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Commodity market disintegration in the interwar period

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In this paper, we document the disintegration of international commodity markets between 1913 and 1938. There was dramatic disintegration during World War I, gradual reintegration during the 1920s, and then a substantial disintegration after 1929. The period saw the unravelling of many of the integration gains of 1870–1913. While increased transport costs help explain the wartime disintegration, they cannot explain the post-1929 increase in trade costs. The proliferation of tariff and non-tariff barriers to trade, the collapse of the interwar gold standard, and the evaporation of commercial credit loom large as suspects.

1. Introduction

Since the work of pioneers such as Williamson (1974), Harley (1978, 1980), Hurd (1975), and Metzer (1974), there has been an explosion of work documenting the integration of national and international commodity markets during the nineteenth century. These papers have advanced knowledge along several dimensions. A minority (e.g., O'Rourke and Williamson 1994; Klovland 2005) have documented patterns of price convergence or divergence for commodities other than the grains that have been the focus of most papers. Some authors, notably Persson (2004), have demonstrated the importance of comparing commodities of identical qualities in different markets. During the past decade or so, more sophisticated econometric procedures have been used to identify both the speed with which commodity prices returned to equilibrium after a shock, and the trade costs that determined whether such an adjustment process would take place in the first place (e.g., Ejrnæs and Persson 2000).

Recent work has broadened the scope of these investigations well beyond the late nineteenth century. Jacks (2005, 2006) and Federico and Persson (2007) have established that international commodity markets were becoming better integrated throughout the post-1815 period, not just after 1870. O'Rourke and Williamson (2002) find no evidence of commodity market integration between continents before 1800, whereas Rönnbäck (2009) finds the opposite. Jacks (2004) and Özmucur and Pamuk (2007) search for evidence of market integration *within* early modern Europe, with decidedly mixed results. Meanwhile, international economists have recently started to uncover evidence of international price convergence for a variety of consumer goods during the late twentieth century, although this

finding is at odds with what little we know about international agricultural markets during the same period (O'Rourke 2002; Parsley and Wei 2002; Engel and Rogers 2004; Goldberg and Verboven 2005; Federico and Persson 2007).

Striking, however, has been the absence of work documenting price convergence or divergence during the interwar period. This is surprising, since the years after 1929 saw an extensively studied collapse in world trade, as well as an exhaustively researched rise in protectionism. One of the classic questions of the period is: can this post-1929 collapse in world trade (documented in figure 1) be attributed to the Smoot–Hawley tariff of 1930 in the United States and equivalent import restrictions elsewhere, or was it simply a reflection of declining world output? Somewhat embarrassingly for economists to whom actions such as Smoot–Hawley symbolize the folly of interwar economic policy-making, quantitative analyses of the episode have tended to downplay the role of tariffs in explaining the world trade slump, emphasizing instead falling demand and output (Irwin 1998). However, Madsen (2001) argues that discretionary increases in protection were as important as nominal income declines in explaining the post-1929 world trade slump.

Presumably, if trade barriers and trade costs contributed to the fall of world trade, this was because they led to the disintegration of international commodity markets. In turn, this would necessarily have manifested itself in an increase in price gaps between markets, leading (*ceteris paribus*) to an increase in import prices, a decline in export prices, and a decline in trade volumes, with the size of all three effects depending upon elasticities of supply and demand. Increasing price gaps is a necessary, if not sufficient, condition for protectionism to have had any effects on world trade. It thus seems as though the question of what happened to interwar commodity market integration should be of interest not just to scholars of market integration *per se*, but to those more generally interested in the international economy of the period. Yet, there is little work on the subject to date. One exception is Federico and Persson (2007), who look at world wheat markets over the past two centuries and find (using annual data) that while these were extremely well integrated in the early 1920s, there was a sharp increase in international price variance in the years after 1929.

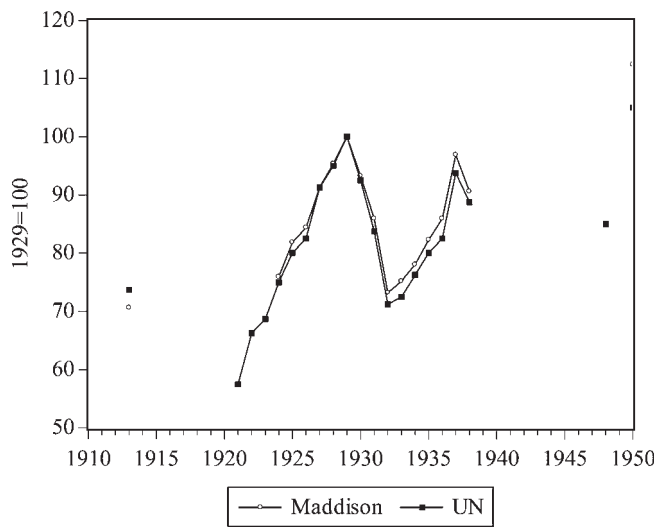

Figure 1. *World trade indices, 1913–1950.* Source*: United Nations (1962) and Maddison (1995, 239).*

The aim of this paper is to provide additional evidence, using higher frequency data and more sophisticated techniques, for a greater range of commodities. Our primary interest is in documenting trade costs during the Great Depression, particularly in 1929–1933, during which world trade collapsed. However, our data also allow us to provide answers to questions such as: how did World War I impact international commodity markets? To what extent did these markets recover during the 1920s? If there was disintegration after 1929, was this severe enough to leave markets less well integrated than before 1914?

We find strong evidence of commodity market disintegration between 1929 and 1933. The 1930s trade decline, thus, may not have been caused by declining income and output alone. This is the primary contribution of the paper, which thus places itself squarely within the market integration literature. Providing a rigorous *explanation* of this disintegration is beyond the scope of the paper. However, we do briefly ask whether it was due to rising transportation costs, as suggested by Estevadeordal et al. (2003). We find little evidence to support this argument, which has been popularized by Krugman (2008). The implication is that other factors—changes in commercial policy, transactions frictions associated with the collapse of the interwar gold standard (another factor which Estevadeordal et al. think mattered), the evaporation of commercial credit, or some combination of these disparate elements—were more likely responsible.

2. Empirics

2.1. Data

Our primary source is the International Institute of Agriculture's (IIA) *International Yearbook of Agricultural Statistics*. Although this publication provides a wealth of information on international commodity markets during the interwar period, we are the first economic historians, so far as we know, to exploit it. The IIA was founded in 1905 and headquartered in Rome. The IIA was a "world clearinghouse for data on crops, prices, and trade to protect the common interests of farmers of all nations." Thus, it was the first international organization dedicated to the task of generating and publicizing world agricultural data. Initially comprising forty nations, membership was extended to fifty-one by 1913. Ultimately, the IIA was succeeded in 1945 by the United Nation's Food and Agricultural Organization (FAO).

The first statistical *Yearbook* was produced in 1909 and covered a wide range of statistical material, from land area and population to agricultural production and prices. After World War I, these volumes were published from 1920 to 1939. One of their express purposes was to document the changes in global commodity markets after World War I. To quote, "the opinion was widely held that world economy [sic] would return to the position existing on the eve of the conflagration so that data for the years immediately preceding the War could be taken in a sense to represent the normal and thus to constitute a good basis of comparison" (International Institute of Agriculture 1933).

The data collection efforts of the IIA were prodigious. Their price data include 374 weekly commodity price series over 46 commodity classifications in locales as far-flung as Rangoon, Rio de Janeiro, and almost all conceivable commercial ports in between. Of the 374 series, we are able to exactly match 27 commodity-specific city pairs. These range from (Danish, creamery for export) butter in Copenhagen and London to (No. 2 winter, American) wheat in Chicago and Liverpool. The commodity and temporal coverage of our exact matches is documented in table 1. The *Yearbook* potentially allows for an even larger

Table 1. *Commodity coverage*

Commodity	Source	Destination	Years
Butter, Danish for export	Copenhagen	London	1913, 1927–1938
Butter, Dutch for export	Leeuwarden	London	1933–1938
Coffee, No. 7 Rio	Rio de Janeiro	New York City	1913, 1922–1938
Coffee, No. 4 Santos	Santos	New York City	1927–1938
Cotton, middling, fair staple, universal standards	New Orleans	Liverpool	1913, 1919–1938
Cotton, machine ginned broach, fully good, good staple, universal standards	Bombay	Liverpool	1913
Cotton, sakellaridis, fully good fair, universal standards	Alexandria	Liverpool	1913, 1927–1938
Cottonseed, upper Egyptian	Alexandria	London	1933–1938
Cottonseed, sakellaridis, good merchandable	Alexandria	London	1927–1932
Eggs, Danish for export	Copenhagen	London	1913, 1927–1932
Groundnuts, coromandel, machine shelled	Madras	London	1927–1938
Jute, first marks	Calcutta	London	1927–1938
Linseed, plata, 4 per cent impurities	Buenos Aires	London	1913, 1927–1938
Linseed, bold	Bombay	London	1913, 1927–1938
Maize, yellow plata	Buenos Aires	London	1913, 1922–1938
Maize, plata	Buenos Aires	Rotterdam	1927–1938
Maize, No. 2 mixed American	Chicago	London	1913, 1922–1926
Oats, No. 2 white Western	Winnipeg	London	1913, 1922–1926
Oats, No. 2 white, 49 kg per hectolitre	Buenos Aires	London	1913, 1922–1938
Rapeseed, Toria, 3 per cent impurities, in bags	Karachi	London	1927–1938
Rice, No. 2 Burma	Burma	London	1913, 1927–1938
Rice, No. 1 Saigon, round white, 25 per cent brokens	Saigon	London	1933–1938
Rye, No. 2 American	Minneapolis	Hamburg	1927–1932
Silk, raw, double extra cracks	Yokohama	New York City	1927–1932
Wheat, No. 1 Northern Manitoba	Winnipeg	London	1913, 1922–1938
Wheat, No. 2 hard winter	Chicago	London	1913, 1922–1932
Wheat, No. 2 hard	Buenos Aires	London	1913, 1922–1938

number of matches. However, we employed a very conservative selection criterion to ensure that product quality differences play no role in our results, following the injunctions of Persson (2004).

We recognize that this criterion is somewhat restrictive in that the resulting sample overweights certain nations, such as the UK. In our defence, the UK remained a serious player in international trade, representing roughly 10 per cent of global trade flows 1921–1939 (authors' calculations based on Jacks et al. 2010). The UK abandoned free trade in 1932 and participated in the global switch toward protectionism during the Great Depression. On the other hand, it was less protectionist than many countries, given its continuing trade links with the Empire and its decision to abandon the gold standard early on (Eichengreen and Irwin 2010). Our sample, therefore, probably understates increased trade costs from protectionist policies during this period. Supplementary material Appendix 1 addresses this issue by considering the commodity price evidence for other, less exact, commodity matches (none of which involve the UK). The appendix suggests that our results are indeed lower bound estimates of the disintegrative tendencies of the interwar period.

In the *Yearbook*, all weekly prices were quoted in local currencies and measures. Quoted prices in the source country were converted into the currency and measures of the matched destination country. For instance, (Danish, creamery for export) butter in Copenhagen was quoted in crowns per 100kg and converted into shillings per hundredweight based on nominal exchange rates derived from the Global Financial Database.[1]

2.2. Methodology

Our main focus is on estimating trade costs—that is, the costs of physically transporting goods across markets inclusive of freight rates, tariffs, and non-tariff barriers to trade—over the interwar period, especially in 1929–1933. It is these costs that should have separated national markets from each other, and contributed to the economic disintegration of the period. In recent years, a voluminous literature has emerged in economics and economic history on how to gauge the trade costs separating markets on the basis of price differentials (Balke and Fomby 1997; Obstfeld and Taylor 1997). For instance, Jacks (2005, 2006) documents market integration in the Atlantic economy by examining grain price data from over hundred markets in Europe and North America 1800–1913.

In contrast to earlier work that looked mainly at average annual price gaps between markets, the modern literature has relied on methods directly based on or indirectly inspired by the threshold auto-regression (TAR) approach first developed by Tsay (1989). Here, we adopt the latter approach and make use of an extremely parsimonious model of commodity market integration. The basic idea is that agents—given the prevailing costs of transport, tariffs and non-tariff barriers to trade, and costs of credit and contracting in foreign exchange

[1] All exchange rate data from the Global Financial database are end of week exchange rates when available. Similarly, we used end of week (Friday) prices where possible. Indeed, for the majority of the series used, prices quoted on major commodity markets were spot prices recorded on Fridays. This was the case for: wheat (exception: No. 1 Manitoba Wheat in Winnipeg for 1913 was based on Wednesday prices), oats, rice, cotton (exception: Skellardis in Liverpool for 1913 based on Thursday prices), and linseed. It was not always possible to get Friday prices and the following were the exceptions: rapeseed in Karachi (Tuesday prices), sugar in New York and London (Thursday prices), butter in Copenhagen (Thursday), butter in London (average prices for weeks ending on Wednesday), jute in Calcutta (Tuesday), and jute in London (Thursday).

markets, etc.—will exploit all profitable opportunities in terms of price differentials. In this case, the basic arbitrage conditions will always be

$$P_t^{1} \leq P_t^{2} + TC^{21} \tag{1}$$

$$P_t^{2} \leq P_t^{1} + TC^{12} \tag{2}$$

That is, the price in location 1 must be less than or equal to the price in location 2 plus the trade cost associated with moving a given commodity from locations 2 to 1. Likewise, the price in location 2 must be less than or equal to the price in location 1 plus the trade cost associated with moving a given commodity from locations 1 to 2. Where commodities are known to be moving in one direction only, say from location 1 (the source city) to location 2 (the destination city), this implies that

$$P_t^{2} - P_t^{1} = M_t^{21} \leq TC^{12} \tag{3}$$

In this case, the difference in prices for a given commodity and for a given city pair will follow a basic TAR process, whereby

$$\Delta M_t^{21} = \lambda(M_{t-1}^{21} - TC^{12}) + \varepsilon_t. \tag{4}$$

In models of this class, λ is allowed to vary according to whether M_{t-1}^{21} is below (that is, $M_{t-1}^{21} \leq TC^{12}$) or above (that is, $M_{t-1}^{21} > TC^{12}$) the threshold defined by the trade cost term, TC^{12}. If $M_{t-1}^{21} \leq TC^{12}$, then there are no profitable arbitrage opportunities available and λ is set equal to zero. However, if $M_{t-1}^{21} > TC^{12}$, then a profitable arbitrage opportunity exists, and we assume that agents exploit such opportunities, which would imply that λ is negative.

The *Yearbook* reports weekly commodity prices. Consequently, we are able to estimate TARs for every individual year available. This comes at the cost of assuming a constant trade cost term within each year. Given the slowly evolving dynamics of international shipping and commercial policy, this is not too heroic an assumption. Finally, we are not open to the identification problem highlighted by Coleman (2007). Given that the IIA reports exact commodity-specific city pair matches (for example, Danish creamery butter for export, in Copenhagen and London) chosen to represent bilateral trading relations, the goods are directly traded between our city pairs by definition, so we need not worry about the emergence of triangular arbitrage shipments, which apparently characterized the pre–World War I gold trade between New York City and London.[2]

2.3. Results

Figure 2 illustrates the estimation procedure for a single commodity for a given city pair in a given year. Here, we consider the market for Danish butter for export in Copenhagen and

[2] However, as Ejrnæs et al. (2008) point out, third market effects may still be important in that they determine the relative supply and demand for goods. This problem is somewhat minimized in our case as it is relatively clear that there is only one exporter of each commodity under consideration (Denmark is the only exporter of Danish butter), and although there may have been multiple importers, the IIA was clearly concerned with predominant trade partners (the UK was the largest importer of Danish butter). What is more, neither the direction nor the size of the potential bias imparted by these third market effects is clear. Unfortunately, our data simply do not allow for the estimation of such multilateral relations.

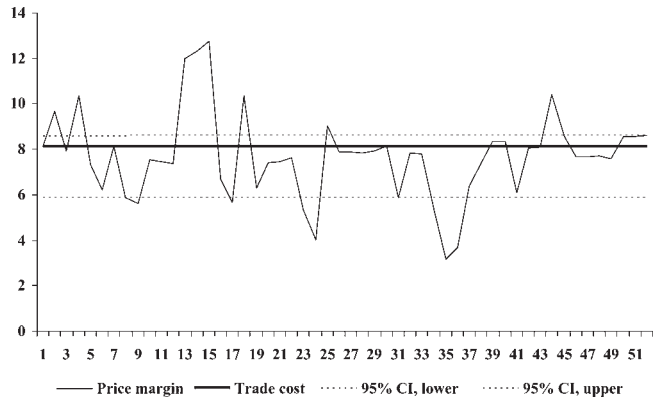

Figure 2. *Price margins in the market for Danish Butter, 1913 (shillings/hundredweight). Source: See text.*

London in 1913. Throughout the year, the price is always higher in London than in Copenhagen. The difference in prices measures the likely size of the composite trade costs—all the costs of transportation and transaction in exporting Danish creamery butter from Copenhagen to London.

Price gaps in hand, we estimate the trade cost term in equation (4) above using the finmetrics module in S-Plus. The procedure yields an estimate of 8.13 shillings per hundredweight, depicted as the solid horizontal line, and a 95% confidence interval of (5.86, 8.58) depicted as the dashed horizontal lines in figure 2.[3] The associated speed of adjustment parameter, $\hat{\lambda}$, is -0.2925 with a standard error of 0.1395 (t-statistic $= 2.10$). In order to make this figure for the speed of adjustment parameter more intuitive, it is common in the literature to calculate the half-life of deviations from the (trade-cost-adjusted) law of one price using the following formula:

$$\frac{\ln(0.5)}{\ln(1+\hat{\lambda})}. \tag{5}$$

In this case, the estimated half-life of a shock to the pricing system is 2. That is, in 1913, the arbitrage trade in butter reduced a pricing deviation above the trade cost estimate between Copenhagen and London by 50 per cent on average in two weeks.

Thus, from fifty-two weekly observations on the price gap between two cities for a particular commodity in a particular year, we generate annual estimates of the trade cost separating these markets, as well as the adjustment speed. In what follows, we concentrate on the trade cost estimates for two reasons. First, we are primarily interested in the changes in the costs of doing trade between 1913 and 1938, and especially between 1929 and 1933. It is these costs that would have led to international commodity price gaps widening, assuming that this in fact happened, and which would reflect the impact of rising protectionism. There is little reason to believe that the technology underlying the commodity trade and, thus, determining

[3] The confidence interval for the threshold is given by the inversion of the likelihood ratio test proposed by Hansen (1997). It is constructed by defining the set of observations in the data for which this likelihood ratio test cannot be rejected at the 5 per cent significance level. Thus, being drawn from the actual data which is discrete and not continuous, the confidence intervals need not be symmetric in this case.

the speed at which commodities were shipped, or prices arbitraged, radically changed in this period. These markets had witnessed innovations such as steamships and telegraphs well beforehand.[4] Secondly, the identification of the threshold parameter comes off the entire set of observations for a given year (generally 52), while the adjustment parameter is identified from the subset of observations that the TAR routine determines to be most likely above the trade-cost threshold, resulting in less precision. Consequently, we are unable to document any statistically significant *differences* in threshold parameters over time.[5] Thus, our focus is on changes in total trade costs—freight rates, and the impact of tariffs, non-tariff barriers to trade, and all other costs of international trade. Most of the estimated coefficients are significant at the 10 per cent level, and, as predicted, we always find a negative adjustment parameter λ and a positive trade cost, TC.

Our trade cost estimates are nominal (e.g., 8.13 shillings per hundredweight in 1913 in the Copenhagen–London butter trade). We must deflate these nominal trade costs somehow when comparing different years. This is particularly true during periods of generalized inflation or deflation (such as the Great Depression). We agree strongly with Shah Mohammed and Williamson (2004) that the best way to proceed is to follow international trade economists such as Hummels (1999), and deflate by the prices of the goods being transported. This gives an ad valorem equivalent of the costs of trade: as Hummels (1999, 11) says, "For many purposes such as measuring the limiting effect of shipping on trade, the ad-valorem equivalent of the barrier is the relevant measure." Other deflators are less suitable for our purposes: GDP deflators and other general price indices include the prices of many non-tradables, for example. Nonetheless, as a robustness check, we also deflate with alternative price indices—specifically the British GDP deflator, wholesale price index, and import price index—and report the results below.

We therefore combine our commodity-, city pair-, year-specific estimates of trade costs with information on the average annual prices of the same commodities in destination cities to arrive at a unit-less measure of trade costs comparable across commodities and years. Tables 2 and 3 summarize the estimated trade costs as a share of destination market prices for the 291 observations at our disposal, while Supplementary material Appendix 2 documents the underlying commodity price data as well as the 95% confidence intervals of the trade cost estimates. Supplementary material Appendix 3 decomposes the variance in our commodity–price-deflated trade cost measure into the components attributable to the variance in trade costs, the variance in prices, and their covariance. The results suggest that, once the covariance between the two series is accounted for, it is the variance in the trade cost series that dominates the variance in the trade cost-to-price ratio and *not the variance in prices in this period*.

The first finding which we want to discuss is the comparison between trade cost levels in 1913 versus the post-war period. For the fourteen trade cost series at our disposal with observations both in 1913 and in the post-war period, fully ten register an increase in trade costs as a share of destination market prices. Regarding the four which register a decrease, we note that three of these involved the trade in grains between North America and the UK

[4] The inauguration of the Panama Canal in 1914 is an obvious exception to this general statement. However, none of those city pairs for which we have price information in 1913 is likely to have been affected by its completion, as a quick review of table 1 will confirm. Below, we discuss interwar transportation technologies further.

[5] In an exercise to follow, we estimate two TARs on all pre-1930 observations, and all post-1929 observations, for the handful of commodities with sufficient data. These results bear out our expectation that adjustment speeds cannot be distinguished from one another, pre- and post-1929, but that estimates of trade costs can.

Table 2. *Estimated trade costs as a share of destination market prices*

Commodity	Butter	Butter	Coffee	Coffee	Cotton	Cotton	Cotton
Source	Copenhagen	Leeuwarden	Rio	Santos	New Orleans	Bombay	Alexandria
Destination	London	London	NYC	NYC	Liverpool	Liverpool	Liverpool
1913	0.0640		0.1271		0.0927	0.0467	0.0454
1919					0.1028		
1920					0.1476		
1921					0.1260		
1922			0.1815		0.1194		
1923			0.2060		0.1151		
1924			0.1904		0.0294		
1925			0.1204		0.0763		
1926			0.0589		0.0990		
1927	0.1007		0.1155	0.2314	0.1216		0.0464
1928	0.0659		0.0989	0.1438	0.1106		0.0353
1929	0.1032		0.1169	0.1584	0.1128		0.0287
1930	0.0935		0.2191	0.2065	0.1156		0.0281
1931	0.0943		0.1968	0.4570	0.1293		0.1294
1932	0.1372		0.3497	0.4735	0.1909		0.1380
1933	0.2415	0.2658	0.5434	0.4955	0.1119		
1934	0.2646	0.3637	0.4209	0.4423	0.1124		
1935	0.2248	0.2958	0.5690	0.5113	0.1357		
1936	0.2137	0.2290	0.4943	0.4666	0.1194		
1937	0.1956	0.1865	0.4830	0.4494	0.1504		
1938	0.1900	0.1681	0.4367	0.4413	0.1134		

Commodity	Cottonseed I	Cottonseed II	Eggs	Groundnuts	Jute	Linseed	Linseed
Source	Alexandria	Alexandria	Copenhagen	Madras	Calcutta	Buenos Aires	Bombay
Destination	London	London	London	London	London	London	London
1913						0.1217	0.1351
1919							
1920							
1921							
1922							

(*Continued*)

Table 2. *Continued*

Commodity Source Destination	Butter Copenhagen London	Butter Leeuwarden London	Coffee Rio NYC	Coffee Santos NYC	Cotton New Orleans Liverpool	Cotton Bombay Liverpool	Cotton Alexandria Liverpool
1923							
1924							
1925							
1926							
1927		0.1087	0.2335	0.1785	0.2981	0.1366	0.1543
1928		0.0954	0.1186	0.0518	0.1992	0.1214	0.1538
1929		0.1536	0.4977	0.1631	0.2056	0.1255	0.1389
1930		0.1222	0.6494	0.0828	0.1810	0.1264	0.1259
1931		0.2229	0.1705	0.2173	0.2400	0.1922	0.1623
1932		0.1528	0.5321	0.2103	0.2406	0.1904	0.2127
1933	0.2437			0.2822	0.2914	0.4450	0.1976
1934	0.2170			0.2334	0.2929	0.1500	0.1891
1935	0.1434			0.1181	0.2345	0.1232	0.2183
1936	0.2109			0.1821	0.2340	0.1525	0.2144
1937	0.2205			0.2056	0.2122	0.1641	0.2314
1938	0.1903			0.2173	0.2670	0.1489	0.2124

Source: See text.

Table 3. *Estimated trade costs as a share of destination market prices*

Commodity	Maize	Maize	Maize	Oats	Oats	Rapeseed	Rice
Source	Buenos Aires	Buenos Aires	Chicago	Winnipeg	Buenos Aires	Karachi	Burma
Destination	London	Rotterdam	London	London	London	London	London
1913	0.1085		0.0884	0.3107	0.0873		0.3570
1919							
1920							
1921							
1922	0.2632		0.2131	0.3013	0.2599		
1923	0.2474		0.1161	0.3103	0.2350		
1924	0.3267		0.1078	0.2425	0.1939		
1925	0.1618		0.1642	0.2499	0.1668		
1926	0.1728		0.1563	0.3147	0.2583		
1927	0.2387	0.1771			0.4709	0.1342	0.2129
1928	0.2391	0.1935			0.4325	0.1469	0.2121
1929	0.1925	0.2154			0.4776	0.1343	0.1855
1930	0.2568	0.1652			0.5202	0.1665	0.1882
1931	0.2804	0.3921			0.6683	0.2147	0.3240
1932	0.2681	0.2399			0.5237	0.1885	0.2449
1933	0.4846	0.4448				0.2319	0.3324
1934	0.1752	0.1551				0.1859	0.3605
1935	0.2183	0.2351				0.1606	0.1857
1936	0.3242	0.2909				0.1829	0.2782
1937	0.3285	0.3016				0.2073	0.3816
1938	0.1757	0.1626				0.1821	0.3258

Commodity	Rice	Rye	Silk	Wheat	Wheat	Wheat
Source	Saigon	Minneapolis	Yokohama	Winnipeg	Chicago	Buenos Aires
Destination	London	Hamburg	New York City	London	London	London
1913				0.2351	0.1194	0.1458
1919						
1920						
1921						
1922				0.2199	0.0764	0.1969
1923				0.1507	0.0777	0.1665
1924				0.1085	0.1195	0.1251
1925				0.1376	0.1073	0.0979
1926				0.1846	0.0662	0.0308
1927		0.1686	0.0729	0.1469	0.1209	0.1246
1928		0.1553	0.1281	0.1655	0.0664	0.1223
1929		0.1387	0.1263	0.1382	0.0744	0.1258
1930		0.2446	0.0963	0.2354	0.1078	0.0630
1931		0.0944	0.1111	0.2266	0.0706	0.2488
1932		0.2307	0.0602	0.2977	0.0934	0.2048
1933	0.2665			0.1872		0.4011
1934	0.3255			0.1688		0.1540
1935	0.2591			0.1125		0.1179

(*Continued*)

Table 3. *Continued*

Commodity	Maize	Maize	Maize	Oats	Oats	Rapeseed	Rice
Source	Buenos Aires	Buenos Aires	Chicago	Winnipeg	Buenos Aires	Karachi	Burma
Destination	London	Rotterdam	London	London	London	London	London
1936	0.2620			0.1201		0.1626	
1937	0.2718			0.1430		0.0527	
1938	0.2467			0.1624		0.2191	

Source: See text.

(oats, Winnipeg–London; wheat, Winnipeg–London; and wheat, Chicago–London). These three exceptions are less surprising if we consider the staggering heights of commercial activity in these trades—and presumably, investment in the attendant handling and shipping facilities—achieved during World War I (Food Research Institute, various years). Comparing trade costs in 1913 with those in 1922 for those series with available data suggests that, on average, trade costs rose by 60 per cent. The respective figures for 1927 and 1929 are 48 and 42 per cent, suggesting that the international economy was slowly converging back to the levels of integration set in 1913. The evidence from the price data is thus consistent with the recovery in world trade volumes during the 1920s apparent in figure 1.

The Great Depression changed all of this. The ratio of trade costs in 1933 to trade costs in 1913 is 2.59—that is, trade costs as a share of destination market prices increased almost 160 per cent. The Great Depression could have mattered in a multitude of ways, and we discuss some of these later. The imposition of the Smoot–Hawley tariff act of 1930 would seem to play an obvious role: by 1933, sixty-one other countries had raised trade barriers in response (Conybeare 1985), reflecting "the mutual insanity of the different nations of the world with respect to international trade" (Jones 1934, vii). Even the UK definitively abandoned its traditional free trade policy with the Import Duties Act in 1932. Importantly, protection did not only involve tariffs. Countries resorted to quantitative restrictions on trade as well. The Depression also increased uncertainty, led to currency chaos, and made credit scarce. It is not surprising then that the ratio still stood at 2.68 in 1938, even after concerted efforts to re-establish some order to international markets.

Some of these patterns can be detected in figure 3. Rather than plotting all the available series, we consider those fourteen trade cost series that bridge the critical period from 1929 to 1933. That is, figure 3 tracks commodity trade costs from the onset of the Great Depression to the nadir in global trade and beyond. The figure distinguishes between series representing different orientations of trade flows. Thus, in figure 3A, there are five trade cost series—groundnuts, Madras–London; jute, Calcutta–London; linseed, Bombay–London; rapeseed, Karachi–London; and rice, Burma–London—which represent trade between the British Empire and the UK. In figure 3B, there are four trade cost series—cotton, New Orleans–Liverpool; maize, Buenos Aires–London; butter, Copenhagen–London; and linseed, Buenos Aires–London—which represent trade between non-British Empire countries and the UK. In figure 3C, there are three trade cost series—coffee (I), Rio de Janeiro–New York City; coffee (II), Santos–New York City; and maize, Buenos Aires–Rotterdam—which represent trade among non-British Empire countries. Finally, in figure 3D, there are two trade cost series from Buenos Aires and Winnipeg to London,

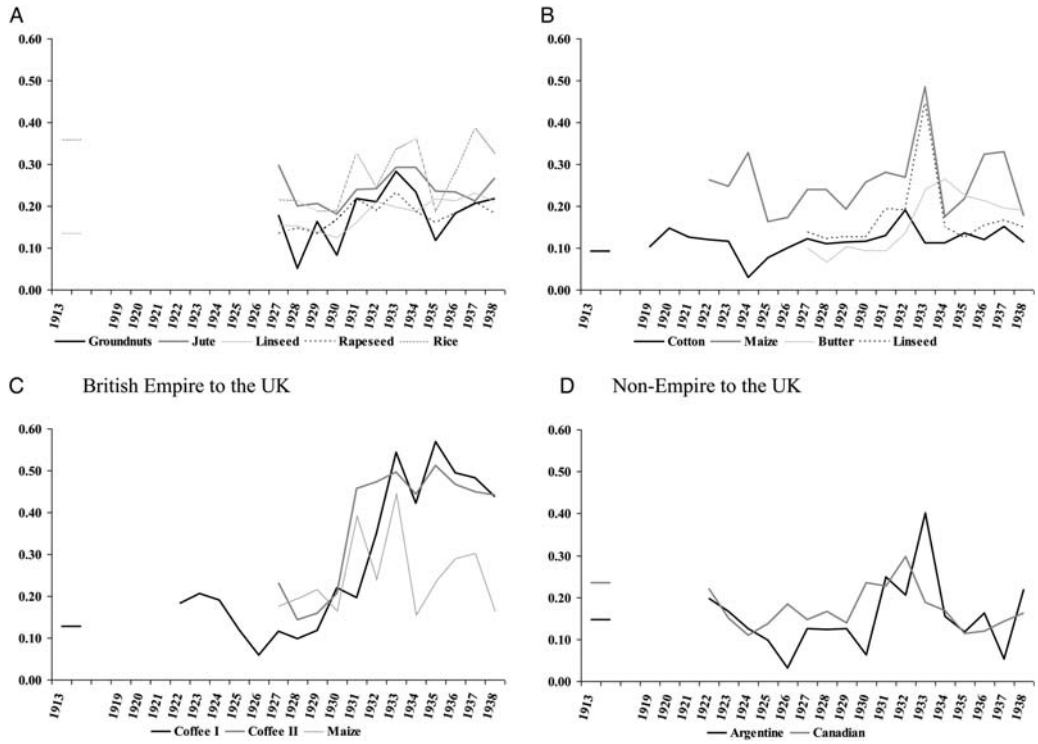

Figure 3. *Trade Costs, 1913, 1919–1938.*

which allow us to compare the trade in wheat with the UK from British Empire and non-British Empire countries.

All trade costs were on the decline during the 1920s. There appears to have been some retrenchment in the later 1920s, but this was more a slowing in trend than a turning point. However, the year 1930 witnessed a marked transition in the trade cost series. The average for all series shot up from 0.151 in 1929 to 0.335 in 1933. Of the fourteen series depicted in 1933, only one—cotton, New Orleans–Liverpool—stood at a level comparable with that of 1929 (0.112 versus 0.113). Even in this case, cotton trade costs increased by 70 per cent between 1929 and 1932. The series are also roughly synchronized on the down-side with most bottoming out no later than 1935. Finally, after stabilizing at levels generally higher than in the 1920s, the averages show no clear trend in the years immediately preceding World War II.

Even more telling than these generalized trends are the differences between Empire and non-Empire trade. For the series in figure 3A, trade between the Empire and the UK, trade costs increased, an average 62 per cent, between 1929 and 1933. For the series in figure 3B, trade between non-British Empire countries and the UK, trade costs increased an average 135 per cent between 1929 and 1933, or almost twice as much. For the series in figure 3C, involving trade among non-British Empire countries, trade costs increased an average 205 per cent. Trade costs for the coffee trade between Rio and New York rose by 365 per cent; those between Santos and New York rose by 213 per cent; and trade costs for maize between Buenos Aires and Rotterdam rose by 106 per cent. This is consistent

with the hypothesis that commodity market disintegration during the Great Depression was more pronounced in the international economy generally than in the case of the UK import trade, which remained relatively free by international standards.

While these figures are suggestive, the commodity composition of trade flows differed across these three categories, and this matters since commercial policy responses across goods and countries is likely to have been highly asymmetric. It is therefore instructive to turn to the series in figure 3D, showing trade costs for wheat between Argentina and the UK on the one hand, and between Canada and the UK on the other hand. Again, Empire membership mattered: Argentine trade costs increased by 219 per cent between 1929 and 1933, while Canadian costs increased by only 35 per cent. What is interesting in this case is that neither Argentine nor Canadian wheat was subject to import duties or quotas in the UK throughout 1931 (Sollohub 1932), although this changed after 1932.[6] Thus, the respective increases of 98 and 64 per cent for wheat trade costs from Argentina and Canada between 1929 and 1931 were presumably generated by forces outside the realm of commercial policy. This is an issue to which we return later. After 1932, commercial policy can help to account for the differences in the trade cost series for the two goods.

The increase in trade costs between 1929 and 1933 is not an artefact of our deflators—deflators which are, we have argued above, appropriate for the problem in hand. Nominal trade costs for the fourteen commodities above rose by 12 per cent between 1929 and 1933, which is striking given the general deflation of the era. Deflation was less pronounced in the UK than elsewhere, and so if we deflate by the British GDP deflator, we obtain a modest real increase in trade costs of 22 per cent. The increase is 49 per cent when we deflate by the British Board of Trade's wholesale price index, 75 per cent when we deflate by an index of British import prices, and 128 per cent when we deflate, appropriately, by the prices of the commodities themselves.[7] Since eleven of the fourteen series involve imports into the UK, which only switched to protection in 1932, it seems reasonable to speculate that these estimates of trade cost increases during the Great Depression are a lower bound estimate of experience more generally, and Supplementary material Appendix 1 provides some evidence in favour of this hypothesis.

2.4. A longer run perspective: international price gaps, 1870–1938

Some authors, such as Federico (2008), prefer to use simpler indicators, such as the average annual price gaps between markets, as a measure of international commodity market integration. In this section, we, therefore, provide this evidence for the interwar period, and compare interwar price gaps with those prevailing in the late nineteenth century, so as to gain a longer run perspective on interwar disintegration.

Table 4 gives annual average price gaps for twenty commodity routes between 1913 and 1937. As a sensitivity check, the sample of routes presented here differs slightly from those presented earlier: the selection criterion used here is that monthly data for the commodity

[6] Non-imperial wheat was subject to a 2.00 shillings per quarter specific tariff as a result of the Imperial Economic Conference in August 1932 (McDiarmid 1946, 283). In 1933, the level of trade costs between Buenos Aires and London for Argentine wheat is estimated at 8.44 shillings per quarter while freight rates for wheat from La Plata to London were quoted at 3.15 shillings per quarter (*Wheat Studies*, see Food Research Institute various years). This leaves nearly 40 per cent of the trade cost measure unexplained by freights and tariffs.

[7] The alternative deflators are taken or derived from Mitchell (1988, 527, 728–30, 836).

Table 4. *Average annual commodity price gaps, 1913–1937 (per cent)*

Commodity	Grade	Markets	1913	1922	1927	1929	1933	1937
Wheat	No. 2 Winter	Liverpool-Chicago	16.0	24.6	12.9	8.7		
Wheat	No. 1 Northern Manitoba	London-Winnipeg	24.5	34.7	7.7	9.9	20.7	17.7
Wheat	Plate	London-Buenos-Aires	9.0	26.3	11.0	11.6	10.1	5.8
Maize	Plate	London-Buenos-Aires	18.7	39.3	25.3	21.0	25.5	33.6
Oats	Plate	London-Buenos-Aires	13.5	33.2	29.1	25.7	26.0	
Rice	Birmanie No. 4	London-Rangoon			25.9	27.7	50.4	55.3
Rice	Saigon No. 1	London-Saigon			76.2	39.7	39.0	44.2
Rapeseed	Toria	London-Karachi			14.7	15.1	21.8	27.3
Groundnut	Coromandel	London-Madras			20.5	15.2	27.1	26.6
Linseed	Bombay	London-Bombay			17.6	16.8	23.9	27.9
Linseed	La Plata	London-Buenos-Aires			16.0	14.7	13.1	22.2
Cotton	Middling	Liverpool-New Orleans	12.0	22.1	12.2	12.2	15.9	16.5
Cotton	Broach	Liverpool-Bombay			4.0	8.4	5.4	8.8
Cotton	Sakellaridas	London-Alexandria			6.2	5.4	13.0	10.1
Cottonseed	Sakellaridas	London-Alexandria			17.5	19.8	23.8	24.2
Eggs	Danish	London-Denmark			43.6	58.7	71.5	73.8
Eggs	Dutch	London-Holland			12.8	23.6	15.4	45.7
Butter	Danish	London-Copenhagen			7.9	10.1	36.7	24.7
Coffee	Rio No. 7	New York-Rio	9.8	17.0	15.5	15.8	103.6	58.2
Coffee	Santos No. 4	New York-Santos			28.0	19.3	89.8	55.8

Source: *International Yearbook of Agricultural Statistics*, International Institute of Agriculture (various years). Data for 1927–1937 are based on annual averages of monthly price data, expressed in gold francs per quintal. Where monthly data in gold francs per quintal are not available, price gaps are calculated based on the weekly price data used elsewhere in this paper.

in question be provided in the IIA Yearbooks, expressed in both markets in gold francs per quintal. Reassuringly, the same qualitative message emerges from these data as earlier.[8] First, the war directly disrupted commodity markets, and price gaps were everywhere higher in 1922 than they had been in 1913. Secondly, the early to mid-1920s saw a gradual reversion to normality, with price gaps narrowing between 1922 and 1927 for each of the seven routes for which we have data. In the case of the wheat trade between Britain and North America, the net result was that 1927 price gaps were below their 1913 levels, but in all other cases price gaps were still higher in 1927 and 1929 than they had been before the war. Thirdly, the years after 1929 saw further disintegration. Price gaps rose in fourteen out of nineteen cases between 1929 and 1933, and in seventeen out of eighteen cases between 1929 and 1937. For example, the New York–Rio coffee price gap rose from 9.8 pecent in 1913 to 15.8 per cent in 1929 and 103.6 per cent in 1933, before declining to a still high 58.2 per cent in 1937.

Figure 4 shows annual average price gaps for nine commodity routes for which we have data that are more or less comparable both before and after 1913. The data are taken from the IIA, as before, as well as from the 1919 and 1923 volumes of the Indian Department

[8] Grades are identical for most of the commodities. However, there are some minor discrepancies in the grades for wheat. For example, Argentinean wheat is graded as Barletta in Buenos Aries and as Plate in Liverpool.

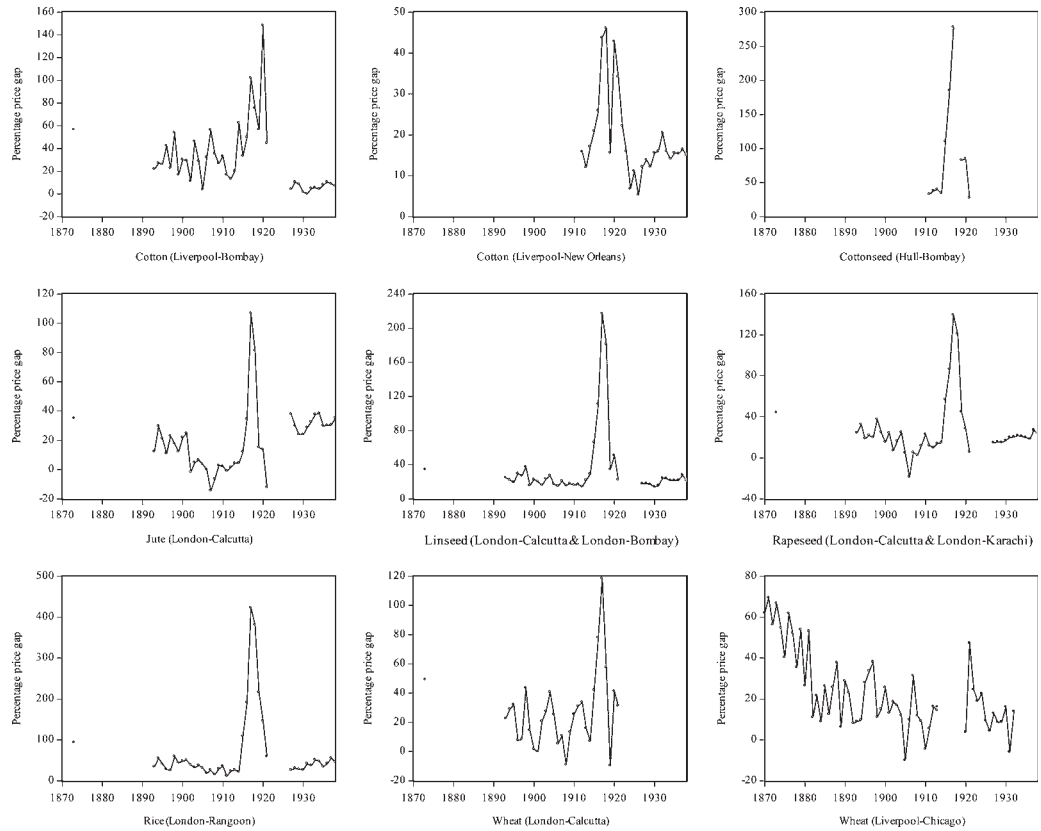

Figure 4. *per centage price gaps, 1870–1938.* Sources*: data on Anglo-Indian price gaps, 1873–1921, are computed based on the price information in the 1919 and 1923 volumes of* Prices and Wages in India. *Data for 1927–1938 are based on* International Yearbook of Agricultural Statistics, *International Institute of Agriculture (various years)*. *Data on the Liverpool–New Orleans cotton price gap are based on the price information in the* International Yearbook of Agricultural Statistics. *Weekly information is used for 1912–1926; monthly data in gold francs per quintal are used for 1927–1938. Data on the Liverpool–Chicago wheat price gap are based on the price information for #2 winter wheat given in Harley (1980) for 1870–1913, and in* International Yearbook of Agricultural Statistics *for 1913–1932*.

of Commercial Intelligence's *Prices and Wages in India*. For Indian cotton, jute, wheat, and cottonseed, as well as for Burmese rice and US cotton and wheat, the same route is considered for both periods, while for Indian linseed and rapeseed the routes are different, representing different embarkation points in India (Calcutta before 1913; Bombay and Karachi for linseed and rapeseed, respectively, afterwards). Four stylized facts emerge clearly from the figure. First, the well-known commodity market integration of the late nineteenth century is confirmed. Secondly, World War I saw a dramatic disintegration of international commodity markets. The Liverpool–Bombay cotton price gap rose from 20 per cent in 1913 to 102 per cent in 1917; the London–Calcutta jute price gap rose from 4.4 to 106.8 per cent, the rapeseed price gap rose from 14 to 140 per cent, the wheat price gap rose from 16 to 118

per cent and the linseed price gap rose from 22 to 217 per cent; the Hull–Bombay cottonseed price gap rose from 40 to 278 per cent; and the London–Rangoon rice price gap increased from 26 to 422 per cent. Thirdly, those wartime losses were later recouped. Fourthly, once this process of post-war recuperation was over, there was no further commodity market integration, while in the cases of rice, linseed, rapeseed, and US cotton, there was disintegration from the late 1920s onwards, with 1929 appearing as a breakpoint. In the case of the London–Rangoon rice trade, for example, price gaps in the 1930s were back in the 40–50 per cent range of 1873. On some routes, the interwar period saw a halt to further integration; on others, it saw a significant erosion of the progress which had been made during 1870–1913.

2.5. Sources of disintegration: policy or technology shocks?

What is the source of this disintegration? The historical literature suggests that drastic changes in commercial policy increased trade costs during the early 1930s. These changes included quantitative trade restrictions, with effects difficult to measure, and higher tariffs. In some cases, we see a direct link between our estimated trade costs and tariff changes. For example, Britain imposed tariffs on Danish butter for the first time in 1932. Following the Ottawa Conference in August, these amounted to 15 shillings per hundredweight of butter (Nüchel Thomsen and Thomas 1966, 363). This tariff nicely matches the estimated increase in trade costs, from 12.6 shillings per hundredweight in 1931 to 25.1 shillings in 1933.

At the same time, Estevadeordal et al. (2003) suggest that there was room for rising transportation costs in explaining the interwar trade bust and, thus, the climb in trade costs. However, the evidence is ambiguous regarding the actual movement of transport costs. The interwar period saw several incremental improvements to ocean shipping technologies, such as better boilers on steamships, or the development of turboelectric transmission mechanisms. According to Shah Mohammed and Williamson (2004), TFP growth in the British tramp shipping industry was at least as fast between 1909–1911 and 1932–1934 as before the war, with annual TFP growth rates of 2.83 per cent on the transatlantic route, 1.27 per cent on the Alexandria route, and 1.05 per cent on the Bombay route. However, most of the improvements had been realized by 1923–1925, suggesting war-induced technological change. Moreover, Estevadeordal, Frantz, and Taylor point out, citing Hummels (1999), that what matters for the cost of shipping is its TFP growth rate relative to the economy-wide TFP growth rate. The latter will raise factor prices throughout the economy and, thus, raise costs for sectors experiencing below-average productivity growth.

Estevadeordal, Frantz, and Taylor's finding that rising real maritime freight rates (from the mid-1920s through the end of the 1930s) help explain the interwar trade bust is based on the Isserlis (1938) maritime freight rate index, which ends in 1936, and which they deflated by the British consumer price index. However, there are at least three reasons why this finding should not be accepted uncritically. The first is that the way in which Isserlis constructed his index has been criticized, for example by Yasuba (1978) who argues that it was upward biased based on its choice of routes. The second is that if we are concerned about the impact of freight rates on international trade, we should be deflating them, as argued above, by the prices of the goods being traded. Finally, invoking rising maritime freight rates as a cause of the interwar trade bust ignores the potential endogeneity of freight rates with respect to trade volumes. Indeed, the British Chamber of Shipping estimated that "due to trade depression . . . about 18,000,000 tons of vessels, or about 20

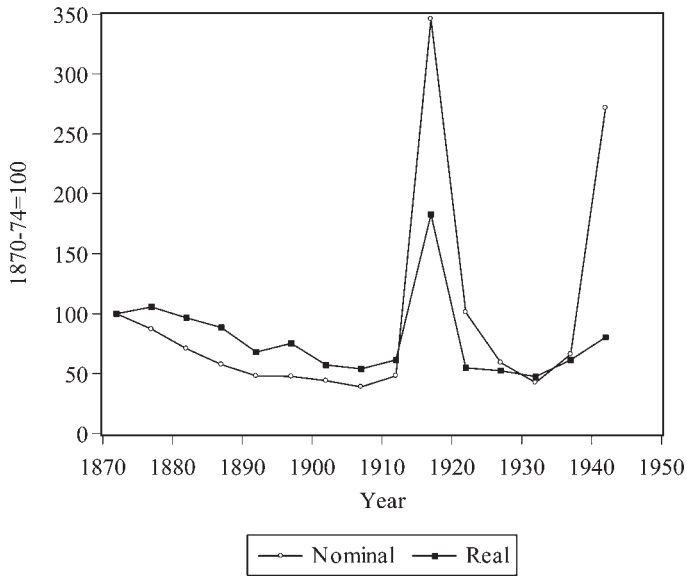

Figure 5. *Freight rate indices, 1870–1944.* Source*: Shah Mohammed and Williamson (2004, table 3, 188).*

percent of world tonnage, were laid up at the end of 1931" (Sollohub 1932, 410). Thus, the causality may have been more from the interwar trade bust to changes in real maritime freight rates than vice versa.

A more recent paper, by Shah Mohammed and Williamson (2004), addresses the first two of these concerns. Shah Mohammed and Williamson collect freight rates for a larger and more representative sample of routes, and deflate by route-specific deflators, based on the prices of the commodities being shipped on those routes. The resulting nominal and real freight rate indices, 1870–1944, are plotted in figure 5. As can be seen, despite the wartime improvements in transportation technology mentioned earlier, freight rates shot up after 1914, as a result of higher wages and fuel, and more expensive ships. Transport cost increases are thus *prima facie* a plausible contender in explaining the wartime disintegration of international commodity markets documented earlier. Nominal freight rates remained higher during the 1920s than before the war, although they fell continuously, and regained pre-war levels briefly in the early 1930s. They then increased as the 1930s progressed, before exploding once more during World War II.[9]

However, it is real freight rates that matter for trade, and commodity prices were much higher after World War I than before. The data show real freight rates falling through the 1920s, to levels below those of 1913, so that the real freight rate index was 0.58 in 1930–1934, as opposed to 0.75 in 1910–1914. The index then increased to 0.75 in 1935–1939, although how much of this rise was due to developments in 1939 is not clear. An immediate implication of this index is that the interwar trade bust could *not* have been due to rising transport costs, since real freight rates started rising only in the mid-1930s, *after* world trade volumes had started to recover.

[9] This evidence is consistent with the idea that because of the endogeneity between freight rates and trade flows the two series should be positively rather than negatively correlated—see Jacks and Pendakur (2010) on this issue.

While the Shah Mohammed index represents the state of the art, there is still a certain ambiguity regarding international transport costs during the interwar period. We therefore use our price data to gain some sense of whether or not the technology of information transmission and goods shipment changed over that time. That is, with the onset of the Great Depression, did commodity markets experience technological regression as the world market imploded? We set a break-point in 1929 and estimate two TARs on all pre-1930 observations and all post-1929 observations for two series: wheat, Buenos Aires–London and wheat, Winnipeg-London. The choice of these two series is strictly predicated on data availability.[10]

Estimating TAR models, as in equation (4), for 1922–1929 and 1930–1938, we generate the results reported in table 5. In the upper panel, we find that trade costs in shillings per quarter between 1922 and 1929 were 7.90 and 6.54 for the Buenos Aires and Winnipeg routes, respectively. Combined with information on the average prices of the specific varieties of wheat in London, this translates into proportional trade costs of 0.157 and 0.119, respectively—results consistent with those in table 3. The speed of adjustment parameters are also fairly precisely estimated, at −0.379 and −0.194.

Turning to the post-1930 environment in the lower panel, we see that trade costs as a proportion of the average London price increased to 0.234 in the case of Argentine wheat and 0.170 in the case of Canadian wheat. At the same time, the speed of adjustment parameter for Buenos Aires rose to −0.288, while for Winnipeg it fell, to −0.252. Thus, trade costs as a proportion of London prices rose by roughly 50 per cent in both instances. Moreover, the difference is statistically significant across periods. In contrast, while the speed of adjustment parameters do change across regimes, they do so inconsistently, and—we emphasize—the differences are not statistically significant. We take this as *prima facie* evidence that the communication and transportation technology surrounding the speed of trade did not change in this period, but that policy and other barriers to trade did.

Further evidence on the unimportance freight rates in driving trade costs and volumes during this period comes from the Food Research Institute's *Wheat Studies* publication, which provides some limited information on prevailing freight rates linking prominent markets in the world wheat trade. Figure 6 depicts the ratio of the estimated trade costs to the London price for the Winnepeg–London trade, the only route with suitable information, and the ratio of quoted freight rates to the London price. Both ratios start in 1922 at or near their pre-war levels of 0.235 and 0.079, respectively. As in table 3, the trade cost to destination price ratio falls rapidly in the early 1920s, but then remains rather steady up to 1929, when it was 0.138. From 1929, the trade cost series explodes, reaching a peak in 1932 of 0.298, and then quickly recedes by the mid-1930s. In contrast, the ratio of freight rates to the destination price declines continuously through the 1920s with an inflection point being reached in 1929. However, the ratio never rises >0.100 and is not marked by the

[10] The price data used in the previous section experienced gaps in reporting from August to December 1926, and from September to December 1932. That is, the observations for 1926 and 1932 previously presented were estimated over the range of January to July and January to August, respectively. This does not present a problem for estimation in a given year as the only data requirement for the TAR procedure is that the price data are evenly spaced (in this case, weekly) and continuous. However, when estimating over the entire period 1922–1929, or 1930–1938, the data need to be augmented so as to fill those gaps with observations from the latter halves of 1926 and 1932. Fortunately, the Food Research Institute's *Wheat Studies* provides a wealth of data not only on consumption, production, and transactions worldwide, but also on trends in wheat prices in international markets. Combining the two sources, we have continuous weekly time series for these two wheat markets from January 1922 to December 1938.

Table 5. *Long-run TARs, pre- and post-1930*

Commodity	Wheat	Wheat
Source	Buenos Aires	Winnipeg
Destination	London	London
Units	Shillings per quarter	Shillings per quarter
1922–1929		
Trade costs	7.90	6.54
95% confidence interval	(7.53, 8.98)	(6.54, 11.38)
Average price in London	50.19	54.94
Trade costs as a proportion of London price	0.1574	0.1190
Adjustment parameter	−0.3786	−0.1944
Standard error	0.0455	0.0213
n	417	417
1930–1938		
Trade costs	6.54	5.72
95% confidence interval	(3.05, 6.60)	(5.69, 5.72)
Average price in London	27.93	33.69
Trade costs as a proportion of London price	0.2341	0.1698
Adjustment parameter	−0.2882	−0.2516
Standard error	0.0406	0.0225
n	471	471

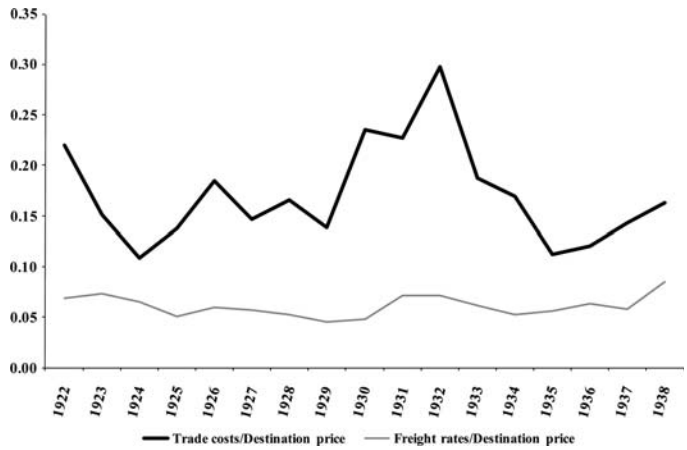

Figure 6. *Freight rates and trade costs in the Anglo-Canadian wheat trade, 1922–1938. Source: See text.*

dramatic spike surrounding the onset of the Great Depression found in the trade cost series. Thus, we are left with the proposition that the spikes in the trade cost series depicted in figure 3 must have been driven by other processes.

One place to begin looking might be changes in domestic Canadian trade costs. Collecting equivalent data from the *Vancouver Sun* on no. 1 northern wheat, figure 7 demonstrates that domestic trade costs (calculated in the same way as international costs) as a proportion of the price in Vancouver hovered around 2 per cent in the years of 1929,

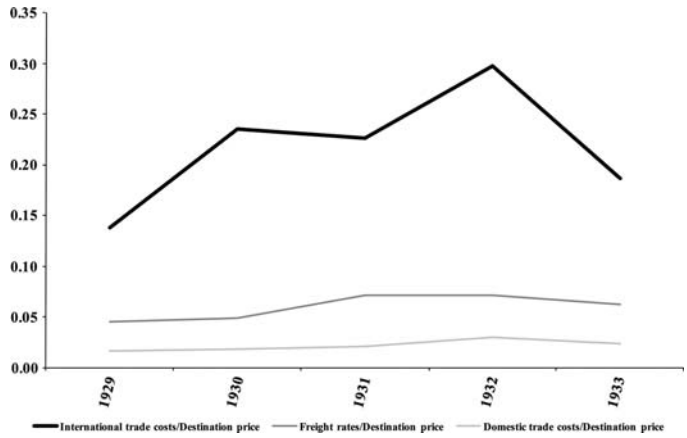

Figure 7. *Domestic versus international trade costs in the Anglo-Canadian Wheat Trade, 1929–1933. Source: See text.*

1930, 1931, and 1933.[11] While the proportional trade cost did climb to 3 per cent in 1932, this can in no way explain the increase of nearly 16 percentage-points observed in the trade cost series for London and Winnipeg. If our increase in international trade costs was driven by collapsing prices, then we should have found a similar increase in domestic trade costs; the fact that we have not tells us that the increase in international trade costs was indeed being driven by factors specific to international trade.

Another possibility might be the potentially distortionary actions of government marketing boards. Indeed, the near monolithic role of the Canadian Wheat Board in "coordinat[ing] the entire movement of western grain within Canada" (Wilson 1979, 69) in the present day suggests that the trade cost spike in figures 6 and 7 may reflect monopoly power in the marketing of Canadian wheat. Such an interpretation fails on grounds of timing. The Canadian Wheat Board emerged in 1919 in response to the cornering of the Winnipeg futures market by a single British purchasing agency which necessitated the closure of the market in 1917 (Wilson 1978). However, it remained in operation only until 1920. It was only resurrected in 1935 as a "temporary and voluntary agency" (Wilson 1979, 100), lacking any mandate as "the sole marketing agency for wheat" (Wilson 1979, 98).[12]

Thus, the higher trade costs of 1929–1933 probably originated in the international arena. The historical literature points to commercial policy as the likely source. However, as stated before, Canadian wheat was not subject to any tariffs or quantitative restrictions in the UK market, which is presumably why trade costs rose by so much less in the case of the Canada–UK wheat trade than in the case of the Argentina–UK wheat trade. So, barring dramatic changes in the costs of international transport or commercial policy, what other forces

[11] Vancouver—along with Prince Rupert—was indeed used as a point of departure for Canadian wheat "after the winter freeze has 'put the cork in the bottleneck' of Winnipeg, and from those ports it is shipped to Europe via Panama and to Asia" (Knowles and Knowles 1930, 505). Fully 13 per cent of the western Canadian wheat crop was shipped through Vancouver in a typical year (Canada YearBook 1927–28, 614). What is more, given Vancouver's status as an ice-free port, weekly price quotations are available on a year-round basis.

[12] It is only with the War Measures Act of 1943 that participation in the Canadian Wheat Board became compulsory (Wilson 1978).

could be at work? Here, we turn to contemporary accounts, specifically reports from the trading pits of the Winnipeg Commodity Exchange.

In the 1920s, Winnipeg became one of the key markets in the world wheat trade. Reports from September 1929 (*Winnipeg Free Press*, 5 September 1929, 12 September 1929, 19 September 1929, 26 September 1929), although bemoaning the noticeable weakness in commodity prices evident from the early 1920s, seem blithely unaware of the catastrophe awaiting. By September of 1930, observers were commenting on the absence of "speculative interest" (*Winnipeg Free Press*, 6 September 1930) and the presence of "very little confidence in the market" with the result that "the market was extremely nervous" (*Winnipeg Free Press*, 30 September 1930). One of the contributing factors here was the lack of commercial credit being extended to commodity brokers and exporting agents alike. Thus, the possibility remains that part of the divergence in the Winnipeg and London prices might be thought of as large bid-ask spreads generated by low volumes of trading activity and scarce credit.

By 1931, complaints still abounded about "the spasmodic nature of export buying,", and worries persisted that "speculative trading [was] at an absolute minimum and exporters show[ed] interest only at wide intervals" (*Winnipeg Free Press*, 5 September 1931). There was also the impression that "rarely, if ever" had the exchange witnessed "such a dull and featureless grain market" (*Winnipeg Free Press*, 19 September 1931). Soon, a new concern had also arisen: "few, if any traders, dreamed that before the end of another week Great Britain would have abandoned the gold standard . . . and that owing to these things export of Canadian wheat to the United Kingdom would be practically at a standstill" (*Winnipeg Free Press*, 26 September 1931). The uncertainty generated by the collapse of the gold standard was perceived to have exacerbated the market's dysfunction—a view which also gained considerable traction among policy-makers throughout the British Empire (Ollivier 1954).

However, by September of 1932, prospects seemed rosier: "a broader buying power was in evidence with export trade showing improvement and Chicago interest lending good support in connection with spreading operations" (*Winnipeg Free Press*, 3 September 1932). By the middle of the month, "foreign sales . . . were again substantial and culminated four days of business which, in the opinion of close market observers, has not been equalled in a similar period in the last nine years" (*Winnipeg Free Press*, 16 September 1932).

Unfortunately, for our purposes, there is a decided lack of detailed information on costs in the Anglo-Canadian wheat trade of the time. Yet, the narrative evidence presented above is consistent with the spike in trade costs 1929–1932 having been generated by the lack of commercial credit as well as uncertainty connected with the collapse of the gold standard. Reductions in Anglo-Canadian trade costs from 1933 on are plausibly related to imperial preferences and, thus, trade diversion instituted by the Imperial Economic Conference of August 1932 (Jones 1934; Eichengreen and Irwin 1995). Thus, the uncertainties and credit restrictions associated with the Great Depression were enough on their own to help disintegrate international commodity markets. Where protection was allowed to proceed unhindered, the disintegration was presumably even more pronounced, and the evidence in figure 3C and D is consistent with this view.

3. Conclusions

This paper documents a dramatic wartime disintegration of international commodity markets; a gradual reintegration during the 1920s; and another phase of disintegration from 1929 on. The post-1929 disintegration was not due to increasing freight costs, unlike

the disintegration of the wartime years. While protectionism seems the likely alternative candidate for the international economy as a whole (note the large increases in trade costs associated with imports into the United States and the Netherlands), the fact that trade costs also rose for the UK import trades covered here, even before the switch to protection in 1932, suggests that other forces may have been at work. Our qualitative Canadian evidence suggests an increasing scarcity of trade finance, or an increase in transaction frictions and uncertainty associated with the collapse of the interwar gold standard, may have played a role. On the other hand, the net impact of abandoning gold on trade remains to be seen, given that, as Irwin (1993) and Eichengreen and Irwin (2010) point out, countries which maintained monetary orthodoxy were more likely to impose quantitative restrictions on trade than those which abandoned gold.

On balance, this paper provides evidence in favour of the view that interwar protectionism, transactions frictions associated with the collapse of the interwar gold standard, and the evaporation of commercial credit all led to a severe disintegration of international commodity markets. Our hope is that it will stimulate others to undertake the kind of work which has been extensively undertaken for the pre-1913 period, so that we will ultimately arrive at a fuller understanding both of twentieth century trends in international integration, and of the causes of the spectacular decline in world trade which occurred after 1929.

Supplementary material

Supplementary material is available at *European Review of Economic History* online.

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