

The Rise and Fall of World Trade, 1870–1939*

Antoni Estevadeordal
Inter-American Development Bank
antonie@iadb.org

Brian Frantz
United States Agency for International Development
bfrantz@usaid.gov

Alan M. Taylor
University of California, Davis
amtaylor@ucdavis.edu

February 2002

Abstract

The ratio of world trade to output was a mere 2% in 1800, but it then rose to 10% in 1870 to 17% in 1900 and 21% in 1913. It then fell back to 14% in 1929 and only 9% in 1938. The period 1870–1913 thus marks the birth of the first great era of trade globalization, the period 1914–39 its death. What caused the trade boom and bust? The textbook interpretations offer a variety of narratives, but few precise answers. We use an augmented gravity model of trade to examine the gold standard, tariffs, and transport costs as determinants of trade. In the nineteenth century the gold standard was much more important than tariff policy, and just as important as transport costs as a trade-creating force. In the 1920s, the slowdown in trade was driven by a rise in transport costs, though trade barriers other than tariffs might have been important. In the 1930s, the final collapse of the gold standard, persistently high transport costs, and the expansion of other barriers drove trade volumes even lower.

* For excellent research assistance we thank David Colin and Kati Suominen. For help with data we thank Douglas Irwin, Marko Terviö, Chris Meissner, Michael Clemens, and Jeffrey Williamson. We received helpful comments from Dudley Baines, Nick Crafts, Barry Eichengreen, Chris Meissner, Maurice Obstfeld, Stephen Redding, Solomos Solomou, and audiences at the University of California at Berkeley, the London School of Economics, and the annual meetings of the Economic History Association. All errors are ours.

Introduction

In answering the question “when did globalization begin?” recent scholarship points to the mid-nineteenth century. By introducing evidence on price movements, their convergence and correlation, this work points to minimal market integration before 1800 (O’Rourke and Williamson 2002ab). To those familiar with the long run evidence on the volume of trade relative to world output, this comes as no surprise, as the mass of goods trade was so small in prior centuries relative to total economic activity, but then boomed during the nineteenth century.¹ Various superficial measures tell the familiar story, but the boom in world trade is a central part of any story. From circa 1800 to 1914, the level of world trade had increased by a factor of about twenty in volume terms, and by a factor of ten relative to world output. The big surge in international economic integration came late in the century, as the pace of integration in all markets accelerated after 1870.²

It may be contentious to pinpoint the origins of modern globalization, but it is far simpler to say when that globalization ended, that is, when it was disrupted by its first major crisis (James 2001). As Ashworth (1962, 218) notes,

Just how sharp a division 1914 brought in international economic affairs became apparent only in fairly long retrospect. To contemporaries there appeared to be a sequence of upheavals, arising from mainly non-economic causes, and some of these disturbances were so deep and prolonged that they left behind permanent changes in important but limited sections of economic life.

The interwar period stood in marked contrast to its predecessor. Although there was continued economic growth, it occurred in a climate of increasing market disintegration. The century-long trade boom ground to a halt, and even reversed. Trade declines have been associated with wartime shipping dangers, the emergence of new borders, and a rise in levels of protection that crept up in the 1910s and 1920s and then multiplied in the Depression years (Kindleberger 1986, 1989).³

Why was the trade boom from 1870 to 1913 followed by a trade bust from 1913 to 1939? The historical narratives are rich, but their quantitative foundations surprisingly weak. In this paper we attempt the first quantitative explanation of the evolution of world trade volumes over the entire period 1870–1939.⁴ We go beyond previous research that has looked at particular countries and sub-periods; our focus is *total* world trade, which we examine using a broad and consistent panel database. Our empirical strategy is to draw on the most successful model of trade volumes, the gravity equation, incorporating

¹ This aggregate view leaves unmoved world historians working in the tradition of Braudel. Like him they could protest that “every time the volume of a leading sector is compared to the total volume of the whole economy, the larger picture reduces the exception to more modest or even insignificant proportions. I am not entirely convinced” (Braudel 1992:2, 453). A response would be that even if certain goods, locations, companies and traders enjoyed boom times, globalization requires more than a few of these “exceptions.”

² In other markets, international migration had become more free than forced, and numbers increased from a few thousand per year to around a million. International capital markets had become ever more integrated and the size of the flows and stocks of foreign capital had greatly multiplied (Obstfeld and Taylor 2001, 2002; O’Rourke and Williamson 1999).

³ On other world markets, migration slowed as receiving countries like the U.S. erected barriers to entry. International investment was discouraged by explicit capital controls and by currency uncertainty (Obstfeld and Taylor 2001, 2002; O’Rourke and Williamson 1999).

⁴ A very distant relative is the study by Maizels (1963), which still surfaces in economic history texts today. Yet that work only covers trade in manufactures and it is built around more of an accounting type of exercise rather than any formal trade theory.

some of the more recent theoretical advances related to that tool (Anderson and van Wincoop 2001, Redding and Venables 2001, Eaton and Kortum 2001).

Having substantiated the model's fit, robustness, and other statistical properties, we then go on to explore its quantitative implications, seeking to decompose the sources of changing trade volumes over a span of many decades using predicted values based on the model's parameters and observed changes in the independent variables. This classic decomposition approach was taken by Baier and Bergstrand (2000) to offer an account of the *second* global trade boom in the late twentieth century. But although it is sorely needed, there are as yet no historical parallels to their study, where, indeed, the need to explain both booms and busts poses what might be an even greater empirical challenge.

What do we find? In contrast to traditional explanations that focus only obvious goods market frictions such as transport costs and commercial policy, we find that (aside from changes in the scale of world economic activity) a large part of the change in trade volumes can be explained by a "common currency" effect, related to the rise and fall of the gold standard.⁵ Tariffs seem to have played a minimal role before 1914 as expected, but they mattered more after 1914, when policy became more activist. Transport costs on maritime routes played a big role: they fell dramatically before 1914 (as is well known) but they then rose steeply up to 1939 (a lesser known fact). We also find that our ability to explain trade volumes is still incomplete in the interwar period, suggesting that other frictions missing from our model, such as non-tariff barriers, also mattered.

We begin by placing our work in a broader context. The next section recounts the evolution of world trade from 1870 to 1939 according to the conventional wisdom of economic historians. We then relate our econometric methodology to the contemporary empirical literature. Next we discuss our data and counterfactual analysis. We conclude by contrasting our findings with historical debates about these questions, and offer some conjectures for future research.

Explaining the Rise and Fall of World Trade, 1870–1939

Stylized Facts

The volume of world trade grew at a rapid and unprecedented pace in the nineteenth century. The conventional textbook estimates state that world trade per capita grew by a factor of 25 in the "long nineteenth century" from 1800 to 1913. Over that same period world output per capita grew by a factor of about 2.2, indicating that the ratio of trade to output must have increased by a factor of roughly 11. Defining trade volume as the sum of exports and imports, this measure stood at approximately 33% in 1913, leading one to infer that in 1800 trade volumes were no greater than a mere 3% of output, an order of magnitude smaller, although we shall present new estimates that downplay these ratios to 20% and 2% respectively. (Cameron 1993, 275; Kenwood and Lougheed 1999, 79).⁶

⁵ Later, we shall discuss these results in comparison with other studies of the gold standard and trade before and after 1914, such as Eichengreen and Irwin (1995) and, a study contemporaneous with ours, López-Córdova and Meissner (2001). Unlike those studies, we also assess long-run impacts of such payments frictions, and compare them to other forces such as policy and transport frictions.

⁶ Growth of trade was by no means even, but it progressed steadily upwards. It appears that the most rapid sub-period of growth occurred from the early 1840s to circa 1873, when volumes rose at 6% annually, five times faster than population, and three times faster than output. There was some slowdown in the subsequent two decades, but in the years 1893–1913 again the growth rate picked up to about 4.5% per annum. Over the period as a whole, volumes probably grew on average at about 3% annually, a rate similar to that seen in the entire twentieth century (Cameron 1993, 275, 280, 283).

Textbook discussions of the interwar period offer a marked contrast. As Lewis (1949, 139) notes, “production and the standard of living rose, but unemployment, prices and international trade caused uneasiness throughout the period.” In each decade from 1881 to 1913 trade per capita had grown on average 34%, but it grew at an almost negligible rate of 3% per decade from 1913 to 1937. In both periods output and population were rising, but in the interwar period trade volumes did not keep up. For twelve developed economies, in 1913–37 trade grew 11% per decade but output at a rate of 22%. Only in the late 1920s was this trend briefly reversed before a deep plunge during the Great Depression. By 1935 world trade had fallen to one third of its 1929 level in real terms (Foreman-Peck 1995, 200; Kenwood and Loughheed 1999, 211).

Thus, we must be careful to keep in mind that the interwar trade slump was not just a phenomenon of the 1930s depression:

That international trade declined after 1929 is well known, and generally attributed to the slump and its aftermath—international currency restrictions, tariffs, the decline of production, and so on. What is not generally realised is that even in the twenties international trade was already failing to retain its pre-war place. Taking 1913 as 100, and averaging the years 1926–29, world manufacturing production stood at 139, and world production in primary products at 125; but world trade in manufactures stood at only 112, and world trade in primary products at 118. (Lewis 1949, 149) ⁷

These figures from various established secondary sources are presented here for illustration. In a moment, when we begin our empirical analysis, we will discuss in detail some newly tabulated and higher-frequency data on the expanding volume of world trade in this period. The new data span 56 countries on an annual basis for the period 1870 to 1939, and measure the bulk of world trade. For an up-front comparison with previous sources, our series are shown in Figures 1 and 2.

Figure 1 sets out our *explicandum* from 1870 to 1939, the rise and fall of world trade-output ratios, and shows the broader context of the last two centuries. Clearly, this period is a genuine break from the past: the first ever rise in the trade ratio to modern levels, and then an abrupt collapse. Figure 2 shows our detailed annual series on world trade volumes for just the period 1870–1939. As far as the rise and fall of trade over the period, our data tell a story that is completely in accord with these textbook descriptions: a rapid rise to 1913 followed by stability, even decline. The trends in exports and imports are in agreement, though the level of imports tends to be systematically higher, as expected, reflecting the more careful recording of imports at customs houses, in addition to the difference between export (f.o.b.) and import (c.i.f.) prices.

Having no quarrel about the stylized facts, our aim is instead to critically examine—and, we might claim, substantially revise—the conventional narrative, by which we mean the traditional, textbook explanations put forth to account for the rise and fall of trade from 1870 to 1939. Accordingly, we must first parse the extant literature in search of the prevailing explanations for the successive episodes of surge and stagnation.

The Rise of World Trade, 1870–1913

Most explanations for the rise of world trade in the nineteenth century quite reasonably stress as a cause the dramatic changes in the transaction costs of trade in that period,

⁷ In the interwar years the volume of trade in primary products grew faster than that in manufactures. This was a partly corollary of the shift in the terms of trade against primary products (Foreman-Peck 1995, 187).

principally shifts in both commercial policy and transportation costs, in that chronological order.

The revolution in commercial policy began with Britain's move to free trade in the 1840s, most notably with the repeal of the Corn Laws. Diplomacy then yielded the first modern trade treaty with multilateral features—that is, the most-favored-nation (MFN) clause—in the Anglo-French Cobden-Chevalier Treaty of 1860. During the decade that followed a network of similar treaties enveloped the whole of Europe, bringing down tariff barriers between countries and encouraging trade (Kenwood and Lougheed 1999, 90). A new age of liberalism in economic policy began, marking the ascendancy of the ideas of Smith and Ricardo over the mercantilism of yore, despite a mildly protectionist backlash in some European countries after the downturn of 1873 (Cameron 1993, chap. 11; Foreman-Peck 1995, chap. 3).⁸

It is commonly agreed that a principal cause of the protectionist backlash was the second major force for the integration of goods markets, the dramatic decline in long-distance transportation costs witnessed in the global economy from the 1850s to 1913. Lower transport costs “expanded the effective supply of agricultural land and brought down agricultural prices” provoking calls for protection in Europe.⁹ Were other factors in play? Increased world population and industrialization also generated higher volumes of activity and greater specialization, and hence more trade volume, but this cannot explain why trade grew *faster* than both population and output (Foreman-Peck 1995, 113–19).

Notably, the importance of a multilateral payments system with gold convertibility, though central in discussions of financial history, appears only as minor players in the trade story. It is seen as enhancing trade a little on the margin, as when Kenwood and Lougheed (1999, 101; see also chaps. 6 and 7) note that the “world economy could thus achieve *maximum* benefits from trade and investment, especially when barriers to trade and capital flows were minimal, that is under a system of free trade and *convertible currencies*” (italics added).

In the literature, the causes of the boom thus appear to be both technological and institutional, but the main difficulty is that we have no quantitative insights, no clear sense as to how much of the trade boom was due to each of the various forces. Did all forces matter, some, or just one?

Traditional trade theories seem to have their place in any explanation. The trade of this era, despite the growth of the economies of the United States and Japan, was dominated by the exchange of European exports of manufactures for imports of primary products from the rest of the world, an outcome consistent with theories both in the style of Ricardo (based on the Industrial Revolution's head start in Europe) and Heckscher-Ohlin (based on relative resource scarcity in the Old World) (Kenwood and Lougheed 1999, 79, 90). More recently, in their influential treatise on the Atlantic economy of the late nineteenth century, O'Rourke and Williamson (1999) single out one explanatory factor as the prime mover in the globalization of goods markets. They stress the primacy of transport costs as an explanation of changes in goods price dispersion, domestic factor prices and inequality, and political responses:

⁸ On the “backlash”: the question of “how mild is mild?” will be discussed shortly.

⁹ Foreman-Peck (1995, 90). He notes that the causes of falling transport costs appear to have been part technological (mainly the rise of the steamship) and part political. In the second half of the nineteenth century, Europeans assumed political control over most tropical regions, having already settled most non-European temperate regions, displacing their indigenous peoples. Even independent periphery economies (in this era, principally in Latin America) generally embraced liberal policies that also engaged them in the tentacles of the world trading system. In all these various regions transport and communication networks were put in place that allowed commodity market integration to proceed apace.

What was the impact of these transport innovations on the cost of moving goods between markets? ... the decline in international transport costs after midcentury was enormous, and it ushered in a new era. When economists look at this period they tend to ignore this fact and focus instead on tariffs and trade. This is a mistake. It turns out that tariffs in the Atlantic economy did *not* fall from the 1870s to World War I; the globalization that took place in the late nineteenth century cannot be ascribed to more liberal trade policy. Instead it was falling transport costs that provoked globalization. (O'Rourke and Williamson 1999, 35)

Given the lack of any continued reductions in tariffs, what we shall call, *policy frictions*, after the 1870s, a greater emphasis on transport costs is logical. But does it explain the trade boom—that is, quantities, as well as prices? At the end of the day, the quantity implications of such a deep change in the *transport frictions* are just as important (indeed simultaneous with) the price implications. Clearly they could emerge as predictions of appropriately-calibrated models, but they also deserve econometric investigation since our inferences here face several challenges. First, the impact of price convergence on trade volumes depends critically on as-yet-unknown trade elasticities (O'Rourke and Williamson 1999, Figure 3.1, p. 31). Second, *ceteris paribus* was not *paribus*. One omitted variable, the simultaneous spread of a multilateral payments system, could also have played a role in the expansion of world trade in this period—and, by diminishing *payments frictions*, it might simultaneously explain some or all of the commodity price convergence too. To evaluate the quantity impacts of changes in all three kinds of frictions one aim of this paper. We recognize it is not so straightforward to disentangle simultaneous price and quantity effects, both clearly warrant investigation, but our focus is the latter.

The Fall of World Trade, 1914–1939

After 1914, all three kinds of friction increased. Transport costs did not continue their spectacular decline. Maritime transport costs rose during World War One, as expected, fell up to 1925, and rose thereafter. Yet never during the interwar period did they approach their prewar lows, and remained, on average flat from 1921 to 1936 at something close to their 1869 level (Findlay and O'Rourke 2001). At the same time the international payments system was undermined as the gold standard unraveled. In each case this amounted to a reversal of the four decades of progress from 1870 to 1913. One might imagine that increased friction from these sources could have repressed trade, but such an explanation is rarely put forward in textbook accounts of the interwar slump.

Rather, according to Foreman-Peck (1995, 181), “most contemporaries blamed commercial policies for the decline in trade” even if they saw such policies as inevitable during depressions and domestic crises, and many observers today would appear to concur.¹⁰ Describing the absence of major trade barriers prior to the war is a brief

¹⁰ Other theories have surfaced. Some argued that the decline in trade volumes was the arrival of a long run trend, but this “diminishing trade hypothesis” appears ultimately unpersuasive. It assumed that the spread of industrialization would narrow comparative advantage gaps between nations and discourage trade. With hindsight we know that the twentieth century has not seen a narrowing of productivity gaps. Nor has spread of industrialization within a limited club of countries, the OECD, implied a fall in trade volumes, given the perhaps unanticipated rise of intra-industry trade. Instead, most economists now see interwar slump in trade as principally driven by rise in barriers to trade, not deeper economic fundamentals (Foreman-Peck 1995, 180; Kenwood and Lougheed 1999, 223–24).

exercise; cataloging the many and various policy deviations in the interwar years could cover many more pages. Let us try to be brief.

In a definitive study Kindleberger (1989) describes how in an unplanned way these policies evolved. The First World War offered many obstacles to trade such as naval blockades and attacks on shipping, but the belligerents also introduced tougher commercial policies. Britain, once a bastion of free trade, imposed the McKenna duties (up to 33%) in 1915, and discriminated in trade in favor of the empire. France had raised the minimum tariff from 5% to 20% by 1918, the maximum tariff from 10% to 40%, and then introduced quotas in 1919. Canada raised tariffs early in the war.

The armistice ended risks on the high seas, but did nothing to undo these policies. Overall, 1920–25 was a “period of considerable disorder in fluctuations of business and of exchange rates, and, in consequence, in policies relating to international trade” and the measures became more stringent and discretionary. France, Germany (after 1925), Italy, Spain, Belgium, and Netherlands all imposed or raised tariffs in the 1920s.¹¹ “Anti-dumping” tariff legislation was enacted in Japan 1920; in Australia, Britain, New Zealand, and the United States in 1921.¹² Canada’s 1904 legislation was amended and extended in 1921. Up to 1930, Britain retained the option to impose an additional 33% tariffs on any devaluing country. France initiated a series of tariff coefficients to compensate for inflation at home and devaluation overseas (Kindleberger 1989, 161–163; Foreman-Peck 1995, 182; Kenwood and Loughheed 1999, 178).

Eastern Europe had different problems. Policy in the Austro-Hungarian successor states, “each with a national consciousness to assert, not least by measures of protective economic policy, was an obstacle to the speedy revival of commerce” (Ashworth 1962, 220–22).¹³ Fiscal problems led to heavy trade taxes, though revenue was insufficient to prevent a descent into hyperinflationary madness, causing real exchange rate volatility, yet another discouragement to trade (Kindleberger 1989, 164). Clearly, those on the sidelines of the First World War also stood to be gravely affected as trade flows were constrained or redirected. The disappearance of European manufactured exports triggered domestic supply responses in India, Japan, Australia, and parts of Latin America (Ashworth 1962, 220; Kenwood and Loughheed 1999, 177). Embroiled in a civil war of its own “Russia simply disappeared from the international economy” (Cameron 1993, 351).

Trade barriers had shot up after 1914 and were still high and rising in the mid-1920s. A common perception, which we think too optimistic, is that barriers then came down, though slowly and fitfully, in the late 1920s as a supposed “reconstruction” of system began. Certainly, an economic recovery began, and “in spite of Britain’s problems, most of Europe prospered in the late 1920s. For five years, from 1924 to 1929, it seemed that normality had indeed returned” (Cameron 1993, 356). Kindleberger uses the term “Normalization of World Trade” in discussing the late 1920s, but the evidence suggests normalization in commercial policy was more hoped for than achieved.¹⁴

¹¹ Kindleberger (1989, 163) notes that the “commercial-policy features of the treaties ending the First World War were minimal” the sole exception being that the Germans were forced to give 5 years of MFN status to the allies, but when this lapsed on 10 January 1925 there was an immediate return to protection.

¹² In the United States, the Fordney-McCumber Tariff Act of 1922 contained the highest rates in American tariff history, eventually to be surpassed by the Smoot-Hawley tariff in 1930. (Cameron 1993, 352).

¹³ Suspicions ran deep: “the height of absurdity came with the disruption of transportation. Immediately after the war, with borders in dispute and continued border skirmishes, each country simply refused to allow the trains on its territory to leave. For a time trade almost came to a standstill” (Cameron 1993, 351)

¹⁴ “As the world economy slowly settled down, the pre-war system of trade treaties was resumed, with extension of the principle of high legislative tariffs—so-called ‘bargaining’ or ‘fighting’ tariffs—which would be reduced through mutual tariff concessions agreed in bilateral treaties, and extended through the

There were *efforts* to normalize, often by global bodies and international conferences. Lofty ideals were espoused, conferences called, and communiqués issued.¹⁵ On the ground nothing changed; governments didn't have the will to actually undo their barriers (James 2001, chap. 3). The League of Nations called a World Economic Conference in 1927, but it led nowhere. The best that could be said was that a rising trend in tariffs was halted, not reversed.¹⁶ The failure to restore free trade stood in contrast to the restoration of openness in capital markets, a pre-requisite for resumed gold standard operation, which for many interested parties did seem to be a goal worth pursuing.¹⁷

A war of escalating tariffs broke out as the Depression worsened and trading partners played a beggar-thy-neighbor game. Free-trading Netherlands and the Scandinavians formed a block and reacted to sterling devaluation. Quotas expanded in France to encompass most goods. Germany built a system of bilateral trade channels and a rigid and complex set of exchange controls. The 1932 Imperial Economic Conference in Ottawa, originally intended to lower tariffs within the empire, instead increased external tariffs. Such actions were unilateral and international co-operation was no longer even an illusion (Ashworth 1962, 244; Kindleberger 1989, 169–83; Cameron 1993, 358).

To contemporaries, this was economic disintegration of a different magnitude, even to those who had been perhaps too optimistic about progress made in the 1920s:

The big increase of obstacles to international trade came after the slump of 1929. It was then that the international currency system seemed finally to break down; that currency controls multiplied; that tariffs reached enormous proportions and licences became diminutive; and that the free multilateral flow of trade was constrained into bilateral channels....All these obstacles existed in 1920, as an aftermath of the war. But while in 1920 men regarded them as temporary, looked forward to their speedy removal, and did in fact proceed to remove them as the twenties progressed, in the 1930s the obstacles came to be regarded by a much larger circle as desirable in themselves, and not just as temporary weapons for coping with a slump, but as a necessary part of national economic systems. (Lewis 1949, 155)

most-favored-nation clause. To a degree, the initial increases in tariff rates succeeded better than the subsequent reduction through negotiation, especially as not all countries were prepared to subscribe to the unconditional version of the most-favored-nation clause.... The United States especially, with its Fordney-McCumber tariff, stood aloof from the system” (Kindleberger 1989, 164).

¹⁵ A long list of deservedly forgotten declarations reflected merely the droning of well-meaning delegates in pleasant conference locations: the International Convention Relating to the Simplification of Customs Formalities of (1923); the Franco-German Commercial Treaty of (1927); the International Convention for the Protection of Industrial Property (1925); the Convention for the Abolition of Import and Export Prohibitions and Restrictions (1927); and so on.

¹⁶ International bureaucrats were apparently mystified by this disconnect: a League of Nations review of commercial policies in the inter-war period called it a striking paradox that conferences unanimously adopted recommendations, and governments proclaimed their intentions to lower tariffs, but then they did nothing. Why did governments make such recommendations if they did not intend to carry them out? (Kindleberger 1989, 166–67). The League of Nations' influence was even weaker in the 1930s, when it “produced a large number of reports and inquiries on both international and national affairs, but their effect on policy appears to have been minimal.” (Kenwood and Loughheed 1999, 179).

¹⁷ By September 1929 the General Assembly of the League of Nations had grown so alarmed by trends in trade conditions that it moved from seeking tariff reductions to simply stopping increases. This is a sign of how badly commercial relations were deteriorating even in the late 1920s, supposedly the most benign and hopeful years in the inter-war period. The League called for a conference to fix rates for 2–3 years and then try to lower them, and a preliminary meeting was set for February 1930. By then it was too late—the Smoot-Hawley tariff was in motion and the project floundered once it was seen that the United States was heading in the opposite direction (Kindleberger 1989).

A last effort to halt the trend proved fruitless when in 1933 the World Economic Conference met, and failed to reverse the “avalanche of restrictions on world trade.” This failure Arthur Lewis termed the “end of an era.” In the United States the new F.D.R. administration had domestic preoccupations, Britain had set up an Empire preference system, and the gold bloc went off and “battered down to ride out the storm” (Ashworth 1962, 241; Kindleberger 1985, 185). Protection was heavy, increasing after 1930, with “especially destructive” quotas and quantitative controls, and a major regional, imperial and bilateral reorientation of trade began.¹⁸ The twin pillars of the prewar liberal order, the gold standard and free trade, had crumbled as governments moved to restrict international dealings as a way to improve the internal economic position.

Summary

Our survey of the literature has sought to trace, in approximation, the shape and origins of today’s prevailing views. We think it is fair to say that the boom-and-bust story of world trade from 1850 to 1939 is commonly told as a story in three parts, with a strong emphasis throughout on only two factors—transport costs and commercial policy—and the story runs from older textbooks to more recent monographs.

In the first phase, that predates our study, from 1850 to about 1870, the spread of free-trade ideology is emphasized, as is the decline in transport costs. In a second phase from 1870, the dominant explanations of continued globalization in goods markets narrow to just one major factor, transport costs, since tariffs remained stable, or even rose in a backlash (O’Rourke and Williamson 1999). After 1913 the bust—a stagnation of trade volumes and their collapse relative to output and population—is seen first and foremost as the result of a spectacular rise in tariffs, quotas, and other commercial policy barriers (James 2001, chap 3).

We will be able to establish a quantitative basis for some of these explanations, but strikingly absent in the extant literature is any major consideration of the role of payments frictions. This is not to say that narratives have altogether omitted this influence on the course of trade, but it still appears as something of a sideshow.¹⁹ If this is the impression received, we think it is potentially misleading. We don’t know how much of the boom and bust is driven by the conventional goods-market explanation, how much by other forces such as the rise of the gold standard payments system.

However, some *prima facie* evidence seems to leap out in favor of the latter. During the great trade boom from 1870 to 1913 one country after another joined the gold standard regime, and in a gradual way this system spread. In the interwar period, rising trade barriers explain the trade decline, but not the brief recovery from 1925 to 1929. The only frictions easing then were payments frictions, as nations briefly rejoined the gold standard. From such raw correlations one might suspect that payments frictions could matter, but, as with the other frictions, the question to be asked is, how much?

¹⁸ For example, a Franco-Italian quota war broke out in 1932–33. In 1932 eleven countries had fully fledged quota or licensing systems; by 1939, 28 countries, 19 of them European had such barriers (Kenwood and Loughheed 1999, 204; Foreman-Peck 1995, 199–200, 205).

¹⁹ For example, the prewar rise of a multilateral payments system is discussed in chapters by Foreman-Peck (1995) and Kenwood and Loughheed (1999). In a discussion of the interwar collapse of trade, Foreman-Peck (1995, 197) notes that the collapse of lending created frictions that hurt trade. A suggestive correlation, but one whose causation is hard to infer, indicates another possible source of trade volume trends: in theory, trade and factor flows might be complements rather than substitutes, as noted earlier. Interwar trade and factor flows fell together, just as prewar they had risen together (Bairoch 1993; Foreman Peck 1995, 182; Collins, O’Rourke, and Williamson 1999), but the causal link and quantitative significance has not been explored in great detail and suitable instruments would surely prove elusive.

An Augmented Gravity Model of Trade

To study the changing determinants of trade we will use an established workhorse of the empirical literature, the gravity model. A full review of the literature on this model is perhaps unnecessary. It has long been customary to use the model to study the impacts of size, distance, and protection on trade, and we will follow in that tradition. What constitutes a more recent and controversial development is the use of this framework to explore the role of currencies in trade, and this new twist deserves some discussion.

For years, proponents of currency unions have argued that a primary benefit accruing to countries willing to cede control of their monetary policy to another country or a regional authority (e.g. the European Central Bank) would be an increase in trade. Indeed, this is one of the few undisputed benefits of joining a currency union, as transaction costs of trade would be substantially reduced. The problem, however, is that until recently there has been precious little empirical evidence supporting this claim.²⁰

In a groundbreaking study that sought to isolate the effects of exchange rate volatility and currency unions on trade, Rose (2000) found that countries which share the same currency trade over three times as much as countries with different currencies, holding other factors constant. He also found a statistically significant negative effect of exchange rate volatility on trade, but the latter effect was rather small. He thus concluded that forming a currency union is not at all identical to reducing exchange rate volatility to zero. Indeed, he forcefully stated that “the effects of currency unions and exchange rate volatility are not only precisely estimated, but economically distinguishable.”²¹

Rose’s original study relied on contemporary data, as he considered the period 1970–90. As such, many of the countries²² he found to be involved in a currency union were small, poor, or both—unlike the eleven members of the recently conceived European Monetary Union (EMU). He therefore cautions against extrapolating his general result to the EMU countries and other similarly advanced economies. One of the ambiguities that has prompted criticism of Rose’s study is whether his results are due to these particular country characteristics, which may make country pairs likely to trade disproportionately with one another and which may not be adequately controlled for.²³

²⁰ It was generally assumed that reducing exchange rate volatility between trading partners to zero was the equivalent of establishing a currency union. Since the effects of exchange rate volatility on trade have often been shown to be small, such studies tended to favor opponents of currency unions. See a series of studies conducted by Frankel and Wei, some of which are summarized in Frankel (1997).

²¹ His results are robust to changes in the sample of countries, the definition of a common currency, the measure of exchange rate volatility, and the measure of distance, as well as the inclusion of possibly omitted variables and the use of different estimation techniques.

²² Examples include African economies in the CFA franc zone, and Caribbean economies in an analogous currency zone. But Rose also considers all countries, dependencies, territories, overseas departments, colonies, etc. for which the United Nations Statistical Office collects international trade data. For simplicity, he refers to all of these as “countries.”

²³ Utilizing different methodologies, two studies have attempted to control for such characteristics. Persson (2001) uses a matching technique, borrowed from the labor literature, in which the monetary union (“treated”) observations are matched to control observations, which are as likely as the treated observations to be involved in monetary unions. His results point to a much smaller effect (approximately a 66% increase in trade), though some might argue that this effect is still quantitatively pretty large. Glick and Rose (2002) use panel data with fixed effects, exploiting those country pairs that altered their monetary union status during the sample period, and find that currency unions effectively double trade. While such methods may be useful for controlling for characteristics that make a country pair more likely to enter a currency union, in both cases the answer provided is indicative of the probable effects of currency unions on trade only for countries exhibiting such characteristics. It remains unclear whether these results can be extrapolated to alternate country pairs. See also Frankel and Rose (2002); Rose and van Wincoop (2001).

Obtaining a full understanding of how currency unions might affect relatively larger economies has proved difficult with contemporary data due to an extreme shortage of observations. Some recent research has therefore sought answers in the historical experience, in particular the late 19th and early 20th centuries, a time when much of the world was tied to gold.

In a pioneering study, Eichengreen and Irwin (1995) analyzed the extent to which trade blocs and currency arrangements were responsible for the changing patterns of trade observed in the 1930s among 34 developed and developing countries. Looking at the interwar period only, in the years 1928, 1935, and 1938, they find that trade bloc membership increased trade, exchange rate volatility slightly reduced trade, but being on a similar monetary regime, i.e., the gold standard, played no conclusive role in explaining trade patterns. Their results also indicate that any beneficial effects of exchange rate stability on trade among the members of a residual gold bloc were neutralized by the trade restrictions they imposed in the face of increasingly overvalued exchange rates.

However, extremely recent work does find an impact of the gold standard on trade. In addition to this paper, another, written contemporaneously by López-Córdova and Meissner (2001), examines the period 1870–1910 and finds that being on the gold standard had a large effect on trade flows. Specifically, their results indicate that two countries on gold would trade 60 percent more with each other than they would with different monetary standards. In addition, they estimate that a monetary union would more than double bilateral trade flows. The combined effect of these two results is remarkably similar to Rose’s conclusion in the contemporary context.

Our distinct contribution to this literature is twofold. First, we present evidence that spans the pre-1914 and interwar periods to examine the stability and statistical significance of these effects over a longer period.²⁴ Second, we assess the broader quantitative significance of the results by running the critical “horse race.” We compare the contributions of gold-standard effects, that is *payments frictions*, with shocks to *policy frictions* and *transport frictions* to measure the relative importance of each and thus piece together a more complete account of the global trade boom and bust from 1870 to 1939.

Model

We follow the literature in employing an empirical tool with a remarkably consistent history of success in explaining trade patterns, the gravity model of international trade. Trade between two countries is inversely related to the distance between them d (the resistance force) and positively related to their economic size Y (GDP, the attraction force). These two opposing forces have analogs in Newtonian physics, giving the model its name. Thus, trade in two-country world might be expressed as

$$(1) \quad \text{Volume of trade}_{12} = \frac{Z}{d^y} \left(\frac{Y_1 Y_2}{Y_1 + Y_2} \right)^x,$$

where $x, y > 0$ and Z depends on tastes, preferences, transaction costs, and other factors.

Rose and Engel (2002) show that, as well as influencing trade, currency unions have many other real effects.

²⁴ Another work on this topic is in preparation by Flandreau and Maurel (private communication), but only preliminary results are available for comparison at this time. As far as we can tell, the main results of their work appear to be broadly consistent with our findings (see the reported results in Bordo and Flandreau 2001).

The gravity model formulation may appear *ad hoc*, but it gained sound microfoundations long ago (Anderson 1979) and it continues to receive further touches of theoretical refinement (Bergstrand 1985, 1989; Deardorff 1998; Anderson and van Wincoop 2001; Redding and Venables 2001; Eaton and Kortum 2001). It can be derived from both neoclassical and monopolistic competition models and hence appears quite flexible whatever one's priors as regards market structure.

A typical theoretical restriction is that $x = 1$, so that trade volumes rise proportionally as the scale of the world economy increases, that is, trade volume is homogeneous of degree 1 in income levels Y_1 and Y_2 . The positive exponent y is unrestricted and represents an elasticity of trade with respect to underlying transport costs, presumed to be a well-behaved monotonic function of the distance d between the two markets. Though such an assumption is common, it is rarely examined. Since we have some shipping cost data for our period, we can empirically examine this implicit cost-distance mapping later in the paper, and it will prove useful for our counterfactual analysis.

Distance aside, any number of other putative "friction" variables could be added to the Z term in the gravity equation, making it useful for analyzing the effects on bilateral trade flows of regional trade agreements, geographic characteristics, cultural affinities, and so on. Since the objective of this paper is to evaluate the relative importance of various policy regimes in explaining global trade patterns we extend the traditional gravity equation with measurements of *payments frictions*, that is being on or off the gold standard, and *policy frictions* using average tariff levels. (We will later discuss how *transport frictions* can be incorporated into the analysis). We also include a number of other standard regressors in the Z term, and the basic equation we estimate is

$$(2) \quad \ln(\text{Trade}_{ijt}) = \beta_0 + \beta_D \ln(\text{Distance}_{ijt}) + \beta_Y \ln(Y_i Y_j) + \beta_{Y/N} \ln(Y_i Y_j / N_i N_j) \\ + \beta_L \text{Locked}_{ijt} + \beta_A \text{Adjacent}_{ijt} + \beta_I \text{Island}_{ijt} + \beta_G \text{Gold}_{ijt} + \beta_T \text{Tariff}_{ijt} + \beta_V \text{ERvol}_{ijt} + \varepsilon_{ijt},$$

where i and j denote the partner countries, respectively; t is the year of observation (1913, 1928 and 1938); β is a vector of coefficients; and ε_{ijt} is a disturbance term assumed to satisfy the necessary properties. The variables are defined at time t as:

- Trade_{ijt} is total bilateral trade (i.e. imports plus exports) between i and j ;
- Distance_{ijt} is the distance, in miles, between i and j ;
- Y_i is country i 's GDP;
- N_i is country i 's population in period t ;
- Locked_{ijt} is a dummy variable equal to 1 if either i or j is landlocked;
- Island_{ijt} is a dummy variable equal to 1 if either i or j is an island;
- Adjacent_{ijt} is a dummy variable equal to 1 if i and j share a border;
- Gold_{ijt} is a dummy variable equal to 1 if i and j were both on the gold standard;
- Tariff_{ijt} is a measure of the tariff rate of protection on trade between i and j ;
- ERvol_{ijt} is a measure of nominal exchange rate volatility between i and j .

Data

We estimate gravity equations for the years 1913, 1928 and 1938. Most of the data on trade, GDP, and country characteristics used in this exercise comes from a larger data set used by Irwin and Terviö (2000) for a study of the effects of trade on the income over the

entire twentieth century, and the sample of 40 countries is shown in Appendix 1.²⁵ Because their trade data was in nominal U.S. dollars, and their GDP per capita data was in constant 1990 U.S. dollars, we had to convert their GDP per capita figures into current dollars to obtain country GDPs. This was done by first normalizing their GDP per capita data to the U.S. and then scaling the normalized figures by U.S. GNP per capita. U.S. GNP per capita data for these years are available from the Bureau of the Census (1975). For gold standard adherence, we relied on data provided by Chris Meissner for 1913,²⁶ supplemented by interwar data found in Eichengreen and Flandreau (1996) and Eichengreen (1992). Our tariff data comes from Clemens and Williamson (2001).²⁷ Following Rose (2000), nominal exchange rate volatility is set equal to the standard deviation of the monthly series of log bilateral nominal exchange rates for a particular pair of countries over the previous five years, using Global Financial Data as a source.

Traditional Specification

Employing the simple and time-honored gravity specification just described, baseline year-by-year and pooled estimates are reported in Table 1. The OLS estimates on the left side of Table 1 use $\ln(\text{Trade}_{ijt})$ as the dependent variable and are based on truncated samples that exclude observations for which trade between a give country pair is zero. This is problematic because such cases also provide useful information about trade patterns; excluding them could indeed bias the results. Alternatively, as is typical in the literature, we could employ Tobit estimates on censored data by constructing a new dependent variable $\ln(1 + \text{Trade}_{ijt})$ as on the right side of Table 1.²⁸

We include cross section regression for comparison, but we need to stress at this point that our preferred estimates are those using pooled data. We hold to this view because estimation is more precise when we exploit the more substantial variation found in the data by looking across time. Furthermore, for our purposes, it is important to have a particular kind of time variation in the data to investigate the impacts on trade of certain policies, such as going on and off gold or changes in tariffs. Specifically, our pooled samples include a year in which the gold standard was widespread and trade was supposedly quite free (1913); but it also includes years in which trade was more controlled, and the gold standard was either almost fully revived (1929) or virtually dead (1938). To control for other changes in the world trade environment between periods that are not captured by our right-hand side variables we can also include year dummies.²⁹ These time effects are significant and negative in the pooled regressions of Table 1, and they indicate that trade volume was significantly lower in 1928 and 1938 than is accounted for by our explanatory variables alone. Based on our earlier historical discussion, this perhaps comes as no surprise given what we know about the increase in non-tariff barriers between the wars, and it is a measure of what is still missing from this model.

In the pooled OLS specification the standard gravity variables, distance, GDP, and GDP per capita are precisely estimated and their signs and magnitudes are consistent with estimates from other gravity models.³⁰ Also as expected, the locked and adjacent

²⁵ We thank Douglas Irwin and Marko Terviö for generously providing this data.

²⁶ We thank Chris Meissner for generously providing this data.

²⁷ We thank Michael Clemens and Jeffrey Williamson for generously providing this data.

²⁸ There are other standard approaches followed in the literature, but they produced similar results and are not reproduced here.

²⁹ Similarly, López-Córdova and Meissner (2001) add year dummies to their pre-1914 pooled regressions.

³⁰ The gravity model appears to perform quite well in contrast to rival models, such as the Heckscher-Ohlin model (Estevadeordal and Taylor 2002), which performs about as poorly in the past as it does today.

dummy variables are usually statistically and quantitatively significant, and, when so, carry the right sign. The island effect is statistically insignificant and quantitatively small (about -6%). The average tariff has a quantitatively large coefficient of -0.75 , though this effect is also statistically insignificant.

The gold standard effect in the pooled regression is positive and highly significant, and measures $+0.542$, meaning that country-pairs which jointly tied their currencies to gold traded ($e^{0.542}-1$) $\approx 72\%$ more. Though somewhat less than Rose's initial estimate of the impact of ($e^{1.21}-1$) $\approx 235\%$, our finding confirms his general conclusions that countries joined in monetary union tend to trade disproportionately with one another and that the effect is indeed economically large. We also find that this impact is distinct from, and much more important quantitatively, than the elimination of exchange rate volatility *per se*. Increasing ERvol from zero to 0.5, would have decreased trade by only about 10%.³¹ In the pooled Tobit model, the standard gravity variables are again of the right sign and highly significant. Other explanatory variables are broadly consistent with the OLS estimates.

Endogeneity Issues

As we shall see later, when all the results are considered together, the gold standard results of Table 1 are also consistent with other studies using a similar methodology but slightly different datasets. First, some further discussion of robustness is in order. One problem that has riddled the literature exploring the effects of exchange rate volatility on international trade is the issue of simultaneity. That is, a country may decide to stabilize its currency with respect to those of its main trading partners; exchange rate stabilization would thus follow trade rather than vice-versa. This has certainly been the case in contemporary Europe. To deal with the simultaneity problem, economists have often employed the method of instrumental variable estimation. This requires the construction of a separate variable that is linked to exchange rate volatility but is not affected by trade considerations.³²

Applying the same logic to the case of currency unions, it could be the case that countries decide to enter into monetary union on the basis of their existing trading relationships. In a contemporary context, Rose (2000) dismissed this argument as purely hypothetical, citing evidence that shows trade considerations to be almost irrelevant to a country contemplating a decision to join or leave a currency union.³³ It is quite likely that the simultaneity problem is more relevant in a historical context. Indeed, there appears to be evidence that countries may have joined the gold standard as a result of their trade dependence on other countries that happened to switch to gold. One such example, as noted by Gallarotti (1995), is the Scandinavian Monetary Union,³⁴ whose members

³¹ This seems like a meaningful experiment for our sample period. In cross section, the mean ERvol (calculated from a lagged five-year window) was 0.01 in 1913, 0.22 in 1928, and 0.04 in 1938. Thus, an increase from 0 to 0.5 corresponds to a two-standard-deviation shift in this variable for 1924–28, the most volatile period in our data.

³² A commonly used example is the volatility of two countries' relative money supply since money supplies and bilateral exchange rates should be highly correlated under the monetary theory of exchange rate determination while monetary policy is less likely to be used to influence goods trade.

³³ Nevertheless, he attempted to test for the endogeneity of his currency union dummy by utilizing the same instrumental variables he used as instruments for exchange rate volatility. Though still correctly signed and significant, his results are, in his own words, "wildly implausible." His results thus point to the extreme difficulty in finding appropriate instruments for a currency union dummy.

³⁴ Members of the Scandinavian Monetary Union were Denmark, Norway, and Sweden. In addition to testing for the effects of the gold standard on trade, we also considered the effects of the Latin Monetary

“found the German transformation [from silver to gold] compelling given a pronounced trade dependence on German states; hence once Germany made the switch, they decided that their monetary systems would have to follow along. Given their own monetary interdependence, each recognizing the monies of the others as legal tender, the move to gold would best be instituted en bloc” (p. 61).

We address this problem by using as an instrumental variable (for the gold dummy) the product of the logarithm of each partner country’s average distance from all countries on gold. Here, one reasons that the farther a country is from gold countries, the less likely it would be to trade with gold countries, thereby reducing the incentive to adopt the gold standard. The 2SLS results are reported in Table 2, with no great surprises. The coefficient on gold is stable in these regressions and very close to the range obtained in our baseline OLS specifications in Table 1. So the results appear robust even with controls for endogeneity.

We conducted even more sensitivity checks, but space constraints preclude their inclusion. Most importantly, we implemented the SUR estimation strategy of Eichengreen and Irwin (1995), allowing the residuals of the 1913, 1928 and 1938 cross sections to be correlated, and once again we found our results to be robust.

State-of-the-Art Specification

The application of the gravity equation to trade has recently received further theoretical refinement and it is worth asking whether the modified empirical specifications now considered “state of the art” have implications for the estimated coefficients. Specifically, as an additional sensitivity check, we add fixed *country effects* to our specification. The theoretical motivation for their inclusion is that they control for unmeasured country-specific market attributes or frictions.

Country fixed effects emerge from more recent gravity models of trade with tight microfoundations, whether they are based on consumer differentiation among goods on the demand side (Anderson and van Wincoop 2001; Redding and Venables 2001) or Ricardian differences in technology on the supply side (Eaton and Kortum 2001).³⁵ Although each model differs in its details, empirical implementation in all three revolves around an estimating equation of essentially the same form, where exports of a good from i to j are given by

$$x_{ij} = \left(\frac{p_i t_{ij}}{P_j} \right)^{-\theta} y_i y_j,$$

where p_i is the price at location i of a good from i (f.o.b.), $t_{ij} > 1$ measures the iceberg transport cost factor between i and j , $P_j = \left[\sum_i (\beta_i p_i t_{ij})^{-\theta} \right]^{-1/\theta}$ is the overall price index in market j , and y_k is output or expenditure at location $k=i,j$, and $\theta > 0$. This expression is intuitive. Bilateral exports will increase if the home country expands (a larger set of goods produced) or if their prices p fall; if transport costs fall (the arbitrage element); and lastly if the import market expands (more expenditure) or if it becomes less competitive (a rise in overall prices P of goods from rival sources).

Union, which included Belgium, France, Italy, Greece, and Switzerland from our sample, and the Scandinavian Monetary Union, separately and jointly, in 1913. No significant impact was found, however, a result most likely due to a lack of observations. Indeed, only about 2 percent of all observations took on a value of 1 for the dummies constructed to examine these unions’ effects.

³⁵ For more details on the state of the art, see the excellent survey by Harrigan (2001).

We note that, in such models, total world trade is homogeneous of degree zero in the iceberg costs, which might sound unappealing at first, since with fixed product and expenditure assumptions, this sounds like a “lump of trade” fallacy. However, it must be remembered that these models also include a prediction of “intranational trade” x_{ii} which depends on internal transaction costs T_{ii} . As long international costs T_{ij} fall *relative* to intranational costs T_{ii} then lower transport costs do indeed promote trade via a process of trade “diversion” from goods traded within to goods traded between countries (Anderson and van Wincoop 2001, p. 9).

These two analogous models form a sound basis for the gravity equation as an empirical tool if the iceberg costs can be reasonably parameterized by distance and other geographic or policy variables. Unfortunately, they also raise the stakes quite a bit in terms of data requirements. Specifically, such models require estimates of traded goods price indices at each location. In some cases this is a feasible estimation strategy, as in the work of Baier and Bergstrand (2001), who have the benefit of studying a postwar OECD sample for which such detailed price data are available. However, when we attempt to apply this method to countries where such data are scarce or unavailable, we have a potential omitted variable problem, and the only solution is to include fixed effects to mop up these missing country-specific terms. Such was the case in Rose and van Wincoop (2001), who examined a cross section of countries in the postwar period, including many developing countries. Historical data for our period are similarly incomplete, so we adopt the same empirical strategy.³⁶

These results are reported in Tables 3 for the preferred pooled OLS, 2SLS, and Tobit specifications. We compare results with time and country effects to those including country effects only. We find that year dummies for 1928 and 1938 are typically statistically insignificant. That is, using a more refined specification that allows for country-specific market effects, our model suggests quite a stable relationship between trade and the underlying variables even in the interwar years of trade disruption. This is only marginally true of the Tobit specification, and we speculate that this is perhaps because interwar controls could have shut down some bilateral trade channels completely, leading to more zeroes, and more severe truncation problems in those years.

Otherwise these new results conform closely to the previous results in Tables 1 and 2.³⁷ The conventional gravity variables all have similar magnitude and statistical significance. The one exception is income per capita, which appears insignificant. This may be considered quite reasonable, however, if we view pre-1940 trade as being driven less by intra-industry trade and differentiated product types, where increasing numbers of varieties (and hence trade) might be associated with levels of development.

One major change stands out: the much smaller magnitude of the gold standard effect. Compared to Tables 1 and 2, this coefficient has fallen by almost 50% with country fixed effects. However, this is a plausible result that delivers a conservative but

³⁶ Some mathematical housekeeping is needed. As is evident from the theory, the fixed effects of the exporting (reporting, R) and importing (partner, P) country are distinct, so that these fixed effects on total bilateral exports should be written as *two* sets of country fixed effects, using the Kronecker delta,

$$x_{ij} = \sum_k (R_i \delta_{ik} + P_j \delta_{jk})$$

But recall that our data are only for total trade (exports plus imports), hence we write total bilateral trade as

$$x_{ij} + x_{ji} = \sum_k ([R_i + P_i] \delta_{ik} + [R_j + P_j] \delta_{jk}) = \sum_k ([R_k + P_k] [\delta_{ik} + \delta_{jk}])$$

where the last expression follows from the algebra of Kronecker deltas. That is, we are required to adopt a specification where each country dummy equals 1 whenever that country enters as part of the bilateral pair, and is zero otherwise.

³⁷ The island dummy is omitted because it is collinear with the fixed effects

more credible estimate as to the effect of the gold standard on trade volumes. To justify this, we can compare this estimate with other scholars' estimates of the effects of common currencies on trade today, and the effects of the gold standard on trade in history. Since all the other gravity equation coefficients are not so hotly disputed, Table 4 shows just the currency regime coefficients from several studies.

We take two main lessons from Table 4. First, the effect of the gold standard on trade was much weaker than the effect of common currencies today. This is not surprising since the gold standard still left countries with their own money, under more or less strict rules, and included escape clauses; by contrast, a currency union is “fixing” for life. Trade effects might be less under gold because the regime thus had slightly less transparency and credibility, and slightly more friction.

Second, like every other study that has included country fixed effects, we also find that adding these leads to much more moderate estimates as to the effect of the currency regime on trade. This consistency is reassuring, and helps deflect some of the criticism that attached to the early results as being just too large to believe. For comparison, Rose (2000) found that with fixed effects, the coefficient on contemporary currency unions fell from 1.21 to 0.77 (a fall of about 40%). López Cordova and Meissner (2001) found their gold standard coefficient from 1870–1910 fell from 0.48 to 0.28 (almost 50%), and the latter point estimate looks very similar to ours.

As we are about to see, our counterfactuals accord most closely with regression 2 in Table 3. This regression implies some simplifying parameter restrictions: we can accept that $\beta_Y = 1$ and $\beta_{Y/N} = 0$, meaning that trade is homogeneous of degree 1 in output as suggested by theory, and invariant to changes in per capita income.³⁸ We can also accept that $\beta_V = 0$, so exchange rate volatility can be neglected, and all currency effects operate via adoption of the gold standard. We therefore adopt parameter estimates in the simulations as follows. The gold standard parameter is taken to be +0.293, a value that corresponds to a volume impact of about $(e^{0.293} - 1) \approx 34\%$. The tariff elasticity of trade is taken to be -1.612 , and the distance elasticity -0.635 .

Three Large Counterfactuals

We have found that the gold standard had a statistically and quantitatively significant effect on bilateral trade patterns in the early twentieth century, both before and after World War One. This result seems to be consistent with the burgeoning strand of literature examining the effects of currency unions on international trade. We have also found a similarly significant effect of commercial policies as measured by tariffs. How do these results help us understand the causes of the global trade boom and bust?

To make the connection, we must pose the appropriate counterfactuals. There are three experiments to be considered to account for variations in the three kinds of frictions in markets. Later, a simpler fourth counterfactual will attempt to explain some of the residual as a function of scale effects.

1. *Payments frictions.* The effect of the gold standard will be inferred by posing the following counterfactual question: what path would world trade have followed from 1870 to 1939 had countries maintained their actual 1913 commitment to gold throughout the entire period?
2. *Policy frictions.* The effect of trade policy will be inferred by posing the following counterfactual question: what path would world trade have followed from 1870 to

³⁸ Baier and Bergstrand (2001) also find that $\beta_Y = 1$ is not rejected on contemporary OECD data.

- 1939 had countries maintained their actual 1913 tariff levels throughout the entire period?
3. *Transport frictions.* The effect of transport costs will be inferred by posing the following counterfactual question: what path would world trade have followed from 1870 to 1939 had transport costs maintained their actual 1913 level throughout the entire period?

The gravity model will work well for the first two experiments, with the geography variables assumed to remain unchanged.³⁹ Since transport costs do not directly figure in the econometric analysis, this counterfactual requires some ingenuity to introduce appropriate auxiliary assumptions. To perform the counterfactual exercises we use annual data on trade, gold standard adherence, tariff protection covering 1870 to 1939.

Data

For panel data on trade volumes in local currency for up to 120 countries (listed in Appendix 1) we use Mitchell (1992, 1993, 1995). These were converted to current U.S. dollars using exchange rates from Global Financial Database, and then converted to constant 1900 U.S. dollars using the U.S. GDP deflator (from Obstfeld and Taylor 2002). To eliminate bias due to a changing sample size, a sample with constant cross section size ($N = 56$) was constructed by imputing data.⁴⁰ The coverage of this database is fairly comprehensive. Compared to “total” trade from the 120-country sample, the subsample we use covers about 98% of trade at the start of the period, falling to about 95% in 1910, and 85% by 1939. The data have been seen in Figure 2 and general trends discussed.

For panel data on the gold standard adherence of countries we make use of the work of López Cordova and Meissner (2001) for 1870–1914 and Eichengreen (1992) for 1919–39. For missing data and in the war years 1915–18 we rely on various sources, and where wartime data is unavailable we assume most countries adherence in these four years is as in 1919. This proves to be a comprehensive source for our purposes, covering all 56 countries in our trade dataset in all years. A summary of this data is shown in Figure 3, which depicts gold standard adherence 1870–1939 using both country weights and export weights. The rise of the system after 1870 is dramatic, with adherence increasing from less than 15% of countries to over 60% in the 1880s, and almost 90% by 1913. The subsequent collapse is rapid, back to around 25% in the war and its aftermath. From 1924 to 1928, however, reconstruction was rapid, and this measure of adherence fleetingly regained its 1913 level. In the 1930s, a slow and final collapse brought adherence down again to around 25%.

For panel data on tariffs we are grateful to Clemens and Williamson (2001 and unpublished data), who allowed us to make use of their 35-country sample of tariff estimates. Their methodology estimates the overall average tariff level according to import duties divided by total imports.⁴¹ The data are shown in Figure 4 in the form of a

³⁹ This is not exactly true, when samples change over time due to the creation of new countries. Territorial boundary changes can affect the variables Distance, Locked, Adjacent, and Island, all of which might have made some difference to trade patterns in Europe after 1919. So perhaps, more accurately, we should think of our counterfactual as assuming away such changes.

⁴⁰ The following algorithm was used. Countries with at least 50 observations for exports and imports in the 60 years 1879–1938 were included. Missing data from 1870–1913 and 1920–39 was imputed by trend interpolation, backcast, and forecast using world trends. Missing data for 1914–19 was not imputed, but in these wartime years the sample size never fell below $N = 51$.

⁴¹ This proves a useful dataset for our purposes, but the sample of countries is smaller than our 56-country dataset for trade, so we are limited in the number of countries for which we can perform a tariff

world average tariff level, using export weights. Some important trends in this series warrant mention. First, despite all the talk of a protectionist backlash against free trade after 1870 and up to 1914, we see little evidence of it here. On average world tariff barriers rose in this period, from around 12% to around 15%, but this could only imply a modest increase in price gaps between export and import points (less than 5%). Next we should note that average tariffs *fell* from around 1900 to 1914 and then strongly to 1920. World inflation undermined the *ad valorem* impact of the predominantly specific tariffs of this period. This prompted legislative pressure to restore protection, albeit with a lag. In the 1920s, as expected from our earlier narrative, we see that the tariff reductions since 1900 were undone, but the earlier peak was by no means exceeded. Still, trade was repressed by other means in this period, such as by quotas and other frictions, so this result might be expected. In the 1930s, tariffs rose to much greater levels than had been seen since 1870, around 20%.

On international transportation costs, we are in no position to construct a panel database over 1870–1939 for costs in trade for each country, let alone for each country pair in each year. The only reasonably comprehensive series for global freight rates covering almost the entire period is that for 1869–36 due to Isserlis (1938) and based on British tramp shipping freights on routes worldwide, displayed in Figure 5.⁴² Of course, this index covers only maritime costs, and says nothing about the changing nature of overland transport costs, a subject we shall return to shortly; and there could be unresolved problems on long versus short routes, where compositional effects might be critical.⁴³ For example, based on only two data points, and hence useful only as an illustration of composition problems, we note that the freight/cost markup fell from 41% to 22% on North Atlantic wheat shipping 1870–1914, but from 74% to 18% on rice from Burma to Europe (Williamson 2002). Another potential problem with the data occurs during the wartime period 1914–18, when freight rates are measured by Isserlis as quadrupling. A rise in freight rates would be expected due to wartime dangers and restrictions, but the British shipping industry was not operating under market mechanisms in this period. Accordingly, we should treat data for these years with extra caution. Other than this, the data appear plausible: a roughly 30% decline in freight rates is seen over the period 1870–1913, and a virtually complete reversal of that trend is then seen to 1939.

Simulation 1: The Gold Standard

In our first counterfactual we infer how much of trade variation in each year relative to 1913 is attributable to the gold standard alone. By equation (2), if all countries are given their 1913 gold standard commitment in year t , then the change in trade for each pair is

counterfactual experiment (see Appendix 1 for the list of countries covered). However, the tariff data does include most major trading nations, and it covers between 70%–80% of trade in our 56-country sample in most years, falling to 60%–70% in the 1930s.

⁴² Still, the Isserlis index is more “global” than one might at first think. With no “navigation acts” or other major colonial impediments in place, British merchant shipping in this period carried freight to and from all the world’s major ports, and Isserlis was able to use rates from over 300 routes to build his index. Moreover, the lack of cross-sectional variation may not be too problematic for us if British freighters served most ports, if shipping was internationally competitive, or if shipping technology rapidly diffused between British and non-British carriers. In that case, this index is an adequate proxy for cost declines on all routes.

⁴³ A 50% fall in freight cost markups is likely to matter more for boosting trade as c.i.f./f.o.b ratios fall from 200 to 150 on a long and expensive route, than when they fall from 110 to 105 on a short and cheap route. This point is made by Hummels (1999) in relation to postwar trade and the compositional changes due to the rise of containerization and then air-freight.

$$(3) \quad \Delta \ln (\text{Trade}_{ijt}) = \beta_G (\text{Gold}_{ij,1913} - \text{Gold}_{ijt}).$$

Hence the counterfactual trade level Trade_{it} for country i is given by

$$(4) \quad \begin{aligned} \text{Trade}_{it}^C &= \sum_j \text{Trade}_{ijt}^C = \sum_j \{1 + (\exp(\beta_G) - 1)(\text{Gold}_{ij,1913} - \text{Gold}_{ijt})\} \text{Trade}_{ijt} \\ &= \text{Trade}_{it} \{1 + (\exp(\beta_G) - 1) \sum_j (\text{Gold}_{i,1913} \text{Gold}_{j,1913} - \text{Gold}_{it} \text{Gold}_{jt}) \text{Trade}_{ijt} / \text{Trade}_{it}\}. \end{aligned}$$

Thus, in the base year and 1913, the gold standard impact on trade for any country is, to a linear approximation, the product of two terms: the elasticity measured by β_G and the “network effect” (under the summation), which equals the trade-weighted number of partners that are on gold at the same time. Note that we can also perform other counterfactuals this way, for example, replacing $\text{Gold}_{i,1913} \text{Gold}_{w,1913}$ by unity for an “all on gold” counterfactual trade level were *every* country to be have been on gold.

Note the importance of the weight of bilateral trade in the “network effect” term. This poses an empirical challenge. It is surely impossible to construct a complete set of bilateral trade-weight matrices $\{\text{Trade}_{ijt} / \text{Trade}_{it}\}$ for all i - j pairs and all years t . We make the simplifying assumption that these weights remain fairly stable over time, and use the 1913 bilateral weights $\{\text{Trade}_{wj,1913} / \text{Trade}_{w,1913}\}$ in all years as an approximation to country specific trading patterns, which we expect to be somewhat persistent over time.⁴⁴

The results are shown in Figure 6, and indicate the powerful effects on trade of payments frictions. Had the 1913 gold standard been applied in 1870, trade volumes would have been about 25% higher. From 1870 to 1913 the trend growth of world trade would have been almost one-sixth lower, 3.3% per annum versus 3.8%. Since world output grew at about 2% per annum over the same period, this would have cut the growth rate of the trade-output ratio from 1.8% to 1.3%, a much more significant fall of about 30%. Part of the 1914–25 stagnation of growth is similarly explained, by gold standard collapse, for under the counterfactual the trend growth of trade would not have declined so much. Clearly, though, other frictions must have stopped the trend growth of trade after the early 1920s, for then even the counterfactual level is flat. It is also clear from the “all on gold” counterfactual that the 1913 gold standard came very close to achieving maximal benefits from reducing payments frictions: perhaps only another 5%–10% of trade volume could have been eked out by placing the entire sample on gold.

Simulation 2: Tariff Protection

Following the above logic, we next ask what might have been the pattern of trade had countries counterfactually maintained an even level of tariff protection at 1913 levels.

By equation (2), and applying Model 2 of Table 3, if all countries are given their 1913 tariff level in year t , then the change in trade for each pair is

$$(5) \quad \begin{aligned} \text{Trade}_{it}^C &= \sum_j \text{Trade}_{ijt}^C \\ &= \text{Trade}_{it} \{1 + \sum_j \exp[\beta_T(1+t_{i,1913})/(1+t_{it})] \exp[\beta_T(1+t_{j,1913})/(1+t_{jt})] \text{Trade}_{ijt} / \text{Trade}_{it}\}. \end{aligned}$$

⁴⁴ For our 56-country sample, bilateral weight data for 1913 cover 34 countries, or 98% of the total trade in that sample. The data are from League of Nations (1927). We use overall world trade shares as weights for the 22 smaller omitted countries (the largest of these is Mauritius, with only 0.75% of total trade in the 56-country sample). Any bias resulting from this approximation will not affect the overall result.

Again we make the simplifying assumption that these weights remain fairly stable over time, and use the 1913 bilateral weights $\{\text{Trade}_{w,j,1913} / \text{Trade}_{w,1913}\}$ in all years. We could also explore other counterfactuals, such as a uniform zero tariff level, which, absent quotas and other restrictions (i.e., not during the interwar period) might be labeled the “free trade” counterfactual. For that exercise we would replace $t_{i,1913}$ and $t_{w,1913}$ in the above expression by zero.

The results are shown in Figure 7, and indicate the very weak effects on trade of tariff policy frictions. Had the 1913 tariffs been applied in 1870, trade volumes would have been no different. This is no surprise given how we saw in Figure 4 that tariff levels barely changed in the 1870–1914 period. The interwar period offers greater scope for tariff effects, but the impacts are uneven. In the 1920s the effects worked in the wrong direction, early 1930s tariffs reached their maximal level, but their impact on trade volume was at most to reduce it by 40%. Given the deviation from the 1870 to 1939 trend in this period, such an impact must be considered weak indeed, at least relative to the primacy accorded tariff policy as an explanatory force.

Again, other frictions must have stopped the trend growth of trade in the interwar period, and since tariffs have now been eliminated, we must hypothesize that either transport friction or other forms of commercial policy, such as quotas, made the difference. It appears that both of these factors lie outside our gravity model, but whilst this is true for quotas, we can take some creative steps to establish some rough estimates as to the impact of changes in transport costs on trade.

Simulation 3: Transport Costs

Since we have no transport costs data for bilateral pairs, but only a global time series, we were unable to include this variable in the gravity model. However, it might be objected that the gravity model *does* include transport frictions, explicitly or implicitly, in its formulation. The explicit transport cost term is, of course, the distance variable, since using iceberg or other types of cost friction allows trade theorists to posit a distance-cost relationship for shipping. The implicit allowance for transport costs, on the margin, is afforded by the tariff variables. We examine the latter first.

In the gravity model, what is the impact on trade of an increase in an *ad valorem* transport cost factor c ? Let us write the gross mark up $C = (1 + c)$ and for an *ad valorem* tariff t , let us write the gross mark up $T = (1 + t)$. Clearly, the total mark up between export and import prices, neglecting other frictions (such as domestic transport costs or other policies) would be $CT = (1 + c)(1 + t)$. That is, a change in *ad valorem* transport costs is isomorphic to a change in the *ad valorem* tariff level.

By analogy with the previous counterfactual, knowing c we could estimate trade levels assuming constant 1913 transport costs, as

$$(8) \quad \text{Trade}_{it}^C = \text{Trade}_{it} \{1 + 2\beta_T(c_{i,1913} - c_{i,t})\},$$

where $c_{i,t}$ is the average mark up on trade from country i .

We can now proceed with estimation, given some measure of *ad valorem* transport costs. Unfortunately, this is difficult to obtain, and seemingly impossible on a country basis. We therefore assume the mark up is uniform on all routes. This is a regrettable approximation, since cost reductions are likely to matter more on long routes, as noted. A more fundamental problem is that the Isserlis index is for freight rates θ , in constant shillings per ton; but the markup is unitless, and takes the form $c = \theta/v$ on any given good, where v measures the value-to-weight ratio of the good, also in constant

shillings per ton. Such data are scant for specific goods, let alone as a weighted average for all trade, such as we seek here. Instead we approximate by finding the markup in some base year, and, assuming v is constant in real terms, make a chain index via the Isserlis series. Thus we are ignoring compositional effects due to changes in the weight to value mix of goods shipped.⁴⁵ According to Williamson's (1999, Table 1) figures (cited earlier) the wheat mark up on Atlantic routes was about 20% in 1913, and this is also the same as the markup on the longer Rangoon to Europe rice run. This mark up could be rather high if these bulk commodities have low value-to-weight ratios. Accordingly we set the c.i.f./f.o.b. mark up factor c in 1913 at 0.2 and extrapolate through time from 1870 to 1939 using the Isserlis index as a multiplicative shift factor reflecting changes in total shipping costs, or, equivalently, (inverse) shipping TFP.

How reasonable is the resulting series? For comparison Hummels (1999), using dubious IMF data, finds an overall c.i.f./f.o.b. of about 10% in 1949–52, falling to less than 5% in the 1990s. For seven commodities in detail over 1963 to 1996 the *ad valorem* shipping costs are between 7% and 12%. The most direct figures we can compare to Williamson (1999, Table 1) cites World Bank estimates of *ad valorem* shipping costs suggesting figures of 27.5% in 1920 and 18.7% in 1940. Using our method we obtain values of 41% in 1921 and 29% in 1939 based on 0.2 times the Isserlis index. We conclude that in level terms this estimate is approximately of the right magnitude, possibly a little high.

Now the counterfactual proceeds and the results are shown in Figure 8 as the “tariff analog” series. Concerns over an upward bias due to an overestimate of c immediately dissolve. According to this experiment, changes in transport costs did little to change the level of trade 1870–1939, with the sole predictable exception of the 1914–19 war period, when, as we have seen, the Isserlis index blows up and using it for prediction might be misleading. To see why this is so, recall that the tariff elasticity is -1 and the fall in the transport index of Isserlis from 1870 to 1913 was from about 125 to 100. This would correspond to a decline in the transport cost mark up from 0.25 to 0.2. The trade impact of this would be about 17% (twice the elasticity times the change in c). The reversal in shipping cost trends from 1913 to 1939 would also have a similarly small impact.

There are obviously several reasons to doubt this counterfactual. First, one could argue that the tariff analogy is inexact: tariffs can be avoided and apply to a limited range of goods, whereas transport costs cannot, so the “true” elasticity for the latter is larger than for the former. Second, one could argue that the convergence in commodity prices 1870–1914 was steeper than the decline in shipping mark ups just estimated, with changes four times as large, on the order of 20 to 80 percentage points (Williamson 2000). Of course, this decline could have been due to falling frictions other than international shipping, such as domestic transport, wholesaling and retailing, but we have no direct measures of these for this panel sample. However, against this point, commodity-price convergence might have been driven by decrease in payments frictions caused by the gold standard, in which case we have already controlled for this effect in our first simulation. We cannot resolve this issue without further research on the changes in each kind of friction.

We now present a second counterfactual exercise that may be immune to some of these difficulties, though not without problems of its own. Instead of invoking an isomorphism from transport costs to tariffs, we now invoke an isomorphism to distance.

⁴⁵ Hummels (1999, 26) notes similar problems for postwar air-freight calculations.

That is our thought experiment for a fall in transport costs will not now be an analogous fall in tariff levels, but some analogous fall in global distances. We will thus imagine that the impact of globalization is to literally “shrink distance.”

How can shipping costs be mapped into distances? To do this we need to set up and estimate some kind of shipping technology. The leading exponent of this technique for the postwar period, Hummels (1999) suggest a technology of the form

$$(9) \quad \ln(\text{Cost per ton}) = a + b \ln(\text{Distance}),$$

and his estimates of the parameter b from postwar data range from 0.81 for world-wide data, and 0.5 on U.S. trade and North American routes. Are these parameters a guide to the shipping technology of the 1870–1939 period, when ocean freight was more dominant over air freight? A complete study of this question would take us too far afield, but in Appendix 2 we show how to re-estimate the Hummels technology of equation (9) for 1935. This is the only year for which we can find suitable data, using shipping rates per ton from Isserlis (1938) on British ships between major destinations in Europe and the rest of the world. We find $b = 0.52$, close to Hummels’ postwar figure for U.S. routes.

We can now approach the trade counterfactual a different way. Suppose transport costs fall by a factor $0 < x < 1$; we assume that the impact on trade is just “as if” distances in the world shrank by a factor $x^{1/b}$. Thus, using equation (2) again, counterfactual trade assuming 1913 transport costs in all years would now be given by

$$(10) \quad \text{Trade}_{it}^C = \text{Trade}_{it} \exp\{(\beta_D/b) \ln(c_{i,1913}/c_{i,t})\}.$$

The results are shown in Figure 8 as the “shrinking distance analog” series, where we take our benchmark estimate of the distance elasticity of trade to be $\beta_D = -0.635$. The impacts of transport costs on trade according to this thought experiment are quite large, approximately two to three times larger than under the “tariff analog.” (Note that the scale differs from Figures 6 and 7 because of the wartime blip). According to this experiment, trade would have been 53% higher in 1870 under 1913 cost-equivalent distances; in 1900 it would have been higher by 23%, in 1929 by 33%, and in 1938 by 87%. The effect is clearly seen in Figure 8: the rise and fall of world trade 1870–1939, relative to its long run trend, and the trend break in 1914, would have been “flattened out” under this counterfactual. Trade would have risen more or less along a uniform trend over the entire period.

Thus, by this reckoning at least, transport costs do have some power to explain the trade boom and bust. But a caveat is in order: applying the Isserlis index to *all* routes is surely an overestimate of the transport cost effect, as it assumes that all trade carried on overland routes (say, the bulk of trade across common borders in Continental Europe) experience cost shifts that were the same as that on long oceanic routes (for example, between Britain and the Americas or Australasia). While such land trade probably did experience costs shifts we have no reason to suppose that costs on railroads, turnpikes, or river barges had the same trends as tramps on the ocean.

Hence, to achieve a lower bound, we therefore attempted to construct a MARITIME_{ij} indicator for those routes where we felt sure that most trade went by ocean freight. We set the indicator to one when two countries in a pair were in different geographic regions (except for the Russia-China trade) or when either one was an

island.⁴⁶ We then recalculated bilateral trade for all pairs in 1913 and found that maritime trade so defined accounted for 56% of all world trade, which is likely a conservative (low) estimate since surely much trade even within region went by coastal tramp steamers (e.g. Argentina to Brazil, or Spain to Netherlands). Thus, the aforementioned effects of the Isserlis cost changes on total world trade might be safely adjusted down by 50% if we seek a reasonable lower bound, and the truth probably lies somewhere in between.

Conclusions

Our analysis of three counterfactuals requires summing up, but first we need to control for one other important long run trend in the data: the overall increase in the scale of world economic activity. From 1870 to 1939 world real GDP grew from about \$1 billion (in 1990 prices) to about \$4 billion; such a 4-fold change in world output in our gravity model would imply a 4-fold change in trade, since we postulate that trade should, *ceteris paribus*, bear a constant ratio relative to total world GDP, assuming $\beta_Y = 1$.⁴⁷

Under those conditions, Table 5 summarizes our explanation of the fall and rise of world trade by focusing on five benchmark years, 1870, 1900, 1913, 1929 and 1938. Panel (a) displays the actual data. Row 1 shows the rise and fall of trade/GDP ratios to be explained. Rows 2 and 3 shows the trade level. Rows 4 to 7 show our potential explanatory variables. In Panel (b), the rise in world trade is decomposed mechanically into the rise in world GDP and the change in the trade-GDP ratio.⁴⁸ Rows 9, 10 and 11 reorganize the data around the 1913 reference date and, since some of the changes are large, all data are put into natural logs. In Panel (c), finally, Rows 12 to 14 display the results of our counterfactual experiments, the three simulations that apply to all years the 1913 gold standard, 1913 tariffs, and 1913 transport costs (where the latter uses the “shrinking distance” method for “maritime routes” only). Row 15 derives the unexplained residual at each date, again, relative to the 1913 benchmark.

Our account of trade seems fairly complete, and the unexplained residual small in most periods, judging from Panels (b) and (c). From Row 9 we see that from 1870 to 1913 trade grew by a factor of 5 (+406% $\approx e^{1.62} - 1$). After the scale effect of growing world output is subtracted (+144% $\approx e^{0.73} - 1$), we are left to explain a rise of the trade-GDP ratio of 106% $\approx e^{0.73} - 1$, the near doubling seen in Row 1 and Figure 1. Both the gold standard (+24% $\approx e^{0.22} - 1$) and maritime transport costs (+27% $\approx e^{0.24} - 1$) each roughly account for an equally large share of this trade boom. But whereas the latter figures prominently in textbook explanations, the former deserves more recognition. Tariffs are estimated to have been of trivial consequence overall, suggesting that the impact of the so-called globalization backlash was limited. The residual (+33% $\approx e^{0.29} - 1$) is small relative to the actual quintupling of trade volumes, but still large compared to the actual doubling of Trade-GDP ratios. This may have been the result of declines in other

⁴⁶ The five possible values for $REGION_i$ were arbitrarily chosen as: Africa, Europe (Continental), North America (includes Mexico); South America, and “Oceania” (which in this case means any island nation). As noted, we set $MARITIME_{ij} = (REGION_i \neq REGION_j)$, except for the Russia-China exception. A finer mesh would have undoubtedly led to a higher estimate of maritime trade.

⁴⁷ Over the same span GDP per capita doubled from \$900 to about \$1,900 (in the same units) according to Maddison (1995, Tables E2 and E3). But in our preferred model, the coefficient on income per capita is assumed to be zero, so we impute no change in trade due to this variable.

⁴⁸ Strictly, as more than a mere accounting exercise, this approach is justified by our failure to reject the restriction that in the gravity model trade is homogeneous of degree one in world GDP.

frictions not accounted for, such as transport costs on non-maritime routes and costs in retailing and distribution. This is an area worthy of future research.

From 1900 there was still a further 67% ($\approx e^{0.51}-1$) increase in trade, of which 21% ($\approx e^{0.19}-1$) was a rise in the trade-output ratio. Most of the work of the gold standard was done by then, but continued transport costs declines continued to boost trade by about 12%, and a further 7% rise is explained by declining tariffs (some of this being due to fixed specific duties waning in real terms during the post-1900 era of gold-boom inflation); the residual is negligible,

After 1913, our explanations also fit the data quite well, albeit over a shorter time horizon. From Row 9 we see that trade volumes were much larger in 1913 than they were in either 1929 (by 11% $\approx e^{0.10}-1$) or in 1938 (by 60% $\approx e^{0.47}-1$). Relative to 1929, the very similar level of the 1913 trade volume (see Row 3) is attributable largely to the offsetting effects of lower transport costs in 1913 (+17% $\approx e^{0.16}-1$), but a smaller world economy back then ($-26\% \approx e^{-0.30}-1$); since the gold standard was by 1929 mostly rebuilt in its 1913 form, differences in payments frictions were small for this pair of dates. A small residual of 0.22 in logs suggests some equally missing factor(s) in our model, perhaps including the non-tariff barriers being erected in the 1920s.

Relative to 1938, the 1913 trade level was much higher, because although the 1913 world economy was smaller ($-34\% \approx e^{-0.42}-1$), the scale effect was more than offset by the trade-boosting effects in 1913 of lower transport costs (+42% $\approx e^{0.35}-1$), the broad presence of the gold standard (+25% $\approx e^{0.22}-1$), and the much lower levels of protection (+19% $\approx e^{0.18}-1$). Again, a residual of 0.13 in logs is the measure of what the model cannot explain.

In summation, have we added anything new to the story of last great era of globalization and its subsequent demise? Our aim was to present an account of the rise and fall of global trade 1870 to 1939. Employing an augmented gravity model, we have been able to account for the long run trends quite well. Of course, the secular expansion of the world output was the main driver of trend growth in world trade, but to explain changes in the ratio of trade to output we conclude that there is an important role in any story for *both* payments frictions (the gold standard) *and* transport frictions (shipping costs), and the folk wisdom in our textbook narratives should be revised accordingly. Furthermore, without diminishing any country-specific impacts, the global role of a so-called tariff “backlash” appears to have been much smaller than conventional wisdom suggests before 1914; but commercial policy probably did matter a great deal in the interwar period, with tariffs seen to be very important by 1938, and also with the rise of non-tariff barriers, a feature absent in our analysis.

Our work also raises important longer-run questions about the current so-called return to globalization. By many measures, this process has not surpassed the marks for integration set by the world economy in 1913 and some insights are suggested. Although commercial policy has become more liberal over the last fifty years, at least in developed countries, there are limits to what the reduction of these frictions alone can achieve. Yet, beyond Europe, the reunification of monetary standards remains a distant prospect and shipping costs have shown an uneven postwar trend (Hummels 1999).

As a historical benchmark, our effort represents a first pass, and future research might be profitably directed to constructing a more complete account by addressing shortcomings in the data sources, particularly our measures of transport costs and commercial policy, and by applying alternative models of trade. Another, more ambitious, research goal is to integrate our account of world trade with complementary accounts from 1820 to 1870, and from 1940 to the present.

Appendix 1: Samples Used

Econometrics

The following countries with Irwin-Terviö data appear in the gravity equation regressions: 1913: Argentina, Australia, Austria(-Hungary), Belgium, Brazil, Bulgaria, Canada, Chile, China, Colombia, Denmark, Egypt, Finland, France, Germany, Greece, India, Italy, Japan, Mexico, Netherlands, Netherlands Antilles, Norway, New Zealand, Peru, Philippines, Portugal, South Africa, Spain, Sweden, Switzerland, Thailand, Turkey, United Kingdom, United States. 1928 and 1938: the above, plus Czechoslovakia, Hungary (now distinct from Austria), U.S.S.R., Venezuela, and Yugoslavia.

Counterfactuals

The following list shows countries with trade data for *any* of the years 1870–1939. Countries in our 56-country sample are marked *. The ratio of trade for the 56-country sample (with imputed data) to trade of all countries in the 120-country sample is shown in Appendix Figure 1. The ratio of imputed to total trade in the 56-country sample is shown in Appendix Figure 2. Countries with Clemens-Williamson tariff data are marked †. Countries with 1913 bilateral trade data are marked §.

	Albania		Guinea-Bissau	* †	Philippines
*	Algeria	*	Guyana	†	Poland
	Angola		Haiti	*	Portugal
* †	Argentina	*	Hawaii	*	Reunion
* †	Australia		Honduras		Romania
* † §	Austria/Hungary		Hong Kong	* † §	Russia
*	Barbados		Hungary	*	Sabah
*	§ Belgium	* †	India		Samoa
	Benin	*	Indochina	*	Sarawak
	Bolivia	* †	Indonesia	*	Senegal
* †	Brazil		Iran	†	Serbia
	British Somaliland		Iraq	*	Sierra Leona
†	Brunei	* † §	Italy		South Africa
	Bulgaria	* †	Jamaica	* † §	Spain
	Cameroon	* §	Japan	†	Sri Lanka
*	Canada		Jordan		Straits Settlements
	Cape Of Good Hope		Kenya		Sudan
* †	Chile		Korea		Surinam
* †	China		Madagascar	* † §	Sweden
†	Colombia		Malawi	*	Switzerland
	Costa Rica		Malaya		Syria
†	Cuba	*	Martinique		Taiwan
*	Cyprus	*	Mauritius		Tanzania
	Czechoslovakia	* †	Mexico	* †	Thailand
* † §	Denmark		Morocco		Togo
	Dom. Republic		Mozambique	*	Trinidad & Tobago
	Ecuador	†	Myanmar	*	Tunisia
* †	Egypt		Natal	†	Turkey
*	El Salvador	* §	Netherlands		Uganda
*	Equatorial French Africa	*	Netherlands Antilles	* † §	United Kingdom
*	Fiji		New Caledonia	†	Uruguay
*	Finland	* †	New Zealand	* † §	USA
* † §	France	*	Newfoundland		Venezuela
	French Polynesia		Nicaragua		Western Samoa
*	Gambia	*	Nigeria		Zaire
* † §	Germany	* †	Norway		Zambia
*	Ghana		Orange Free State		Zanzibar
†	Greece		Palestine		Zimbabwe
*	Guadeloupe		Panama		
	Guatemala		Paraguay		
	Guinea	* †	Peru		

Appendix 2: Shipping Technology in 1935

We impose Hummels' (1999) technology, $\ln(\text{Cost per ton}) = a + b \ln(\text{Distance})$. We take 1935 shipping rates from Isserlis (1938, Table 10) as shown in Appendix Table 1. We use only major cities and measure distance from London (even though some freight is to "the continent"). Distances are great circle, not by sea. Estimation is by OLS. The slope is found to be 0.52 and the fit is shown in Appendix Figure 3.

References

- Anderson, James E. "A Theoretical Foundation for the Gravity Equation." *American Economic Review* 69, no. 1 (1979): 106–16.
- Anderson, James E., and Eric van Wincoop. "Gravity with Gravitas: A Solution to the Border Puzzle." Working Paper Series, no. 8079, National Bureau of Economic Research, January 2001.
- Ashworth, William. *A Short History of the International Economy Since 1850*. London: Longman, 1962.
- Baier, Scott L., and Jeffrey H. Bergstrand. "The Growth of World Trade: Tariffs, Transport Costs, and Income Similarity." *Journal of International Economics* 53, no. 1 (2001): 1–27.
- Bergstrand, Jeffrey H. "The Gravity Equation in International Trade: Some Microeconomic Foundations and Empirical Evidence." *Review of Economics and Statistics* 67, no. 3 (1985): 474–81.
- Bergstrand, Jeffrey H. "The Generalized Gravity Equation, Monopolistic Competition, and the Factor-Proportions Theory in International Trade." *Review of Economics and Statistics* 71, no. 1 (1989): 143–53.
- Bairoch, Paul. *Economics and World History: Myths and Paradoxes*. New York: Harvester Wheatsheaf, 1993.
- Bordo, Michael D., and Marc Flandreau. "Core, Periphery, Exchange Rate Regimes, and Globalization." May 2001. Photocopy.
- Braudel, Fernand. *Civilization and Capitalism, 15th-18th Century*. Translated by Siân Reynolds. 3 vols. Berkeley: University of California Press, 1992.
- Cameron, Rondo E. *A Concise Economic History of the World: From Paleolithic Times to the Present*. 2nd ed. New York: Oxford University Press, 1993.
- Clemens, Michael, and Jeffrey G. Williamson. "A Tariff-Growth Paradox? Protection's Impact the World Around 1875–1997." National Bureau of Economic Research, Working Paper Series no. 8459, September 2001.
- Collins, William J., Kevin H. O'Rourke, and Jeffrey G. Williamson. "Were Trade and Factor Mobility Substitutes in History?" In *Migration: The Controversies and the Evidence*, edited by Riccardo Faini, Jaime De Melo and Klaus F. Zimmermann. Cambridge: Cambridge University Press, 1999.
- Deardorff, Alan V. "Determinants of Bilateral Trade: Does Gravity Work in a Neoclassical World." In *The Regionalization of the World Economy*, edited by Jeffrey A. Frankel. Chicago: University of Chicago Press, 1998.
- Eaton, Jonathan, and Samuel Kortum. "Technology, Geography, and Trade." Boston University, 2001. Photocopy.
- Eichengreen, Barry J. *Golden Fetters: The Gold Standard and The Great Depression, 1919–1939*. Oxford: Oxford University Press, 1992.
- Eichengreen, Barry J., and Marc Flandreau. "The Geography of the Gold Standard." In *Currency Convertibility: The Gold Standard and Beyond*, edited by Jorge Braga de Macedo, Barry J. Eichengreen and Jaime Reis. London: Routledge, 1996.
- Eichengreen, Barry J., and Douglas A. Irwin. "Trade Blocs, Currency Blocs and the Reorientation of World Trade in the 1930s." *Journal of International Economics* 38 (1995): 1–24.
- Estevadeordal, Antoni, and Alan M. Taylor. "A Century of Missing Trade?" *American Economic Review* (2002). Forthcoming.
- Findlay, Ronald, and Kevin H. O'Rourke. "Commodity Market Integration, 1500–2000." National Bureau of Economic Research, Working Paper Series no. 8579, November 2001.
- Foreman-Peck, James. *A History of the World Economy: International Economic Relations Since 1850*. 2nd ed. New York: Harvester Wheatsheaf, 1995.
- Frankel, Jeffrey A. *Regional Trading Blocs in the World Economic System*. Washington, D.C.: Institute for International Economics, 1997.
- Frankel, Jeffrey A., and Andrew K. Rose. "An Estimate of the Effect of Currency Unions on Trade and Growth." *Quarterly Journal of Economics* (2002). Forthcoming.

- Gallarotti, Giulio M. *The Anatomy of an International Monetary Regime: The Classical Gold Standard, 1880–1914*. New York: Oxford University Press, 1995.
- Glick, Reuven, and Andrew K. Rose. “Does a Currency Union affect Trade? The Time-Series Evidence.” *European Economic Review* (2002). Forthcoming.
- Harrigan, James. “Specialization and the Volume of Trade: Do the Data Obey the Laws.” National Bureau of Economic Research, Working Paper Series no. 8675, December 2001.
- Hummels, David. “Have International Transportation Costs Declined?” November 1999. Photocopy.
- Irwin, Douglas A., and Marko Terviö. “Does Trade Raise Income? Evidence from the Twentieth Century.” Dartmouth College, 2000. Photocopy.
- Isserlis, L. “Tramp Shipping Cargoes, and Freights.” *Journal of the Royal Statistical Society* 101, no. 1 (1938): 53–146.
- James, Harold. *The End of Globalization: Lessons from The Great Depression*. Cambridge: Harvard University Press, 2001.
- Kenwood, A. G., and A. L. Lougheed. *The Growth of the International Economy, 1820–2000*. 4th ed. London: Routledge, 1999.
- Kindleberger, Charles P. *The World in Depression, 1929–1939*. Revised ed. Berkeley: University of California Press, 1986.
- Kindleberger, Charles P. “Commercial Policy Between the Wars.” In *The Cambridge Economic History of Europe*, vol. 8, edited by Peter Mathias and Sidney Pollard. Cambridge: Cambridge University Press, 1989.
- League of Nations. *Memorandum on International Trade and Balances of Payments, 1912–1926*. 2 vols. Geneva: League of Nations, 1927.
- Lewis, W. Arthur. *Economic Survey: 1919–1939*. London: George Allen and Unwin, 1949.
- López-Córdova, J. Ernesto, and Chris Meissner. “Exchange-Rate Regimes and International Trade: Evidence from the Classical Gold Standard Era.” U.C. Berkeley, April 2001. Photocopy.
- Mitchell, Brian R. *International Historical Statistics: Europe, 1750–1988*. New York: Stockton Press, 1992.
- Mitchell, Brian R. *International Historical Statistics: The Americas, 1750–1988*. New York: Stockton Press, 1993.
- Mitchell, Brian R. *International Historical Statistics: Africa, Asia & Oceania, 1750–1988*. New York: Stockton Press, 1995.
- Maizels, Alfred. *Industrial Growth and World Trade*. Cambridge: Cambridge University Press, 1963.
- O’Rourke, Kevin H., Alan M. Taylor, and Jeffrey G. Williamson. “Factor Price Convergence in the Late Nineteenth Century.” *International Economic Review* 37 (1996): 499–530.
- O’Rourke, Kevin H., and Jeffrey G. Williamson. *Globalization and History: The Evolution of a Nineteenth-Century Atlantic Economy*. Cambridge: MIT Press, 1999.
- O’Rourke, Kevin H., and Jeffrey G. Williamson. “When Did Globalization Begin?” *European Review of Economic History* (2002a). Forthcoming.
- O’Rourke, Kevin H., and Jeffrey G. Williamson. “After Columbus: Explaining the European Overseas Trade Boom 1500–1800.” *Journal of Economic History* (2002b). Forthcoming.
- Obstfeld, Maurice, and Alan M. Taylor. “Globalization and Capital Markets.” University of California, Berkeley, 2001. Photocopy.
- Obstfeld, Maurice, and Alan M. Taylor. *Global Capital Markets: Integration, Crisis, and Growth*. Cambridge: Cambridge University Press, 2002. In progress.
- Redding, Stephen, and Anthony J. Venables. “Economic Geography and International Inequality.” April 2001. Photocopy.
- Persson, Torsten. “Currency Unions and Trade: How Large is the Treatment Effect?” *Economic Policy* 33 (2001): 433–48.
- Rose, Andrew K. “One Money, One Market: The Effect of Common Currencies on Trade.” *Economic Policy* 15, no. 30 (2000): 7–33.
- Rose, Andrew K., and Charles Engel. “Currency Unions and International Integration.” *Journal of Money, Credit, and Banking* (2002). Forthcoming.
- Rose, Andrew K., and Eric van Wincoop. “National Money as a Barrier to International Trade: The Real Case for Currency Union.” *American Economic Review* 91, no. 2 (2001): 386–90.
- United States Bureau of the Census. *Historical Statistics of the United States, Colonial Times to 1970, Bicentennial Edition*. 2 vols. Washington, D.C.: Government Printing Office, 1975.
- Williamson, Jeffrey G. “Land, Labor, and Globalization in the Pre-Industrial Third World.” *Journal of Economic History* (2002). Forthcoming.

Table 1: OLS and Tobit Estimates

	OLS, dependent variable: ln(t)				Tobit, dependent variable: ln(1+t)			
	1913	1928	1938	Pooled	1913	1928	1938	Pooled
Distance	-0.952 (-6.27)	-0.679 (-8.12)	-0.436 (-4.72)	-0.754 (-10.52)	-0.777 (-9.65)	-0.719 (-8.50)	-0.468 (-4.90)	-0.708 (-13.96)
GDP	0.957 (14.61)	0.778 (19.24)	0.691 (15.88)	0.862 (27.20)	0.642 (18.98)	0.873 (22.41)	0.867 (21.23)	0.784 (36.64)
GDP per capita	0.316 (2.41)	0.491 (6.42)	0.716 (8.92)	0.430 (6.89)	0.357 (5.30)	0.542 (7.17)	0.639 (8.11)	0.480 (11.26)
Locked	-0.713 (-1.56)	-0.955 (-3.89)	—	-0.755 (-3.18)	-0.615 (-2.55)	-0.888 (-3.65)	—	-0.753 (-4.55)
Adjacent	0.777 (1.50)	0.592 (2.37)	0.369 (1.17)	0.589 (2.51)	0.714 (2.53)	0.813 (3.07)	0.311 (0.97)	0.592 (3.49)
Island	-0.176 (-0.65)	0.365 (2.57)	0.086 (0.57)	0.065 (0.54)	0.260 (1.86)	0.076 (0.55)	-0.264 (-1.79)	0.082 (0.99)
Gold	0.725 (2.75)	0.533 (3.76)	2.014 (2.18)	0.542 (4.12)	0.535 (3.96)	0.650 (4.74)	1.670 (1.66)	0.595 (6.65)
Tariff*	-3.171 (-2.40)	0.459 (0.52)	3.132 (4.29)	-0.725 (-1.15)	-1.715 (-2.54)	-0.325 (-0.38)	0.937 (1.28)	-0.623 (-1.44)
Exchange rate volatility	0.032 (0.24)	-0.011 (-2.72)	-0.058 (-1.69)	-0.014 (-2.60)	-0.014 (-0.22)	-0.018 (-4.61)	-0.109 (-3.18)	-0.016 (-4.64)
Constant	-8.817 (-4.14)	-11.496 (-8.41)	-15.149 (-9.80)	-10.640 (-10.08)	-5.402 (-4.78)	-13.298 (-9.77)	-16.167 (-10.56)	-9.704 (-13.18)
Year = 1928				-0.606 (-3.95)				-1.356 (-13.07)
Year = 1938				-0.324 (-1.63)				-1.055 (-7.84)
Observations	311	294	203	808	378	406	276	1060
Adjusted/Pseudo R ²	0.545	0.699	0.727	0.612	0.301	0.337	0.364	0.317
Root MSE	1.993	1.027	0.910	1.494				

Notes: See text. t-statistics in parentheses. * Tariff = $\ln(1+t_i) + \ln(1+t_i)$

Table 2: Two-Stage Least Squares EstimatesDependent variable: $\ln(\text{trade})$

	1913	1928	1938	Pooled
Distance	-0.951 (-6.27)	-0.679 (-8.12)	-0.436 (-4.72)	-0.753 (-10.51)
GDP	0.957 (14.60)	0.778 (19.24)	0.691 (15.88)	0.862 (27.19)
GDP per capita	0.317 (2.41)	0.491 (6.42)	0.716 (8.92)	0.432 (6.93)
Locked	-0.728 (-1.59)	-0.955 (-3.89)	—	-0.761 (-3.20)
Adjacent	0.778 (1.50)	0.592 (2.37)	0.369 (1.17)	0.589 (2.52)
Island	-0.172 (-0.63)	0.365 (2.57)	0.086 (0.57)	0.066 (0.54)
Gold	0.701 (2.66)	0.533 (3.76)	2.014 (2.18)	0.519 (3.93)
Tariff*	-3.160 (-2.39)	0.460 (0.52)	3.132 (4.29)	-0.723 (-1.15)
Exchange rate volatility	0.028 (0.22)	-0.011 (-2.72)	-0.058 (-1.69)	-0.015 (-2.64)
Constant	-8.808 (-4.13)	-11.496 (-8.41)	-15.149 (-9.80)	-10.656 (-10.10)
Year = 1928				-0.607 (-3.96)
Year = 1938				-0.340 (-1.71)
Observations	311	294	203	808
Adj. R ² / Pseudo R ²	0.545	0.699	0.727	0.612
Root MSE	1.993	1.027	0.910	1.494

Notes: See text. t -statistics in parentheses. For 2SLS estimates, Gold is instrumented by $\ln(\text{mean distance from } i \text{ to its gold partners}) * \ln(\text{mean distance from } j \text{ to its gold partners})$. * $\text{Tariff} = \ln(1+t_i) + \ln(1+t_j)$

Table 3: OLS, 2SLS, and Tobit with Fixed Effects, Pooled

	OLS, dependent variable: ln(trade)		2SLS dependent variable: ln(trade)		Tobit, dependent variable: ln(1+trade)	
	T & C	C only	T & C	C only	T & C	C only
Distance	-0.634 (-7.99)	-0.635 (-8.01)	-0.634 (-7.99)	-0.635 (-8.01)	-0.605 (-12.05)	-0.604 (-12.02)
GDP	1.164 (4.36)	1.127 (5.17)	1.154 (4.32)	1.117 (5.11)	0.659 (3.96)	0.468 (3.45)
GDP per capita	-0.360 (-1.03)	-0.408 (-1.46)	-0.347 (-0.99)	-0.396 (-1.42)	0.080 (0.37)	-0.169 (-0.97)
Adjacent	0.784 (3.47)	0.781 (3.47)	0.786 (3.48)	0.782 (3.47)	0.735 (5.01)	0.731 (4.98)
Gold	0.272 (1.48)	0.293 (2.02)	0.247 (1.34)	0.279 (1.90)	0.173 (1.57)	0.222 (2.48)
Tariff*	-1.493 (-1.60)	-1.612 (-1.94)	-1.497 (-1.60)	-1.643 (-1.98)	-0.727 (-1.26)	-1.163 (-2.27)
Exchange rate volatility	-0.009 (-1.26)	-0.009 (-1.36)	-0.009 (-1.30)	-0.009 (-1.38)	-0.011 (-2.80)	-0.013 (-3.33)
Constant	-6.316 (-1.68)	-5.713 (-3.86)	-6.279 (-1.67)	-12.222 (-4.86)	-3.127 (-1.33)	1.220 (1.32)
Year = 1928	-0.108 (-0.21)	—	-0.107 (-0.21)	—	-0.590 (-1.86)	—
Year = 1938	-0.153 (-0.27)	—	-0.169 (-0.30)	—	-0.714 (-1.99)	—
Observations	808	808	808	808	1060	1060
Adj. R ² / Pseudo R ²	0.683	0.683	0.683	0.683	0.404	0.403
Root MSE	1.350	1.349	1.350	1.349	—	—

Notes: See text. *t*-statistics in parentheses. Column label 'T' signifies 'Time Effects', and 'C' signifies 'Country Effects'. Country effects not shown. For 2SLS estimates, Gold is instrumented by ln(mean distance from i to its gold partners) * ln(mean distance from j to its gold partners). * Tariff = ln(1+t_i) + ln(1+t_j)

Table 4: The Gold Standard and Common Currency Effects on Trade: A Comparison with the Literature

Period	“Common Currency” Effect (on log trade)	Estimation Method	Number of Observations
<i>(a) Classical Gold Standard</i>			
Lopez–Cordova & Meissner (2001)			
1870–1910	0.48 (0.12)	OLS	1,140
1870–1910	0.97 (1.32)	IV	681
1870–1910	0.64 (0.13)	TOBIT	1,150
1870–1910	0.64 (0.14)	Heckitt	1,150
1870–1910	0.28 (0.13)	OLS Time & Country Effects	1,140
Bordo & Flandreau (2001)			
1880–1913	0.44 (0.05)	2SLS	2,846
<i>(b) Interwar Gold Standard</i>			
Eichengreen & Irwin(1995)			
1928	0.29 (0.39)	SUR	561
1935	0.53 (0.38)	SUR	561
1938	0.68 (0.38)	SUR	561
Bordo & Flandreau (2001)			
1920–1939	0.36 (0.04)	2SLS	3,078
<i>(c) Postwar Currency Unions</i>			
Rose (2001)			
1970–1990	1.21 (0.14)	OLS Time Effects	22,948
1970–1990	1.57 (0.18)	Tobit Time Effects	22,948
1970–1990	1.30 (0.14)	WLS Time Effects	22,948
1970–1990	1.52 (0.14)	Heckit Time Effects	35,998
1970–1990	1.69 (0.21)	IV Time Effects	16,855
1970–1990	0.77 (0.16)	OLS Time & Country Effects	22,948
Glick & Rose (2001)			
1949–1997	1.20 (0.13)	OLS	219,558
1949–1997	0.65 (0.05)	OLS Country Effects	219,558
Rose & van Wincoop (2001)			
1970–1995	1.38 (0.19)	OLS Time Effects	31,101
1970–1995	0.86 (0.19)	OLS Time & Country Effects	31,101

Notes: Coefficient shown are those from pooled regressions only (i.e., those with more than one cross section).

Table 5: Explaining the World Trade Boom and Bust

	1870	1900	1913	1929	1938
<i>(a) Actual Levels</i>					
(1) World Trade/GDP (%)	10	17	21	14	9
(2) World Trade (X+M, billion 1990 US\$)	105	318	532	480	332
(3) World Trade (X+M, million 1913 US\$)	7,359	22,282	37,241	33,581	23,262
(4) Gold Standard (trade weighted, %, up to 56 countries)	13	81	88	89	25
(5) Tariffs (trade weighted, %, 35 countries)	12	13	11	13	20
(6) Transport Costs 1913=100, British)	125	112	100	116	138
(7) "World" GDP (billion 1990 US\$, 56 countries)	1,048	1,849	2,554	3,450	3,868
(8) "World" GDP (billion 1990 US\$, 199 countries)	1,128	1,977	2,726	3,696	—
<i>(b) Change in ln(Trade) Explained by Output Trend</i>					
<i>1913 Versus Base Year</i>					
(9) Actual Change in ln(Trade)	1.62	0.51	0.00	0.10	0.47
(10) Change in ln(GDP)	0.89	0.32	0.00	-0.30	-0.42
(11) Change in ln(Trade/GDP)	0.73	0.19	0.00	0.40	0.89
<i>(c) Change in ln(Trade/GDP) Explained by the Model</i>					
<i>1913 Versus Base Year</i>					
(12) due to: Gold Standard	0.22	0.03	—	-0.02	0.22
(13) Tariffs	-0.01	0.07	—	0.04	0.18
(14) Transport Costs	0.24	0.12	—	0.16	0.35
(15) Residual	0.29	-0.03	—	0.22	0.13

Sources: Row 1 from rows 2 and 7. Row 2 from row 3 and US GDP deflator. Rows 3–6 and 9–15 from this paper. Rows 7 and 8 from Maddison (1995, Tables E2 and G2). See text.

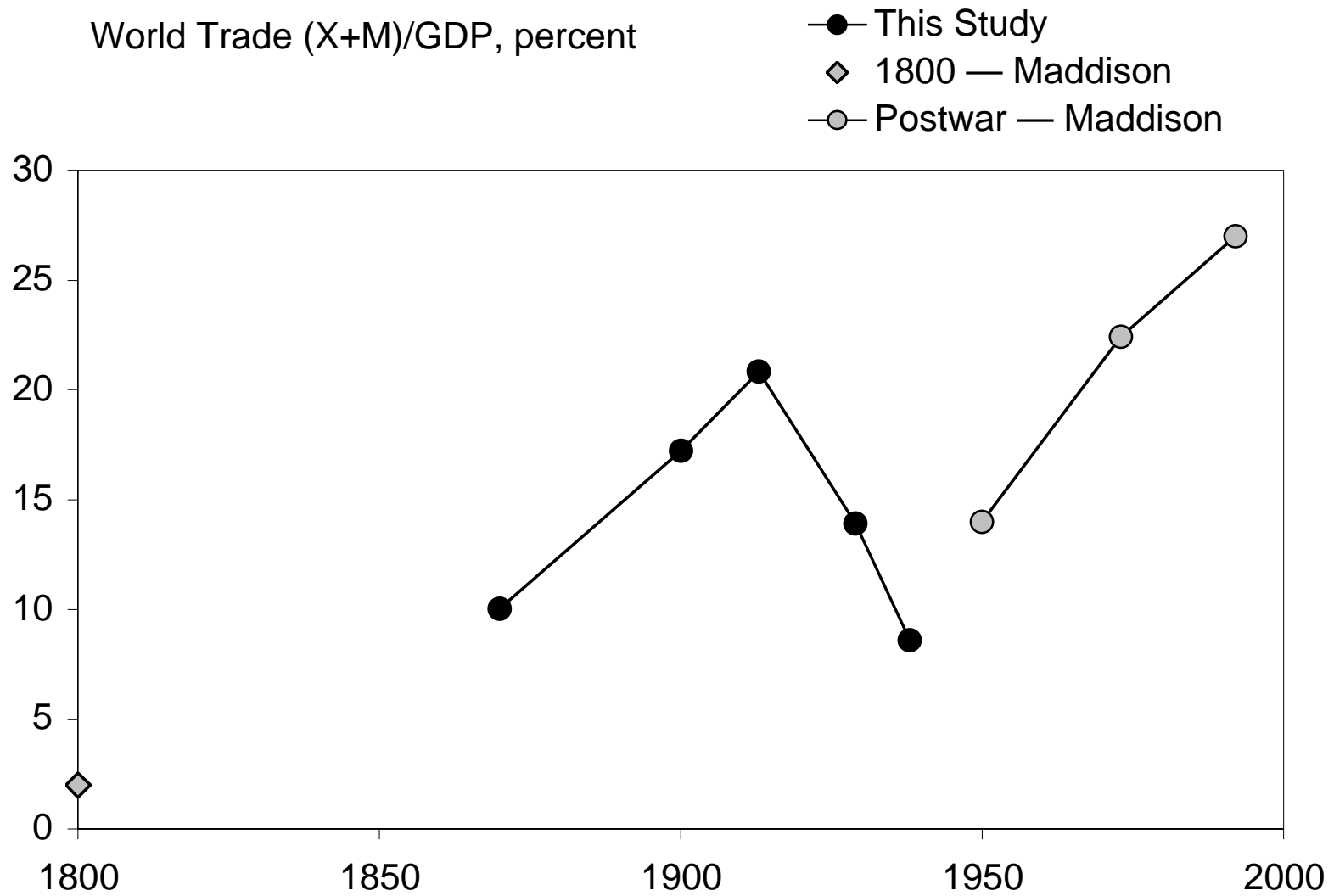
Notes: Transport costs are according to the "shrinking distance analog" on "maritime routes." See text.

Appendix Table 1: Freight Rates and “Distances” in 1935

UK/Continental Trade with		Great Circle Distance from London (Miles)	Isserlis Freight Rate (Shillings/Ton)
Lisbon	Coal outbound	980	6.94
Piraeus (Athens)	Coal outbound	1490	9.17
Black Sea (Istanbul)	Grain inbound	1560	10.04
Montreal	Coal outbound	3240	7.00
Delhi	Grain inbound	4170	20.40
Cuba	Sugar inbound	4710	13.17
North Pacific (San Francisco)	Grain inbound	5350	19.00
Burma	Grain inbound	5590	22.52
Cape Town	Grain inbound	6010	13.94
Saigon	Grain inbound	6330	23.67
Buenos Aires	Coal outbound	6920	8.90
Buenos Aires	Grain inbound	6920	14.65
Chile (Santiago)	Fertilizer inbound	7250	19.40
W. Australia (Perth)	Grain inbound	9000	26.04
Queensland (Brisbane)	Sugar inbound	10500	28.75
Victoria (Melbourne)	Grain inbound	10510	26.50
Sydney	Grain inbound	10560	23.13

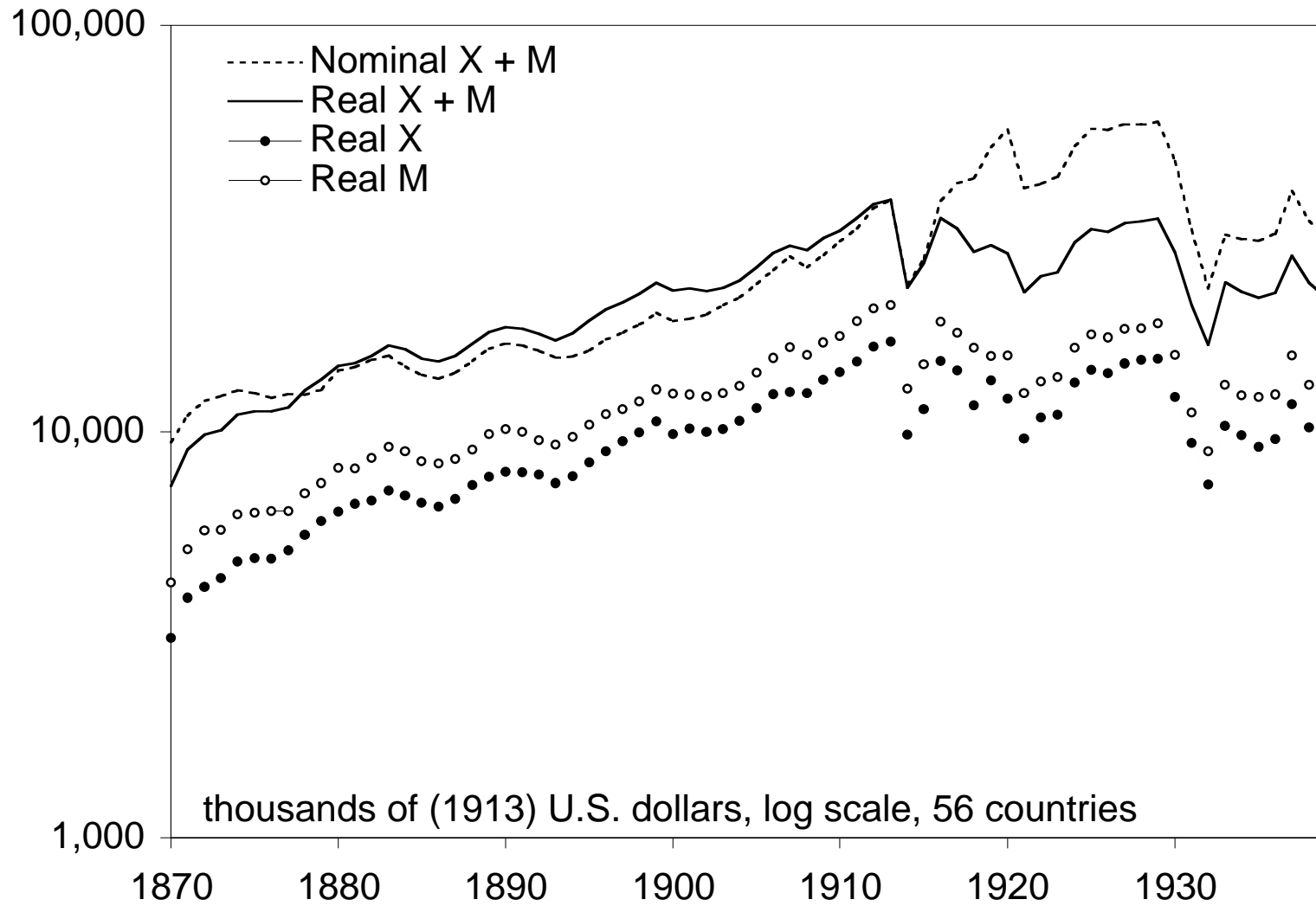
Source: Selected freights to and from major cities from Isserlis (1938, Table 10). Distances from a digital map.

Figure 1: World Trade-to-GDP Ratios, 1800 to the Present



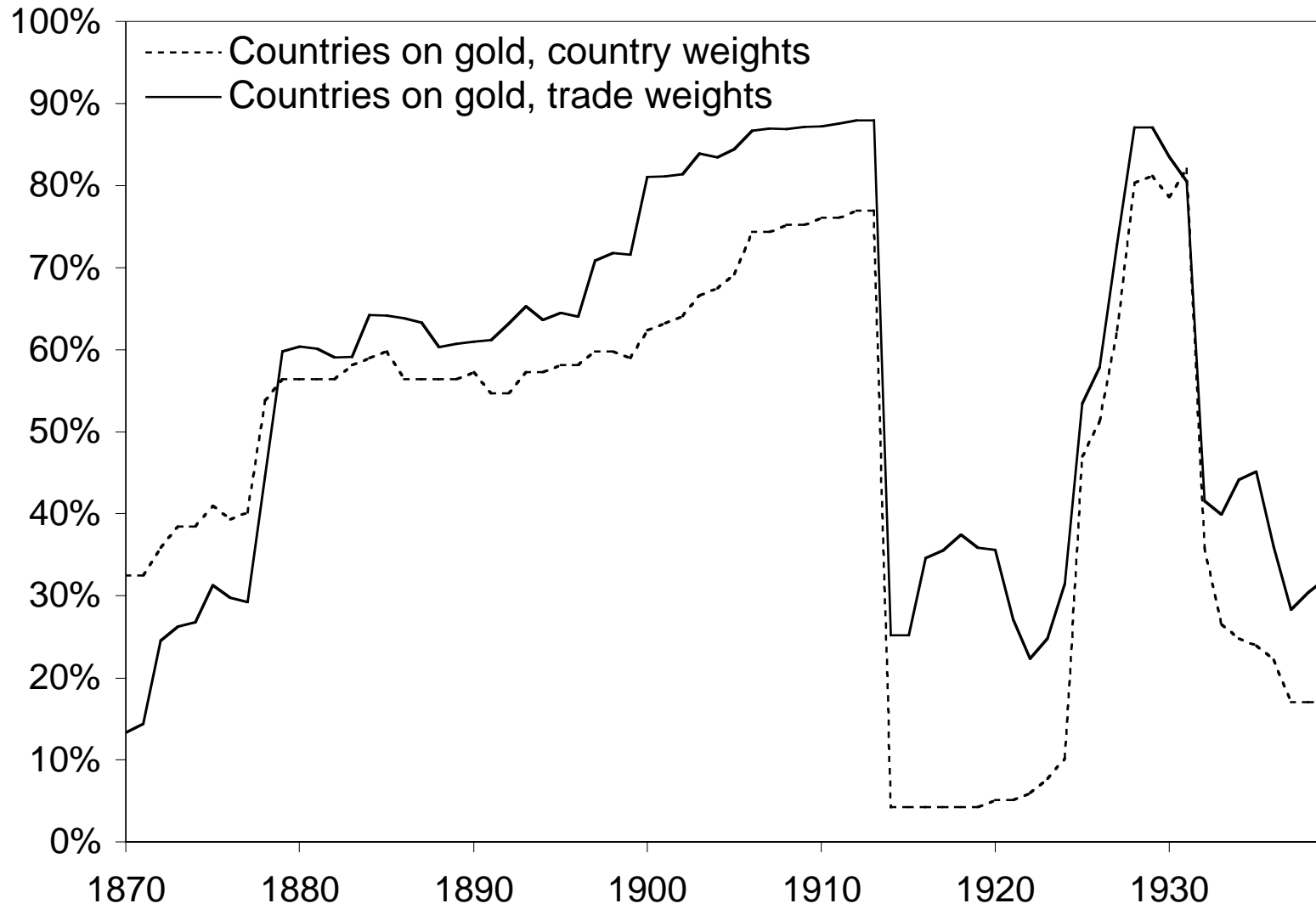
Notes and Sources: Maddison (1995). This study: see text and Figure 2.

Figure 2: World Trade Volume, 1870–1939



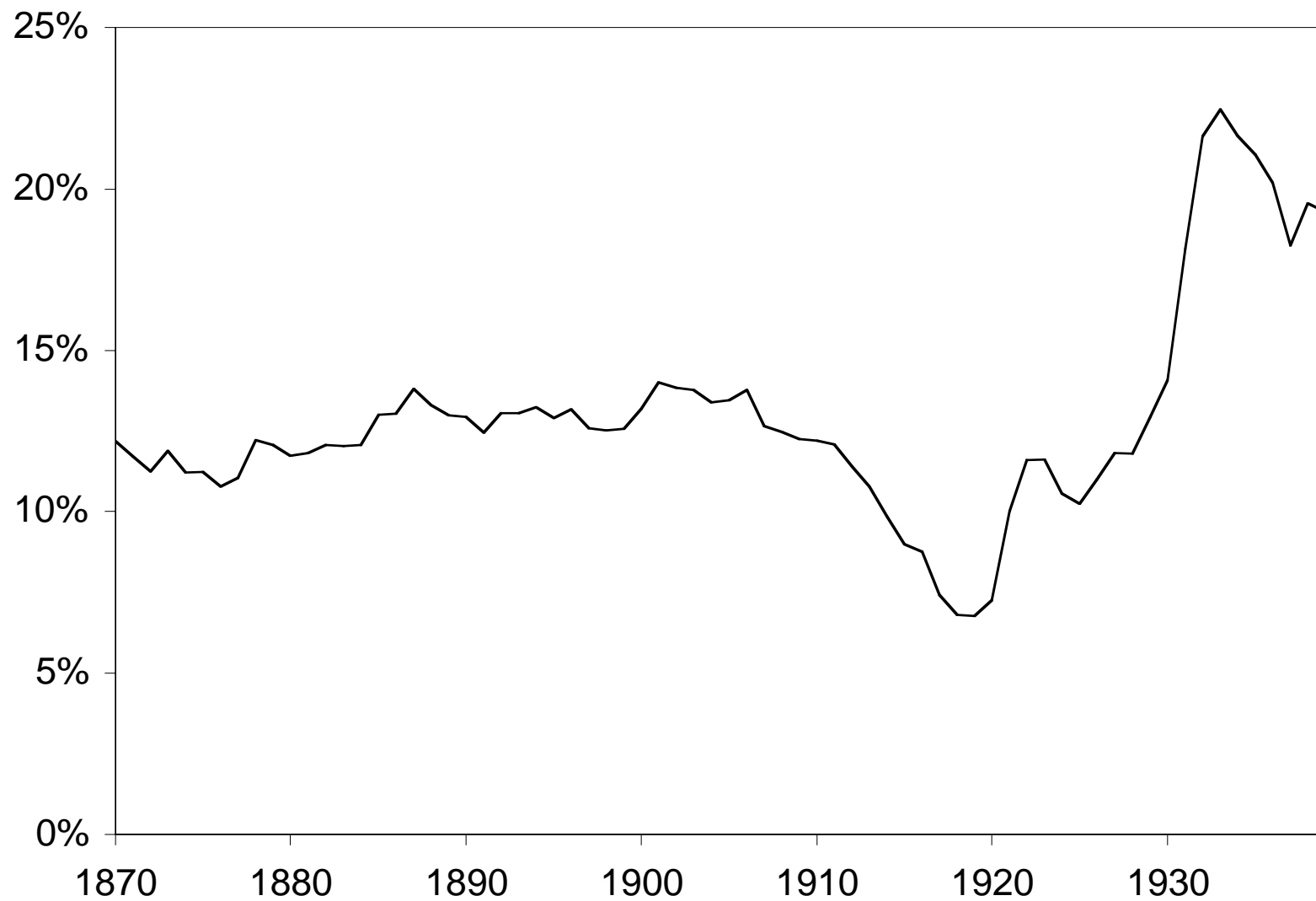
Notes and Source: Trade from Mitchell (1992 1993; 1995). Converted to 1913 U.S. dollars using U.S. exchange rate and GDP deflator; see text. Data for a constant sample of 56 countries (excluding war 1914–19, when sample is at least 51 countries). Missing data imputed from trend interpolation. See appendix.

Figure 3: Gold Standard Adherence, 1870–1939



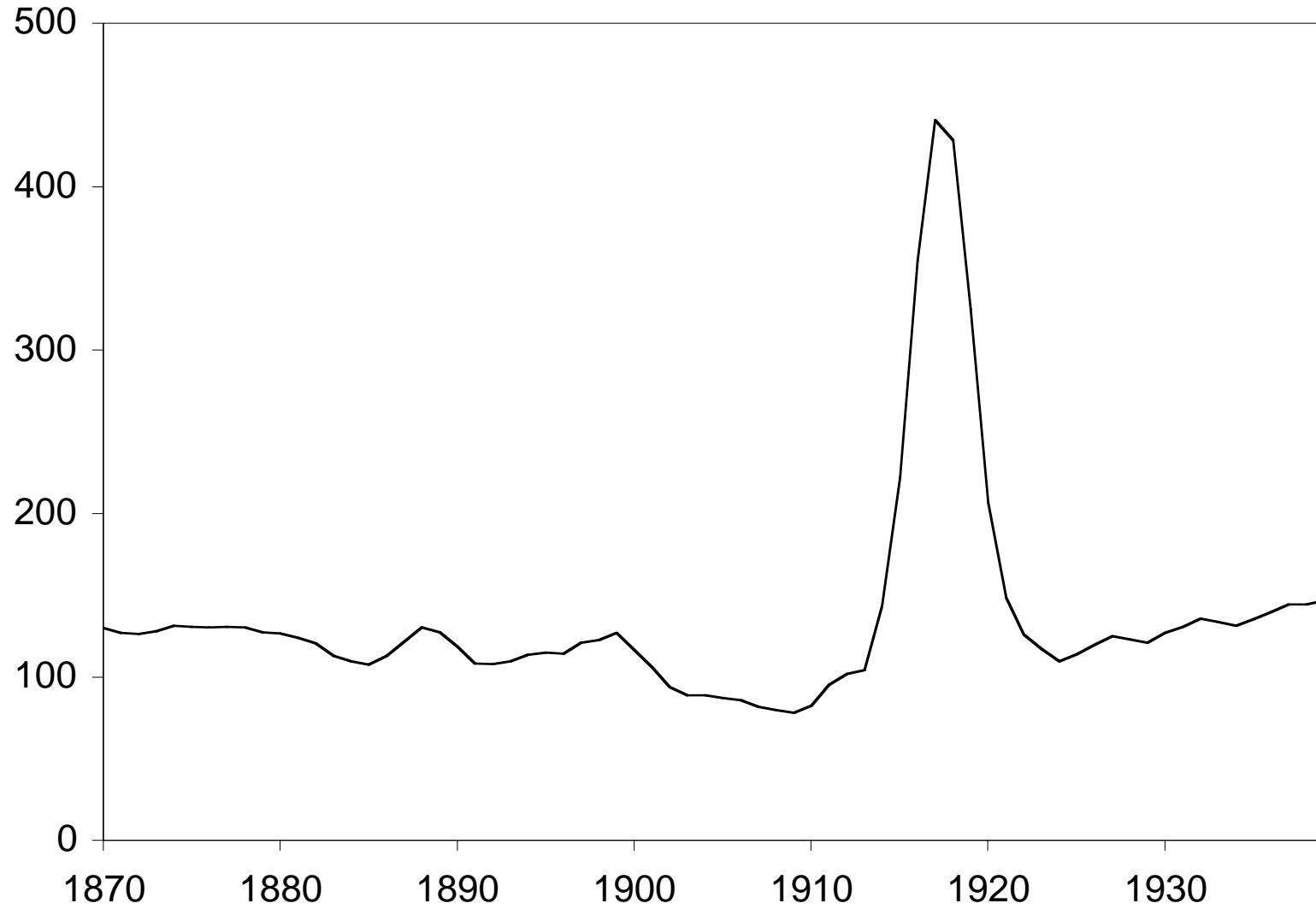
Notes and Source: Gold standard dummy variable from Meissner and López-Córdova (2000) and Eichengreen (1992). Trade weights in current U.S. dollars as in Figure 1.

Figure 4: World Average Tariff Level, 1870–1939



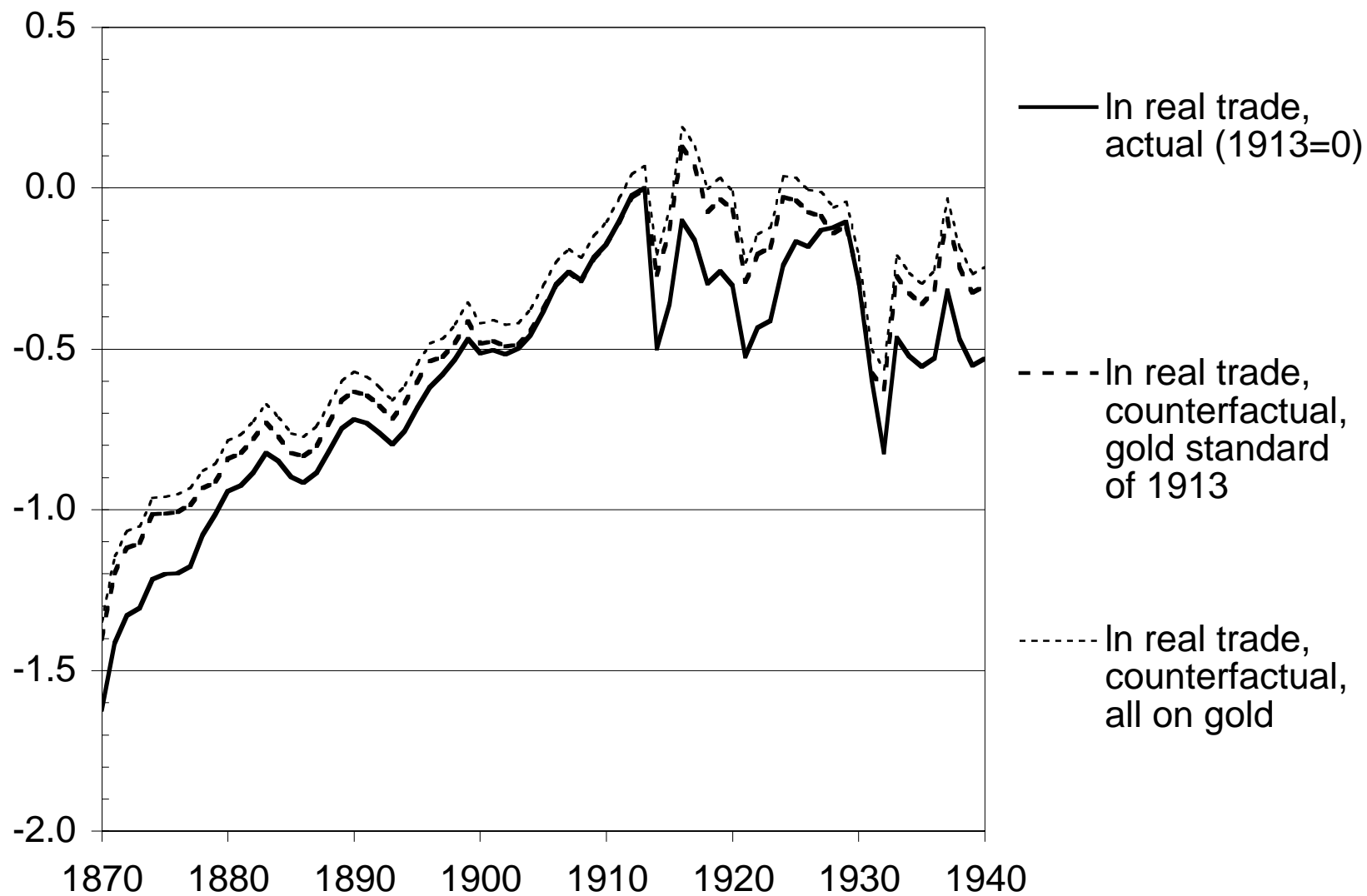
Notes and Source: For a sample of 35 countries from Clemens and Williamson (2001). Trade weights in current U.S. dollars as in Figure 1.

Figure 5: Maritime Transport Cost Index, 1870–1939



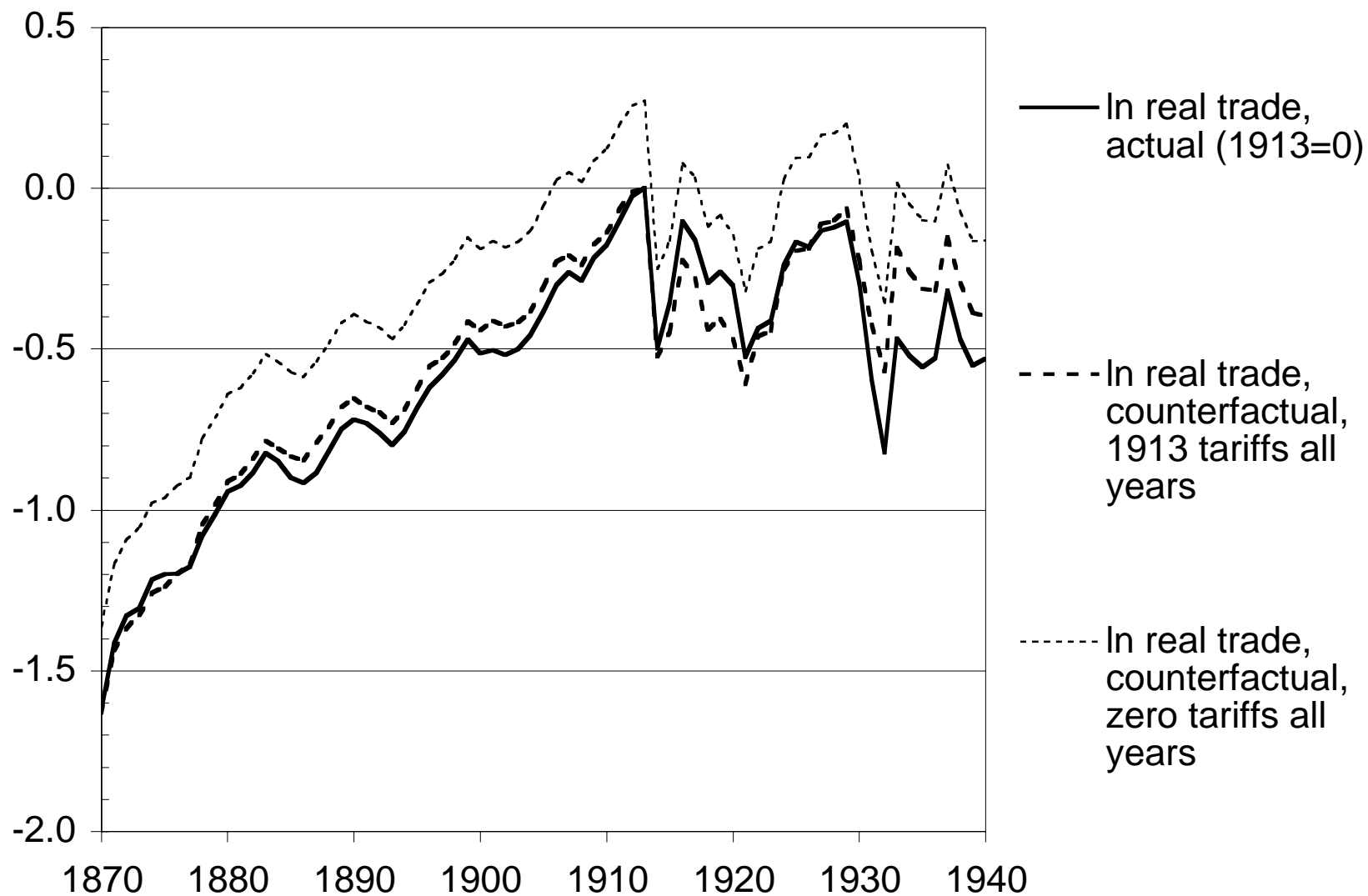
Notes and source: Index of freight rates on British tramp routes, deflated by British CPI. For 1869–36 from Isserlis (1938), with 1937–40 interpolated from 1930–36 trend.

Figure 6: World Trade Under Counterfactual Gold Standard Regimes, 1870–1939



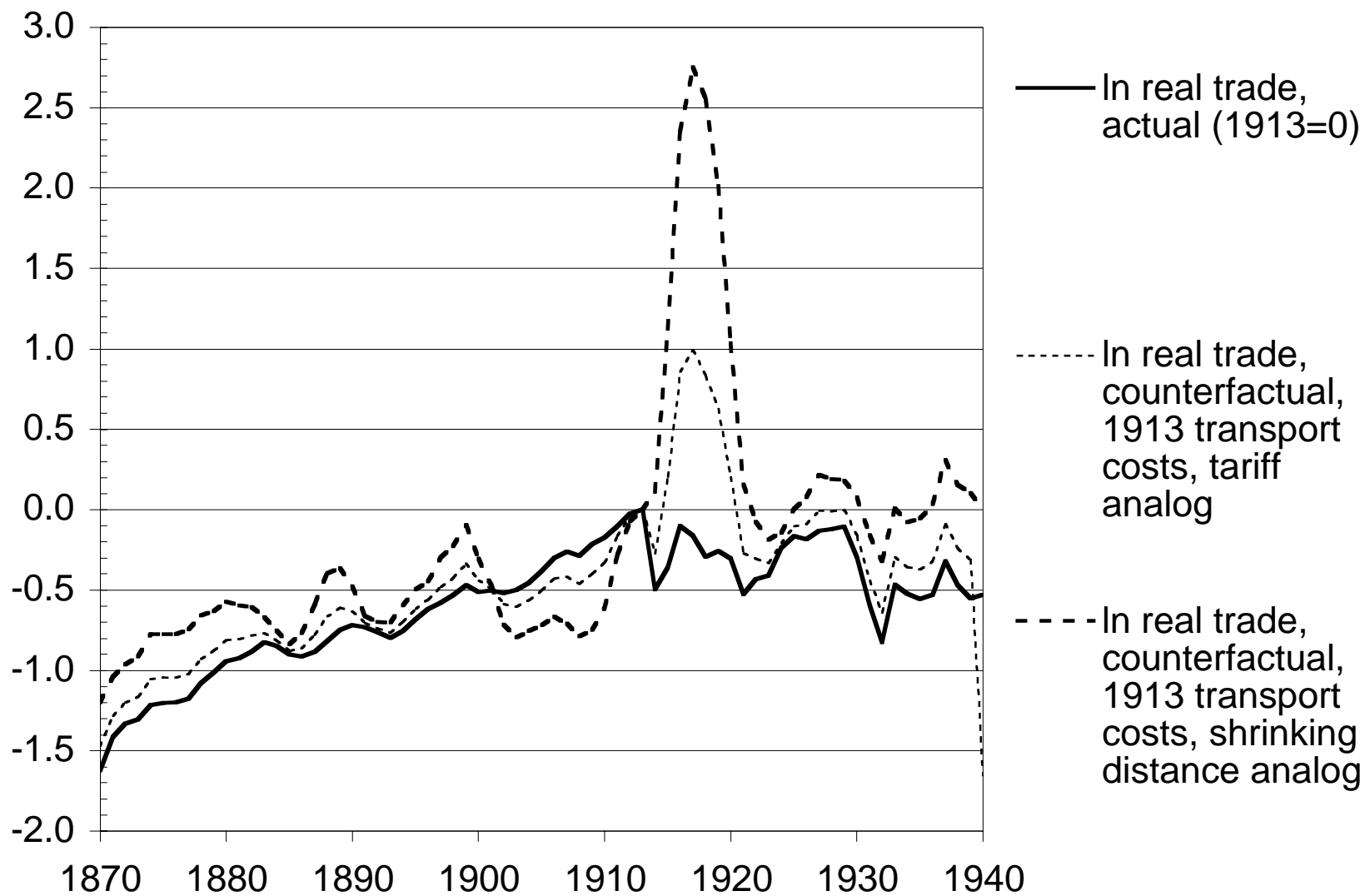
Notes: See text.

Figure 7: World Trade Under Counterfactual Tariff Regimes, 1870–1939



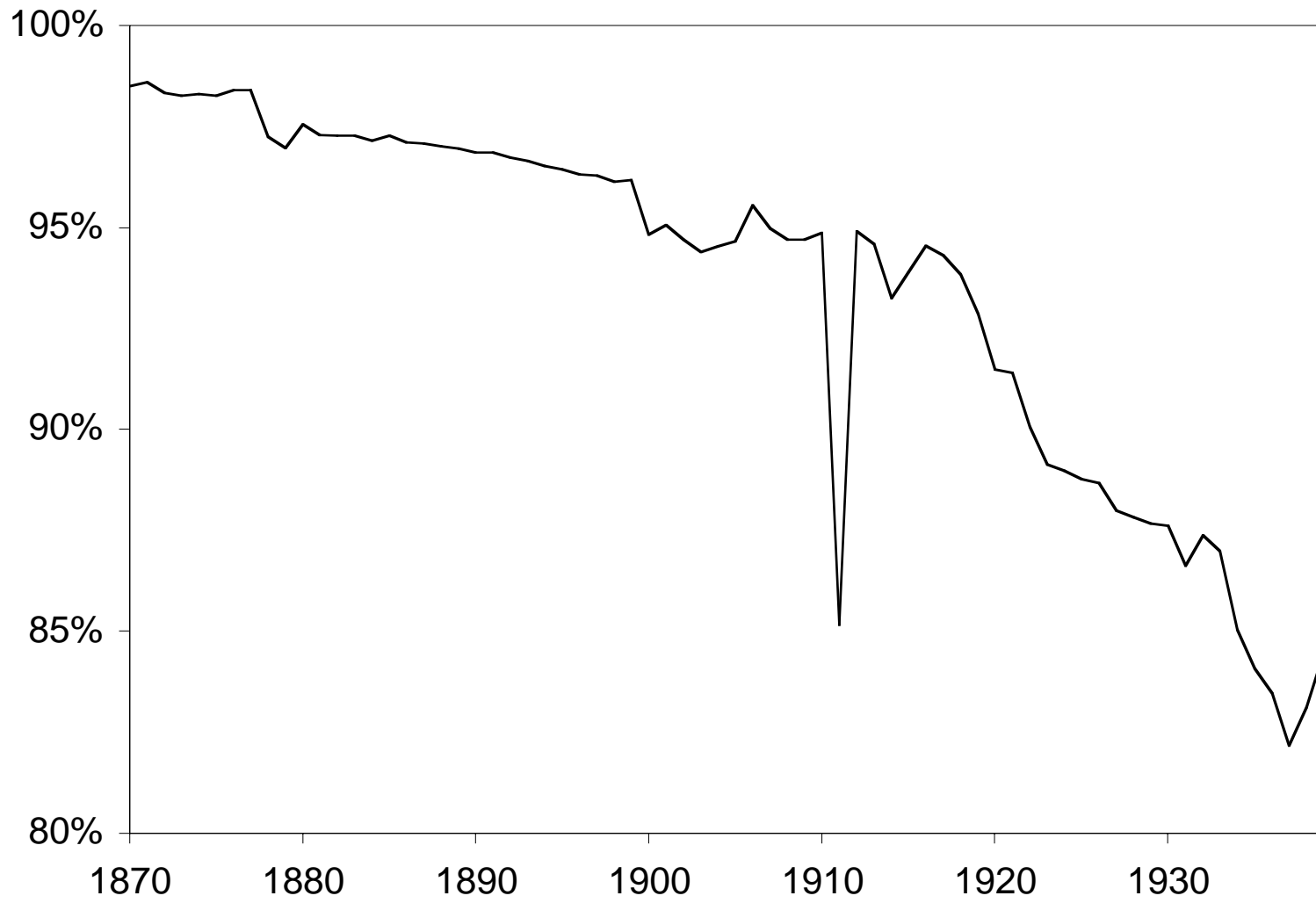
Notes: See text.

Figure 8: World Trade Under Counterfactual Transport Cost Regimes, 1870–1939

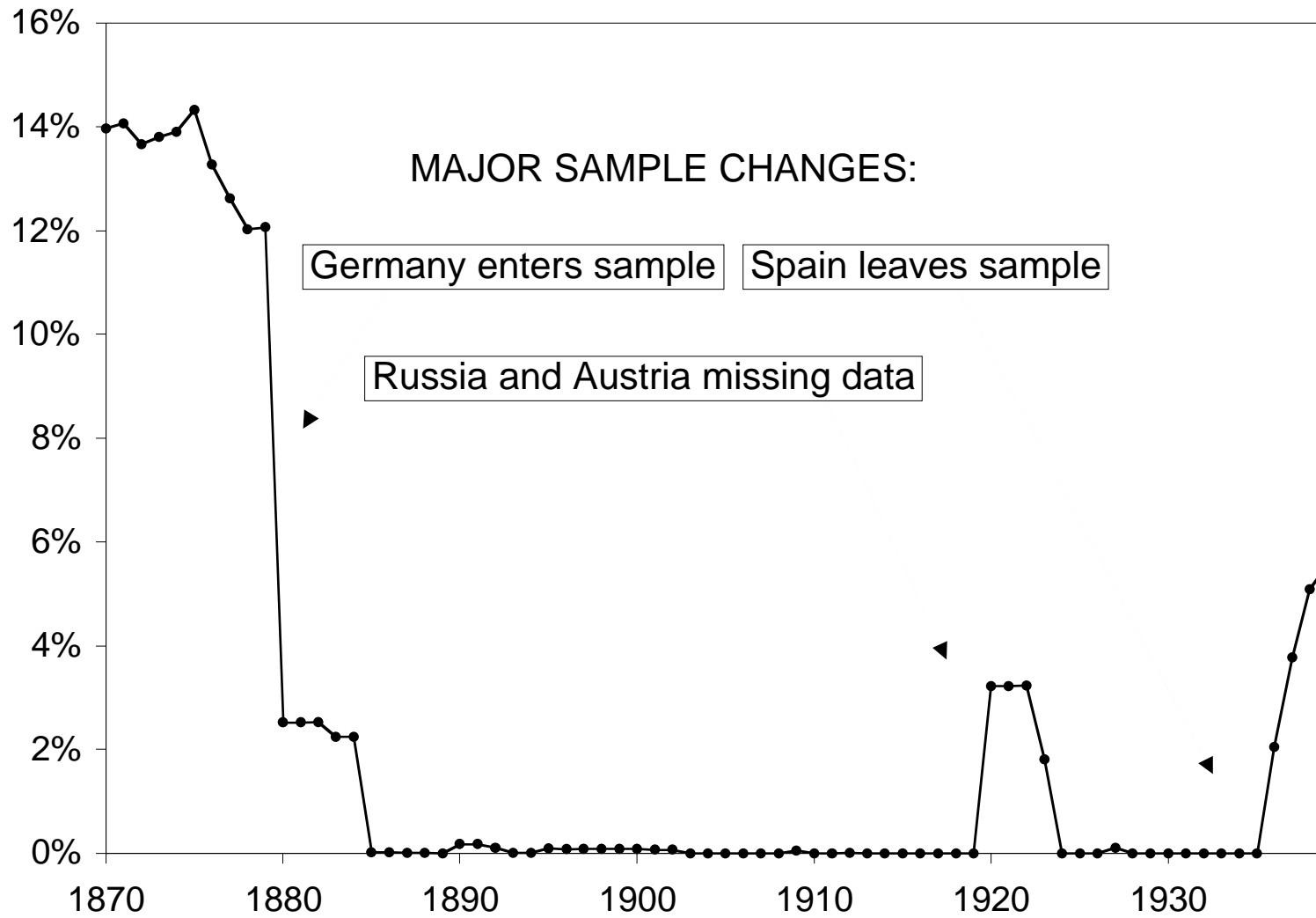


Notes: See text.

Appendix Figure 1
Ratio of Trade in 56-Country Sample to “Total” (Measured) World Trade, 1870–1939

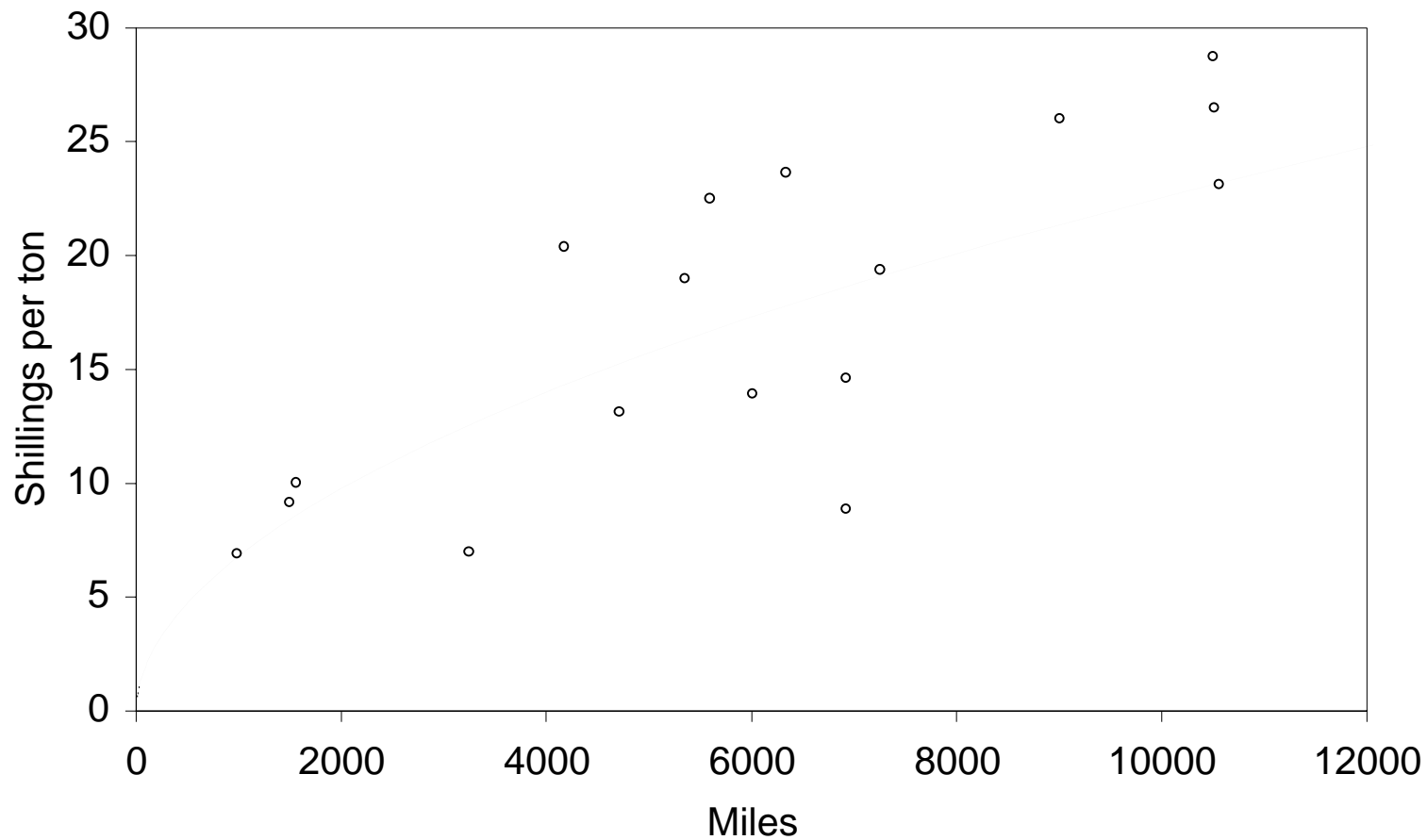


Appendix Figure 2
Ratio of Imputed to Total Trade in 56-Country Sample, 1870–1939



Appendix Figure 3
Hummels Shipping Technology for 1935 Using Isserlis Freights

$$\ln(\text{Shillings per ton}) = \text{constant} + 0.52 \ln(\text{Miles})$$



Notes: See appendix text and Appendix Table 1.