimation techniques, instrument sets, and country samples are the same as in Table 7. These results show that, controlling for time, initial income, and inflation, countries with greater financial depth at the start of a 5-year period had long-term interest rates over that period that were closer to the periodic mean of the sample than those that were less well-developed financially by our measure. Trade effects, though important in reducing the level of rates, do not appear to contribute to their convergence over the 1850-1914 period.

5. Conclusion

Our paper brings together two strands of the economic literature – that on the finance-growth nexus and that on capital market integration – and explores the key issues surrounding each strand through both institutional/country histories and formal quantitative analysis. We find a robust correlation between financial factors and economic growth that is consistent with a leading role for finance in a broad cross section of seventeen economies over the 1850-1997 period, with the effects of finance strongest prior to the Great Depression. This result suggests that our earlier findings for the United States between 1790 and 1850 (Rousseau and Sylla, 1999) may have broader implications in other parts of the 19th- and early 20th-century world.

We next showed that countries with more sophisticated financial systems engage in more trade and appear to be better integrated with other economies by econometrically identifying roles for both finance and trade in the absolute convergence in long-term interest rates that is observed among the Atlantic economies between 1850 and the start of the First World War. The results, when combined with the evidence presented from historical case studies of the Dutch Republic, England, the U.S., France, Germany and Japan over the past three centuries, suggest that the economic growth and increasing globalization of the Atlantic economies might indeed have been "finance-led."

6. Data Appendix

In this section, we list the data sources for the series used in our regression analysis. The data draw from six sources: World Bank's *World Development Indicators 1999* database, worksheets underlying Obstfeld and Taylor (2000), Bordo and Jonung (1987), Rousseau and Wachtel (1998), and Rousseau (1999), and published interest rates from Homer and Sylla (1996). Of course, these sources themselves draw upon a vast body of government documents and the collective work of generations of economic historians whose efforts have made it possible to consolidate key

macroeconomic and financial aggregates into a database that covers the Atlantic economies for the past century and a half. We do not list the primary sources here, but refer the interested reader to the materials listed above for details.

In nearly all cases, data for a given series are from more than one source. Further, the definitions across sources of a given data item are not always consistent. For example, we use the broad M3 aggregate as a measure of financial development for the later years of our sample, but in many cases have only a narrower aggregate such as M2 for earlier years. When the data are obtained from multiple sources and differ in value at the point of joining, we always use the most recent data as it appears and adjust earlier data with a ratio-splice.

We present the data sources below by country.

Argentina, 1884-1997

Gross domestic product, GDP deflator, population, money stock: 1960-97 from *World Development Indicators*; 1884-1959 from worksheets underlying Obstfeld and Taylor (2000).

Imports, exports: 1960-97 from *World Development Indicators*; 1884-1959 from Mitchell (1998b), Table E1, pp. 442-52.

Government expenditure: 1960-97 from *World Development Indicators*; 1884-1959 from Mitchell (1998b), Table G5, pp. 670-78.

Long-term interest rate: 1884-1913 from worksheets underlying Obstfeld and Taylor (2000).

Australia, 1870-1997

Gross domestic product, GDP deflator, population: 1960-97 from *World Development Indicators*; 1870-1959 from worksheets underlying Obstfeld and Taylor (2000).

Money stock: 1960-97 is M3 from *World Development Indicators;* 1870-1959 is M2 from worksheets underlying Bordo and Jonung (1987).

Imports, exports: 1960-97 from *World Development Indicators*; 1870-1959 from Mitchell (1998a), Table E1, pp. 551-8.

Government expenditure: 1960-97 from *World Development Indicators*; 1870-1959 from Mitchell (1998a), Table G5, pp. 905-6.

Long-term interest rate: 1870-1914 from worksheets underlying Obstfeld and Taylor (2000).

Brazil, 1880-1997

Gross domestic product, GDP deflator, population, money stock: 1960-97 from *World Development Indicators*; 1880-1959 from worksheets underlying Obstfeld and Taylor (2000).

Imports, exports: 1960-97 from *World Development Indicators*; 1880-1959 from Mitchell (1998b), Table E1, pp. 442-52.

Government expenditure: 1960-97 from *World Development Indicators*; 1880-1959 from Mitchell (1998b), Table G5, pp. 670-78.

Long-term interest rate: 1899-1912 from worksheets underlying Obstfeld and Taylor (2000).

Canada, 1870-1997

Gross domestic product, GDP deflator, population: 1960-97 from *World Development Indicators*; 1870-1959 from worksheets underlying Obstfeld and Taylor (2000).

Money stock: 1960-97 is M3 from *World Development Indicators;* 1870-1959 is M2 from worksheets underlying Bordo and Jonung (1987).

Imports, exports: 1960-97 from *World Development Indicators*; 1870-1959 from Mitchell (1998b), Table E1, pp. 429-41.

Government expenditure: 1960-97 from *World Development Indicators*; 1870-1959 from Mitchell (1998b), Table G5, pp. 664-9.

Long-term interest rate: 1870-1914 from worksheets underlying Obstfeld and Taylor (2000).

Denmark, 1850-1997

Gross domestic product, GDP deflator, population: 1960-97 from *World Development Indicators*; 1850-1959 from worksheets underlying Obstfeld and Taylor (2000).

Money stock: 1960-97 is M3 from *World Development Indicators;* 1880-1959 is M2 from worksheets underlying Bordo and Jonung (1987); 1850-79 is liquid liabilities of the banking system from worksheets underlying Obstfeld and Taylor (2000).

Imports, exports: 1960-97 from *World Development Indicators*; 1870-1959 from Mitchell (1998c), Table E1, pp. 571-86.

Government expenditure: 1960-97 from *World Development Indicators*; 1854-1959 from Mitchell (1998c), Table G5, pp. 816-24.

France, 1850-1997

Gross domestic product, GDP deflator: 1960-97 from *World Development Indicators*; 1850-1913, 1921-38, 1949-59 from worksheets underlying Obstfeld and Taylor (2000).

Population: 1960-89 from *World Development Indicators*; 1850-1959 from worksheets underlying Obstfeld and Taylor (2000).

Money stock: 1960-97 is M3 from *World Development Indicators;* 1900-59 is the sum of banknote circulation from Mitchell (1998c), Table G1, pp. 788-92, commercial bank deposits from Mitchell, Table G2, pp. 793-99, and savings bank deposits from Mitchell, Table G3, pp. 800-10; 1880-99 is banknote circulation from Mitchell, savings bank deposits from Mitchell, and M1 less circulation in the hands of the public from worksheets underlying Bordo and Jonung (1987); 1850-79 is the sum of banknote circulation and savings deposits from Mitchell.

Imports, exports: 1960-97 from *World Development Indicators*; 1850-1959 from Mitchell (1998c), Table E1, pp. 571-86.

Government expenditure: 1960-97 from *World Development Indicators*; 1854-1959 from Mitchell (1998c), Table G5, pp. 816-24.

Long-term interest rate: 1880-1914 from worksheets underlying Obstfeld and Taylor (2000); 1850-1879 from Homer and Sylla, Table 25, pp. 222-3.

Finland, 1862-1997

Gross domestic product, GDP deflator, population: 1960-97 from *World Development*

Indicators; 1862-1959 from worksheets underlying Obstfeld and Taylor (2000).

Money stock: 1960-97 from *World Development Indicators;* 1862-59 from worksheets underlying Obstfeld and Taylor (2000).

Imports, exports: 1960-97 from *World Development Indicators*; 1862-1959 from Mitchell (1998c), Table E1, pp. 571-86.

Government expenditure: 1960-97 from *World Development Indicators*; 1882-1959 from Mitchell (1998c), Table G5, pp. 816-24.

Germany, 1850-1989

Gross domestic product, GDP deflator: 1960-89 from *World Development Indicators*; 1850-1913, 1925-38, 1950-59 from worksheets underlying Obstfeld and Taylor (2000).

Population: 1960-89 from *World Development Indicators*; 1880-1959 from worksheets underlying Obstfeld and Taylor (2000); 1850-79 from Mitchell (1998c), Table A5, pp. 79-91.

Money stock: 1960-97 is M3 from *World Development Indicators;* 1850-1944, 1948-59 is liquid liabilities in the financial system from worksheets underlying Obstfeld and Taylor (2000).

Imports, exports: 1960-97 from *World Development Indicators*; 1880-1959 from Mitchell (1998c), Table E1, pp. 571-86.

Government expenditure: 1960-97 from *World Development Indicators*; 1872-1959 from Mitchell (1998c), Table G5, pp. 816-24.

Long-term interest rate: 1870-1914 from worksheets underlying Obstfeld and Taylor (2000).

Italy, 1862-1997

Gross domestic product, GDP deflator: 1960-97 from *World Development Indicators*; 1862-1959 from worksheets underlying Obstfeld and Taylor (2000).

Population: 1960-97 from *World Development Indicators*; 1880-1959 from worksheets underlying Obstfeld and Taylor (2000), 1862-79 from Mitchell (1998c), Table A5, pp. 79-91.

Money stock: 1962-97 is M3 from *World Development Indicators;* 1880-1961 is M2 from worksheets underlying Bordo and Jonung (1987); 1872-79 is the sum of banknote circulation from Mitchell (1998c), Table G1, pp. 788-92, commercial bank deposits from Mitchell, Table G2, pp. 793-99, and savings bank deposits from Mitchell, Table G3, pp. 800-10.

Imports, exports: 1960-97 from *World Development Indicators*; 1862-1959 from Mitchell (1995c), Table E1, pp. 571-86.

Government expenditure: 1960-97 from *World Development Indicators*; 1862-1959 from Mitchell (1995c), Table G5, pp. 816-24.

Long-term interest rate: 1880-1914 from worksheets underlying Obstfeld and Taylor (2000).

Japan, 1885-1997

Gross domestic product: 1960-97 from *World Development Indicators*; 1945-1959 from Mitchell (1998a) Table J1, pp. 1025-38; 1885-1944 from worksheets underlying Rousseau (1999).

GDP deflator: 1960-97 from *World Development Indicators*; 1945-1959 from Mitchell (1998a) Table J1, pp. 1025-38 constructed as quotient of nominal GDP and GDP in constant 1934-36 units; 1885-1944 from worksheets underlying Rousseau (1999).

Population: 1960-97 from *World Development Indicators*; 1945-1959 from Mitchell (1998a) Table A5, pp. 57-63; 1885-1944 from worksheets underlying Rousseau (1999).

Money stock: 1960-97 is M3 from *World Development Indicators*; 1945-1959 is the sum of banknote circulation from Mitchell (1998a), Table G1, pp. 830-7, commercial bank deposits from

Mitchell, Table G2, pp. 848-56, and savings bank deposits from Mitchell, Table G3, pp. 864-8; 1878-1944 from worksheets underlying Rousseau (1999).

Imports, exports: 1960-97 from *World Development Indicators*; 1860-1959 from Mitchell (1998a), Table E1, pp. 538-50.

Government expenditure: 1960-97 from *World Development Indicators*; 1860-1959 from Mitchell (1998), Table G5, pp. 898-904.

Long-term interest rate: 1880-1914 from worksheets underlying Obstfeld and Taylor (2000).

Netherlands, 1850-1997

Gross domestic product, GDP deflator, population: 1960-97 from *World Development Indicators*; 1850-1959 from worksheets underlying Obstfeld and Taylor (2000).

Money stock: 1960-97 is M3 from *World Development Indicators;* 1918-59 is the sum of circulation in the hands of the public from Mitchell (1998c), Table G1, pp. 788-92, commercial bank deposits from Mitchell, Table G2, pp. 793-99, and savings bank deposits from Mitchell, Table G3, pp. 800-10. 1900-17 is circulation and savings deposits from Mitchell; 1850-1899 defined as in 1918-59, with commercial bank deposits interpolated under a constant growth assumption between 5-year benchmarks for 1850-74.

Imports, exports: 1960-97 from *World Development Indicators*; 1850-1959 from Mitchell (1998c), Table E1, pp. 571-86.

Government expenditure: 1960-97 from *World Development Indicators*; 1850-1959 from Mitchell (1998c), Table G5, pp. 816-24.

Long-term interest rate: 1850-1914 from worksheets underlying Obstfeld and Taylor (2000).

Norway, 1865-1997

Gross domestic product, GDP deflator, population: 1960-97 from *World Development Indicators*; 1865-1959 from worksheets underlying Rousseau and Wachtel (1998).

Money stock: 1960-97 is M3 from *World Development Indicators;* 1865-1959 is the sum of circulation in the hands of the public from Mitchell (1998c), Table G1, pp. 788-92, commercial bank deposits from Mitchell, Table G2, pp. 793-99, and savings bank deposits from Mitchell, Table G3, pp. 800-10. Commercial and savings bank deposits were interpolated under a constant growth assumption between 5-year benchmarks for 1865-74.

Imports, exports: 1960-97 from *World Development Indicators*; 1865-1959 from Mitchell (1998c), Table E1, pp. 571-86.

Government expenditure: 1960-97 from *World Development Indicators*; 1865-1959 from Mitchell (1998c), Table G5, pp. 816-24.

Portugal, 1880-1997

Gross domestic product, GDP deflator, population: 1960-97 from *World Development Indicators*; 1880-1959 from worksheets underlying Obstfeld and Taylor (2000).

Money stock: 1960-97 is M3 from *World Development Indicators;* 1880-59 from worksheets underlying Obstfeld and Taylor (2000).

Imports, exports: 1960-97 from *World Development Indicators*; 1880-1959 from Mitchell (1998c), Table E1, pp. 571-86.

Government expenditure: 1960-97 from *World Development Indicators*; 1880-1959 from Mitchell (1998c), Table G5, pp. 816-24.

Spain, 1850-1997

Gross domestic product, GDP deflator, population: 1960-97 from *World Development Indicators*; 1875-1959 from worksheets underlying Obstfeld and Taylor (2000).

Money stock: 1960-97 is M3 from *World Development Indicators;* 1875-59 is the sum of banknote circulation from Mitchell (1998c), Table G1, pp. 788-92, commercial bank deposits from Mitchell, Table G2, pp. 793-99, and savings bank deposits from Mitchell, Table G3, pp. 800-10.

Imports, exports: 1960-97 from *World Development Indicators*; 1875-1959 from Mitchell (1998c), Table E1, pp. 571-86.

Government expenditure: 1960-97 from *World Development Indicators*; 1875-1959 from Mitchell (1998c), Table G5, pp. 816-24.

Sweden, 1861-1997

Gross domestic product, GDP deflator, population: 1960-97 from *World Development Indicators*; 1861-1959 from worksheets underlying Obstfeld and Taylor (2000).

Money stock: 1960-97 is M3 from *World Development Indicators;* 1870-59 is the sum of banknote circulation from Mitchell (1998c), Table G1, pp. 788-92, commercial bank deposits from Mitchell, Table G2, pp. 793-99, and savings bank deposits from Mitchell, Table G3, pp. 800-10.

Imports, exports: 1960-97 from *World Development Indicators*; 1870-1959 from Mitchell (1998c), Table E1, pp. 571-86.

Government expenditure: 1960-97 from *World Development Indicators*; 1870-1959 from Mitchell (1998c), Table G5, pp. 816-24.

United Kingdom, 1850-1997

Gross domestic product, GDP deflator: 1960-97 from *World Development Indicators*; 1850-1959 from worksheets underlying Obstfeld and Taylor (2000).

Population: 1960-97 from *World Development Indicators*; 1870-1959 from worksheets underlying Obstfeld and Taylor (2000); 1850-79 from Mitchell (1998c), Table A5, pp. 79-91.

Money stock: 1994-97 is M2 from *World Development Indicators;* 1870-1993 is M2 from worksheets underlying Obstfeld and Taylor (2000).

Imports, exports: 1960-97 from *World Development Indicators*; 1850-1959 from Mitchell (1998c), Table E1, pp. 571-86.

Government expenditure: 1960-97 from *World Development Indicators*; 1850-1959 from Mitchell (1998c), Table G5, pp. 816-24.

Long-term interest rate: 1870-1914 from worksheets underlying Obstfeld and Taylor (2000).

United States, 1870-1997

Gross domestic product: 1960-97 from *World Development Indicators*; 1870-1959 from worksheets underlying Obstfeld and Taylor (2000), 1850-69 from Berry (1988), Table 3, pp. 18-20.

GDP deflator: 1960-97 from *World Development Indicators*; 1870-1959 from worksheets underlying Obstfeld and Taylor (2000), 1850-1869 derived as quotient of nominal and real GNP from Berry (1988), Table 3, pp. 18-20, and Table 7, p. 23.

Population: 1960-97 from *World Development Indicators*; 1870-1959 from worksheets underlying Obstfeld and Taylor (2000), 1850-69 from Berry (1988), Table 6, p. 22.

Money stock: 1960-97 is M3 from *World Development Indicators;* 1870-1959 is M2 from worksheets underlying Wachtel and Rousseau (1995); 1850-69 from worksheets underlying Obstfeld and Taylor (2000).

Imports, exports: 1960-97 from *World Development Indicators*; 1850-1959 from Mitchell (1998b), Table E1, pp. 429-41.

Government expenditure: 1960-97 from *World Development Indicators*; 1850-1959 from Mitchell (1998a), Table G5, pp. 664-9.

Long-term interest rate: 1870-1914 from worksheets underlying Obstfeld and Taylor (2000), 1860-1869 are high-grade railroad bond yields from Homer and Sylla (1996), Table 42, pp. 309-10.

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