Globalization and Capital Markets*

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October 2001

*This paper was presented at the NBER conference "Globalization in Historical Perspective" held at Santa Barbara, May 4–5, 2001, and is forthcoming in the NBER conference volume of the same name edited by Michael D. Bordo, Alan M. Taylor, and Jeffrey G. Williamson. Jay Shambaugh and Julian di Giovanni provided superb research assistance. For assistance with data we thank Michael Bordo, Ian McLean, Satyen Mehta, Chris Meissner, and Michael Twomey; and for editorial suggestions we thank Michael Bordo. We received helpful comments from our discussant Richard Portes, from Marc Flandreau and other conference participants at Santa Barbara, and from Michael Jansson. Obstfeld acknowledges the financial support of the National Science Foundation, through a grant to the National Bureau of Economic Research.

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1 Global Capital Markets: Overview and Origins

At the turn of the twenty-first century, the merits of international financial integration are under more forceful attack than at any time since the 1940s. Even mainstream academic proponents of free multilateral commodity trade, such as Bhagwati, argue that the risks of global financial integration outweigh the benefits it affords. Critics from the left such as Eatwell, more skeptical even of the case for free trade on current account, suggest that since the 1960s "free international capital flows" have been "associated with a deterioration in economic efficiency (as measured by growth and unemployment)."[1]

The resurgence of concerns over international financial integration is understandable in light of the financial crises in Latin America in 1994–95 and in East Asia in 1997–98. Proponents of free trade in tangible goods have long recognized that its net benefits to countries typically are distributed unevenly, creating domestic winners and losers. But international financial crises such as those in east Asia have submerged entire economies and threatened their trading partners, inflicting losses all around. International financial transactions rely intrinsically on the expectation that counterparties will fulfill future contractual commitments; they therefore place confidence and possibly volatile expectations at center stage.[2] These same factors are present in purely domestic financial trades, of course. But oversight, adjudication, and enforcement all are orders of magnitude more difficult among sovereign nations with distinct national currencies than within a single national jurisdiction. And there is no natural world lender of last resort, so international crises are intrinsically harder to head off and contain. Factors other than the threat of crises, such as the power of capital markets to constrain domestically-oriented economic policies, also have sparked concerns over greater financial openness.

The ebb and flow of international capital since the nineteenth century illustrates recurring difficulties, as well as the alternative perspectives from which policymakers have tried to confront them. The subsequent sections are devoted to documenting these vicissitudes quantitatively and explaining them. We believe that economic theory and economic history together can provide useful insights into events of the past and deliver relevant lessons for today.

[1] See Bhagwati (1998); Eatwell (1997, p. 2). For a broad perspective on the future prospects of economic integration in general, see Rodrik (2000).

[2] The vast majority of commodity trades also involve an element of intertemporal exchange, via deferred or advance payment for goods, but the unwinding of the resulting cross-border obligations tends to be predictable.

1.1 The Emergence of World Capital Markets

Prior to the nineteenth century, the geographical scope for international finance was relatively limited compared to what was to come. Italian banks of the Renaissance financed trade and government around the Mediterranean and farther north. Later, London and Amsterdam became the key centers, and their currencies and financial instruments were the principal focus of players in the market. As the industrial revolution gathered force and spread out from Britain, the importance of international financial markets became more apparent in both the public and private spheres.[3]

In due course, the scope for such trades extended to other centers that developed the markets and institutions capable of supporting international financial transactions, and whose governments were not hostile to such developments. In the Eastern U.S., a broad range of centers including Boston, Philadelphia, and Baltimore gave way to what became the dominant center of national and international finance, New York. By the late nineteenth century both France and the Germany had developed sophisticated and expanding international markets well-integrated into the networks of global finance. Elsewhere in Europe and the New World similar markets began from an embryonic stage, and eventually financial trading spread to places as far afield as Melbourne and Buenos Aires.[4] As we shall discuss later, after 1870 these developments were to progress even further. With the world starting to converge on the gold standard as a monetary system, and with technological developments in shipping (for example, steamships replacing sail, the Panama Canal) and communications (the telegraph, trans-oceanic cables), the construction of the first global marketplace in capital, as well as goods and labor, took hold in an era of undisputed liberalism and virtual *laisser faire*.[5]

Within finance, the technological and institutional developments were many: the use of modern communications to transmit prices; the development of a very broad array of private debt and equity instruments, and the expansion of the scope for insurance activities; the expanding role of government bond markets inter-

[3] See Neal (1990, 2000); Oppers (1993); Brezis (1995).

[4] On the U.S. see Davis (1965) and Sylla (1975; 1998). On Europe see Kindleberger (1984). For a comprehensive discussion of the historical and institutional developments in some key countries where international financial markets made an impact at this time—the United Kingdom, the United States, Australia, Argentina, and Canada—see Davis and Gallman (2001). On comparative financial deepening and sophistication see Goldsmith (1985).

[5] On this first era of globalization see Sachs and Warner (1993); Williamson (1996); O'Rourke and Williamson (1999); and chapters by Findlay and O'Rourke, and Chiswick and Hatton, in this volume.

nationally; and the more widespread use of forward and futures contracts, and derivative securities. By 1900, the use of such instruments permeated the major economic centers of dozens of countries around the world, stretching from Europe, east and west, north to south, to the Americas, Asia, and Africa. The key currencies and instruments were known everywhere, and formed the basis for an expanding world commercial network, whose rise was equally meteoric. Bills of exchange, bond finance, equity issues, foreign direct investments, and many other types of transactions were by then quite common among the core countries, and among a growing number of nations at the periphery.

Aside from *haute finance*, more and more day-to-day activities came into the orbit of finance via the growth and development of banking systems in many countries, offering checking and saving accounts as time passed. This in turn raised the question of whether banking supervision would be done by the banks themselves or the government authorities, with solutions including free banking and "wildcat" banks (as in the United States), and changing over time to include supervisory functions as part of a broader central monetary authority, the central bank. From what was once an esoteric sector of the economy, the financial sector grew locally and globally to touch an ever-expanding range of activity.[6]

Thus, the scope for capital markets to do good—or do harm—loomed larger as time went by. As an ever-greater part of national and international economies became monetized and sensitive to financial markets, agents in all spheres—public and private, labor and capital, domestic and foreign—were affected. Who stood to gain or lose? What policies would emerge as government objectives evolved? Would global capital markets proceed unfettered or not? From the turn of the twentieth century, the unfolding history of the international capital market has been of enormous import. The market has undoubtedly shaped the course of national and international economic development and swayed political interests in all manner of directions at various times. In terms of distribution and equality, it has made winners and losers, though so often is the process misunderstood that the winners and losers are often unclear, at the national and the global level. An aim of this paper is to tell the history of what became a truly *global* capital market on the eve of the twentieth century, and explore how it has influenced the course of events ever since.

[6]On financial development see the chapter by Rousseau and Sylla in this volume.

1.2 Stylized Facts for the Nineteenth and Twentieth Century

Notwithstanding the undisputed record of technological advancement and economic growth over the long run, we must reject the temptations of a simple linear history as we examine international capital markets and their evolution. It has not been a record of ever-more-perfectly-functioning markets with ever-lower transaction costs and ever-expanding scope. The mid-twentieth century, on the contrary, was marked by an enormous reaction against markets, international as well as domestic, and against financial markets in particular.[7] Muted echoes of these same themes could be heard once again at the end of the twentieth century.

What do we already know about the evolution of global capital mobility in the last century or more? Very few previous studies exist for the entire period and covering a sufficiently comprehensive cross-section of countries; but many authors have focused on individual countries and particular epochs, and from their work we can piece together a working set of hypotheses which might be termed the conventional wisdom concerning the evolution of international capital mobility in the post-1870 era. The story comes in four parts, and not coincidentally these echo the division of the twentieth century into distinct international monetary regimes.[8]

The first period runs up to 1914. After 1870 an increasing share of the world economy came into the orbit of the classical gold standard, and a global capital market centered on London. By 1880, quite a few countries were on gold, and by 1900 a large number. This fixed exchange-rate system was for most countries a stable and credible regime, and functioned as a disciplining or commitment device. Accordingly, interest rates across countries tended to converge, and capital flows surged. Many peripheral countries, not to mention the New World offshoots of Western Europe, took part in an increasingly globalized economy in not only the capital market, but also goods and labor markets.[9]

In the second period, from 1914 to 1945, this global economy was destroyed. Two world wars and a Great Depression accompanied a rise in nationalism and increasingly noncooperative economic policymaking. With gold-standard credibility broken by World War One, monetary policy became subject to domestic

[7] See Polanyi (1944).

[8] On this division of history see, in particular, Eichengreen (1996). Earlier surveys of the progress of financial-market globalization since the nineteenth century include Obstfeld and Taylor (1998), Bordo, Eichengreen, and Kim (1999), and Flandreau and Rivière (1999).

[9] On the gold-standard regime and late-nineteenth-century capital markets see, *inter alia*, Eichengreen (1996); Eichengreen and Flandreau (1996); Bordo and Kydland (1995); Bordo and Rockoff (1996); Edelstein (1982); on trade in goods and migrations in labor markets as part of the nineteenth century globalization see O'Rourke and Williamson (1999).

political goals, first as a way to help finance wartime deficits. Later, monetary policy was a tool to engineer beggar-thy-neighbor devaluations under floating rates. As a guard against currency crises and to protect gold, capital controls became widespread. The world economy went from globalized to almost autarkic in the space of a few decades. Capital flows were minimal, international investment was regarded with suspicion, and international prices and interest rates fell completely out of synchronization. Global capital was demonized, and seen as one of the principal causes of the international depression of the 1930s.[10]

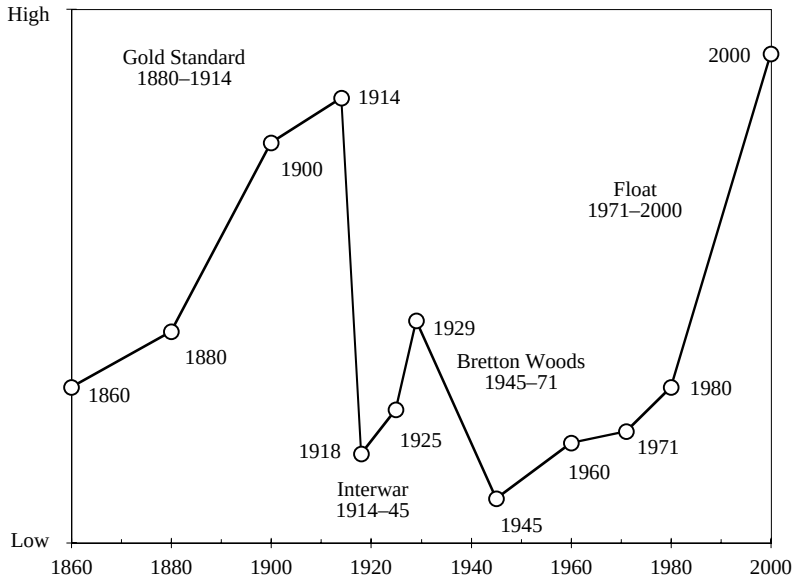
In the third period, the Bretton Woods era (1945–1971), an attempt to rebuild the global economy took shape. Trade flows began a remarkable expansion, and economic growth began its most rapid spurt in history worldwide. Yet fears formed in the interwar period concerning global capital were not easily dispelled. The IMF original design sanctioned capital controls as a means for governments to protect themselves from currency crises and runs, and to lend autonomy by providing more power to activist monetary policy. For twenty years, this prevailing philosophy held firm; and although capital markets recovered, they did so slowly. But by the late 1960s global capital could not be held back so easily, and its workings eventually broke the compromise that had sustained the fixed exchange-rate system.[11]

In the fourth and final period, the post-Bretton Woods floating-rate era, a different trend has been evident. Although fixed-rate regimes were reluctantly given up, and though some countries still attempt to maintain or create such regimes anew, the years from the 1970s to the 1990s have been characterized by a seeming increase in capital mobility. Generally speaking, industrial-country governments no longer needed capital controls as a tool to help preserve a fixed exchange-rate peg, since the peg was gone. As a floating rate could accommodate market sentiment, controls could be lifted. This was encouraging to the flow of capital in all countries. In peripheral countries, economic reforms reduced the transactions costs and risks of foreign investment, and capital flows grew there too—at least until the crises of the latter 1990s reminded investors of the fragility of the fixed-rate regimes that remained in the developing world. Increasingly the smaller peripheral countries that desire fixed exchange rates seek credibly to give up domestic monetary policy autonomy through currency boards or even dollarization, whereas larger developing countries such as Mexico, Chile, and Brazil have opted for exchange-rate flexibility coupled with inflation targeting.

In the 1990s, the term "globalization" has became a catch-all to describe the

[10]See Eichengreen (1992; 1996) and Temin (1989). In labor markets migrations collapsed (Williamson 1995; James 2001), and in goods markets trade barriers multiplied (Kindleberger

Figure 1: Conjecture? A Stylized View of Capital Mobility in Modern History



Source: Introspection.

phenomenon of an increasingly integrated and interdependent world economy, one that exhibits supposedly free flows of goods, services, and capital, albeit not of labor. Yet for all the hype, economic history suggests that we be a little cautious in assessing how amazing this development really is. We will show that a period of impressive global integration has been witnessed before, at least for capital markets, at the turn of the twentieth century, just about a hundred years ago. Of course, that earlier epoch of globalization did not endure. As the above discussion suggests, if we were roughly to sketch out the implied movements in capital mobility, we would chart an upswing from 1880 to 1914; this would be followed by a collapse to 1945, though perhaps with a minor recovery during the brief reconstruction of the gold standard in the 1920s, between the autarky of World War One and the Depression; we would then think of a gradual rise in mobility after 1945, becoming faster after the collapse of Bretton Woods in the early 1970s.

For illustrative purposes, let us make the tenuous assumption that international capital mobility or global capital market integration *could* be measured in a single

1986, 1989; James 2001).

[11] On Bretton Woods see, for example, Bordo and Eichengreen eds. (1993); Eichengreen (1996).

parameter. Suppose we could plot that parameter over time for the last century or so. We would then expect to see a time path something like Figure 1, where the vertical axis carries the mobility or integration measure. It is reasonable, given the specific histories of various subperiods or certain countries, as contained in numerous fragments of the historical literature, to speak of capital mobility increasing or decreasing at the times we have noted. Thus, the overall ∪-shape of this figure is probably correct.

However, without further quantification the usefulness of the stylized view remains unclear. For one thing, we do not know if it accords with empirical measures of capital mobility. Moreover, even if we know the direction of changes in the mobility of capital at various times, we cannot measure the extent of those changes. Without such evidence, we cannot assess whether the ∪-shaped path is complete: that is, have we now reached a degree of capital mobility that is above, or still below, that seen in the years before 1914? To address these questions requires more formal empirical testing, and that is one of the motivations for the quantitative analysis which follows.

1.3 The Trilemma: Capital Mobility, the Exchange Rate, and Monetary Policy

We seek in this paper not only to offer evidence in support of the stylized view of global capital market evolution, but also to provide an organizing framework for understanding that evolution and the forces that shaped the international economy of the twentieth century. Given the stylized description, we must address the question: what explains the long stretch of high capital mobility that prevailed before 1914, the subsequent breakdown in the interwar period, and the very slow postwar reconstruction of the world financial system? The answer is tied up with one of the central and most visible areas in which openness to the world capital market constrains government power: the choice of an exchange rate regime.[12]

The *macroeconomic policy trilemma* for open economies (also known as the "inconsistent trinity" proposition) follows from a basic fact: An open capital market deprives a country's government of the ability simultaneously to target its exchange rate and to use monetary policy in pursuit of other economic objectives. The trilemma arises because a macroeconomic policy regime can include at most two elements of the "inconsistent trinity" of three policy goals:

(i) full freedom of cross-border capital movements;

[12]This section draws on Obstfeld and Taylor (1998) and Obstfeld (1998).

(ii) a fixed exchange rate; and

(iii) an independent monetary policy oriented toward domestic objectives.

If capital movements are prohibited, in the case where element *(i)* is ruled out, a country on a fixed exchange rate can break ranks with foreign interest rates and thereby run an independent monetary policy. Similarly a floating exchange rate, in the case where element *(ii)* is ruled out, reconciles freedom of international capital movements with monetary-policy effectiveness (at least when some nominal domestic prices are sticky). But monetary policy is powerless to achieve domestic goals when the exchange rate is fixed and capital movements free, the case where element *(iii)* is ruled out, since intervention in support of the exchange parity then entails capital flows that exactly offset any monetary-policy action threatening to alter domestic interest rates.[13]

Recognition of the trilemma leads to our central proposition, that secular movements in the scope of international lending and borrowing may be understood in terms of this trilemma. Capital mobility has prevailed and expanded under circumstances of widespread political support either for an exchange-rate-subordinated monetary regime (for example, the gold standard), or for a monetary regime geared mainly toward domestic objectives at the expense of exchange-rate stability (for example, the recent float). The middle ground in which countries attempt simultaneously to hit exchange-rate targets and domestic policy goals has, almost as a logical consequence, entailed exchange controls or other harsh constraints on international transactions.

It is this conflict among rival policy choices, the trilemma, that informs our discussion of the historical evolution of world capital markets in the pages that follow, and helps make sense of the ebb and flow of capital mobility in the long run and in the broader political-economy context. Of course, the trilemma is only a proximate explanation, in the sense that deeper socio-political forces explain the relative dominance of some policy targets over others.

[13]The choice between fixed and floating exchange rates should not be viewed as dichotomous; nor should it be assumed that the choice of a floating-rate regime necessarily leads to a useful degree of monetary-policy flexibility. In reality, the degree of exchange-rate flexibility lies on a continuum, with exchange-rate target zones, crawling pegs, crawling zones, and managed floats of various other kinds residing between the extremes of irrevocably fixed and freely floating. The greater the attention given to the exchange rate, the more constrained monetary policy is in pursuing other objectives. Indeed, the notion of a "free" float is an abstraction with little empirical content, as few governments are willing to set monetary policy without some considerations of its exchange-rate effects. If exchange rates are subject to pure speculative shocks unrelated to economic fundamentals, and if policy makers are concerned to counter these movements, then monetary control will be compromised.

1.4 A Brief Narrative

The broad trends and cycles in the world capital market that we will document reflect changing responses to the fundamental trilemma. Before 1914, each of the world's major economies pegged its currency's price in terms of gold, and thus, implicitly, maintained a fixed rate of exchange against every other major country's currency. Financial interests ruled the world of the classical gold standard and financial orthodoxy saw no alternative mode of sound finance.[14] Thus, the gold standard system met the trilemma by opting for fixed exchange rates and capital mobility, sometimes at the expense of domestic macroeconomic health. Between 1891 and 1897, for example, the United States Treasury put the country through a harsh deflation in the face of persistent speculation on the dollar's departure from gold. These policies were hotly debated; the Populist movement agitated forcefully against gold, but lost.

The balance of political power began to change only with the First World War, which brought a sea-change in the social contract underlying the industrial democracies. Organized labor emerged as a political power, a counterweight to the interests of capital. Although Britain's return to gold in 1925 led the way to a restored international gold standard and a limited resurgence of international finance, the system helped propagate a worldwide depression after the 1929 New York stock market crash. Following (and in some cases anticipating) Britain's example, many countries abandoned the gold standard in the early 1930s and depreciated their currencies; many also resorted to trade and capital controls in order to manage independently their exchange rates and domestic policies. Those countries in the "gold bloc," which stubbornly clung to gold through the mid-1930s, showed the steepest output and price-level declines. But eventually, in the 1930s, all countries jettisoned rigid exchange-rate targets and/or open capital markets in favor of domestic macroeconomic goals.[15]

These decisions reflected the shift in political power solidified by the First World War. They also signaled the beginnings of a new consensus on the role of economic policy that would endure through the inflationary 1970s. As an immediate consequence, however, the Great Depression discredited gold-standard orthodoxy and brought Keynesian ideas about macroeconomic management to the fore. It also made financial markets and financial practitioners unpopular. Their supposed excesses and attachment to gold became identified in the public mind as causes of the economic calamity. In the United States, the New Deal

[14] See Bordo and Schwartz (1984); Eichengreen (1996).

[15] See Temin (1989); Eichengreen (1992).

brought a Jacksonian hostility toward eastern (read: New York) high finance back to Washington. Financial products and markets were banned or more closely regulated, and the Federal Reserve was brought under heavier Treasury influence. Similar reactions occurred in other countries.

Changed attitudes toward financial activities and economic management underlay the new postwar economic order negotiated at Bretton Woods, New Hampshire, in July 1944. Forty-four allied countries set up a system based on fixed, but adjustable, exchange parities, in the belief that floating exchange rates would exhibit instability and damage international trade. At the center of the system was the International Monetary Fund (IMF). The IMF's prime function was as a source of hard-currency loans to governments that might otherwise have to put their economies into recession to maintain a fixed exchange rate. Countries experiencing permanent balance-of-payments problems had the option of realigning their currencies, subject to IMF approval.[16]

Importantly, the IMF's founders viewed its lending capability as primarily a substitute for, not a complement to, private capital inflows. Interwar experience had given the latter a reputation as unreliable at best and, at worst, a dangerous source of disturbances. Encompassing controls over private capital movement, perfected in wartime, were expected to continue. The IMF's Articles of Agreement explicitly empowered countries to impose new capital controls. Articles VIII and XIV of the IMF agreement did demand that countries' currencies eventually be made convertible—in effect, freely saleable to the issuing central bank, at the official exchange parity, for dollars or gold. But this privilege was to be extended only if the country's currency had been earned through current account transactions. Convertibility on capital account, as opposed to current-account convertibility, was not viewed as mandatory or desirable.

Unfortunately, a wide extent even of current-account convertibility took many years to achieve, and even then it was often restricted to nonresidents. In the interim, countries resorted to bilateral trade deals that required balanced or nearly balanced trade between every pair of trading partners. If France had an export surplus with Britain, and Britain a surplus with Germany, Britain could not use its excess marks to obtain dollars with which to pay France. Germany had very few dollars and guarded them jealously for critical imports from the Americas. Instead, each country would try to divert import demand toward countries with high demand for its goods, and to direct its exports toward countries whose goods were favored domestically.

[16]On the Bretton Woods system, see Bordo and Eichengreen (1993).

Convertibility gridlock in Europe and its dependencies was ended through a regional multilateral clearing scheme, the European Payments Union (EPU). The clearing scheme was set up in 1950 and some countries reached *de facto* convertibility by mid-decade. But it was not until December 27, 1958 that Europe officially embraced convertibility and ended the EPU.

Although most European countries still chose to retain extensive capital controls (Germany being the main exception), the return to convertibility, important as it was in promoting multilateral trade growth, also increased the opportunities for disguised capital movements. These might take the form, for example, of misinvoicing, or of accelerated or delayed merchandise payments. Buoyant growth encouraged some countries in further financial liberalization, although the U.S., worried about its gold losses, raised progressively higher barriers to capital outflow over the 1960s. Eventually, the Bretton Woods system's very successes hastened its collapse by resurrecting the trilemma.

Key countries in the system, notably the U.S. (fearful of slower growth) and Germany (fearful of higher inflation), proved unwilling to accept the domestic policy implications of maintaining fixed rates. Even the limited capital mobility of the early 1970s proved sufficient to allow furious speculative attacks on the major currencies, and after vain attempts to restore fixed dollar exchange rates, the industrial countries retreated to floating rates early in 1973. Although viewed at the time as a temporary emergency measure, the floating-dollar-rate regime is still with us a thirty years later.

Floating exchange rates have allowed the explosion in international financial markets experienced over the same three decades. Freed from one element of the trilemma—fixed exchange rates—countries have been able to open their capital markets while still retaining the flexibility to deploy monetary policy in pursuit of national objectives. No doubt the experience gained after the inflationary 1970s in anchoring monetary policy to avoid price instability has helped to promote ongoing financial integration. Perhaps for the first time in history, countries have learned how to keep inflation in check under fiat monies and floating exchange rates.

There are several potentially valid reasons, however, for countries to fix their exchange rates—for example, to keep a better lid on inflation or to counter exchange-rate instability due to financial-market shocks. However, few countries that have tried have succeeded for long; eventually, exchange-rate stability tends to come into conflict with other policy objectives, the capital markets catch on to the government's predicament, and a crisis adds enough economic pain to make the authorities give in. In recent years only a very few major countries have observed the discipline of fixed exchange rates for at least five years, and most of those were

rather special cases.[17] One puzzling case, Thailand, has dropped off the list—with a resounding crash. Even Hong Kong, which operates as a currency board supposedly subordinated to maintaining the Hong Kong-U.S. dollar peg, suffered repeated speculative attacks in the Asian crisis period. Another currency-board country, Argentina, has now held to its 1:1 dollar exchange rate since April 1991, a remarkable stint of more than ten years. To accomplish that feat, the country has relied on IMF credit and has suffered unemployment higher than many countries could tolerate. It has suffered especially acutely since Brazil moved to a float in January 1999—its politics and economy are both in crisis, and the government has switched from a pure dollar peg to a dollar-euro basket. The European Union members that maintained mutually fixed rates prior to January 1999 were aided by market confidence in their own planned solution to the trilemma, a near-term currency merger. For most larger countries, the trend toward greater financial openness has been accompanied—inevitably, we would argue—by a declining reliance on pegged exchange rates in favor of greater exchange-rate flexibility. Some countries have opted for a different solution, however, adopting extreme straitjackets for monetary policy in order to peg an exchange rate. If monetary policy is geared toward domestic considerations, capital mobility or the exchange-rate target must go. If, instead, fixed exchange rates and integration into the global capital market are the primary desiderata, monetary policy must be subjugated to those ends.

The details of this argument require a book-length discourse (Obstfeld and Taylor 2002), which allows a full survey of the empirical evidence and the historical record, but we can already pinpoint the key turning points (see Table 1). The Great Depression stands as the watershed here, in that it was caused by an ill-advised subordination of monetary policy to an exchange-rate constraint (the gold standard), which led to a chaotic time of troubles in which countries experimented, typically noncooperatively, with alternative modes of addressing the fundamental trilemma. Interwar experience, in turn, discredited the gold standard and led to a new and fairly universal policy consensus. The new consensus shaped the more cooperative postwar international economic order fashioned by Harry Dexter White and John Maynard Keynes, but implanted within that order the seeds of its own eventual destruction a quarter-century later. The global financial nexus that has evolved since rests on a solution to the basic open-economy trilemma quite different than that envisioned by Keynes or White—one that allows considerable freedom for capital movements, gives the major currency areas freedom to pursue internal goals, but largely leaves their mutual exchange rates as the equilibrating residual.

[17] See Obstfeld and Rogoff (1995).

Table 1: The Trilemma and Major Phases of Capital Mobility

	Resolution of trilemma – Countries choose to sacrifice:			
Era	Activist policies	Capital mobility	Fixed exchange rate	Notes
Gold standard	Most	Few	Few	Broad consensus.
Interwar (when off gold)	Few	Several	Most	Capital controls especially in Central Europe, Latin America.
Bretton Woods	Few	Most	Few	Broad consensus.
Float	Few	Few	Many	Some consensus; except currency boards, dollarization, etc.

1.5 Summary

As always, we have to consider the potential costs and benefits of international capital mobility for the national participants. Clearly, the ability to lend or borrow represents, trivially, a loosening of constraints relative to a perfectly closed economy. In this dimension, at least, open trade in financial markets offers unambiguous gains relative to a closed economy. Such trades permit insurance, the smoothing of shocks, and allow capital to seek out its highest rewards, implying the usual gains-from-trade results.

However, in other ways, international financial mobility raises concerns, particularly for policymakers attached to certain policy goals that may be inconsistent with the free flow of capital across international boundaries. In addition, the risks of financial and balance of payments crises—some of them self-fulfilling crises unrelated to "fundamentals"—may represent further obstacles to the adoption of free capital markets.

Although these are very much contemporary issues in world capital markets, the questions they raise can be traced back to the very founding of international financial markets in the Renaissance. Then too, advanced forms of financial asset trades developed very quickly, sometimes as a response to Church-imposed constraints such as usury proscriptions. Financial innovation was subject to suspicion from various quarters, both public and private. Thus, calls for the regulation and restriction of financial market activity have been with us since the earliest days.

Despite these fears, by the late nineteenth century a succession of technological breakthroughs, and a gradual institutional evolution, had positioned many nations in a newly forming international capital market. This network of nations embraced modern financial instruments and operated virtually free of controls on the part of governments. Under the gold standard monetary regime, this flourishing global market for capital reached at least a local peak in the decades just prior to World War One.

Subsequent history showed that this seemingly-linear path toward ever more technological progress and institutional sophistication in a liberal world order could indeed be upset. Two global wars and a depression led the world down an autarkic path. Conflicting policy goals and democratic tensions often put the interests of global capital at a low premium relative to other objectives. Activist governments appealed to capital controls to sidestep the discipline of external markets, and so free monetary policy for use as a tool of macroeconomic control.

These events demonstrate the power of the macroeconomic policy trilemma to account for many of the ups and downs in global capital market evolution in the twentieth century. In the next section, we match up these stylized facts with some of the quantitative and institutional record, so as to better document the course of events. It is a remarkable history without which today's economic, financial, political, and institutional landscape cannot be fully understood.

2 Evidence

In theory and practice, the extent of international capital mobility can have profound implications for the operation of individual and global economies. With respect to theory, the applicability of various classes of macroeconomic models rests on many assumptions, and not the least important of these are axioms linked to the closure of the model in the capital market. The predictions of a theory and its usefulness for policy debates can revolve critically on this part of the structure.

The importance of these issues for policy is not surprising at all: a moment's reflection on practical aspects of macroeconomic policy choice underscores the impact that capital mobility can have on the efficacy of various interventions: trivially, if capital is perfectly mobile, this dooms to failure any attempts to manipulate local asset prices to make them deviate from global prices, including the most critical macroeconomic asset price, the interest rate. Thus, the feasibility and relevance of key policy actions cannot be judged absent some informed position on the extent to which local economic conditions are in any way separable from global condi-

tions. This means an empirical measure of market integration is implicitly, though rarely explicitly, a necessary adjunct to any policy discussion. Although recent globalization trends have brought this issue to the fore, we show in this paper how the experience of longer-run macroeconomic history can clarify and inform these debates.

In attacking the problem of measuring market integration, economists have no universally recognized criterion to turn to. For example, imagine the simple expedient of examining price differentials: prices would be identical in two identical neighboring economies, being determined in each by the identical structures of tastes, technologies, and endowments; but if the two markets were physically separated by an infinitely high transaction-cost barrier one could hardly describe them as being integrated in a single market, as the equality of prices was merely a chance event. Or consider looking at the size of flows between two markets as a gauge of mobility; this is an equally flawed criterion, for suppose we now destroyed the barrier between the two economies just mentioned, and reduced transaction costs to zero; we would then truly have a single integrated market, but, since on either side of the barrier prices were identical in autarky, there would be no incentive for any good or factor to move after the barrier disappeared. Thus, convergence of prices and movements of goods are not unambiguous indicators of market integration. One could run through any number of other putative criteria for market integration, examining perhaps the levels or correlations of prices or quantities, and discover essentially the same kind of weakness: all such tests may be able to evaluate market integration, but only as a joint hypothesis test where some other maintained auxiliary assumptions are needed to make the test meaningful.

Given this impasse, an historical study such as the present paper is potentially valuable in two respects. First, we can use a very large array of data sources covering different aspects of international capital mobility over the last one hundred years or more. Without being wedded to a single criterion, we can attempt to make inferences about the path of global capital mobility with a battery of tests, using both quantity and price criteria of various kinds. As long as important caveats are kept in mind about each method, especially the auxiliary assumptions required for meaningful inference, we can essay a broad-based approach to the evidence. Should the different methods all lead to a similar conclusion we would be in a stronger position than if we simply relied on a single test.

Historical work offers a second benefit in that it provides a natural set of benchmarks for our understanding of today's situation. In addition to the many competing tests for capital mobility, we also face the problem that almost every test is usually a matter of degree, of interpreting a parameter or a measure of dispersion or some

other variable or coefficient. We face the typical empirical conundrums (how big is big? or how fast is fast?) in placing an absolute meaning on these measures. An historical perspective allows a more nuanced view, and places all such inferences in a relative context: when we say that a parameter for capital mobility is big, this is easier to interpret if we can say that by this we mean bigger than a decade or a century ago. The historical focus of this paper will be directed at addressing just such concerns.[18] We examine the broadest range of data over the last one-hundred-plus years to see what has happened to the degree of capital mobility in a cross section of countries.[19]

The empirical work begins by looking at quantity data, focusing on the extent of international capital movements over a century or more, using data on stocks of foreign capital.[20] The next empirical section focuses on price-based criteria for capital market integration, and looks at nominal interest arbitrage, real interest parity (RIP), and equity and bond returns.

2.1 Gross Stocks of Foreign Capital

In this section we examine the extant data on foreign capital stocks to get some sense of the evolution of the global market. We seek some measure of the size of foreign investment globally that is appropriately scaled and consistent over time.

Although the concept is simple, the measurement is not. Perhaps the simplest measure of the activity in the global capital market is obtained by looking at the total stock of overseas investment at a point in time. Suppose that the total asset stock in country or region i, owned by country or region j, at time t is A_{ijt}. Included in here is the domestically-owned capital stock A_{iit}. Of interest are two concepts: what assets of country j reside overseas? and what liabilities of country i are held overseas?

[18] But note that, again, auxiliary assumptions will be necessary, and the caveats will be considered along the way; for example, what if neighboring economies became exogenously more or less identical over time, but no more or less integrated in terms of transaction costs?

[19] Given the limitations of the data, we will frequently be restricted to looking at between a dozen and twenty countries for which long-run macroeconomic statistics are available, and this sample will be dominated by today's developed countries, including most of the OECD countries. However, we also have long data series for some developing countries such as Argentina, Brazil, and Mexico; and in some criteria, such as our opening look at the evolution of the stock of foreign investments, we can examine a much broader sample.

[20] Elsewhere we have examined flows of foreign capital, and more refined quantity criteria using the correlations of saving and investment in individual economies over the long run (Obstfeld and Taylor 1998; 2002).

A relatively easy hurdle to surmount concerns normalization of the data; foreign investment stocks are commonly measured at a point in time in current nominal terms, in most cases U.S. dollars. Obviously, both the growth of the national and international economies might be associated with an increase in such a nominal quantity, as would any long run inflation. These trends would have nothing to do with market integration *per se*. To overcome this problem, we elected to normalize foreign capital at each point in time by some measure of the size of the world economy, dividing through by a denominator in the form of a nominal size index.

A seemingly ideal denominator, given that the numerator is the stock of foreign-owned capital, would probably be the total stock of capital, whether financial or real. The problem with using financial capital measures is that they have greatly multiplied over the long run as financial development has expanded the number of balance sheets in the economy, thanks to the rise of nmerous financial intermediaries.[21] This trend, in principle, could happen at any point in time without any underlying change in the extent of foreign asset holdings. The problem with using real capital stocks is that data construction is fraught with difficulty.[22]

Given these problems we chose a simpler and more readily available measure of the size of an economy, namely the level of output Y measured in current prices in a common currency unit.[23] Over short horizons, unless the capital-output ratio were to move dramatically, the ratio of foreign capital to output should be adequate as a proxy measure of the penetration of foreign capital in any economy. Over the long run, difficulties might arise if the capital-output ratio has changed significantly over time—but we have little firm evidence to suggest that it has.[24] Thus, as a result

[21] See Goldsmith (1985).

[22] Only a few countries have reliable data from which to estimate capital stocks. Most of these estimates are accurate only at benchmark censuses, and in between census dates they rely on combinations of interpolation and estimation based on investment flow data and depreciation assumptions. Most of these estimates are calculated in real (constant price) rather than nominal (current price) terms, which makes them incommensurate with the nominally measured foreign capital data. At the end of the day, we would be unlikely to find more than a handful of countries for which this technique would be feasible for the entire twentieth century, and certainly nothing like global coverage would be possible even for recent years.

[23] For the GDP data we rely on Maddison's (1995) constant price 1990 U.S. dollar estimates of output for the period from 1820. These figures are then "reflated" using a U.S. price deflator to obtain estimates of nominal U.S. dollar "World" GDP at each benchmark date. This approach is crude, since, in particular, it relies on a PPP assumption. Ideally we would want historical series on nominal GDP and exchange rates, to estimate a common (U.S.dollar) GDP figure at various historical dates.

[24] But for exactly the reasons just mentioned, since we have no capital stock data for many countries, it is hard to form a sample of capital-output ratios to see how these differ across time and

of these long-run data constraints, our analysis focuses on capital-to-GDP ratios of the form

$$\text{Foreign Assets-to-GDP Ratio}_{it} = \sum_{j \neq i} A_{jit}/Y_{it}; \quad (1)$$

$$\text{Foreign Liabilities-to-GDP Ratio}_{it} = \sum_{j \neq i} A_{ijt}/Y_{it}. \quad (2)$$

However, even with the concept established, measurement is still problematic in the case of the numerator. It is in fact very difficult to discover the extent of foreign capital in an economy using both contemporary and historical data. For example, the IMF has always reported balance-of-payments flow transactions in its *International Financial Statistics*. It is straightforward for most of the recent postwar period to discover the annual *flows* of equity, debt, or other forms of capital account transactions from these accounts. Conversely, it was only in 1997 that the IMF began reporting the corresponding *stock* data, namely, the international investment position of each country. This data are also more sparse, beginning in 1980 for less than a dozen countries, and expanding to about 30 countries by the mid-1990s.

The paucity of data is understandable, since the collection burden for these data is much more significant: knowing the size of a bond issue in a single year reveals the flow transaction size; knowing the implications for future stocks requires, for example, tracking each debt and equity item, and its fluctuating market value over time, and maintaining an aggregate of these data. The stock data are not simply a temporal aggregate of flows: the stock value depends on past flows, capital gains and losses, any retirements of principal or buybacks of equity, and a host of other factors. Not surprisingly accurate data of this type are hard to assemble.[25] Just as the IMF has had difficulty doing so, so too have economic historians. Looking back over the nineteenth and twentieth centuries an exhaustive search across many different sources yields only a handful of benchmark years in which estimates have been made, an effort that draws on the work of dozens of scholars in official institutions and numerous other individual efforts.[26]

space. The conventional wisdom, is that the capital-output ranges from 3 to 4 for most countries, although perhaps lower in capital-scarce developing countries.

[25] An important new source, however, is Lane and Milesi-Ferretti (2001). See below.

[26] See, for example, Paish (1914), Lewis (1938), Woodruff (1967), and Twomey (2000). Twomey, following Feinstein (1990), favors the estimates of Paish et al., versus the downward revisions to pre-1914 British overseas investment proposed by Platt (1986).

It is based on these efforts that we can put together a fragmentary, but still potentially illuminating, historical description in Table 2 and Figure 2. Displayed here are nominal foreign investment and output data for major countries and regions, grouped according to assets and liabilities. Many cells are empty because data are unavailable, but where possible summary data have been derived to illustrate the ratio of foreign capital to output, and the share of various countries in foreign investment activity.

What do the data show? On the asset side it is immediately apparent that for all of the nineteenth century, and until the interwar period, the British were rightly termed the "bankers to the world"; at its peak, the British share of total global foreign investment was almost 80 percent. This is far above the recent U.S. share of global foreign assets, a mere 22 percent in 1995, and still higher than the maximum U.S. share of 50 percent circa 1960. The only rivals to the British in the early nineteenth century were the Dutch, who according to these figures held perhaps 30 percent of global assets in 1825. This comes as no surprise given what we know of Amsterdam's early preeminence as the first global financial center before London's rise to dominance in the eighteenth and nineteenth centuries. By the late nineteenth century both Paris and Berlin had also emerged as major financial centers, and, as their own economies grew and industrialized, French and German holdings of foreign capital rose significantly, each eclipsing the Dutch position.

In this era the United States was a debtor rather than a creditor nation, and was only starting to emerge as a major lender and foreign asset holder after 1900. European borrowing from the United States in World War One then suddenly made the United States a big creditor. This came at a time when she was ready, if not altogether willing, to assume the mantle of "banker to the world," following Britain's abdication of this position under the burden of war and recovery in the 1910s and 1920s.[27] But the dislocations of the interwar years were to postpone the United States' rise as a foreign creditor, and New York's pivotal role as a financial center. After 1945, however, the United States decisively surpassed Britain as the major international asset holder, a position that has never been challenged.[28]

How big were nineteenth century holdings of foreign assets? In 1870 we

[27]This Anglo-American transfer of hegemonic power is discussed by Kindleberger (1986) and by Bordo, Edelstein, and Rockoff (1999). Gallarotti (1995) challenges the view that Britain acted as a monetary hegemon up to 1914.

[28]Of course, this is the gross foreign investment position, not the net position. The United States is also now the world's number one debtor nation, in both gross and net terms, having become a net debtor for the first time since the First World War in the late 1980s.

Table 2: Foreign Capital Stocks

	1825	1855	1870	1900	1914	1930	1938	1945
Assets								
United Kingdom	0.5a	0.7a	4.9a	12.1a	19.5a	18.2a	22.9c	14.2a
France	0.1a	—	2.5a	5.2a	8.6a	3.5a	3.9c	—
Germany	—	—	—	4.8a	6.7a	1.1a	0.7c	—
Netherlands	0.3a	0.2a	0.3a	1.1a	1.2a	2.3a	4.8c	3.7a
United States	0.0a	0.0a	0.0a	0.5a	2.5a	14.7a	11.5c	15.3a
Canada	—	—	—	0.1a	0.2a	1.3a	1.9c	—
Japan	—	—	—	—	—	—	1.2c	—
Other Europe	—	—	—	—	—	—	4.6c	—
Other	—	—	—	—	—	—	6.0c	2.0a
All	0.9a	0.9a	7.7a	23.8a	38.7a	41.1a	52.8c	35.2a
World GDP	—	—	111b	128b	221b	491b	491b	722b
Sample GDP	—	—	—	43f	76f	149f	182f	273f
Sample size	—	—	—	7f	7f	7f	7f	7f
Assets/Sample GDP	—	—	—	0.55	0.51	0.28	0.26	0.12
Assets/World GDP	—	—	0.07	0.19	0.18	0.08	0.11	0.05
UK/All	0.56	0.78	0.64	0.51	0.50	0.44	0.43	0.40
US/All	0.00	0.00	0.00	0.02	0.06	0.36	0.22	0.43
Liabilities								
Europe	—	—	—	5.4a	12.0a	—	10.3a	—
North America	—	—	—	2.6a	11.1a	—	13.7a	—
Australia & N.Z.	—	—	—	1.6a	2.0a	—	4.5a	—
Japan	—	—	—	0.1a	1.0a	—	0.6a	—
Latin America	—	—	—	2.9g	8.9g	—	11.3g	—
Asia (excl. Japan)	—	—	—	2.4g	6.8g	—	10.6g	—
Africa	—	—	—	3.0g	4.1g	—	4.0g	—
Developing Countries	—	—	—	6.0g	13.0g	—	25.9g	—
All	—	—	—	18.0a	45.5a	—	55.0a	—
World GDP	—	—	111b	128b	221b	491b	491b	722b
Sample GDP	—	—	—	—	—	—	—	—
Sample size	—	—	—	—	—	—	—	—
Liabilities/Sample GDP	—	—	—	—	—	—	—	—
Liabilities/World GDP	—	—	—	0.14	0.21	—	0.11	—
Developing Countries/All	—	—	—	0.33	0.29	—	0.47	—

Table 2. (Continued)

	1960	1971	1980	1985	1990
Assets					
United Kingdom	26.4a	—	551d	857d	1,760d
France	—	—	268d	428d	736d
Germany	1.2a	—	257d	342d	1,100d
Netherlands	27.6a	—	99d	178d	418d
United States	63.6a	—	775d	1,300d	2,180d
Canada	—	—	92d	129d	227d
Japan	—	—	160d	437d	1,860d
Other Europe	—	—	503d	715d	1,777d
Other	5.9a	—	94d	123d	214d
All	124.7a	—	2,800d	4,508d	10,272d
World GDP	1,942b	4,733b	11,118e	12,455e	21,141e
Sample GDP	671f	—	7,806d	9,705d	17,250d
Sample size	7f	—	25d	25d	25d
Assets/Sample GDP	0.18	—	0.36	0.46	0.60
Assets/World GDP	0.06	—	0.25	0.36	0.49
UK/All	0.21	—	0.20	0.19	0.17
US/All	0.51	—	0.28	0.29	0.21
Liabilities					
Europe	7.6a	—	1,457d	2,248d	5,406d
North America	12.5a	—	684d	1,412d	2,830d
Australia & N.Z.	2.2a	—	71d	118d	216d
Japan	0.3a	—	147d	307d	1,530d
Latin America	9.2a	57g	250g	—	505g
Asia (excl. Japan)	2.7a	29g	129g	—	524g
Africa	2.2a	19g	124g	—	306g
Developing Countries	14.1a	107g	506g	—	1,338g
All	39.9a	—	3,368dg	—	12,655dg
World GDP	1,942b	4,733b	11,118e	12,455e	21,141e
Sample GDP	—	—	9,508d	—	19,294d
Sample size	—	—	65dg	—	65dg
Liabilities/Sample GDP	—	—	0.35	—	0.66
Liabilities/World GDP	0.02	—	0.30	—	0.60
Developing Countries/All	0.35	—	0.15	—	0.11

Notes and Sources:

Units for foreign investment and GDP are billions of current U.S. dollars.

a = from Woodruff(1967, 150–159).

b = from Maddison (1995); sample of 199 countries; 1990 US dollars converted to current dollars using US GDP deflator; some interpolation.

c = from Lewis (1945, 292–97).

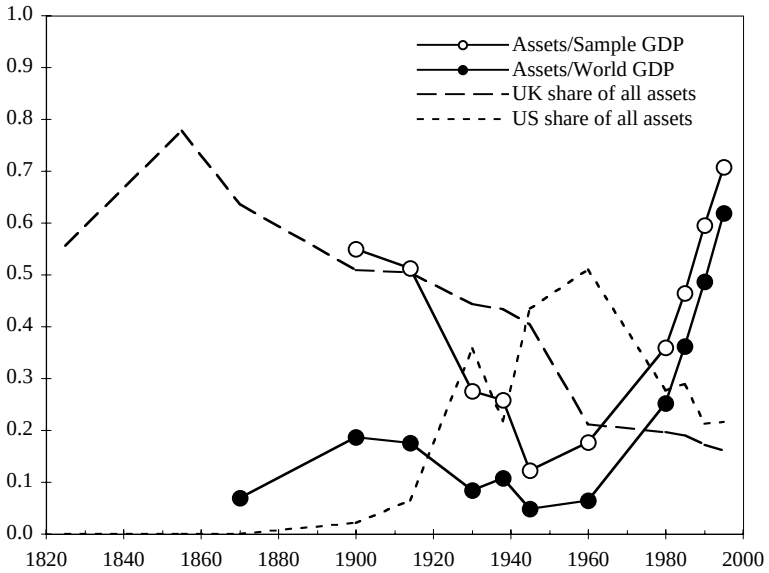
d = from IFS (9/97). Up to 26 countries, fixed sample, trend interpolation on missing d

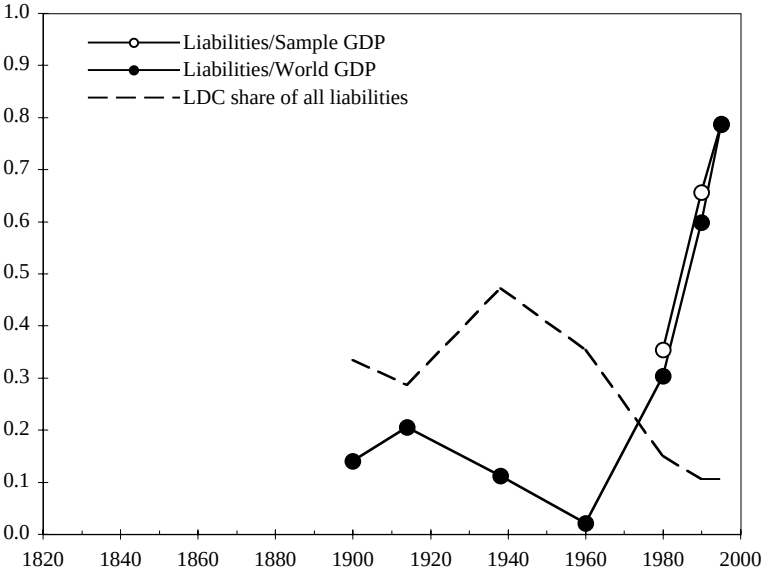
e = from World Bank (1994).

f = excludes "Other Europe" and "Other"; GDP data from appendix.

g = from Twomey (1998; unpublished worksheets).

Figure 2: Foreign Capital Stocks





Source: Table 2.

estimate that foreign assets were just 7 percent of World GDP; but this figure rose quickly, to just under 20 percent in the years 1900–14 at the zenith of the classical gold standard. During the interwar period, the collapse was swift, and foreign assets were only 8 percent of world output by 1930, 11 percent in 1938, and just 5 percent in 1945. Since this low point, the ratio has climbed, to 6 percent in 1960, 25 percent in 1980, and then climbing dramatically to 62 percent in 1995. Thus, the 1900–14 ratio of foreign investment to output in the world economy was not equaled again until 1980, but has now been approximately doubled.

An alternative measure recognizes the incompleteness of the data sources: for many countries we have no information on foreign investments at all, so a zero has been placed in the numerator, although that country's output has been included in the denominator as part of the World GDP estimate. This is an unfortunate aspect of our estimation procedure, and makes the above ratio a likely an underestimate, or lower bound, for the true ratio of foreign assets to output. One way to correct this is to only include in the denominator the countries for which we actually have data on foreign investment in the numerator.[29] This procedure yields an estimate we term the ratio of foreign assets to sample GDP. This is likely an overestimate, or upper bound, for the true ratio, largely because in historical data, if not in contemporary sources, attention in the collection of foreign investment data has usually focused on the principal players, that is, the countries which have significant foreign asset holdings.[30]

Given all these concerns, does the ratio to sample GDP evolve in a very different way? No. The two ratios are very close after 1980. But before 1945 they are quite far apart: from 1870 to 1914, the sample of seven countries has a foreign asset to GDP ratio of over 50 percent, far above the "world" figure of 7 to 20 percent. Clearly, these seven major creditors were exceptionally internationally diversified in the late nineteenth century in a way that no group of countries is today. By this reckoning, in countries like today's United States, we still have yet to see a return to the extremely high degree of international portfolio diversification seen

[29]That sample of countries is much less than the entire world, as we have noted. Until 1960, it includes only the seven major creditor countries noted in Table 2; after 1980, we rely on the IMF sample from which we can identify up to 30 countries with foreign investment and GDP data.

[30]That is, we are probably restricted in these samples to countries with individually high ratios of foreign assets to GDP. For example, in the rest of Europe circa 1914, we would be unlikely to find countries with portfolios as diversified internationally as the British, French, Germans, and Dutch. If we included those other countries it would probably bring our estimated ratio down. However, in the 1980s and 1990s IMF data the problem is much less severe since we observe many more countries, and both large and small asset holders.

in, say, Britain in the 1900–14 period, an historical finding that places in historical perspective the ongoing international diversification puzzle.[31]

Is the picture similar for liabilities as well as assets? Essentially, yes. The data are much more fragmentary here, with none in the nineteenth century, when the information for the key creditor nations was simpler to collect than data for a multitude of debtors, perhaps. Even so, we have some estimates running from 1900 to the present at a few key dates. The ratio of liabilities to world GDP follows a path very much like that of the asset ratio, which is reassuring: they are each approximations built from different data sources at certain time points, though, in principle, they should be equal. Again, the ratio reaches a local maximum in 1914 of 21 percent, collapsing in the interwar period to 11 percent in 1938, and just 2 percent in 1960. By 1980 it had exceeded the 1914 level and stood at 30 percent. By 1995, the ratio was 79 percent.

To summarize, data on gross international asset positions seem broadly consistent with the idea of a ∪-shape in the evolution of international capital mobility since the late nineteenth century, though it is less clear how we should compare the degree of diversification attained by some countries then with today's apparently significant, albeit declining, home bias in foreign asset holdings. Figuring whether too much or too little diversification existed at any point must remain conjectural, and conclusions would hinge on a calibrated and estimated portfolio model applied historically. This is certainly an object for future research. However, unless the global economy has dramatically changed in terms of the risk-return profile of assets and their global distribution, we have no prior reason to expect the efficient degree of diversification to have changed. For the present we can just say that, unless a massive such change did occur in the 1914–45 period, *and unless it was then promptly reversed in the 1945–90 period*, we cannot explain the time path of foreign capital stocks seen in Table 2 and Figures 2 and 9 except as a result of a dramatic decline in capital mobility in the interwar period, and a very slow recovery of capital mobility thereafter.

There is another important dimension of international asset stock data that we have not yet discussed: the evolution of *net* stocks, that is, the behavior of longer-term *development* flows, as distinct from *diversification* flows. The literature on the Feldstein-Horioka (1980) paradox alerts us to the possibility that gross flows are orders of magnitude above net flows. We postpone discussion of that issue until later.

[31] On the international diversification puzzle see K. Lewis (1996).

2.2 Real Interest Rate Equalization

A fundamental property of fully integrated international capital markets is that investors are indifferent on the margin between any two activities to which they allocate capital, regardless of national location. International real interest rate equality would hold in the long run in a world where capital moves freely across borders and technological diffusion tends to drive a convergence process for national production possibilities.[32]

2.2.1 Stationarity of Long-Term Real Interest Differentials

We first examine the basic features of long-term real interest rate data. Our source is Global Financial Data. For a nominal interest rate i_t we use the monthly series on long-term government bond yields, which apply to bonds of maturities of seven years or longer. For inflation $\pi_t = (P_{t+12} - P_t)/P_t$ we use the *ex post* 12-month forward rate of change of the consumer price index. The *ex post* real interest rate is then calculated as $r_t = i_t - \pi_t$, and for now we make the standard assumption that this is equal to the *ex ante* real rate plus a white-noise stationary forecast error. We focus on real long-term bond yields because these are most directly related to financing costs for capital investments, and, hence, to the expected marginal yield on investment. It is the latter variable we would like to be able to measure directly in order to evaluate the international mobility of capital.[33]

We consider seven countries in our sample, relative to the United States as a base country. They are Britain, the Netherlands, France, Germany, Italy, Japan, and Canada. We should note that the series are as consistent as they can be given the changing types of bonds issued by the various countries over the last century, although maturities do change at several points for some countries. There are a few exceptions, such as the British consol which has a continuous time series.

[32] We focus on *long-term* real interest rates here because these rates are most closely linked to the cost of long-lived capital, because the slow mean reversion in real exchange rates makes it difficult to discern expected exchange rate changes in short-term data, and because risk premia can be reduced over long horizons if long-run purchasing power parity holds. We focus on long-term real rather than nominal interest rate parity in the belief that with mean reverting real exchange rates, it is easier to proxy long-run expected real exchange rates than the corresponding nominal exchange rates.

[33] These proprietary data are available online at <http://www.globalfindata.com>. Terms of use allow that a copy of the data we used can be supplied upon request for replication purposes only. For recent data, there is substantial evidence that international real interest rate differentials on short-term bonds are I(0); see, for example, Meese and Rogoff (1988) and Edison and Melick (1999).

Figure 3: Long-Term Real Interest Differentials

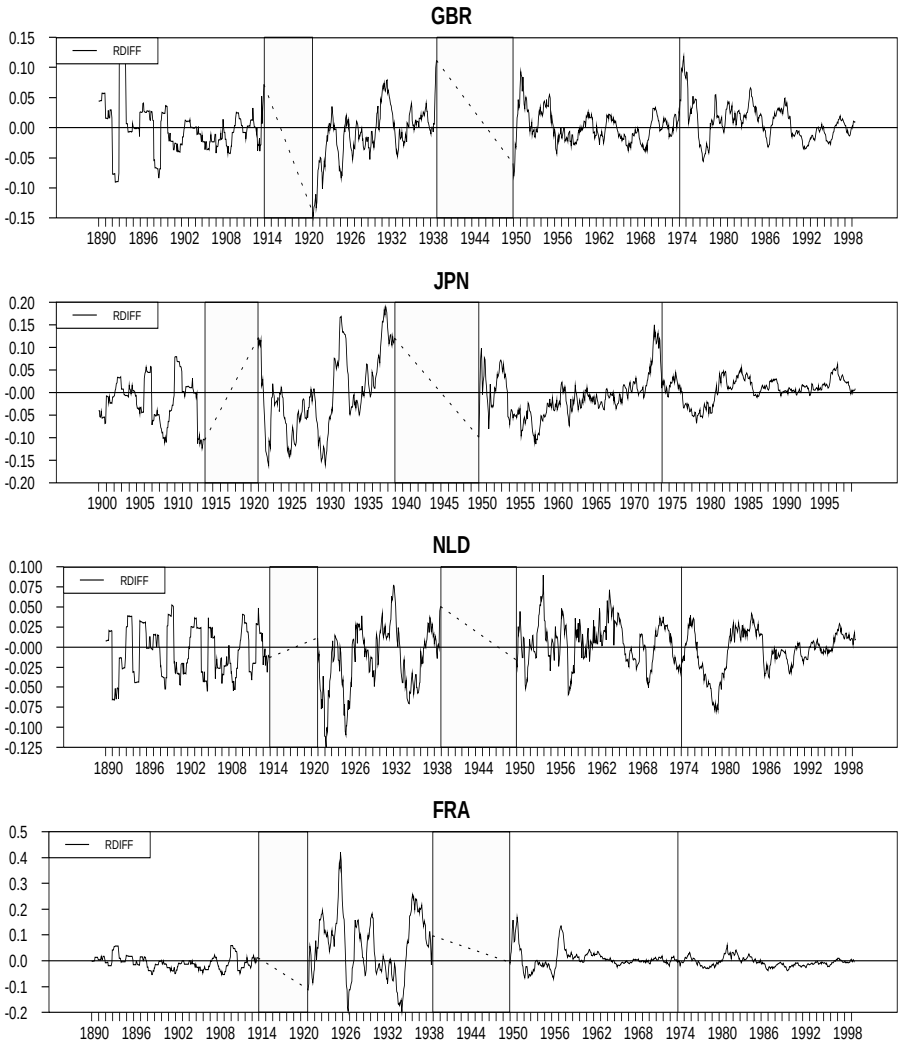
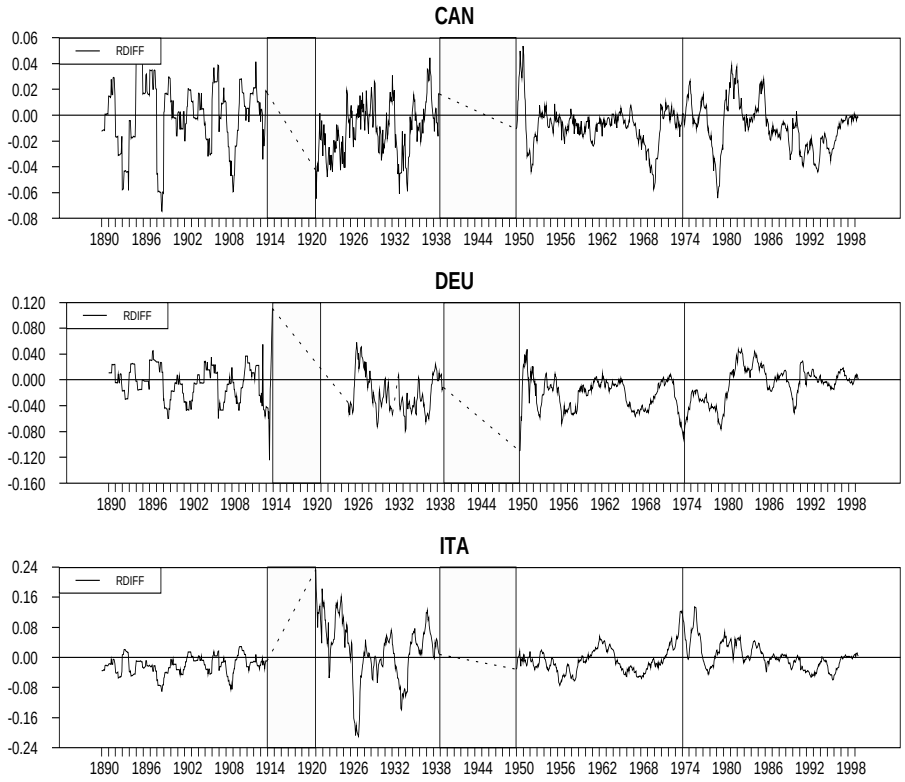


Figure 3: Long-Term Real Interest Differentials (continued)



Notes: See text. The real interest rate differential is calculated relative to the U.S. as $\tilde{r}_t = r_t - r_{\mathrm{US},t}$.

We also note that prior to 1914 most countries have only annual price indices meaning that our derived inflation series will also consist of annual observations, the exceptions being the United States and Britain. For the other countries, we construct monthly series of *ex post* real interest rates by matching monthly nominal interest rates within a year t with the realized inflation rate between years $t+1$ and t. Of course, in measuring long-term real interest rates, we would like to proxy long-term inflation expectations but that cannot be done reliably. Thus we follow earlier empirical studies in utilizing a relatively short-horizon inflation measure notwithstanding the longer term of the corresponding nominal interest rates.

The real interest rate differential for each of our seven countries is shown in Figures 3. This differential is calculated as $\tilde{r}_t = r_t - r_{\mathrm{US},t}$. This is the first time real interest rates over more than a century have been analyzed for this set of countries at such high frequency, so it is of interest to start by evaluating some general features of the data. The most striking impression conveyed by the figure is that differentials have varied widely over time, but have stayed relatively close to a zero mean. That is, the series appear to have been stationary over the very long run, and even in shorter subperiods.

The figures also reveal some of the changing coherence of real interest rates in the subperiods. To avoid noisy data from nonmarket periods, the wartime samples have been omitted and are shown by shaded bands. A bar in 1974 denotes the changeover from the predominantly fixed exchange rate Bretton Woods regime to the recent regime of mostly floating exchange rates. We thus focus on four different subperiods that correspond to four different monetary regimes: the gold standard (1890–1914), the interwar period (1921–38), Bretton Woods and the brief transitional period prior to generalized floating (1950–73), and the float (1974–2000).[34]

Allowing for the annual inflation data used before 1914, we can see that real interest differentials became somewhat more volatile in the interwar period, with a larger variance. There is a decline in this volatility after 1950, and perhaps very little change between the pre-1974 period and the float. The latter observation may seem surprising, except that it is consistent with observations that, aside from nominal and real exchange rate volatility, there is little difference in the behavior of macro fundamentals between fixed and floating rate regimes, at least for developed countries (for example, Baxter and Stockman 1989).

[34] For the purpose of the present empirical analysis we begin our floating rate period in early 1974 to be consistent with other empirical literature on the real interest rate-real exchange rate nexus. However, most historians would place the end of the Bretton Woods system in August 1971, the month the U.S. official gold window was shut.

Table 3: Stationarity Tests: Long-Term Real Interest Differentials

	Historical Epochs				*Recent Float*		
		ADF	DFGLSu			ADF	DFGLSu
GBR	1890:1 2000:7	-4.30 ***	-5.54 ***	GBR	1974:2 2000:8	-2.42	-3.75 ***
NLD	1890:1 2000:7	-4.92 ***	-5.76 ***	NLD	1974:2 2000:8	-2.75 *	-2.57 *
FRA	1890:1 2000:7	-6.05 ***	-6.36 ***	FRA	1974:2 2000:8	-2.70 *	-2.52 *
DEU	1890:1 2000:7	-4.64 ***	-5.14 ***	DEU	1974:2 2000:8	-2.82 *	-2.73 *
ITA	1890:1 2000:7	-5.15 ***	-5.90 ***	ITA	1974:2 2000:8	-2.52	-2.87 **
JPN	1890:1 2000:7	-4.47 ***	-5.11 ***	JPN	1974:2 2000:8	-2.20	-2.52 *
CAN	1890:1 2000:7	-5.57 ***	-6.78 ***	CAN	1974:2 2000:8	-3.71 ***	-3.15 **
GBR	1890:1 1913:12	-1.38	-3.44 ***	GBR	1974:2 1986:3	-2.61 *	-2.82 **
NLD	1890:1 1913:12	-3.14 **	-4.04 ***	NLD	1974:2 1986:3	-1.28	-1.19
FRA	1890:1 1913:12	-3.18 **	-4.36 ***	FRA	1974:2 1986:3	-2.21	-1.77
DEU	1890:1 1913:12	-3.86 ***	-3.70 ***	DEU	1974:2 1986:3	-1.77	-1.64
ITA	1890:1 1913:12	-3.58 ***	-3.62 ***	ITA	1974:2 1986:3	-2.56	-2.89 **
JPN	1890:1 1913:12	-2.24	-2.16	JPN	1974:2 1986:3	-1.50	-1.72
CAN	1890:1 1913:12	-3.99 ***	-4.86 ***	CAN	1974:2 1986:3	-1.92	-1.93
GBR	1921:1 1938:12	-3.59 ***	-4.01 ***	GBR	1986:4 2000:7	-2.01	-2.62 *
NLD	1921:1 1938:12	-2.88 **	-2.83 **	NLD	1986:4 2000:7	-2.61 *	-2.37
FRA	1921:1 1938:12	-2.39	-4.31 ***	FRA	1986:4 2000:7	-2.25	-2.50 *
DEU	1921:1 1938:12	-2.42	-2.84 **	DEU	1986:4 2000:7	-3.34 **	-2.83 **
ITA	1921:1 1938:12	-3.36 **	-2.87 **	ITA	1986:4 2000:7	-2.54	-2.55 *
JPN	1921:1 1938:12	-2.19	-2.85 **	JPN	1986:4 2000:7	-2.43	-2.55 *
CAN	1921:1 1938:12	-2.23	-3.71 ***	CAN	1986:4 2000:7	-0.86	-2.28
GBR	1951:1 1973:2	-5.09 ***	-5.37 ***				
NLD	1951:1 1973:2	-3.98 ***	-2.94 **				
FRA	1951:1 1973:2	-3.81 ***	-3.34 ***				
DEU	1951:1 1973:2	-3.32 **	-3.51 ***				
ITA	1951:1 1973:2	-1.23	-2.24				
JPN	1951:1 1973:2	-0.53	-2.40				
CAN	1951:1 1973:2	-4.60 ***	-3.59 ***				

Notes: See text. ADF is the Augmented Dickey Fuller *t*-statistic. DFGLSu is the test of Elliott (1999). *** denotes significance at the 1 percent level; ** at the 5 percent level; * at the 10 percent level. The critical values are, respectively, $(-3.43, -2.86, -2.57)$ for the ADF test, and $(-3.28, -2.73, -2.46)$ for the DFGLSu test. Lag selection was via the LM criterion with a maximum of 12 lags.

With no real interest rate divergence apparent, these figures provide *prima facie* evidence that real interest rates in developed countries have been cointegrated over time, where the differentials between countries appear stationary. A formal test of this hypothesis appears in Table 3, where we apply two stationarity tests to the data for the period as a whole, as well as in various subperiods. The first test is the traditional augmented Dickey-Fuller (ADF) unit root test, and the second is the DF-GLSu test, one of a family of enhanced point-optimal and asymptotically efficient unit root tests recently proposed.[35]

Where the null is rejected at the 1 percent level, the results show conclusively that the real interest differential has no unit root over the long run. Changes in

[35]See Elliott, Rothenberg, and Stock (1996) and Elliott (1999). We use the DF-GLSu test from the latter, which allows for the initial observation to be drawn from the unconditional mean of the series. The RATS code for this procedure is available online at <http://www.estima.com>.

the variances of series over time, of the kind evident in the preceding figures, may distort unit root tests (Hamori and Tokihisa 1997). In the four major subperiods, however, the hypothesis of a unit root can also be rejected in all but three cases at least at the 10 percent level. In fact it is usually rejected at the 1 percent level in all periods except the recent float, the exceptions being interwar Japan, and Italy and Japan during Bretton Woods. With respect to the recent float, the evidence against a unit root is stronger over the second subperiod (1986–2000) than over the first (1974–1986). The above findings refer to the more powerful DFGLSu test, which rejects the null more frequently than the standard ADF test.

This indication of a stationary long-term real interest differential, especially insofar as it applies to the recent period of floating industrial-country exchange rates, contradicts much of the empirical literature produced through the mid-1990s. Why do we find evidence of stationarity where others, such as Meese and Rogoff (1988) and Edison and Pauls (1993), could not reject a unit root in recent data? We note that previous authors only focused attention on the recent float, had shorter samples, and used tests of low power such as the ADF test.

Indeed, our data and methods are consistent with earlier findings: if we switch to the Meese-Rogoff sample of February 1974 to March 1986, and use the ADF test as they did, and insist on a 5 percent significance level for rejection of the null, then we replicate their conclusions exactly (as shown in the penultimate panel of the table). Even if we switch to the DFGLSu test on the same data, we can reject the null in only 2 out of 7 cases. The results for the post-1986 sample show similar problems, even though for the post-1974 period as a whole we can reject the null.[36]

Our finding of stationarity in recent long-term real interest differentials is consistent with another strand in the literature that does find support for international real interest rate equalization at longer horizons (Fujii and Chinn 2000). We conclude that earlier analyses of recent data were hampered by the low power of unit root tests on samples of small span.

2.2.2 Real Interest Parity

A main reason why real interest rates are not equal across borders in the short or medium term is that investors expect changes in real exchange rates, that is, there seem to be expected deviations from purchasing power parity. Thus a natural, and

[36]Edison and Melick (1999, p. 97) find mixed results on the stationarity of Canadian, German, and Japanese long-term real interest differentials against the U.S., but nonetheless base their econometric analysis of real interest parity on the assumption that all real interest differentials are stationary.

more stringent test, of international financial integration asks whether expected international real interest differences are offset by expected real exchange rate changes. Let q_t be the date-t (log) real exchange rate between the home and foreign currencies, defined so that a rise in q_t is a relative real *appreciation* of the home currency, and let $\mathrm{E}_t\{q_{t+1}\}$ be the expectation of next period's real exchage rate. We write the real interest parity condition as:

$$\tilde{r}_t = -\left(\mathrm{E}_t\{q_{t+1}\} - q_t\right). \tag{3}$$

The maintained hypotheses underlying the last equation are the same stringent ones that underly the uncovered (or naked) nominal interest parity condition, though for reasons noted above, a version of eq. (3) based on long-term interest rates might be thought to have a better chance against the data than does uncovered nominal interest parity.

In a standard sticky-price model allowing for the equilibrium or "permanent" level of the log real exchange rate $\bar{q}_t$ to follow a random walk, as in Meese and Rogoff (1988), we can write

$$\tilde{r}_t = \lambda(q_t - \bar{q}_t), \tag{4}$$

$$(q_t - \bar{q}_t) = \lambda^{-1}\tilde{r}_t, \tag{5}$$

where $\tilde{r}_t$ is the real interest rate differential, q_t is the log real exchange rate, and λ is the speed of adjustment of the real exchange rate toward equilibrium. Testing of these equations is the focus of much of the recent literature on real interest parity and the real exchange rate (RIP-RER).[37] However, empirical testing of the relationship above, ever since Meese and Rogoff (1988), has generally not been very supportive.[38]

[37] While, a relationship of this type is fundamental to sticky-price exchange rate models, flexible-price models driven by technology shocks can exhibit qualitatively similar correlations under specific assumptions.

[38] More general tests for the short-term equalization predicted by eq. (3) have not generally been supportive either. A recent exception is the long-run panel cointegration study by MacDonald and Nagayasu (2000) of 14 OECD countries relative to the United States. The statistical methodology of that work, however, assumes that long-term real interest differentials are nonstationary. Chortareas and Driver (2001) implement a similar approach using a 17-country panel of OECD countries versus the U.S.; their conclusions are similar to those of MacDonald and Nagayasu. Chortareas and Driver report mixed results for tests on the stationarity of long-term real interest differentials. One issue pervading all of the work in this area is the effect of alternative proxies for long-term inflation expectations. The proxies that are chosen often differ across authors, affecting some results. A systematic discussion of these differences lies beyond the scope of this paper.

We find stronger support for a version of the RIP-RER relationship that incorporates costs of international trade. A recent literature finds evidence of nonlinear dynamics in the real exchange rate: our earlier work has drawn attention to this possibility (Obstfeld and Taylor 1997), and many others have found similar results (O'Connell and Wei 1997; Michael, Nobay, and Peel 1997; Peel, Sarno, and Taylor 2001). If such nonlinearities are present then a recent insight by Nakagawa (2000) shows that tests of the RIP-RER hypothesis must be duly modified.

To take a simple example, suppose that the dynamics of the real exchange rate take the form of a three-regime threshold autoregressive (TAR) process,

$$q_t - \bar{q}_t = \begin{cases} c + \rho(q_{t-1} - c - \bar{q}_{t-1}) + e_t & \text{if } q_{t-1} > c + \bar{q}_{t-1}; \\ q_{t-1} - \bar{q}_{t-1} + e_t & \text{if } |q_{t-1} - \bar{q}_{t-1}| \leq c; \\ c + \rho(q_{t-1} + c - \bar{q}_{t-1}) + e_t & \text{if } -c + \bar{q}_{t-1} > q_{t-1}. \end{cases} \tag{6}$$

In the case $\bar{q} = 0$ there is no trend to the exchange rate process. There is a band of width $2c$ within which the exchange rate follows a random walk, and outside that band there is reversion to the band edge at speed $\lambda = 1 - \rho$. Alternatively, the process may have some deterministic trend, such as the linear trend $\bar{q}_t = a + bt$, under which the band's position shifts over time. Below, we carry out our tests on raw as well as linearly detreneded real exchange rate data, although as we shall see, econometric analysis of the latter relies on rather more assumptions.

Under the preceding dynamics, the expected change in the exchange rate is no longer a function of the deviation of the current exchange rate q from the band center $\bar{q}$. Instead, it is a function of the deviation from the band edge, and, under a purely deterministic process we would replace equations (4) and (5) with appropriately modified RIP equations

$$\tilde{r}_t = \lambda \tilde{q}_t, \tag{7}$$

$$\tilde{q}_t = \lambda^{-1} \tilde{r}_t, \tag{8}$$

where

$$\tilde{q}_t = \begin{cases} q_t - c - \bar{q}_t & \text{if } q_t > c + \bar{q}_t; \\ 0 & \text{if } |q_t - \bar{q}_t| \leq c; \\ q_t + c - \bar{q}_t & \text{if } -c + \bar{q}_t > q_t. \end{cases} \tag{9}$$

Here $\bar{q}_t$ represents the equilibrium level or trend in the real exchange rate, so that the removal of a known mean or trend in the data is assumed at this point. These equations show that agents demand a real interest differential (leaving aside the predictable trend) if and only if the real exchange rate q wanders outside the "band of inaction." Within the band, today's q is the best forecast of next period's q, so

Table 4: Threshold Models and Specification Tests

		(a) Raw Data					*(b) Linear Detrend*				
		c	*LLR*	λ	*t*	*p*	*c*	*LLR*	λ	*t*	*p*
GBR	1890:1 1913:12	0.09	32.7	0.09	2.2	0.00	0.03	51.5	0.08	2.1	0.00
NLD	1890:1 1913:12	0.03	54.0	0.03	1.4	0.00	0.01	31.5	0.19	4.0	0.03
FRA	1890:1 1913:12	0.13	11.8	0.15	1.3	0.23	0.05	11.1	0.26	3.3	0.11
DEU	1890:1 1913:12	0.02	30.7	0.10	2.6	0.05	0.02	41.6	0.11	2.4	0.01
ITA	1890:1 1913:12	0.08	29.1	0.07	1.5	0.00	0.01	11.4	0.07	3.3	0.06
JPN	1890:1 1913:12	0.01	26.4	0.06	2.5	0.01	0.08	15.9	0.31	1.7	0.01
CAN	1890:1 1913:12	0.03	59.3	0.11	2.6	0.01	0.00	32.6	0.09	3.5	0.00
GBR	1921:1 1938:12	0.04	44.4	0.06	2.3	0.01	0.04	45.1	0.07	2.6	0.01
NLD	1921:1 1938:12	0.21	30.2	0.07	1.3	0.00	0.15	22.2	0.03	1.1	0.00
FRA	1921:1 1938:12	0.12	32.4	0.08	2.8	0.00	0.25	17.0	0.16	2.3	0.01
DEU	1921:1 1938:12	0.18	84.3	0.01	1.2	0.00	0.03	13.7	0.02	1.1	0.06
ITA	1921:1 1938:12	0.14	108.4	0.03	1.4	0.00	0.05	24.6	0.08	3.4	0.03
JPN	1921:1 1938:12	0.39	50.5	0.07	1.3	0.00	0.15	54.4	0.01	0.1	0.00
CAN	1921:1 1938:12	0.01	21.8	0.13	3.4	0.01	0.02	35.9	0.13	3.2	0.00
GBR	1951:1 1973:2	0.02	77.2	0.02	2.7	0.00	0.04	78.4	0.03	2.2	0.02
NLD	1951:1 1973:2	0.15	57.9	0.00	0.2	0.00	0.05	14.1	0.03	1.4	0.02
FRA	1951:1 1973:2	0.09	61.7	-0.01	0.4	0.00	0.06	61.7	-0.01	0.4	0.00
DEU	1951:1 1973:2	0.12	47.6	-0.04	1.2	0.85	0.03	68.8	0.01	1.8	0.00
ITA	1951:1 1973:2	0.23	288.3	0.22	1.7	0.00	0.18	288.3	0.22	1.7	0.01
JPN	1951:1 1973:2	0.28	57.2	0.00	0.1	0.26	0.10	50.1	0.02	1.4	0.36
CAN	1951:1 1973:2	0.12	4.9	0.21	1.3	0.55	0.05	10.6	0.11	3.4	0.10
GBR	1974:2 2000:8	0.25	25.2	0.08	0.9	0.00	0.11	26.4	0.06	1.5	0.01
NLD	1974:2 2000:8	0.35	4.6	0.05	0.9	0.64	0.27	10.3	0.15	1.6	0.09
FRA	1974:2 2000:8	0.19	16.5	0.10	2.0	0.02	0.27	10.9	0.25	2.2	0.19
DEU	1974:2 2000:8	0.30	10.2	0.12	1.6	0.09	0.17	10.4	0.06	1.6	0.11
ITA	1974:2 2000:8	0.19	17.5	0.07	1.3	0.00	0.21	18.5	0.15	1.7	0.01
JPN	1974:2 2000:8	0.19	10.8	0.03	2.0	0.06	0.21	19.2	0.08	1.7	0.03
CAN	1974:2 2000:8	0.18	5.7	0.21	2.2	0.56	0.04	18.3	0.03	1.6	0.01

Notes: See text.

no premium is required. Outside the band, reversion of q to the band edge implies that the real interest differential will only widen in proportion to the distance to the edge of the band, and not to its center.

To estimate such a relationship, we may proceed with a two stage estimation. First, we construct the deviation from the band $\tilde{q}$ by estimating a nonlinear model of the form (6) following the now familiar procedure of a maximum likelihood grid-search on the threshold parameter c (see the appendix to Obstfeld and Taylor 1997). It is then appropriate to test whether this simple TAR is a better fit than a null of an AR model, and this is achieved via a log likelihood ratio (*LLR*) test, whose distribution is calculated by Monte Carlo simulation.

Table 4 reports these results in brief form for the seven countries and four subsamples under consideration, using both raw and linearly detrended data. The table shows, in each case, the computed *LLR*, the best-fit threshold c, the estimate of λ and that estimate's t-statistic, and the significance level p for the test of the TAR versus AR based on 100 simulations.

These results offer an important new finding along the way, since they present clear evidence of very widespread nonlinear real exchange rate dynamics throughout modern history, from the gold standard until the present. And the indicated halflives of real exchange rate deviations (from the band edge) also call into question the PPP puzzle: based on the average estimate of λ in each period, the halflife of deviations was around 4–7 months during the gold standard and float periods, and perhaps as high as 10–12 months during the interwar and Bretton Woods eras. This stands in marked contrast to the conventional puzzle that stems from halflives estimated at 4–5 years on recent data using linear models. If substantiated more broadly such findings would call into question the application of frictionless open-economy macroeconomic models to data from the late nineteenth century to the present (Obstfeld and Rogoff 2000).[39]

It is striking that these results also call into question the received wisdom that international *goods* market integration has also followed a "linear history" of even tighter integration. Consistent with the micro-level findings of Findlay and O'Rourke in this volume, we find that goods market integration as measured by PPP "bands of inaction" experienced a deep reversal in the twentieth century. that the estimated bands (of width $2c$) are much wider in the float than in previous epochs: often around 10 to 30 percent, versus zero to 8 percent under the gold standard. This result, counter to some received wisdom, may alert us to the possibility of even greater trading frictions today than before the First World War, disconcerting as that might be. It must be kept in mind, however, that all of these results apply to very agreggative price indexes that may change in composition between epochs.[40]

In the second step of our procedure we estimated equations (7) and (8), using the nonlinear-adjusted deviation from equilibrium $\tilde{q}$ in RIP instrumental-variable regressions of the form

$$\tilde{r}_t = \alpha + \beta \tilde{q}_t + u_t, \tag{10}$$

$$\tilde{q}_t = \alpha' + \beta' \tilde{r}_t + u'_t. \tag{11}$$

Here, the error terms capture risk premia as well as forecast errors, and instruments

[39] Still, the results appear somewhat sensitive to the method of deterending. A simple linear trend, estimated over the entire sample, may be objected to on the grounds that future values of the data are used to construct current and past trend levels. One way out of this is to construct a one-sided or rolling trend, but the results obtained after of doing so are less conclusive. For that reason, results using the raw data in levels might be preferred.

[40] Using recent data, Obstfeld and Taylor (1997) document the high positive simple correlation between estimated international transaction cost bands for disaggregated consumption items and nominal exchange rate volatility.

Table 5: Real Interest Parity Tests: Threshold Models

		(a) Raw Data		*(b) Linear Detrend*	
Dependent Variable		*q*	*rdiff*	*q*	*rdiff*
GBR	1890:1 1913:12	1.12 **	0.76 **	0.89 **	0.73 **
NLD	1890:1 1913:12	2.20 **	0.22 *	0.61 ***	1.57 ***
FRA	1890:1 1913:12	0.61	0.83	0.50 ***	1.86 **
DEU	1890:1 1913:12	1.24 ***	0.78 ***	1.07 ***	0.88 ***
ITA	1890:1 1913:12	0.93 *	0.64	2.36 *	0.41 *
JPN	1890:1 1913:12	0.98 ***	0.79 ***	0.08 ***	12.86 ***
CAN	1890:1 1913:12	0.92 ***	1.08 ***	1.21 ***	0.82 ***
GBR	1921:1 1938:12	-1.15	-0.54	-1.18	-0.64
NLD	1921:1 1938:12	-0.52	-0.03	1.44 ***	0.69 ***
FRA	1921:1 1938:12	-3.07	-0.13	0.84 **	0.82 *
DEU	1921:1 1938:12	8.08 *	0.12 *	1.20	0.00
ITA	1921:1 1938:12	4.42 ***	0.15 ***	0.97 ***	0.64 ***
JPN	1921:1 1938:12	-1.69 *	-0.53	0.24	0.75
CAN	1921:1 1938:12	-0.09	-4.18	-0.14	-5.38
GBR	1951:1 1973:2	4.70 ***	0.19 ***	2.71 ***	0.36 ***
NLD	1951:1 1973:2	-1.83	-0.03	10.40	0.08
FRA	1951:1 1973:2	-2.55 *	-0.22	-1.77 *	-0.24
DEU	1951:1 1973:2	3.10 **	0.30 **	-2.67	-0.02
ITA	1951:1 1973:2	3.98 ***	0.23 ***	3.98 ***	0.23 ***
JPN	1951:1 1973:2	-6.63 **	-0.06	-3.64 *	-0.14
CAN	1951:1 1973:2	0.55	1.58	-0.58	-0.50
GBR	1974:2 2000:8	1.01	0.06	63.43	0.01
NLD	1974:2 2000:8	3.06 ***	0.33 ***	1.68 ***	0.59 ***
FRA	1974:2 2000:8	2.63 ***	0.10 *	6.62 *	0.10 *
DEU	1974:2 2000:8	1.03 **	0.77 ***	2.58 ***	0.31 ***
ITA	1974:2 2000:8	2.39 ***	0.35 ***	2.33 ***	0.31 ***
JPN	1974:2 2000:8	-5.44 **	-0.10 **	2.93 ***	0.34 ***
CAN	1974:2 2000:8	27.06 **	0.03 **	4.19 ***	0.21 ***

Notes: See text.

must be lagged sufficiently to avoid problems of overlapping inflation forecast errors in our monthly data. The theory predicts that the slope coefficient β (β') should be positive, with a magnitude less than (greater than) 1 when the real interest differential (real exchange rate) appears as the dependent variable (see Meese and Rogoff 1988). Following the literature, the test is implemented using GMM-IV estimators, to allow for the fact that the variables are endogenous and the inflation forecast term contains a moving average of white-noise error terms. The instruments are the 13th lag of both variables, since a 12-month inflation forecast is used.

The results are shown in Table 5, which uses real long-term interest rates constructed (as before) on the basis of 12-month ahead inflation forecasts. The results offer strong support for RIP in both the gold standard period *and* the recent float, the two periods in which, according to conventional wisdom, the globalization of capital markets has reached its highest levels. In every case (except Britain under the float) this specification lends support to the RIP-RER hypothesis.

Focusing on post-1973 data to start, we see that columns 1 and 3, for example, indicate that float is indeed characterized by coefficients that exceed unity in the reverse regression, as theory would predict. Such clean results do not obtain for the gold standard, we should note, but even there the coefficients are always statistically significant and of the right sign. Moreover, if we set aside the case of Japan, which was not a truly integrated core economy in that period, then the magnitudes of the coefficients are more palatable. The fact that they range too widely for comfort may reflect, in part, some imprecision or biases stemming from the use of annual, rather than monthly, CPI data in the pre-1914 period.

These findings lend further credence to the ∪-shape hypothesis for the evolution of international capital mobility since the late 19th century. Capital mobility was high under the gold standard, declined precipitously after 1914, began a gradual recovery after 1945, and, recently, has reached levels equal to or exceeding those that prevailed before the First World War.

2.3 Exchange-Risk Free Nominal Interest Parity

Perhaps the most unambiguous indicator of capital mobility is the relationship between interest rates on identical assets located in different financial centers.[41,42] The great advantage of comparing onshore and offshore interest rates such as these is that relative rates of return are not affected by pure currency risk. For much of the period we study here, a direct onshore-offshore comparison is impossible. However, the existence of forward exchange instruments allows us to construct roughly equivalent measures of the return to currency-risk-free international arbitrage operations.

Using monthly data on forward exchange rates, spot rates, and nominal interest rates for 1921 to the latter half of 2001, we assess the degree of international financial-market integration by calculating the return to covered interest arbitrage between financial centers. For example, a London resident could earn the gross sterling interest rate $1 + i_t^*$ on a London loan of one pound sterling. Alternatively, she could invest the same currency unit in New York, simultaneously covering her exchange risk by selling dollars forward. She would do this in three steps: Buy e_t dollars in the spot exchange market (where e_t is the spot price of sterling in dollar terms); next, invest the proceeds for a total of $e_t(1 + i_t)$ (where i_t is the nominal

[41] See the discussion in Obstfeld (1995), for example.

[42] This section draws heavily on Obstfeld and Taylor (1998) for the case of Britain, but adds new data on Germany for comparison. After our 1998 paper was published, we became aware of a similar 1889–1909 U.S.-U.K. interest rate comparison contained in Calomiris and Hubbard (1996).

dollar interest rate; and, finally, sell that sum of dollars forward at for $e_t(1+i_t)/f_t$ in sterling (where f_t, the forward exchange rate, is the price of forward sterling in terms of forward dollars). The net gain from borrowing in London and investing in New York,

$$\frac{e_t}{f_t}(1+i_t) - (1+i_t^*), \tag{12}$$

is zero when capital mobility is perfect and the interest rates and forward rate are free of default risk. The left-hand side of the preceding equation represents a price of present pounds sterling in terms of future pounds sterling, i.e., of pounds dated t in terms of pounds dated $t+1$, but it can be viewed as the relative price prevailing in the New York market, that is, as a kind of offshore interest rate. Thus, our test, in effect, examines the equality of the onshore sterling interest rate i^* with the offshore New York rate so defined. We perform a similar calculation for mark interest differentials between London (considered as the offshore center) and Germany (onshore), thereby gauging the difference between implicit mark interest rates in London and the rates prevailing near the same time in Germany.

For pre-1920 data, we examine a related but distinct measure based on current New York prices of sterling for (two-months) future delivery, as in Obstfeld and Taylor (1998). The parallel Germany-London arbitrage calculation before 1920, corresponding to the preceding New York-London comparison, is based on London prices for marks to be delivered three months in the future. Forward exchange contracts of the kind common after 1920 were not prevalent before then (except in some exceptional financial centers, see Einzig 1937), so we instead base our pre-1920 comparison of onshore and offshore interest rates on the most widely traded instrument, one for which prices were regularly quoted in the major financial centers' markets, the long bill of exchange. Long bills could be used to cover the exchange risk that might otherwise be involved in interest-rate arbitrage.[43]

To see how such a transaction would work, let b_t denote the date-t dollar price in New York of £1 deliverable in London after 60 days, and e_t the spot New York price of sterling.[44] One way to purchase a future pound deliverable in London would be through a straight sterling loan, at price $1/(1+i_t^*)$, where i_t^* is the London 60-day discount rate. An alternative would be to purchase in New York a bill on London, at a price in terms of current sterling of b_t/e_t. With perfect and

[43]Margraff (1908, p. 37) speaks explicitly of the need to "cover" interest arbitrage through the exchange market.

[44]In fact such bills were payable after 63 days due to a legal "grace period" of three days, an institutional fact we account for in the calculations below (Haupt 1894, p. 429).

costless international arbitrage, these two prices of £1 to be delivered in London in the future should be the same.

Perkins (1978) observed that the series $(e/b) - 1$ defines the sterling interest rate in American financial markets, that is, the offshore sterling rate in the United States. This series may be compared with the London rate i^*, as we did in our 1998 paper, to gauge the degree of cross-border financial integration; that is, we calculate the differential

$$\frac{e_t}{b_t} - (1 + i_t^*)$$

before 1920.

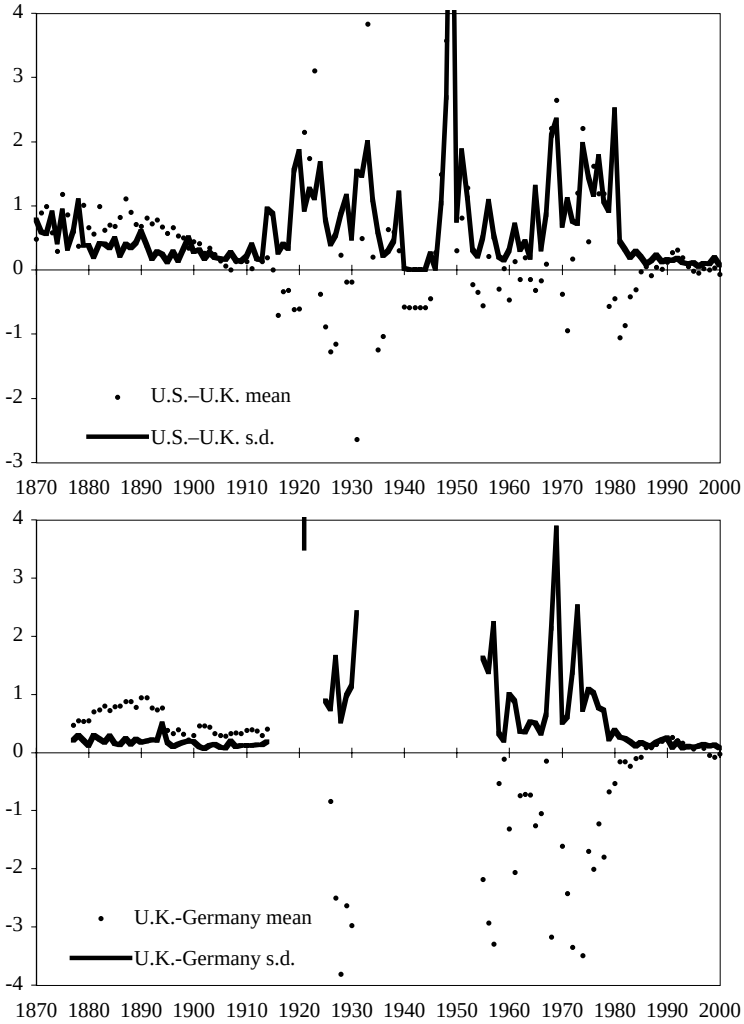
Perkins's (1978) primary aim was to modify earlier series of dollar-sterling spot rates derived by Davis and Hughes (1960), who applied U.S. rather than U.K. interest rates to the dollar prices of long sterling bills in order to infer a series of sight exchange rates. Perkins argued that the sight bill rate should be derived by multiplying the (lower) long bill rate by a sterling, not a dollar, interest factor, and subsequent scholars have followed him; see, for example, the verdict of Officer (1996, p. 69). From a theoretical point of view, the point is clear: the relative price of current and future sterling defines a sterling nominal interest rate, in the present case, the offshore New York rate that we compare to London rates.

The upper panel of Figure 4 is based on monthly differences between sterling rates in New York and in London from 1870 to 2001, where we simply splice together the 1870–1919 numbers based on time bill rates with the subsequently available covered interest differentials. Differential returns are calculated as annual rates of accrual.[45]

[45]The U.S.-U.K. comparison is based on the data described in Obstfeld and Tayor (1998, p. 361, n. 7), with the following amendments. From January 1975-August 2001, the London sterling interest rate i^* is the three-month bank bill middle rate, from Datastream. From January 1981-August 2001, the New York dollar interest rate i is the discount rate on 90-day bankers' acceptances, from Datastream. Finally, from January 1981-August 2001 spot and three-month forward dollar-sterling exchange rates come from Datastream. All of these new data are end-of-month observations.

For the U.K.-German comparison, data are monthly averages up until January 1981 and end of month thereafter, as follows. *Exchange rates*: From October 1877 to July 1914 we use the month-average spot mark-sterling exchange rate from the NBER macro-history database, series 14106 (hereafter "NBER"). London sterling prices for three-month bills on Berlin are "money" rates taken from the "Course of Exchange" table in the *Economist*. From January 1921-September 1931 we average the weekly spot and three-month forward exchange rates listed by Einzig (1937). From May 1955 to December 1980, spot exchange rates are from the *Economist* through 1957 and thereafter from Datastream. Forward exchange rates are from the London *Times* (May 1955-October 1958), from the *Economist* subsequently through 1964, then from the London *Times* through 1975, and, finally, starting January 1976, from Datastream. *U.K. three-month interest rate*:

Figure 4: Exchange-Risk Free Nominal Interest Differentials Since 1870: U.S.-U.K. and U.K.-Germany



Notes and Sources: Annual samples of monthly data, percent per annum. See text.

The figure broadly supports other indicators of the evolution of capital mobility. Differentials are relatively small and steady under the pre-1914 gold standard, but start to open up during World War I. They stay quite large in the early 1920s. Differentials diminish briefly in the late 1920s, but widen sharply in the early 1930s. There are some big arbitrage gaps in the late 1940s through the mid-1950s—including a sharp spike in volatility at the time of the 1956 Suez crisis.[46] But these shrink starting in the late 1950s and early 1960s, only to open up again in the late 1960s as sterling's 1967 devaluation initiates a period of foreign exchange turmoil, culminating in the unraveling of the Bretton Woods system in the early 1970s. Interest differentials have become small once again since the disappearance of U.K. capital controls around 1980. The differentials appear even smaller now than before 1914.[47]

Indeed, for the 1870–1914 data we observe a tendency, quite systematic albeit declining over time, for New York sterling rates to exceed London rates. In arguing in favor of a sterling discount rate for valuing long sterling bills traded in the U.S., Perkins (1978) demonstrated a tendency for the implicit offshore sterling interest rate $(e/b) - 1$ to converge toward Bank Rate toward the end of the nineteenth century (see his Figure 2, p. 399). Our Figure 4, however, compares the New York offshore sterling interest rate with the London money-market rate of discount,

Open market three-month discount rate, NBER series 13016, through September 1931. Data from 1955–1974 come from the Federal Reserve banking data base (and are similar to the well-known Capie-Webber series). Starting in January 1975 we use the U.K. interbank (money-market) three-month middle rate of interest. *German three-month interest rate*: From October 1877 through September 1931, where observations are available, we use the Berlin private open market discount rate for prime bankers' acceptances given as NBER series 13018. The German three-month money market rate for 1955–1959 is an average of monthly high and low rates taken from *Monthly Report of the Deutsche Bundesbank* and thereafter, through end-1980, comes from *International Financial Statistics*. Subsequent data are from Datastream, the three-month "dead middle" money market rate.

[46] See Klug and Smith (1999) for a fascinating empirical study of the Suez crisis. The paper includes a discussion of daily covered arbitrage differentials from June 1, 1956—January 31, 1957.

[47] We alert the reader to several potential problems with our calculations and data. First, as we have stressed already above and indeed stressed quite clearly in Obstfeld and Taylor (1998), the two measures of market integration that we calculate refer to different arbitrage possibilities before and after 1920. Second, some forward transactions appear at different maturities in our data set. Third, most data are observed at or near end-of-month, but some data are averages of weekly numbers. Averaging has the effect of dampening measured volatility. Fourth, data from World War II reflect rigidly administered prices and have no capital-mobility implications. Fifth, the data used are not closely aligned for time of day (and even differ as to day in some cases), so that some deviations from parity may be exaggerated. The purpose of the exercise, however, is merely to convey a broad sense of the trend in integration, not to pursue a detailed hunt for small arbitrage possibilities.

which tended to be somewhat below Bank Rate. Were we to use Bank Rate as the London interest rate in the figure, much of the pre-1914 gap would be eliminated. Given that the U.S. data consist of prices of high quality paper (such as bank bills), however, comparisons with Bank Rate are probably inappropriate. As Spalding (1915, p. 49) observes: "Bank Rate, as is well known, is usually higher than market rate; therefore if ordinary trade bills are remitted [to London] from [abroad], to find the long exchange, interest will be calculated at our Bank Rate, as trade paper is not considered such a good security as bank bills."[48] Officer (1996, p. 69) concurs, though on different grounds: "Whereas the Bank Rate was set by the Bank of England, the money-market rate was a true competitive price …. The money-market rate of discount is the better measure …."

If it is impermissible to compare the sterling interest rate in New York with Bank Rate in London, how, then, can we explain the systematic positive interest gap in favor of New York before 1914? Much if not all of the gap can be explained as an artifact of the procedure we have used to extract the "offshore" interest rate from the observations on sight and time bill prices.

Continuing our focus on the New York-London comparison of sterling interest rates, we notice that the published money-market discount rate for London is quoted as a "pure" relative price of future in terms of present sterling. In contrast, as practitioners' textbooks of the period make amply clear, in determining the price to be paid for a long bill of exchange on London, purchasers would factor in not only the spot exchange rate and the London market discount rate, but, in addition, commissions, profit margins, and, importantly, the stamp duty (0.05 percent of the bill's face value) payable to the British government. These factors made bill prices lower than they would have been if they simply were equal to the spot exchange rate discounted by the pure New York sterling rate of interest.

Margraff (1908, p. 121) estimates that for a 90-day bill, the total of such factors amounted to 0.125 percent of face value. For a 60-day bill, that charge would represent about 75 basis points on an annualized basis; Escher (1918, pp. 81–2), published a decade later, cites a very slightly smaller number. By subtracting that "tax" from the pre-1914 differentials plotted in the top of Figure 4, we see that the apparent average excess return in New York disappears.

Indeed, the average return becomes negative for 1890–1914, so that 75 basis points in additional costs may well be an overestimate for the entire prewar period. Suggestive of declining costs is the tendency shown in the figure for the average bias to decline over time. Perkins (1978, pp. 400–1) argues that U.S. foreign

[48] See also the summary table in Margraff (1908, p. 112).

exchange dealers of the period were able to exploit market power to inflate their commissions. Certainly such market power declined through 1914 as markets evolved, and Officer's (1996, p. 75) data on brokers' commissions supports this view.[49] Of course, a process of market integration increases competition and drives commissions down. Thus, leaving aside the portion due to the stamp tax, the size of the New York-London discrepancy is to some degree a reflection of financial market segmentation and its secular decline evidence of a process of progressive integration.

The lower panel of Figure 4 shows the difference between the implicit mark interest rate in London and the one prevailing in Germany. Before 1914, the former, offshore, rate is calculated on the basis of 90-day prime bills of exchange on Berlin traded in London. The results are remarkably consistent with those for New York-London. In particular, we again observe a systematic but secularly declining excess return in London prior to 1914.

The explanation is essentially the same as in the New York-London comparison above. Germany levied a stamp duty on bills at the same rate as Britain's (0.05 percent; see Haupt 1894, p. 164, or Margraff 1908, p. 133). Margraff's estimates of concomitant costs suggest that for a 90-day bill on Berlin, about 40 basis points should be subtracted from the the annualized sight bill premium $4 \times [(e/b) - 1]$ to ascertain the true London mark interest rate. On the assumption that some costs decline over time, with 40 basis points an average for the prewar period as whole, that cost adjustment brings the offshore and onshore mark rates roughly into line.[50]

While the cost and tax considerations we have described potentially eliminate the upward bias in our estimated series of offshore interest rates, other financial transaction costs would, as usual, create no-arbitrage bands around the point of onshore-offshore interest rate equality. One way to evaluate the evolution of capital mobility through time would be to estimate over different eras what Einzig (1937, p. 25) calls "transfer points," i.e., the minimum return differential necessary to induce arbitrage operations. Keynes and Einzig agreed that during the interwar period, at least a 50 basis point covered differential would be needed to induce arbitrage. That

[49] Country risk type arguments cannot easily rationalize the pre-1920 interest differential in favor of New York, as we pointed out earlier in Obstfeld and Taylor (1998, p. 361, n. 6). The reason is that the two transactions we compare both entail future payment in the same place, London. This is not the case in the post-1920 covered interest arbitrage calculations.

[50] Flandreau and Rivière (1999) focus on a London-Paris comparison. Their results are entirely consistent with the data that we show in Figure 4, including a systematic excess of the London franc interest rate over that in Paris. Their rationale for the differential is apparently different from ours, although they do not include details of their derivation.

is, they suggested a no-arbitrage band of ± 50 basis points. Applying nonlinear estimation techniques including a TAR methodology to weekly interwar data on dollar-sterling covered return differentials, Peel and Taylor (2000) confirm that a no-arbitrage band close to ± 50 basis points did appear to prevail, as Keynes and Einzig claimed. Only outside of this range did arbitrage forces push spot and forward exchange rates toward conformity with the band.

A detailed investigation is beyond the scope of this paper, but a first pass at the data using the TAR methodology described earlier is suggestive. For the dollar-sterling exchange between June 1925 and June 1931, we calculate a band of inaction of ± 60 basis points, very close to the Peel-Taylor estimate given that we are using coarser, monthly data. For the corresponding interwar sterling-mark exchange our estimated band is ± 91 basis points wide. On 1880–1914 differentials, in contrast, we find (after subtracting a constant mean differential) bands of only ± 19 basis points for New York-London and ± 35 basis points for London-Berlin. By way of comparison, Clinton (1988) suggests that covered interest differentials in the mid-1980s needed to reach just ± 6 basis points to become economically significant, and the bar is certainly even lower by now. We suspect that a more careful analysis of pre-1914 differentials, one taking account of the upward trend in market integration, would reduce our estimated transaction cost bands for the early twentieth century. Accordingly, the degree of integration among core money markets achieved under the classical gold standard must be judged as truly impressive compared to conditions over the following half century or so.

The Great Depression, perhaps as part of a much broader interwar phase of disintegration, therefore stands out as an event that transformed the world capital market and left interest arbitrage differentials higher and more volatile than ever before.

2.4 Equity and Bond Returns

It is interesting to ask whether the long-run evidence on the $\cup$-shape of capital market integration extends to other criteria, and other markets such as equities. Over the long run, global equity markets have evolved at a very different rate than global bond markets, for example. Government bonds from core countries have generally traded in financial centers in the last one hundred years, but for long spans of time emerging-market debt was very difficult to place in the private sector, and most went through multilateral intermediaries. Similarly, international trade in equities, though quiescent in the middle of the century, grew substantially in core countries after the lifting of capital controls in the 1970s and 1980s, and by the

1990s several emerging equity markets were involved too.

Does quantitative evidence exist to verify this narrative? Quantity data are harder to find at a disaggregated level. Breaking down foreign investment into its subcomponents is an enormous historical task, and few have attempted it in the quest for long-run comparable series across many countries (but see Twomey 2000). We will not attempt to press further here. Instead, we will examine price evidence to see what changing patterns of equity returns might tell us about globalization.

There is certainly some debate about the indicators of equity returns in the long run and what they tell us about globalization. Goetzmann and Jorion (2000) find that most of the world's stock markets have exhibited fairly low real returns over the long run in the last century, around 1 percent, with the exception of the United States which has yielded around 4 percent annually since 1921. These figures caution that U.S. exceptionalism might extend to stock market returns also, and cast doubt on the general, global truth of the equity premium puzzle. The authors also note that "survivorship bias" likely afflicts the U.S. and many other markets in the core countries for which data exist. In many emerging markets, stock prices have fluctuated wildly and many series break down at critical historical junctures and during wars, limiting our ability to compare like with like.

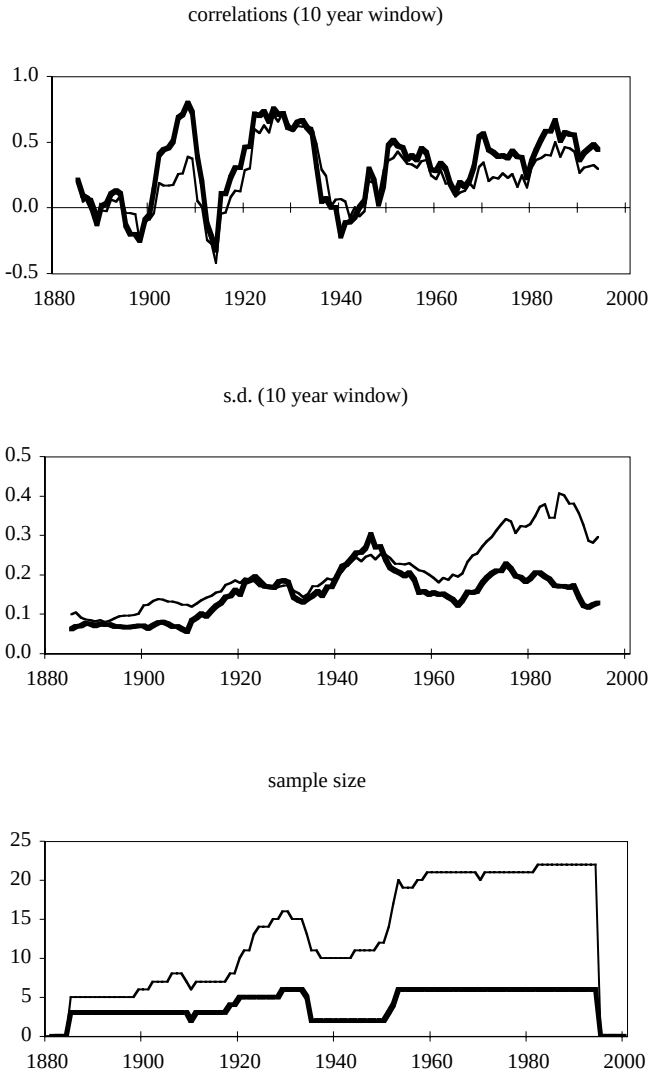
In this section we take a fresh look at long-run equity returns using similar data to that employed by Goetzmann and Jorion (2000), the Global Financial Data source. We ask two questions not addressed by previous authors: to what extend have stock returns (measured in a common currency, the U.S. dollar) diverged or converged over time? and to what extent have the time series correlations of returns across countries changed over time? We then consider what the answers may have to say about globalization.

Figure 5 shows summary statistics for a sample of up to 22 country stock price indices based on annual U.S. dollar-denominated returns since 1880.[51] The bottom chart indicates that the sample size diminishes markedly prior to 1950, evidence of the survivorship problem. We usually have 20 countries in the sample after that date, but in the interwar period the sample size is about a dozen, and before 1920 between five and ten. A wide line traces out the sample size for a limited set of core countries, the G7. For this group there is a more consistent sample size over time, though only three series before 1920.

The middle chart shows the standard deviation of returns across time, calculated for a centered moving window of ten-year length and encompassing the largest

[51] Since dividend data are not available for the entire sample, the calculated returns are based on equity-price changes only.

Figure 5: Equity Returns in U.S. Dollars for the G7 and up to 22 Global Stock Markets, 1880–2000



Source: Global Financial Data.

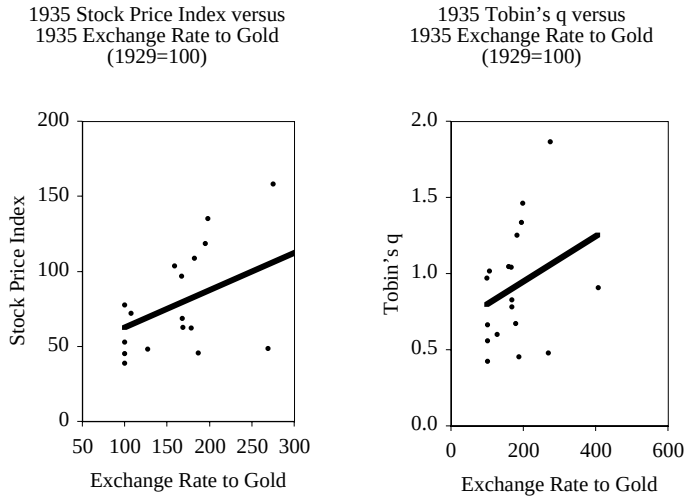
sample possible.[52] Again, the thin line is the full sample, the wide line the G7. As a description of the coherence of the returns in G7 equity markets this figure is strikingly consistent with the ∪-shape hypothesis and the underlying arbitrage arguments. Returns showed relatively little dispersion prior to 1914, but larger gaps opened up in the interwar period. This dispersion reached a peak around 1945 or 1950, but has been falling since, with a minor reversal in the latter 1960s, but convergence again after 1980, roughly when G7 capital controls loosened. The picture for the full sample is a little less clear, since the sample size is not consistent. We do not know how much of the long run increase in dispersion, for example, is due to an increase in the sample size over time. But for the post-1950 period, when the sample is stable, the trends are quite similar to those in the G7, although the returns are much less coherent than the G7 in the 1970s and 1980s, a period in which capital controls were much tighter in the periphery than in the core. It is also apparent that in the 1990s, the emerging markets have seen a much larger decline in dispersion, at a time when economic reforms generally reduced barriers to capital mobility, and emerging market portfolio investment grew rapidly.

Finally, the top chart explores a second measure of coherence of stock prices across countries, based on the average correlation of annual dollar returns with that on the U.S. market, again calculated for a centered moving window of ten-year length and encompassing the largest sample possible, and where the thin line is the average for the full sample, the wide line the G7. The correlations show clear disconnects between markets during times of well know autarky such as the two world wars. Periods of high correlation also appear more recently and before 1914 (though only just before). Although the noisiness of the correlations is quite large, this much, at least, is consistent with the ∪-shape story. What isn't consistent with the story is the large spike in cross-country correlations in the 1920s and 1930s. Why should this be so, in what was an era of supposedly fairly low capital mobility?

One answer has been provided already by Eichengreen and Sachs (1985, Figure 5), who show that the interwar patterns may simply reflect common shocks associated with going on and off the gold standard. To follow their example, consider the 1929 to 1935 period. Countries that stayed on gold like France and Germany endured a brutal downturn in prices and output, whereas countries that devalued didn't. This has been empirically verified for wider samples such as Latin America (Campa 1990). It is consistent with monetary explanations of recovery which build on both the debt-deflation logic of Fisher and the expected-real-interest-rate channel emphasized by Mundell, not to mention the conventional Keynesian trans-

[52] Specifically, we plot ten-year averages of the cross-sectional standard deviations of returns.

Figure 6: Equity Markets and the Great Depression, 1929–35



Source: Global Financial Data; Obstfeld and Taylor (2002).

mission mechanism (Temin 1989; Romer 1992; Eichengreen 1992; Bernanke and Carey 1996).

What did this mean for stock markets? In a world of non-neutral money, devaluers would be able to drive up Tobin's *q* by restoring positive investment expectations. Eichengreen and Sachs (1985) found a statistically significant correlation between the change in *q* and the change in the exchange rate (relative to gold parity) in a sample of nine countries from 1929 to 1935. We replicate and extend their analysis in Figure 6. This figure shows that the correlation holds true in a wider sample of 18 countries.

These results imply that we must therefore be cautious about interpreting an increased correlation among markets as evidence of globalization *per se*. Instead, certain high correlations might simply be a result of common shocks among a group of countries, in this case countries experiencing, and then reacting to, the biggest single macroeconomic shock of the twentieth century. This caveat is well known. For example, a recent article in the *Economist* (Economics Focus, "Dancing in Step," March 24, 2001) reports that in the 1990s global stock market correlations have risen to even higher levels than in the late 1980s (as high as 0.8 in year 2000, though at what frequency is not mentioned).[53] This came after a decline

[53]On these correlations see also Gourinchas and Rey (2001) and International Monetary Fund

in correlations in the early 1990s, but "the long term trend is upward." Overall, the article concludes, this is consistent with increased globalization pressures, but certain large shocks, like the recent crises in Asia, might also have also been associated with higher correlations via contagion channels. As the article notes, "stock markets tend to be more correlated at times of high volatility in share prices; during calmer periods, correlations tend to be weaker." Similar reasoning, of course, could pertain to the roaring twenties, and the bust of the thirties.[54]

Since we have the data at hand, we might also ask whether these same kinds of patterns of coherence are witnessed in bond returns over the same long span. Figure 7 supplies the answer. Here we examine just the G7 bond returns in common currency since 1880, since for much of the late twentieth century emerging bond markets have been quite dormant, they have existed under economy-wide conditions of often severe financial repression, and no such countries can issue external bonds in their own currency. (Though we will examine periphery bonds in the pre-1940 period in the next section.)[55]

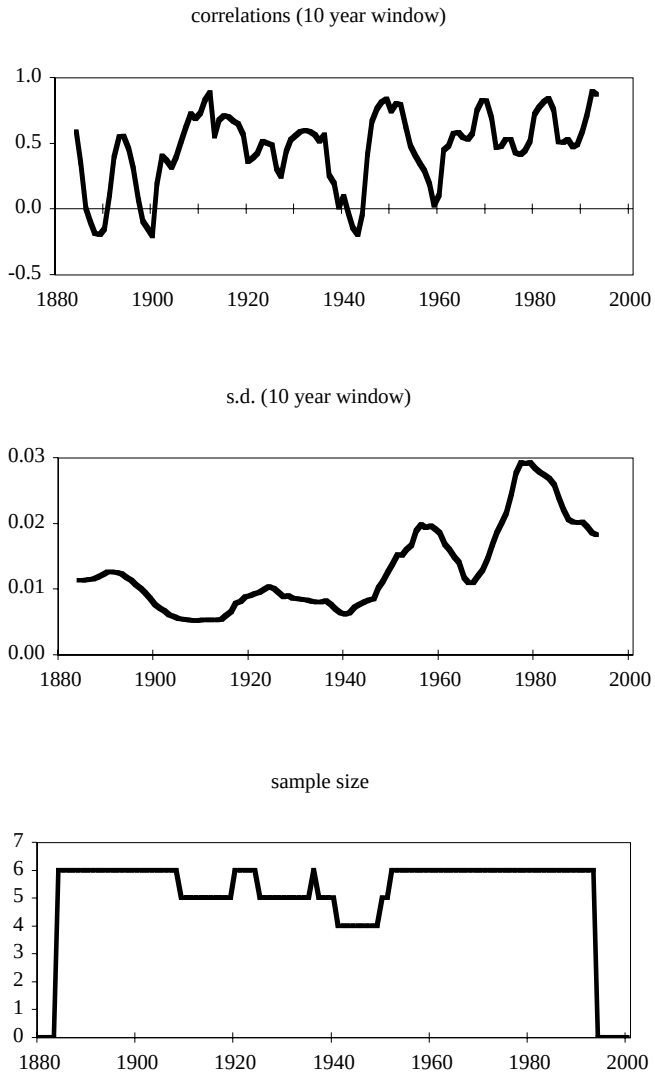
Here the results are a little different. There is certainly a rise in the mid-century dispersion of bond yields, after a pre-1914 convergence. But the peak is much later, circa 1980, and has then been followed by a fairly sharp decline. We again see evidence of a rough $\cup$-shape in mobility, but with significant differences in timing suggested as compared to the equity market. Correlations show more noise, again, as expected, but correlations were high and rising before 1914, and again more recently, but still very volatile in between. Correlations fell after 1914 through to around 1945, then turned around, and the trend since the 1960s has been upward, consistent with our conjectural historical description. Bond correlations often are as high or higher than equity correlations.

(2001, p. 74).

[54]The definition of "contagion" is controversial: contagion may entail a structural intensification of spillovers in crisis periods. As Forbes and Rigobon (2000) stress, however, higher return volatility itself can mechanically raise cross-border return correlations even in the absence of any underlying structural change, and it may be misleading to view this as a contagion effect.

[55]The twelve-month U.S. dollar return of each bond is estimated from the monthly Global Financial Data series, and is estimated as the initial yield on the bond (representing the interest) plus any annual capital gain (where the bond's price is estimated as the fixed coupon divided by the yield, so that the capital gain is approximately minus the percentage change in yield) plus any annual gain or loss due to exchange rate changes.

Figure 7: Bond Returns in U.S. Dollars for the G7, 1880–2000



Source: Global Financial Data.

2.5 Summary

Many studies of market integration have focused on a single kind of criterion. This approach seems unreasonably restrictive to us, since the interpretation of such narrow criteria must necessarily rest upon untested auxiliary assumptions. By contrast, we see no reason to dismiss any useful information, in either price or quantity form, especially given the paucity of historical data in certain quarters. Thus, we have opted for a broad battery of tests to try to cut down the possible set of explanations that could account for the empirical record, and so, by a process of elimination, work towards a set on controlled conjectures concerning the evolution of the global capital market.

The preceding section succinctly conveys the benefits we think this kind of approach can deliver. Our quantity-based tests delivered a certain set of stylized facts, and the price-based tests another set of facts. Combining the two, and introducing evidence on convergence and divergence in other economic phenomena such as living standards and demography, we claim there is overwhelming support for the notion that the major long-run changes in the degree of global capital mobility have taken the form of changes in the impediments to capital flows themselves, rather than any encouragement or discouragement to flows arising from structural shifts within the economies themselves. That is not to discount the fact that such changes have occurred, and are no doubt important at the margin; but it is an assertion that the virtual disappearance of foreign capital flows and stocks in mid-century, and the explosion in price differentials, can only be explained by an appeal to changes in arbitrage possibilities as permitted by two major constraining factors in capital market operations: technology and national economic policies.

From this point, it is a short step to the conclusion that a full accounting of the phenomena at hand must rest on a detailed political and institutional history. Clearly, technology is a poor candidate for the explanation of the twentieth century collapse of capital mobility. In the 1920s and 1930s the prevailing financial technologies were not suddenly forgotten by market participants: indeed some technologies, such as futures markets for foreign exchange came to fruition in those decades. Technological evolution was not smooth and linear, but, as we have already noted, was at least unidirectional, and, absent any other impediments, would have implied an uninterrupted progress toward an ever more tightly connected global marketplace.

Such was not allowed to happen, of course. Rather, the shifting forces of national economic policies, as influenced by the prevailing economic theories of the day, loomed large during and after the watershed event of the twentieth century,

the economic and political crisis of the Great Depression. Understanding the macroeconomic and international economic history of our present century in these terms, and the changes it wrought for the operation of the global capital market, is a long and complex story, a narrative that properly accompanies the empirical record presented in this paper, and we take up some of the political economy dimensions of that story in the section that follows.

3 Political Economy

We have thus far amassed some evidence that international capital mobility has experienced two major swings over the course of the twentieth century: a pronounced decline during the interwar years and a recovery in the later postwar years. The timing is hard to pin down precisely, and, indeed, surely varied by country and by the type of capital movements being considered.

Taking this as given, we now must ask, why did capital mobility follow this path, and what corroborative evidence can we assemble to buttress an account of these events that incorporates the forces of political economy? We start first with the downturn in capital mobility after 1914.

3.1 The Downturn

The conventional macro-historical account of the collapse of capital mobility after 1914 focuses on the trilemma, as we have noted (Eichengreen 1996; Obstfeld and Taylor 1998). The literature suggests that the major political economy forces at work during this period were increasing pressure for macroeconomic activism, particularly from newly- or better-enfranchised groups such as the working classes. If fixed exchange rates were to be maintained, then capital mobility would have to be compromised, at least on some occasions. Maintenance of capital mobility instead would preclude the exchange rate target. Either option would raise uncertainty for investors.

It is believed that prior to 1914, gold standard orthodoxy had been a *sine qua non* for access to global capital markets on favorable terms. A first study Bordo and Rockoff (1996) found that adherence to gold standard rules acted as a "seal of approval" for sovereign debt. Gold standard countries had lower country risk, measured by the bond spread in London over the British consol.[56] Accordingly,

[56]Clemens and Williamson (2001), however, find no statistically significant gold standard effect

evidence of a new political dynamic after 1914 might be seen in a changing relationship between country risk and gold. With the rules of the game in question, investors might have doubted whether the announcement of gold standard commitment alone would signal credibility. In addition, public solvency indicators, such as debt-GDP ratios, might be seen as having a bigger impact on international bond spreads. Did this doubt manifest itself in the data?

There is no comprehensive study of bond spreads across these two eras that would allow us to definitively answer this question, but a second study by Bordo, Edelstein, and Rockoff (1999) came to a conclusion that was surprising, even by the authors' own admission. Looking solely at 1920s bonds they found continued evidence that the gold standard remained a seal of approval, lowering bond spreads by up to 200 basis points, at least when a country stuck to its prewar parity. Devaluers were not so lucky with their bond spreads, since for them the impact of being on gold was small and statistically insignificant. Such a conclusion challenged the conventional wisdom that the interwar gold standard was a pale shadow of its predecessor.

These are two pioneering studies but, for comparative work across regimes, they are not ideal. Unfortunately, they cannot be merged together into a consistent picture because of differences in the methods and data employed. The former looked at long-term government bonds in the secondary market, and examined their yield to maturity; the latter examined new issues and their yield at the moment of flotation only. The former study therefore had complete time series, whereas the latter had a small sample that was often interrupted by missing data in years when no issues took place—a not uncommon event in the 1920s, and one that could raise a potential sample-selection issue. Finally, the former studied prices in London, the latter prices in New York, a switch that could be defended as the hegemonic center of global capital markets shifted across the Atlantic around this time, and one that allowed the use of Cleona Lewis' (1938) data on new issues for the 1920s.

To overcome the differences between these studies, we re-examine the question of what determined bond spreads in the pre-1914 and interwar years using a much larger database that allows us to view a consistent set of data for a larger sample of countries from 1870 to 1931. The Global Financial Data source includes yields to maturity of bonds traded in London for this entire period, and we focus on 20 countries, some in the core and some in the periphery, to see how their country risk evolved. This allows us to focus on the same market and the same type of risk

on the magnitudes British capital flows to various foreign recipients during 1870–1913. It remains to reconcile the apparently conflicting message of the price and quantity data.

measure across both eras.

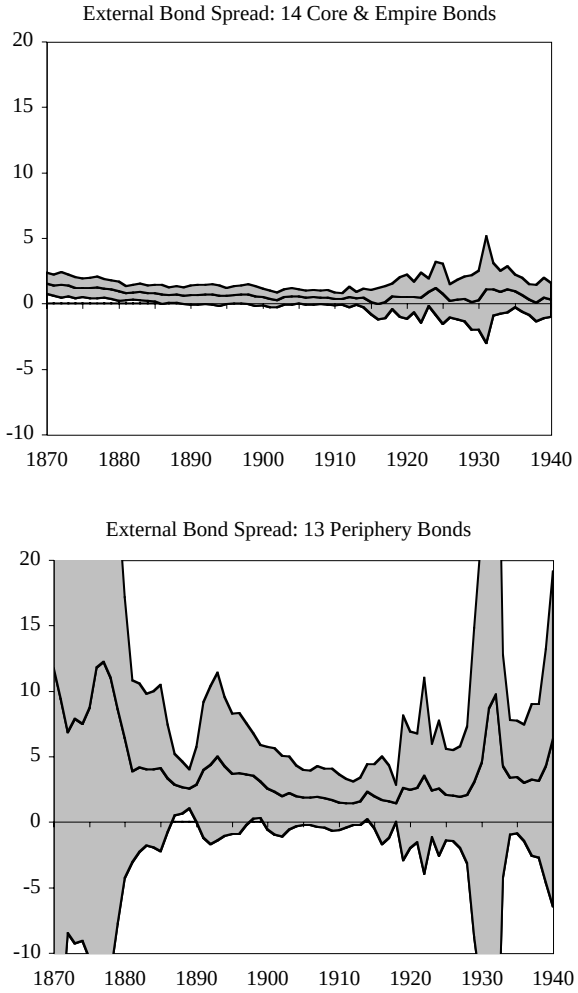
Figure 8 offers an overview of the data. The mean bond spread for the core and periphery sub-samples is presented in the top and bottom charts respectively, and each is surrounded by a measure of dispersion, a band equal to plus or minus two standard deviations. The units are percentage points and the scales are deliberately the same on the two charts.

The differences between the two sub-samples are very striking: the core had much smaller country risk than the periphery, as expected. Core countries usually had interest rates within one or two percentage points of Britain's. The periphery could have spreads as large as ten percentage points, which was tantamount to having a bond in default in many cases. But the figures also show some similarities, once we normalize for this scale difference: both core and periphery experienced a convergence in bond spreads up to 1914, and then a good deal of volatility in the interwar years, when spreads widened.

The gradual convergence of bond spreads warns us that a simple static "on and off" gold indicator is unlikely to capture the full dynamics of evolving country risk in this period. Intuitively, these figures hint at high levels of persistence or serial correlation in bond spreads, and it is easy to imagine why. Bond spreads are a function of reputation, which in capital markets, as in any other repeated game, cannot be built overnight. Instead, there is an "I know what you did last summer" effect: one's reputation in the previous period is likely to have substantial explanatory power in deciding one's reputation today. Beyond this, levels of public indebtedness were relevant for at least some countries. Flandreau, Le Cacheux, and Zumer (1998) argue that a major factor driving the evident convergence of bond spreads after the early 1890s and through 1914 is worldwide inflation resulting from gold discoveries, a factor that drove both an unexpected reduction in countries ratios of public debt to nominal GDP and a more widespread adherence to the gold standard. For the pre-1914 period, they investigate borrowing spreads over London using a country sample larger than that of Bordo and Rockoff (1996) and an econometric specification encompassing the public debt ratio to GDP as well as gold standard adherence. They report smaller benefits from gold standard adherence than Bordo and Rockoff did, on the order of 35–55 basis points, or about a quarter of the benefit detected by the earlier authors. They also find a positive effect of public debt on borrowing spreads. Perhaps some of the benefits ascribed by Bordo and Rockoff to gold standard adherence before 1914 can be accounted for by a tendency of association with more moderate public debt levels.

Our focus here is on comparing the pre-1914 and interwar gold standards. We examine a variety of specifications to investigate the relationship between

Figure 8: London Bond Spreads, Core and Periphery, 1870–1940



Notes: Country risk is calculated as the spread between the country's long bond, denominated in hard currency or gold (the external London bond), and the British consol. The core and empire countries are Australia, Belgium, Canada, Denmark, France, Germany, India, Netherlands, New Zealand, Norway, South Africa, Sweden, Switzerland, and the United States. The periphery countries are Argentina, Austria, Brazil, Chile , Finland, Greece, Hungary, Italy, Japan, Mexico, Portugal, Spain, Uruguay. There are occasional missing data, notably Finland (1870–1910), Mexico (1933–40), Switzerland (1870–1914), and several countries around the time of World War One (1914–18). *Source*: Global Financial Data.

the dependent variable country risk, measured by the bond spread over London, SPREAD_{it}, and selected macroeconomic policy variables that could play a role for country i and time t. One such variable is gold standard adherence, measured by two dummy variables: GSPAR_{it}, which takes the value 1 if on date t country i is on gold at the 1913 parity, and GSDEV_{it}, which takes the value 1 if the country is on gold at a devalued parity (this latter variable applies in the interwar period only). Monetary policy reputation is proxied by the lagged inflation rate, INFL_{it}. As a final macro explanatory variable, we examine the effects of public debt levels, measured by the ratio of debt to output, PUBDGDP_{it}. We also include country fixed effects to capture constant but unmeasured political, economic, institutional, or geographic features of individual countries (for example, location on the "periphery").[57]

[57] Bond spread series are from Global Financial Data; many start in 1870. For prewar and interwar regressions that do not include public debt and inflation as explanaory variables, we use 27 Global Financial Data countries for which spread data are available. These are: Argentina, Australia, Austria-Hungary (before 1914, but we include Austria and Hungary separately for the interwar period), Belgium, Brazil, Canada, Chile, Denmark, Finland (only for the interwar period), France, Germany, Greece, India, Italy, Japan, Mexico, Netherlands, New Zealand, Norway, Portugal, South Africa, Spain, Sweden, Switzerland (only for the interwar period), the United States, and Uruguay.

We follow Global Financial Data in treating bonds with spreads over 10 percent as being in default and we exclude them from the analysis that follows. In our dataset this excludes 63 such outliers from a total of 1,734 spread observations (3.6% of the sample) in 27 countries for the period 1870–1940.

Gold standard adherence data are from Meissner (2001) and Eichengreen (1992), available for all countries.

Central government public debt data (mostly starting in 1880) and inflation come from Bordo and Jonung (1996) for a sample of 14 "Euro-North American" countries consisting of: Belgium, Canada, Denmark, Finland, France, Germany, Italy, Japan, Netherlands (starting 1900), Norway, Sweden, Switzerland (starting 1913), United Kingdom, and United States. For those countries, the same source has data on nominal GDP. Central public debt data for Argentina before 1914 come from della Paolera (1988, Table 36) and Argentine nominal GDP from della Paolera and Ortiz (1995). Data on the Australian general government debt (as a ratio to GDP) for our entire period come from Barnard (1987, series GF7). For the post-World War One period, we augment our other public debt data with the total central government debts reported by United Nations (1948); and we use the nominal GDP figures from Obstfeld and Taylor (1998) or Global Financial Data. We also tried using deficit-to-GDP ratios, following Bordo and Rockoff (1996), but, like them, we found deficit ratios to be statistically insiginificant in preliminary testing.

For our interwar explorations, the subsample of countries for which we have public debt data consists of the 14 Bordo-Jonung countries (now including Switzerland) plus Argentina, Australia, Austria, Brazil, Chile, Greece, Hungary, India, New Zealand, Portugal, and Spain, although we exclude the United Kingdom as it is used as the base country for the purpose of computing relative spreads.

Inflation data are based on consumer price indices taken from Obstfeld and Taylor (1998) or

Using pooled annual data for a large sample of countries, the basic regression equation is then of the form

$$\text{SPREAD}_{it} = a_i + bX_{it} + u_{it} \tag{13}$$

where $X_{it} = (\text{GSPAR}_{it}, \text{GSDEV}_{it}, \text{INFL}_{i,t-1}, \text{PUBDGDP}_{it})$ is the vector of explanatory variables. The main question we ask is whether 1914 was a watershed—that is, if the interwar gold standard differed from its predecessor. Accordingly we investigate this relationship on prewar (1870–1913) and interwar (1925–31) samples.

In Tables 6 and 7 we present our results. In these tables, when the public debt variable is omitted on the right hand side, as in the odd-numbered columns, the potential sample is the full set of country-time observations for which spreads are available; otherwise, the sample shrinks to a subset of observations for which both these and debt and inflation variables are available, as in the even columns.

In the upper panels of Tables 6 and 7, we estimate using the full pre-1914 pooled sample. We first see if we are able to replicate the basic findings of the Bordo-Rockoff and the Bordo-Edelstein-Rockoff studies. Column 1 shows the OLS results including only the "on gold" dummy variable, while column 3 adds an AR(1) correction in light of the evidence of high serial correlation in the column 1 residuals prior to 1914.[58] Gold appears statistically significant before 1914, contributing about -55 to -75 basis points to the spread over London. But the gold standard variables are statistically insignificant (though correctly signed) for the interwar years 1925–1931. In the lower panels of the tables we restrict the

Global Financial Data. CPI data before 1914 are missing for Austria-Hungary, Brazil, Chile, Greece, India, New Zealand, South Africa, and Uruguay; and for the interwar period for India, New Zealand, South Africa, and Uruguay. These omissions accordingly restrict our samples when inflation is included as an additional control variable.

We are unable to make our pre-1914 analysis of spread-debt relationships comparable with that of Flandreau, Le Cacheux, and Zumer (1998), as their data, which comprise a different country sample than ours, have not been made available. Besides apparently covering the countries in our prewar sample, excluding Argentina, Australia, Finland, and the United States, the Flandreau et al. sample adds public debt data for Switzerland and the five "European peripheral" countries of Austria-Hungary, Portugal, Greece, Russia, and Spain. Judging from the 1892 data from Haupt (1894) graphed by Dornbusch (1998), the latter five countries all had significant public debts relative to GDP.

[58] For the prewar period, the Durbin-Watson statistics for the uncorrected equations are very low. The AR(1) model was also used by Bordo and Rockoff (1996). Flandreau, Le Cacheux, and Zumer (1998) add additional controls, the export-to-output ratio and output per capita, which appear to soak up the serial correlation.

sample to the Bordo-Jonung (1996) Euro-North American countries, most of which would be considered part of the gold standard "core" membership, but the results in columns 1 and 3 are not materially affected.

Given the presence of such highly autocorrelated equation residuals before 1914, a difference specification seems warranted for that period. In that version, the gold dummies measure the effects of going onto the gold standard or of returning to gold. Column 5 applies OLS to the differenced form of the basic equation. Differencing seems to reduce the estimated benefits of joining gold before 1914. But the spread effect remains highly statistically significant for that era, whereas it remains insignificant for the interwar years (in which period the need for differencing is much more dubious). Again, the results persist in the smaller Bordo-Jonung sample.

An interesting theme in all of the 1925–31 results of Table 7—leaving aside the "difference" estimates, which have little justification for the interwar period—is that returning to gold at a devalued parity is estimated to have a bigger effect than returning at prewar parity, very much contrary to the Bordo-Edelstein-Rockoff empirical result. Our different finding supports the theoretical view of Drazen and Masson (1994) that policymakers may hurt rather than enhance their credibility through policies that appear "tough" in the short term but are too Draconian to be sustained for long.

A general concern is that omitted macroeconomic variables correlated with gold-standard adherence might be responsible for the apparent pre-1914 benefits of going on gold, or might mask such benefits after the First World War. Before the war, countries on gold may have had more disciplined fiscal policies, lower public debt, and hence more favorable treatment by the bond markets. On the other hand, perhaps countries that inflated away their public debts in the early or mid-1920s would have been unlikely to rejoin gold at parity, making high public debts and a return to gold at prewar parity positively correlated variables. In these circumstances, omitting macro controls could lead us to overestimate the prewar benefit of gold standard adherence and underestimate the postwar benefit of returning to gold at the prewar par.

Since public debt data are scarcer than spread data, the samples in the even numbered columns of each table are much reduced in size.[59] With controls for public debt and lagged inflation added to the regression, however, the results change very little. In the even-numbered columns of Table 6, the gold dummy remains statistically significant and economically important before 1914, and inflation and

[59] See footnote 57 or the Table notes for details.

Table 6: Country Risk and the Gold Standard, 1870–1913

	Levels		Levels		Differences	
	Fixed Effects		Fixed Effects		No Fixed Effects	
	OLS	IV	AR1	AR1	OLS	IV
Full sample						
N	857	305	835	294	832	395
R-sq	0.067	0.142	0.672	0.840	0.019	-0.008
SEE	0.934	0.570	0.532	0.248	0.522	0.238
DW	0.544	0.296	2.129	1.853	2.154	2.064
GS	-0.751	-0.743	-0.543	-0.729	-0.478	-0.674
	(0.097)	(0.131)	(0.125)	(0.128)	(0.120)	(0.123)
INFL		0.961		0.375		0.401
		(0.539)		(0.184)		(0.163)
PUBDGDP		0.536		0.231		1.720
		(0.203)		(0.266)		(1.024)
RHO			0.829	0.917		
			(0.020)	(0.026)		
Bordo-Jonung sample						
N	354	237	345	228	345	327
R-sq	0.227	0.076	0.883	0.867	0.042	0.139
SEE	0.671	0.549	0.249	0.209	0.252	0.192
DW	0.423	0.257	2.011	1.956	2.169	2.107
GS	-1.011	-0.534	-0.366	-0.910	-0.329	-0.924
	(0.101)	(0.168)	(0.087)	(0.123)	(0.085)	(0.111)
INFL		-0.191		0.251		0.299
		(0.890)		(0.248)		(0.266)
PUBDGDP		1.104		-0.128		0.993
		(0.377)		(0.337)		(2.116)
RHO			0.888	0.957		
			(0.020)	(0.025)		

Notes and Sources: The dependent variable is SPREAD as in Figure 8, and the same sample of countries is considered here and in Table 7. Before 1914 we omit Finland and Switzerland for lack of data, and for Austria-Hungary we use the Austria spread. GS is gold standard adherence from Meissner (2001) and Eichengreen (1992), with no missing data. INFL is the CPI inflation rate from Global Financial Data, with missing data for India, New Zealand, South Africa, and Uruguay in all years; and for Austria-Hungary, Brazil, Chile, and Greece before 1914. PUBDGDP is the public debt to GDP ratio from Bordo and Jonung (1996), augmented by data for Argentina from della Paolera (1988) and della Paolera and Ortiz (1995); and for Australia from Barnard (1987); and for various countries from United Nations (1948); with missing data for Mexico, South Africa, and Uruguay in all years; and for Austria-Hungary, Brazil, Chile, Greece, India, New Zealand, Portugal, Spain, and Switzerland before 1914. The 1870–1913 sample includes all countries as in Figure 8 except Finland and Switzerland when INFL and PUBDGDP are omitted. When these controls are added we also lose from the sample Austria-Hungary, Brazil, Chile, Greece, India, New Zealand, Portugal, South Africa, Spain, and Uruguay. In IV cases the instrument for PUBDGDP is its own lag. In AR1 specifications RHO is the autoregressive coefficient.

Table 7: Country Risk and the Gold Standard, 1925–31

	Levels		Levels		Differences	
	Fixed Effects		Fixed Effects		No Fixed Effects	
	OLS	IV	AR1	AR1	OLS	IV
Full sample						
N	162	113	137	92	159	134
R-sq	0.006	0.232	0.113	0.306	0.037	0.171
SEE	0.996	0.999	0.990	1.032	0.946	0.902
DW	1.591	1.728	1.912	2.042	1.955	2.011
GSPAR	-0.208	0.021	-0.198	0.064	-0.670	-0.311
	(0.394)	(0.576)	(0.522)	(0.719)	(0.321)	(0.383)
GSDEV	-0.219	-0.620	-0.413	-0.255	-0.374	-0.336
	(0.274)	(0.389)	(0.367)	(0.483)	(0.278)	(0.279)
INFL		-2.666		-2.596		0.395
		(1.855)		(1.857)		(0.129)
PUBDGDP		5.322		5.990		4.688
		(2.204)		(1.399)		(3.351)
RHO			0.566	0.413		
			(0.156)	(0.197)		
Bordo-Jonung sample						
N	84	72	72	60	84	90
R-sq	0.008	0.216	0.046	0.291	0.013	0.167
SEE	1.048	0.985	1.077	1.006	0.996	0.897
DW	1.603	1.577	1.824	1.860	2.013	1.871
GSPAR	-0.129	-0.008	-0.104	-0.038	-0.502	-0.505
	(0.654)	(0.808)	(1.005)	(1.089)	(0.511)	(0.462)
GSDEV	-0.295	-1.159	-0.316	-0.818	-0.144	-0.304
	(0.400)	(0.539)	(0.578)	(0.676)	(0.423)	(0.424)
INFL		-3.352		-3.413		0.384
		(2.037)		(2.252)		(0.131)
PUBDGDP		4.813		7.133		3.325
		(2.199)		(1.955)		(3.893)
RHO			0.330	0.252		
			(0.216)	(0.224)		

Notes and Sources: See Table 6. GSPAR denotes gold standard restored at the 1913 parity; GSDEV denotes gold standard restored at a devalued parity. The 1925–31 sample includes all countries as in Figure 8 when INFL and PUBDGDP are omitted. When these controls are added we lose from the sample India, Mexico, New Zealand, South Africa, and Uruguay. In IV cases the instrument for PUBDGDP is its own lag. In AR1 specifications RHO is the autoregressive coefficient.

debt enter with the expected positive signs in the full sample. In the narrower Bordo-Jonung sample, inflation has an unexpected negative coefficient in one case and public debt a negative coefficient in another, but the estimated responses are economically small and statistically insignificant in those cases. The instrumental variable (IV) estimates are motivated by the concern that our estimated supply equation might be contaminated by demand effects, that is, simultaneity might be a problem. In these estimates, lagged public debt is used as an instrument for its own contemporaneous value. For the prewar period shown in Table 6, we would regard the differenced IV results (last column) as most reliable in view of the very high autoregressive parameter *RHO* found in column 4. For the full sample, gold standard adherence yields about a 70 basis point reduction in borrowing cost, inflation raises borrowing cost significantly, and public debt has a moderate effect—an increase in public debt equivalent to 10 percent of GDP raises the spread by 17 basis points—albeit one of only marginal statistical significance. In the Bordo-Jonung subsample, more heavily weighted with core countries, the results are similar, although in the preferred differenced IV specification (column 6), gold standard adherence has a larger estimated effect and inflation and debt smaller, insignificant, effects.[60]

Before 1914 the gold standard was indeed a "seal of approval" and was worth about 70 to 90 basis points, always a statistically significant effect, the size depending on the sample. So good a signal was being on gold that markets did not seem to care much what inflation or debt levels might be, at least for core countries: the credibility of gold commitments seemed to be strong enough in that era for markets to believe that the discipline of the gold standard would keep monetary and fiscal policy in line should pressures arise. However, the additional macro variables' effects, though neither economically huge nor statistically very significant, are of the expected sign before 1914.

Do these results change after 1914? Adding the macro controls to the interwar results in Table 7 we see that— leaving aside the column 6 IV-differenced regressions—public debt has a robust positive effect on spreads that is much larger than what we estimate before 1914, and is statistically significant. That effect is reduced only slightly for the Bordo-Jonung subsample, so there is a direct comparison with the per-1914 results. In the interwar period, public debt matters even

[60]Flandreau, Le Cacheux, and Zumer (1998, p. 145) conclude that before 1914, "countries had to plunge quite deep into debt before they started feeling the pain." The limited set of countries for which we have Bordo-Jonung debt data pre-1914 generally had public debt levels at which, according to Flandreau et al., "markets did not inflict massive punishments." This may explain why we find insignificant debt effects under the classical gold standard for the Bordo-Jonung subsample.

for the core gold standard countries, something that was not true before 1914; the results in the upper panel of Table 7 do not appear to not be an artifact of a broader country sample including more peripheral economies. Based on the preferred specification in column 2, an increase in public debt equivalent to 10 percent of GDP raises spreads by about 50 basis points. This finding may help us to understand why many policymakers of the 1930s so feared the market response to unbalanced public budgets, notwithstanding the countercyclical case for fiscal expansion (James 2001). In the 1920s, being on gold was not enough to soothe the financial markets.

Notice that the effect of inflation on the spread, while typically statistically insignificant, is negative in the level specifications, suggesting that deflation rather than inflation may have been a key factor undermining credibility in the interwar period. That is, it may be that in the presence of a negative global demand shock, economies experiencing deflationary pressures were viewed as being riper for default.

Estimates based on the added macro control variables contradict the interwar findings of Bordo, Edelstein, and Rockoff (1999) even more strongly than the earlier naive regressions. Not only is a return to gold at prewar par inconsequential, but in the IV-levels specifications (column 2 of Table 7), a return at a devalued parity is borderline statistically significant (upper panel) if not significant (lower panel). In the interwar period, a return to gold after devaluation appears to lower a country's borrowing spread by around 60 to 120 basis points, though the standard errors of these estimates are large.

To recapitulate: unlike Bordo, Edelstein, and Rockoff (1999), we find very different behavior of bond spreads in relation to the gold standard over the interwar period 1925–31 as compared to the pre-1914 period. This may be ascribed to differences in concept (use of around 300 annual secondary bond yields in London, not around 50 new issues in New York), differences in macroeconomic control variables (government debt rather than deficit), and the use of a different econometric technique (their use of OLS versus our use of instrumental variables and more consistent attention to residual autocorrelation). Of these features in our estimation approach, the first, at least, seems necessary if we are to make comparisons on an equal footing with Bordo and Rockoff (1996).

Before 1914, we find that the gold standard did indeed confer a "seal of approval," whereas macro fundamentals, measured by public debt and inflation, seem to have affected the spreads of peripheral more than core countries. We infer that adherence to gold by core countries was pretty much sufficient to confer credibility, whereas markets took a broader a more skeptical view of peripheral countries.

For the interwar period, a return to gold after devaluation seemed more credible, notwithstanding the arguments that led Britain and other countries to return to gold at par; indeed, returning at par yielded small benefits at best. Moreover, for core and periphery countries alike, high public debts were punished. The situation with regard to inflation was less clear-cut, but it appears that deflationary, not inflationary, fears raised foreign borrowing costs.

Both our results on the drop in spreads associated with going on gold, and on markets' differential response to public debt and inflation prewar and interwar, suggest that the interwar gold standard was indeed less credible than its pre-1914 predecessor. It remains to reconcile these results with findings such as those of Hallwood, MacDonald, and Marsh (1996) that indicate a credible gold standard during the late 1920s, at least in the short term. Perhaps the bond markets adopted a longer perspective under which protracted adherence to unchanging gold parities seemed less probable than short-term adherence.

These findings on bond markets serve to illuminate how different the interwar global capital market was from its antecedent, the classical gold-standard regime of 1870–1914. An image used quite often to describe this regime change in the global economy is one of Humpty Dumpty falling to pieces, and these preliminary statistical results show cross-regime evidence on how those pieces were scattered. The findings offer persuasive evidence that the global convergence of the bond market prior to 1914, so clearly seen in the figure, had been replaced by some quite different disintegrative forces after 1914.

3.2 The Upturn

After the immediate post-World War Two dislocations, the world economy began to reconstitute its severed linkages, a process both promoting and promoted by the return of some degree of durable prosperity and peace. Postwar policy makers, through the IMF, successive multilateral trade liberalization rounds, current account currency convertibility, and other measures, successfully promoted growing world trade. By the late 1960s, the very success of these initiatives in forging trading linkages among countries simultaneously made capital flows across borders ever more difficult to contain. As a result, the trilemma re-emerged with full force, and on a global scale, in the early 1970s. As a result the Bretton Woods system, initially designed for a world of tightly controlled capital movements, blew apart. The major industrial countries retreated to floating exchange rates.

While initially viewed as a temporary expedient, floating rates have remained a durable feature of the international financial landscape. Floating rates helped

reconcile the social demand for domestic macroeconomic stabilization with the interest of the business community for open markets in goods and assets. Some episodes of exchange rate misalignment have prompted calls for renewed protection and even capital-account restrictions. Some of these calls have been accommodated, but usually not in the form of across-the-board restrictions on international transactions.

Other forces have also helped to promote liberalization. In Europe, the political and economic rationales for a large single market have prompted ongoing financial liberalization; at the same time, the political (and, some argue, economic) imperative of stable exchange rates has pushed toward the logical conclusion of a single currency, the euro. Other regions, likewise, have opted for fixed exchange rates, either by some form of ultra-hard peg—Argentina—or outright dollarization, in either case bending to the trilemma by giving up monetary policy autonomy.

Since the late 1980s, the drive toward capital-account liberalization in the developing world is probably the most striking pattern in the evolution of global capital markets. Clearly one element has been the widespread failure in the periphery of populist policies adopted in the 1980s and earlier. On a larger scale, the collapse of the Soviet empire in the late 1980s also highlighted the advantages of the capitalist model. The resulting decline in Cold War tensions certainly held out the promise of greater fluidity in private international capital. Whether exchange rates float (Mexico et al.) or are fixed (Argentina), there is much greater openness to private financial flows on the periphery than in the 1980s. In part a reflection of U.S. business interests, American administrations have pushed developing economies to liberalize on capital account; in some cases, liberalization ran far ahead of domestic financial systems' absorptive capacities, and clashed with national exchange rate policies. The resulting contradictions helped spark the developing country currency crises of the latter 1990s. To attract productive capital from the industrial world remains a prime goal on the periphery, however, and that requires market-oriented reforms, stable macro policies, and transparency in governance and legal systems.

There is, however, one critical dimension in which pre-1914 international capital flows differ sharply in nature from what we see today, with important implications for the periphery: to see this we return to the distinction between net and gross international asset stocks. A cursory glance at the data reveals that this problem is very serious in recent decades, but relatively unimportant in the pre-1914 era of globalization. The reason is simple: in the late nineteenth century the principal flows were long-term investment capital, and virtually unidirectional at that. There was one notable exception, the United States, where both inflows and

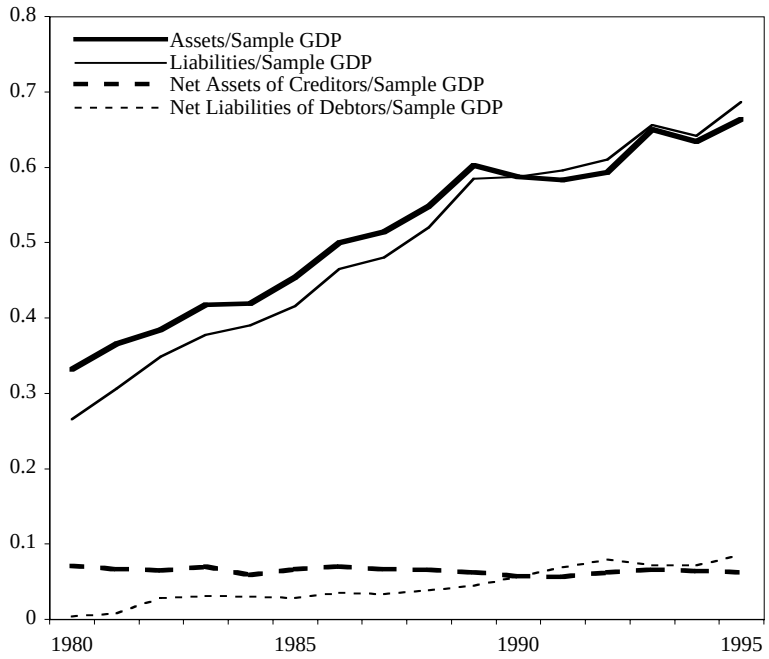
outflows were large. But in most cases key creditor nations, principally Britain, but also France and Germany, engaged in the financing of other countries' capital accumulation, and in doing so, developed enormous one-way positions in their portfolios.

For example, circa 1914 the scale of Argentine assets in Britain's portfolio was very large, but the converse holding of British assets by Argentine's was trivial by comparison. Thus, the nineteenth century was an era of one-way asset shifts, leading to great portfolio diversification by the principal creditor/outflow nations like Britain, but relatively little diversification by the debtor/inflow nations. To a first approximation, the gross asset and liability positions were very close to net in that distant era. The 1980s and 1990s are obviously very different: for example, the United States became in this period the world's largest net debtor nation. But whilst accounting for the biggest national stock of gross foreign liabilities, the United States *also* held the largest stock of gross foreign assets.

Our earlier discussion of the gross stock data, and our inferences concerning the recovery of foreign asset and liabilities in the world economy after 1980, therefore need considerable modification to take into account this problem. And, indeed, it is a significant problem for all of the countries concerned: the rank of countries by foreign assets in the IMF sample, is very highly correlated with the rank by foreign liabilities. Countries such as Britain, Japan, Canada, Germany, and the Netherlands are all big holders of both foreign assets and liabilities. Strikingly, when we net out the data, the result is that, since 1980, the net foreign asset position (or liability) positions in the world economy have remained very low indeed, as indicated by Figure 9. Unlike the gross stocks, the net stocks have increased little, and if we trust the asset data rather more (arguably more of the net asset data are collected in developing countries with better accounting methods) then the picture is one of relative decline in the size of net foreign capital stocks relative to GDP.

Thus, for all the suggestion that we have returned to the pre-1914 type of global capital market, here is one major qualitative difference between then and now. Today's foreign asset distribution is much more about asset "swapping" by rich countries—diversification—than it is about the accumulation of large one-way positions—a critical component of the development process in poorer countries in standard textbook treatments. It is therefore more about hedging and risk sharing than it is about long-term finance and the mediation of saving supply and investment demand between countries. In the latter sense, we have never come close to recapturing the heady times of the pre-1914 era, when a creditor like Britain could persist for years in satisfying half of its accumulation of assets with foreign capital, or a debtor like Argentina could similarly go on for years generating liabilities of

Figure 9: Foreign Capital Stocks: Net Versus Gross

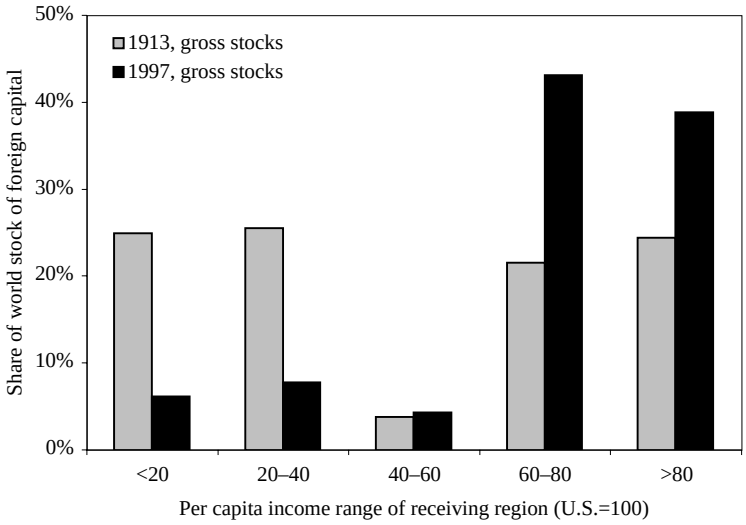


Source: IMF.

which one half were taken up by foreigners. Instead, still to a very great extent today, a country's net wealth will depend, for accumulation, on the provision of financing from domestic rather than foreign sources (Feldstein and Horioka 1980).

An interesting, and closely related, insight also follows from looking at the share of less-developed countries (LDCs) in global liabilities. This is now at an all time low. In 1900, LDCs in Asia, Latin America, and Africa accounted for 33 percent of global liabilities, in the 1990s only 11 percent (Figure 9). The global capital market of the nineteenth century centered on Europe, especially London, extended relatively more credit to LDCs than does today's global capital market. Is this surprising? There are various interpretations for this observation. One is that capital markets are biased now, or were biased in the past; for example, did Britain, as an imperial power, favor LDCs within her orbit with finance? or, today, does the global capital market fail in the sense that there are insufficient capital flows to LDCs, and an excess of flows among developed countries? These are hard claims to prove, as market failure could be a cause, as could a host of other factors including institutions and policies affecting the marginal product of capital

Figure 10: Did Capital Flow to Poor Countries? 1913 Versus 1997



Sources: The 1913 stock data are from Woodruff (1967) and Royal Institute for International Affairs (1937), incomes from Maddison (1995). The 1997 data are from Lane and Milesi-Ferreti (2001), based on the stocks of inward direct investment and portfolio equity liabilities.

in different locations. Of course, this result just follows from the fact that many of the top asset holders also figure in the top liability holders, and most of them are developed OECD countries.

Figure 10 both illustrates the periphery's need to draw on industrial country savings, as well as an important dimension in which the globalization of capital markets remains behind the level attained under the classical gold standard. In the last great era of globalization, the most striking characteristic is that foreign capital was distributed bimodally; it moved to both rich and poor countries, with relatively little in the middle. Receiving regions included both colonies and independent regions. The rich countries were the settler economies where capital was attracted by abundant land, and the poor countries were places where capital was attracted by abundant labor.[61]

Globalized capital markets is back, but with a difference: capital transactions seem to be mostly a rich-rich affair, a process of "diversification finance" rather than "development finance." The creditor-debtor country pairs involved involved are more rich-rich than rich-poor, and today's foreign investment in the poorest

[61] On the broad distribution of foreign capital then, see Twomey (2000).

developing countries lags far behind the levels attained at the start of the last century. In other words, we see again the paradox noted by Lucas (1990), of capital failing to flow to capital-poor countries, places where we would presume the marginal product of capital to be very high. And the figure may understate the failure in some ways: a century ago world income and productivity levels were far less divergent than they are today, so it is all the more remarkable that so much capital was directed to countries at or below the 20 percent and 40 percent relative income levels. Today, a much larger fraction of the world's output and population is located in such low productivity regions, but a much smaller share of global foreign investment reaches them.[62]

As we have noted, capital is discouraged from entering poorer countries by a host of factors, and some of these were less relevant a century ago. Capital controls persist in many regions. The risks of investment may be perceived differently after a century of exchange risks, expropriations, and defaults. Domestic policies that distort prices, especially of investment goods, may result in returns too low to attract any capital. These conditions make a difficult situation much worse. Poorer countries must draw on foreign capital to a greater extent than they do at present if they are to achieve an acceptable growth in living standards. That is a fundamental reason why reform and liberalization in the developing world, despite the setbacks of the late 1990s, are likely to continue, albeit hopefully with due regard to the painful lessons learned in the recent past.

[62] See Clemens and Williamson (2001) for a detailed analysis of the determinants of British capital export before 1914.

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