NBER WORKING PAPER SERIES

TRADE AND EMPIRE

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Working Paper 13765
http://www.nber.org/papers/w13765

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
January 2008

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NBER Working Paper No. 13765
January 2008
JEL No. F15,F33,N20,N23,N40

ABSTRACT

Although many modern studies find large and significant effects of prior colonial status on bilateral
trade, there is very little empirical research that has focused on the contemporaneous impact of empire
on trade. We employ a new database of over 21,000 bilateral trade observations during the Age of
High Imperialism, 1870-1913, to quantitatively assess the effect of empire on trade. Our augmented
gravity model shows that belonging to an empire roughly doubled trade relative to those countries
that were not part of an empire. The positive impact that empire exerts on trade does not appear to
be sensitive to whether the metropole was Britain, France, Germany, Spain, or the United States or
to the inclusion of other institutional factors such as being on the gold standard. In addition, we examine
some of the channels through which colonial status impacted bilateral trade flows. The empirical analysis
suggests that empires increased trade by lowering transactions costs and by establishing trade policies
that promoted trade within empires. In particular, the use of a common language, the establishment
of currency unions, the monetizing of recently acquired colonies, preferential trade arrangements,
and customs unions help to account for the observed increase in trade associated with empire.

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Trade and Empire

I. Introduction

What factors determine the size of trade flows between countries? To assess the determinants of bilateral trade flows, many empirical studies employ a standard augmented gravity model that includes mass, distance, and a host of economic and political variables often including currency unions, tariffs, wars, and exchange-rate regimes. One empirical finding of many studies is that a country's prior colonial status exerts a large and statistically significant positive effect on current bilateral trade.[1] This result raises several interesting additional questions that, to date, have received comparatively little attention by economists. First, to what extent was trade influenced by colonial status when these former colonies were still part of formal empires? Second, if we could examine the contemporaneous impact, would membership in an empire increase or reduce trade? Third, what are the channels through which colonial status impacts trade?

To gain some perspective on these questions, this paper provides a thorough examination of the contemporaneous effect of empire on trade during the Age of High Imperialism, 1870-1913.[2] Although a few previous studies have attempted to control for the contemporaneous effects of empire on trade using historical data sets (Estevadeordal, Frantz, and Taylor, 2003; Lopez-Cordova and Meissner, 2003), they did not focus on understanding how empire impacted trade, in part because their samples lacked adequate bilateral trade data on colonies and global

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[1] For example, see Baldwin (2005), Glick and Taylor (2006), and Rose (2000, 2002).

[2] This paper also relates to a growing body of scholarship that examines how empires and colonial relationships affect economic outcomes (Ferguson 2004; Lal 2001, 2004; Acemoglu, Johnson, and Robinson, 2001).Whereas some of these studies re-examine the institutional legacies of empire and their impact on economic development while others provide an overall accounting of the economic effects of colonial relationships, the main objective of this paper is a narrower one: to provide an empirical assessment of how they affect trade. We acknowledge that our empirical approach focuses on total trade flows, and may not account for the extent to which some of the trade between metropole and colony was based, not on mutual exchange, but on coercion.

trade.[3] To examine empire's effect on trade, we first construct a new bilateral trade database of over 21,000 observations from 1870-1913 that is nearly 20 times larger than existing databases for this sample period. We then estimate the impact of empire on trade using an augmented gravity model of trade, and examine some channels through which this effect may have operated.

Our results suggest that being in an empire roughly doubled trade relative to those countries that were not part of an empire. Moreover, the positive effect of empire on trade does not appear sensitive to whether the metropole was Britain, France, Germany, Spain, or the United States, nor does it appear to be sensitive to a variety of different econometric specifications or robustness checks (including endogeneity, multilateral resistance, propensity score matching, and selection models). We further examined whether tariff policies and transactions costs help account for the observed boost in bilateral trade.[4] We find that preferential trading agreements, customs unions between colonies and metropoles, empire-based currency unions, and sharing a common language increased bilateral trade. Consistent with earlier studies, our analysis also confirms that, in most specifications, the gold standard had a positive effect on bilateral trade flows during the period 1870-1913; however, the effect of joining the gold club is substantially smaller than the empire effect.[5] Although our paper does not claim to capture the overall welfare costs or benefits of belonging to an empire, it provides new estimates of the contemporaneous effect of empire on trade and examines the mechanisms through which this effect may have operated. In addition, our results shed light on the historical

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[3] Accominotti and Flandreau (2005) and Flandreau (2000) have employed gravity models to examine the effects of bilateral trade agreements and currency unions on trade during the nineteenth century.

[4] Relatedly, Ferguson (2002, 2003) has argued that England "enforced" free trade during the gold standard period while other countries moved towards more protectionist policies near the end of the century.

[5] In a similar vein, Ferguson and Schularick (2004) find a large empire effect for British colonial bonds during the classical gold standard period. Membership in the British Empire significantly reduced the cost of capital for colonial borrowers since the mother country guaranteed the bonds of its possessions. Flandreau and Zúmer (2004) find that adherence to the gold standard did not lower the cost of capital for sovereign borrowers during the gold standard period.

origins of the large legacy effect of empire often reported in studies examining recent bilateral trade flows.

In the next section, we review the empirical literature on bilateral trade, present an augmented gravity model of trade, and describe the data we use to test it. Section III provides empirical estimates of the effects of empire, non-empire currency unions, and the gold standard on bilateral trade. Section IV identifies the channels of empire and the effects of these mechanisms on bilateral trade. The last section offers some concluding comments and discusses how empire may have imparted a positive effect on trade.

II. Explaining Bilateral Trade Flows During the Classical Gold Standard Era

A. Empirical Research on Bilateral Trade

Empirical research has drawn attention to the effects of policies, institutions, and geography on trade. Using augmented "gravity" models of trade, economists have examined the importance of tariffs, transport costs, exchange-rate volatility, and transactions costs in explaining the cross-country variation in bilateral trade flows. Numerous studies utilizing the gravity model framework (with data from different time periods and for different country samples) have reported on the costs of trade-policy frictions, the tyranny of distance, and the benefits of being part of a common currency area (Estevadeordal, Frantz, and Taylor (hereafter "EFT"), 2003; Glick and Rose, 2002; Rose, 2000). Reviewing the empirical evidence and performing a meta-analysis of earlier studies, Rose (2004) finds that belonging to a currency union has a positive and statistically significant effect on trade, and that this result appears robust

to various econometric specifications, definitions of currency union, measures of distance, exchange rate volatility, and country samples.[6]

EFT (2003) has argued that historical episodes, such as the gold standard era and the interwar period, may be even better suited for testing the effects of currency unions on trade since there was considerable variation in trade flows that existed during these periods and since the gold standard represented "the formation of the largest currency arrangement in history." Using quinquennial panel data for the period 1870-1910, Lopez-Cordova and Meissner (2003) (hereafter "LCM") test for the effects of currency unions and gold-standard membership on bilateral trade. After controlling for other influences such as distance, language, and a common border, they find a large, positive effect for historical currency unions, similar to what Rose and others find using more recent samples, as well as a large effect from gold-standard membership. EFT (2003) and Flandreau and Maurel (2001) report similar results for historical currency unions.

One puzzle that arises from this empirical literature is that exchange-rate volatility appears to be unimportant in explaining bilateral trade flows; some studies have found that exchange rate volatility impacts trade negatively, but no consensus has emerged. Even in studies where the coefficient is negative, the size of the effect is generally small, and the statistical significance varies widely.[7] Many of the gravity model studies (including those examining historical periods) include a currency union indicator variable as well as a measure for exchange rate volatility as independent variables. If we assume that multicollinearity is not a severe problem, then the high degree of statistical significance on the currency union indicator variable must reflect a benefit other than exchange rate stability. Rose (2000) suggests that currency

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[6] See Baldwin (2005) for a more recent survey.
[7] Edison and Melvin (1990) review the empirical studies.

unions could also reduce transaction costs that arise from operating with various currencies, and that they provide a more serious and durable commitment than simply having a fixed rate. Nevertheless, he professes ignorance as to why the estimated effects of currency unions on trade are so large: "It is wisest to conclude that we simply don't know why a common currency seems to facilitate trade." (Rose, 2000, p.24). This leaves open the possibility that currency union dummy variables are proxying for omitted influences.[8]

As we suggested in the introduction, one institutional factor that may have affected bilateral trade flows in the late nineteenth and early twentieth centuries and that has received little attention in previous empirical studies is empire. The notion that trade and empire are linked is certainly not new. Scholarly debate reaches back at least a century to the era of High Imperialism, when France, Germany, and Great Britain (and to a lesser extent Russia, Portugal, Belgium, and the United States) renewed their quest for territorial acquisition. Even though the British Empire, which spanned five continents, was still unrivaled during the 19th century, continental European countries began to more actively challenge Britain's role on the world stage in the latter half of the century. New imperial powers sought overseas territories to complement their growing economies, which had been stimulated by the industrial revolution. Colonial acquisitions during this phase of expansion included Britain extending its holdings in Burma, Malaysia, and Africa, France consolidating its Indo-Chinese Empire and its foothold in Madagascar, and Germany carving out an empire in Africa. The Age of High Imperialism also included the United States, which had acquired the Philippines and Hawaii after its war with Spain.

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[8] Although studies examining the period 1870-1913 confirm the salutary effects of currency unions on trade, they provide little direct evidence that the gold standard reduced transaction costs or payments frictions.

A careful reading of the economics and history literatures suggests a variety of reasons why membership in an empire could have affected trade flows during the gold standard era (Bairoch, 1989; Ferguson, 2002; Frieden, 2006; Lal, 2004; Porter, 1999). These include preferential trade policies and other transaction costs, which arise from monetary arrangements, developing marketing or distribution networks, or sharing a common language. In order to determine whether trade among empire members differed from non-empire countries and to assess the relative importance of empire versus other institutional factors, such as currency unions and monetary regimes, we now turn to estimating an augmented gravity model of trade for the Age of High Imperialism.

B. Gravity Model of Bilateral Trade

The gravity model is the workhorse empirical model of studies examining trade flows, and continues to be used widely by economists due in part to its straightforward implementation and theoretical underpinnings.[9] In its simplest form, the gravity model captures two main forces affecting trade: mass (a force of attraction) and distance (a force of resistance). Mass (measured here by the size of countries) is proportional to trade whereas distance varies inversely. The model thus predicts that, all else equal, larger economies ought to trade more than smaller economies, and those that are located closer to each other will also experience greater trade. The second prediction seems particularly relevant to our sample period, since transportation costs declined dramatically during the nineteenth century and appear to have been an important driver of trade during this period (EFT, 2002; O'Rourke and Williamson, 1999).

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[9] There are a variety of theoretical models used to justify the implementation of a gravity model of trade. See Deardorff (1998), Evenett and Keller (1998) and Feenstra, Markusen and Rose (1998) for discussion and additional references.

We augment this basic model with an additional set of covariates to capture the effects of differences in geography, institutions, tastes, and preferences on bilateral trade. In particular, previous studies have argued that, holding other factors constant, having a common border ought to boost trade while being landlocked will reduce trade with other countries. Following earlier work, we include a measure of exchange-rate volatility since more volatility ought to reduce trade. Finally, we include historical-institutional variables: whether countries were on the gold standard, whether they were part of a "formal" currency union, and whether they were part of an empire, all of which may have boosted trade between countries. Given our greatly expanded trade database, our model will also allow us to comment on the reliability of previous empirical studies focusing on currency unions and gold standard membership during the late nineteenth- and early- twentieth centuries. Our basic estimation equation takes the following form:

(1) $\ln(BITRADE_{ijt}) = \beta_0 + \beta_1 \ln(RR_i RR_j)_t + \beta_2 \ln Distance_{ij} + \beta_3 Lndlck_{ij} + \beta_4 Border_{ij} + \beta_5 ExVolatility_{ijt} + \beta_6 \ln(Pop_i Pop_j)_t + \beta_7 War_{ijt} + \beta_8 Gold_{ijt} + \beta_9 NONEMPCU_{ijt} + \beta_{10} Empire_{ijt} + \varepsilon_{ijt},$

where i and j denote countries, t denotes time, and other variables are defined as follows:

- $BITRADE_{ijt}$ denotes the average value of real bilateral trade between i and j at time t;[10]
- RR is railroad track miles;
- Distance in miles between i and j;
- Lndlck is the number of landlocked countries in the country-pair dyad (0,1, or 2);
- Border is a binary variable which is unity if i and j share a border;
- ExVolatility is exchange rate volatility;
- Population is a nation's population;
- NONEMPCU is a binary variable which is unity if both countries are part of either the Latin or Scandinavian currency unions;
- Gold is a binary variable which is unity if i and j both are on the gold standard;
- War is a binary variable which is unity if countries i and j are at war;
- Empire is a binary which is unity if both countries are part of the same political empire;
- β are estimated coefficients;
- and ε is a white noise error term capturing other influences on bilateral trade.

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[10] The average value of real bilateral trade is either the average value of one or two dyadic trade pairs, depending on data availability.

For this study, the key coefficients of interest are β_8 - β_{10}, which show the effects of the gold standard, non-colonial currency unions, and empire on trade. We estimate equation (1) using a variety of econometric specifications: pooled ordinary least squares and fixed-effects models. The fixed effects model, or within estimator, is equivalent to adding a complete set of dyad-pair or country-specific intercepts to the estimating equation (Anderson and van Wincoop, 2003). The dyad or country-pair fixed effects are designed to capture bilateral trade resistance. Time dummies can also be added to the dyad fixed effects models to control for annual shocks that impact bilateral trade flows. Country-fixed effects are included to capture the idea that each country may have a different general resistance to trade. The country-fixed effects can also be interacted with year dummies to allow for time-varying multilateral resistance to trade such as distance.

C. Dataset

To estimate equation 1, we created a new, large database of annual bilateral trade that draws most extensively on a consistent set of British statistical sources published by the Board of Trade. In particular, we relied on numerous volumes of the *Statistical Abstract for the United Kingdom*, the *Statistical Abstract for the Several British, Colonies, Possessions, and Protectorates*, and the *Statistical Abstract for the Principal and other Foreign Countries* for the period 1870 to 1913. Some additional data for French colonies is from the *Tableau General du*

Commerce Exterieur. Overall, the data consist of more than 21,000 bilateral trade observations and 880 distinct country pairs or dyads.[11]

The trade data we collected from British Board of Trade publications are converted into current pounds using annual exchange rates from the *Global Financial Database* and Ferguson and Schularick (2004). We deflated the data using the UK PPI and expressed the figures in £2000.[12] Although we would like to have included GDP to measure "mass" in our gravity model, reliable annual estimates for a wide range of non-OECD countries prior to 1914 (including smaller colonies) are scarce. We therefore used population to capture mass. Total railroad miles are employed to measure a country's transportation network that proxies for internal transport costs that might affect bilateral trade flows. These data series (as well as population) are from Banks (1976) and the aforementioned Board of Trade publications. Data on (log) distance in miles are from Rose (2002) and an online distance calculator that employs U.S. Geographical Survey information.[13] Data on when countries joined the gold standard and joined the Latin and Scandinavian Monetary Unions are from Flandreau and Muriel (2001), Bae and Bailey (2003), Ferguson and Schularick (2004), Meissner (2005), and Officer (2004). We computed exchange-rate volatility following the methodology of Rose (2000), but using the exchange rate sources listed above.[14] We limit our definition of empire to include only formal empires and only those with more than one dependency, which rules out Sweden-Norway, but otherwise initially code

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[11] The colonies included in the sample are Aden, Algeria, Australia (New South Wales, Western Australia, Queensland, South Australia, Tasmania, Victoria), Bahamas, Barbados, Belgium Congo, Bermuda, British Guiana, British Honduras, Brunei, Canada, Ceylon, Cuba, Cyprus, Djibouti, Dutch Guiana, Egypt, Falkland Islands, Fiji, French Guiana, French Indochina, Gambia, German East Africa, German SW Africa, German West Africa, Gibraltar, Gold Coast, Guadeloupe, Hawaii, Hong Kong, India, Jamaica, Labuan, Lagos, Madagascar, Maldives, Malta, Martinique, Mauritius, Morocco, Netherlands East Indies, New Caledonia, New Hebrides, New Zealand, Newfoundland, Nyasa, Philippines, Portonovo, Portuguese West Africa, Puerto Rico, Reunion, Sarawak, Senegal, Seychelles, Sierra Leone, Somalia, South Africa (Natal Province, Cape Province, and Transvaal), Southern Nigeria, St. Helena, St. Pierre/Miquelon, Straits Settlement, Togo, Trinidad and Tobago, Tunis, Uganda, UK East Africa, and Zanzibar.
[12] We thank Moritz Schularick for generously sharing his data with us.
[13] We use information from www.wcrl.ars.usda.gov/cec/java to calculate great circle distance.

data for all empires that existed during this period and for which trade data existed.[15] We use information on empire affiliation from the *Correlates of War Database* (COW) described in Sarkees (2000), Olson (1991), O'Brien (1991), and the online historical encyclopedia available at http://regiments.org/nations/index.htm. Following Glick and Taylor (2006), the COW database is also used to code interstate conflicts between bilateral trading partners during the gold standard period.

Our database significantly improves upon the trade data used in earlier studies of the classical gold standard period in that it is better suited for sorting out the relative impact of belonging to a monetary standard or an empire. The first reason is its sheer size. To date, the most comprehensive bilateral trade database for the gold standard period, at least in terms of country coverage, is LCM (2003), which augmented Barbieri's (1996) trade data with information from general statistical compendiums.[16] It is roughly 20 times smaller than the one we have constructed. Flandreau and Muriel (2001) use annual data, but limit it to a sample of sixteen European countries, and EFT (2002) uses only one year of data from the pre-World War I period.

Our data are superior to LCM in both dimensions of the panel – number of years and number of country pairs. LCM (2003) constructed trade for five-year intervals from 1870-1910 whereas our trade data are annual. Moreover, nearly 70 percent of the observations in LCM come from just four years. Perhaps even more significant is that the early years in the sample are drawn overwhelmingly from intra-European trade. For example, in 1875, 70 percent of the

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[14] Rose (2000) computes exchange-rate volatility as the standard deviation.

[15] Belgium, Italy, Japan, Portugal, and Russia also had colonial empires during this period. We have very limited bilateral trade data for the Belgian, Italian, Japanese, and Portuguese colonial empires. We do not have any bilateral trade data for members of the Russian Empire. As a result, we could not consider these empires in the empirical analysis.

observations are European trade pairs. Even in later periods, only a small portion of the sample involves trade pairs that are both non-European and non-US. This is an important omission considering that non-European/non-US and colonial trade constituted more than 21 percent of world trade in 1903 and nearly 23 percent of world trade in 1913 (*Colonial Tariff Policies*, 1922). Hence, existing databases are insufficient in country and colony coverage to permit an analysis of empire on trade.

In contrast, our database contains the universe of readily available bilateral trade data reported in the *British Board of Trade Statistics*, which contains a significant portion of non-European, non-US, and colonial bilateral trade flows. This distinction is nontrivial if one is attempting to estimate the impact of belonging to an empire and joining the gold standard. In this case, it is important to have identifying variation in the cross-section and time-series coming from two different sources: (1) trade pairs that consist of colonies and non-colonizers and (2) colonies that are both on and not on the gold standard. Since our database provides both types of identifying variation we should be able to provide new insight into the importance of empire and monetary arrangements for trade.

III. Analysis of Bilateral Trade Flows, 1870-1913

A. Gravity Model Estimates

Table 1 displays pooled, ordinary least squares regressions with clustered standard errors (since we cannot assume that ε_{ijt} is independent over the country pair or dyad). The most basic

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[16] Barbieri's (1996) data set was merged with data from at least a dozen other sources to create LCM (2003). The authors do not describe how they reconciled the differences in statistical presentation of data across sources and countries.

specification explains approximately 40 percent of the variation in bilateral trade flows. Most variables enter with the correct expected signs and are, for the most part, statistically significant at conventional levels. In terms of geographical influences on trade, all else constant, sharing a border boosts bilateral trade whereas being landlocked or far away from your trading partner reduces trade flows. Most of the specifications also show that larger countries (as measured here by population and railroad networks) trade more. Finally, with respect to our institutional variables, being part of an empire, being on the gold standard, or belonging to a non-empire currency union all seem to have significant positive effects on bilateral trade flows. For example, being part of an empire resulted in more than 2.5 times as much trade (270 percent) compared to those areas that were not part of an empire. In the initial specification, those countries on the gold standard realized a boost in their bilateral trade, although the effect is relatively small (less than 20 percent), when compared to the effect on empire. On the other hand, being a member in a currency union increased trade by more than 90 percent. We find little evidence that interstate conflicts reduced bilateral trade during the gold standard period. This may reflect the fact that the gold standard period is generally considered a period of economic and political stability characterized by the absence of a global conflict.[17]   Indeed, there are only 29 dyads exhibiting conflict between bilateral trading partners in our sample. Interstate conflict probably did not have an effect on bilateral trade until the outbreak of World War I, as shown by Glick and Taylor (2006).

Column 2 adds year dummies to the initial specification while Column 3 additionally includes exchange rate volatility. The basic tenor of the results remains unchanged. Countries that share a border have higher trade and countries that are landlocked or far away from its

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[17] The Age of High Imperialism (1870-1913) is also part of the period that is commonly referred to as Pax Britannica (1825-1913), the era of British peace.

trading partner have lower bilateral trade flows. Countries with greater population and more railroad miles also have larger trade flows. Membership in an empire more than doubles trade and belonging to the gold standard or a non-empire currency union boosts trade by 30 and 86 percent, respectively. Exchange rate volatility does not have a statistically significant effect on bilateral trade flows. Including exchange rate volatility, however, reduces the sample size by more than 50 percent since we do not have data on bilateral exchange rates for all trade pairs in our sample.[18] Interstate conflict generally does not have a statistically significant effect on bilateral trade.

Table 2 examines alternative specifications of the regression model and performs some robustness checks to provide additional information on the size and significance of the empire effect. Column 1 considers whether the empire effect is significant for all the major empires that existed in the late-nineteenth and early-twentieth centuries. We coded separate indicator variables for whether dyads were part of the British, Spanish, French, German, or American empires. The statistically significant and positively signed coefficients on all the empire indicator variables suggest that empire consistently boosted trade, but as the point estimate indicates, the effects were not uniform across empires. As we discuss later in the paper, differences across empires in terms of their effects on empire may relate to metropoles requiring their colonies to establish common tariff policies, other trade policies that biased trade in favor of within-empire trade, or the extent to which an empire succeeded in reducing transactions costs.

Columns 2 and 3 exploit the panel nature of the data by estimating country-fixed effects and country-year fixed effects. Columns 4 and 5 report the results from the dyad-pair and dyad-pair-year, fixed-effects models. The results are robust to these alternative specifications in that

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[18] Foreign countries often report their bilateral trade in pounds sterling during the classical gold standard period. This explains why the sample shrinks nearly 50 percent when we include exchange rate volatility. We were forced to

all the models show a strong positive association between empire membership and bilateral trade flows. Depending on the specification, the point estimates suggest that empire boosted bilateral trade between 54 and 486 percent.[19] Including a term for time-varying multilateral trade resistance also does not reduce the size of the empire effect (Anderson and van Wincoop, 2003).[20]

In terms of other determinants of trade, being on the gold standard increases bilateral trade by between 18 to 57 percent. The currency union variable is significant and positive in the three out of the four specifications. Exchange rate volatility has a negative and statistically significant effect on bilateral trade flows in the two country-pair fixed effects models. Interstate conflict generally does not have a statistically significant effect on trade in the different empirical specifications even when the joint significance of the lagged variables is tested.

The possibility that the flag may have followed trade could produce biased results in the OLS and panel regressions. That is, empires may have colonized areas where there were already well-established trade ties or where there was potential for strong trade linkages between the region and the metropole.[21] To control for this source of endogeneity, we use an instrumental variables model. Our instrument for empire is the five-year lagged value of the size of *other* empires (measured by area). Our constructed instrument suggests that an empire, such as England, may have increased its size, in part, because it felt threatened – economically,

rely on other primary and secondary sources for bilateral exchange rate data.

[19] As a robustness check, we also estimated a difference-in-differences model. By differencing the dependent variable and including year dummies we are able to control for country-specific and global trends in trade that might be driving the large empire effect found in the OLS and panel regressions. The difference-in-differences estimator shows that membership in an empire (and its 5-and 10-year lagged effects) increased trade approximately one percent per year (not reported). The empire effect is statistically significant at the one-percent level of significance in all regressions.

[20] It may be the case that some bilateral trade is zero or close to zero in our sample. To deal with this issue, we also estimated a series of Tobit and median regressions. For both of these specifications, the empire effect on trade remains large, positive, and statistically significant.

[21] Frieden (2006, p.74) suggests that it is a matter of "continuing controversy how important foreign economic interests were in colonial expansion."

politically, or militarily – by France or Germany's territorial acquisitions. Historians have noted that this was a primary reason why the "Great Powers" sought out new colonies during the second half of the nineteenth century. For example, historians have described the dramatic expansion by European powers in Africa as a "scramble" that was unsuccessfully held in check by the failed partition arrangement of the Berlin Conference in 1884-5. Germany's expansion beyond Africa and into the Middle East and Far East led British policymakers to worry about this new European colonial rival; Bismarck, in turn, seemed to have decided to engage Germany in territorial expansion as a response to what he saw as aggressive actions of European rivals (Townsend, 1996, p.71, 87). America's growing naval power and acquisitions in the Caribbean and the Philippines in 1898 signaled the presence of a new rival to the West and led to territorial disputes in South America. And Britain and France competed in Asia over areas once occupied by China (Porter, 1999).

Since our instrumental variable tracks the growth of *other* empires, it is likely to be highly correlated with the empire dummy variable, but uncorrelated with bilateral trade of a given empire. The first stage regression suggests that we likely do not suffer from a "weak" instrument problem.[22] The results from the instrumental variables estimation are very similar to the baseline regressions as well as the fixed effect specifications. Empire membership significantly increases trade.

To provide some additional insight into the effects of colonization on trade, consider the trade of West Africa an area of new colonization in the late nineteenth century. Exports, such as groundnut oil, which was used as a substitute for olive oil and palm oil to lubricate machinery, more than quadrupled between 1897 and 1913. The export boom was especially pronounced in

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[22] The five-year lagged value for the land area of other major empires is significant at the one-percent level as an instrument in the first stage regression. The R-squared in the first stage regression is approximately 90 percent.

the British colonies of Nigeria and Gold Coast and the French colonies of Senegal and Ivory Coast. In Nigeria, groundnut exports went from a few million pounds to over 130 million pounds. Cocoa exports boomed in the Gold Coast and timber exports from the Ivory Coast increased by a factor of six in twenty years (Frieden, 2006). In return, these colonies began to import European manufactures. In Indochina (under the French colonial regime), the land under cultivation dramatically increased, allowing it to become the third largest producer of rice in the world. In British Malaya, tin became the most important commodity export, supplying half of the world's demand, and after 1900, Malay and British Ceylon (already exporting large quantities of tea and coconuts) became major exporters of rubber (Frieden, 2006).

B. Robustness Checks

To test whether our results are sensitive to the specification of the econometric model, we also conducted a series of robustness checks. We first test whether the inclusion of gross domestic product (GDP) – a measure of country "mass" that is widely used in gravity models that analyze the modern period (when estimates of GDP are widely available for most countries) – changes our results. We include GDP for all countries and colonies for which reliable historical estimates have been assembled by employing the data set of Clemens and Williamson (2004).[23] Their data set includes estimates for 35 countries and colonies and is assembled using a variety of sources including Maddison (1995). The inclusion of GDP reduces the sample size to approximately 6,700 observations; however, as shown in Appendix Table 1, membership in an empire still has an economically large and statistically significant effect on bilateral trade flows. Using this more limited sample of countries and colonies, membership in a colonial empire

raises trade between 158 and 779 percent in the dyad and country fixed-effects specifications.[24]

The other variables in the gravity model generally have the correctly predicted signs and are statistically significant at conventional levels. GDP is positive and statistically significant. Bilateral trade flows are lower for countries/colonies that are located farther away from each other and in cases where they are landlocked. Countries and colonies that border one another have greater trade, and membership in a non-empire currency union raises trade in three out of the four specifications. Although adherence to the gold standard raises bilateral trade flows, the effect is only statistically significant in the dyad fixed-effects model. The most notable change in the empirical results from the baseline regressions is the statistical insignificance of the population variable, which has a correlation coefficient of nearly 90 percent with the GDP variable. The fact that these two variables are so highly correlated suggests that we are losing very little in our analysis when we include population to analyze the broader sample of countries and colonies contained in our bilateral trade database.

IV. What explains the "Empire Effect"?

Our empirical results suggest that being part of an empire in the late-nineteenth and early-twentieth centuries had a large positive and statistically significant effect on trade. In this section, we hope to shed further light on this finding by exploring some of the channels through which empire may have boosted bilateral trade flows. Although there are many possible ways in which a particular colony's trade was directly impacted by "membership" in an empire, our aim is to examine general effects that can be discerned across empires and over time. We focus on two

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[23] We thank Michael Clemens for generously providing these data.
[24] We estimated a country fixed effects model with year dummies.

channels that both economists and historians have highlighted as important determinants of trade: (1) trade policy and (2) transactions costs.

A. Trade Policy

Trade policies of metropoles may have been shaped by colonial ties. Economists have recently suggested that European powers viewed colonies as a way of setting up preferential trading relationships (EFT, 2002) and of ensuring markets (Alesina, 2002).[25] This system of trade preferences and agreements between an empire and its colonies often took three different forms: (1) policies of tariff assimilation/customs union, (2) preferential tariff policies, and/or (3) "open door" policies. The policy of tariff assimilation is a policy regime where the tariff rates on goods are the same in the metropole and the colony. Under this arrangement, the metropole and colony form a customs union. A preferential tariff system describes a trade policy where colonies and the mother country have differential tariffs, but non-empire goods are generally taxed at a higher rate. An "open door" trade policy refers to a tariff regime where there is no distinction made between the products of the mother country and non-empire trading partners. In other words, a colony or metropole with an "open door" trade policy does have not a preferential tariff policy or trade agreement (i.e., customs union) with some of its trading partners. The open door trade policy should not be confused with a free trade policy, however. Many countries with

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[25] Alesina (2002, p.20) quotes the British premier's response to the French ambassador in 1897 to make his case: "If you were not such persistent protectionists you would not find us so keen to annex territories." One could perhaps also view the motivation for preferential trade arrangements in light of the earlier literature on economic imperialism. Hobson (1902) and Lenin (1916) suggested that capitalist economies needed to acquire colonies in order to sustain themselves; securing favorable terms for trade with colonies may have been another way to sustain their economies. Of course, these writers emphasized flows of financial capital rather than trade flows as the motivation for acquiring colonies.

"open door" policies levied duties to protect local industries or to raise revenue for the fiscal authority (Colonial Tariff Policies, 1922).

From the colonizer's perspective, Britain was the least protectionist of the imperial powers as of 1913.[26] According to Bairoch (1989, p.139), average tariff rates on imported manufacturers were around 13 percent in Germany, over 20 percent in France, over 40 percent in the United States, and more than 80 percent in Russia. Table 3 breaks down the trade policies of the major empires during the era of high imperialism. Great Britain generally maintained an open door policy during the gold standard period, while many of the British colonies in the West Indies (such as Jamaica, British Guiana, and the Bahamas) adopted differential import duties to promote domestic industries. The British Dominions – Canada, Australia (in particular, Victoria) , New Zealand, and South Africa – also implemented preferential trading agreements in favor of Great Britain between 1898 and 1907 – to protect domestic producers and manufacturers (Colonial Tariff Policies, 1922). On the other hand, France and most of its colonies adopted tariff assimilation or a customs union as its predominant trade policy in 1892. Under this regime, colonies enjoyed free trade with France for most products while non-colonies were charged tariffs to promote trade within the empire. As shown in Table 3, Algeria, Indo-China, and Tunis, three of France's most important colonies, formed a customs union with the metropole. Many of its remaining colonies, including French West Africa as well as its island dependencies adopted open door or preferential trading policies.

The smaller colonial empires tended to have a more uniform colonial trade policy. For example, colonies of the Belgian, Dutch, and German empires had open-door trading policies and low to moderate tariffs that were levied strictly for revenue purposes. Spain, Portugal, and the United States generally adopted preferential tariff systems with its colonies. There were a

few exceptions, however. Macao, Portuguese Congo, the Canal Zone, and American Samoa had open door trade policies, and the United States maintained a customs union with Puerto Rico after acquiring the colony in the Spanish-American War in 1898.

B. Transactions Costs

A second channel through which membership in an empire may have benefited international trade is by lowering transactions costs and payments frictions. One way empires reduced payments frictions was by promoting a common language among merchants. Even in cases where the dominant language of the population differed from that of the imperial power, a lingua franca often developed around commercial centers (Ferguson, 2002). Since trade in the 18th century and early 19th century had been initially organized around principles of mercantilism and imperial preference, all else equal, merchants had a financial incentive to learn the language of colonial masters in order to sell more goods. Even as the incentive to learn "colonial" languages receded as trade relationships changed over time, the process was path dependent: the foreign language of the imperial power continued to be used by merchants.

Merchants who had been trading within an empire were already acclimated to local customs and habits. They had well-established contacts and may have developed social networks as well as distribution and marketing channels for buying and selling goods; this would tend to lower the transactions costs associated with trade. Greif (1997), McMillan (1997), and McMillan and Woodruff (1999) have noted the importance of informal relationships in fostering deals where laws of contract are weak; social networks can, in turn, support contracting and foster

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[26] The average level of import duties on manufactures was approximately zero for the United Kingdom.

trade (Rauch and Trindade 2002). The historical record suggests that colonial officials were often urged to foster ties between locals and merchants.[27]

Finally, empires may have also reduced transaction costs associated with trade via the widespread propagation and use of colonial currencies. As discussed above, previous scholarship on currency unions has highlighted the role of the gold standard in reducing payments frictions, but during this period other "currency unions" also existed. The Latin Monetary Union (LMU) and Scandinavian Monetary Union (SMU) were included in the gravity models estimated in Section III, but during our sample period, some colonies also participated in less formal monetary arrangements that functioned like currency unions (*Monetary Systems of the Colonies*, 1950). Table 4 displays the considerable cross-sectional and times-series variation in the establishment and formation of currency unions within colonial empires during the classical gold standard period. Belgium, Dutch, and French colonies generally linked up to their respective metropoles' currencies to form a fixed-exchange-rate area. The United States introduced the dollar in its dependencies after acquiring many of its colonies in the Spanish-American War of 1898. British and German colonies, on the other hand, either joined the sterling or mark block or formed currency unions with other colonies in the region. British colonies in East Africa, for example, formed a silver rupee union with India that also included some areas in East Africa that were members of the German Empire. Brunei, Johore, Labuan, and the Straits Settlements also formed a currency union while British colonies in West Africa left the sterling union to form a West African (Silver) Currency Union in 1913.

Although many different currency unions were formed within and even across the colonial empires, the pound sterling remained the largest and most important currency during the classical gold standard period. As the pound sterling became the preferred means for settling

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[27] See Frieden (2006, pp.90-1) for discussion of this point.

accounts, countries and colonies began to hold sterling balances with foreign banks, which set up offices in London, and the sterling functioned as the reserve currency of the world. Thus, while previous research points to the gold standard as playing an important role in reducing payments frictions, and currencies like the pound sterling were "as good as gold," it may have been the case that sterling was in many ways *better than gold*. It was more convenient in that British exporters and importers preferred to draw and be drawn on in pounds sterling. Investor and trader preference for carrying out transactions in sterling or sterling-denominated bills of exchange meant that it was advantageous for dominions and colonies to also carry out their transactions in sterling.[28]

C. The Effects of Transactions Costs and Trade Policies on Bilateral Trade

Before assessing the direct effects of these channels on bilateral trade, we first assess whether trade policies and transactions costs are correlated with empire in order to provide better insight into this cross-sectional indicator variable. This exercise should help to "unpack" the empire variable that may bundle a package of economic policies and political relationships between a metropole and its colony. We do this by estimating a series of simple OLS regressions where we model the determinants of empire. Column 1 of Table 5 (Panel A) shows the regression of empire on a constant and the common language variable. Columns 2 through 5 of Table 5 (Panel A) show the contribution of including one additional variable to the variable(s) listed in the previous column. (The correlation coefficients are shown in Panel B of the table.)

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[28] For example, Butlin (1986) has noted that the use of the pound sterling was widespread in Australia and New Zealand.

Column 1 shows that common language (one measure of transactions costs) is positively correlated with empire and is statistically significant, although the R-squared in the regression is only four percent.[29] Column 2 augments the simple model with the number of years a colony has been a member of an Empire since the conclusion of the Napoleonic Wars. We include this variable to capture a reduction in transactions costs that may have arisen from the long-run relationship between a colony and its metropole, such as familiarity with local customs and culture, the development of distribution and marketing channels, or the formation of social networks – all of which may benefit trade or its participants gradually, over many decades. This measure of transactions costs has a positive and statistically significant effect on empire, and the fit of the model improves from four percent to more than 23 percent. Columns 3 and 4 augment the model with measures for customs unions and trade preferences within empires.[30] The two variables take a value of one if country/colony i and j were both members of the same customs union or had a preferential trade agreement with each other. The results show that two trade policy variables both significantly predict empire, but do not substantially improve the fit of the model. Column 5 adds a currency union variable for empire countries.[31] The currency union variable substantially improves the fit of the model. Despite the admittedly parsimonious specification, the trade policy and transactions costs variables explain more than 50 percent of the variation in the empire indicator variable.

Since the transactions costs and trade-policy variables are highly correlated with empire and also seem to capture a significant amount of the variation in empires across colonies, we

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[29] With respect to the colonial empires, settler colonies were coded as having a common language with the metropole. For example, British settler colonies such as Australia, Canada, New Zealand, and South Africa were coded as having the same language as England. As a result of the coding scheme, the language variable may also capture institutional differences.
[30] Customs unions and trade preferences are based on information from Colonial Tariff Policies (1922).
[31] The currency union variable for empire countries was coded using Pick and Sedillot (1971), www.dollarization.org, and *Monetary Systems of the Colonies* (1950).

now consider the extent to which these variables mattered for bilateral trade during the period 1870-1913. We replace the empire indicator variable used in our earlier empirical models with the transactions costs and trade-policy variables described above. Table 6 reports country and dyad fixed-effects models. Consistent with the results shown in earlier tables, countries that are more distant trade less. Bilateral trade between two countries and/or colonies is increasing with miles of railroad track and population, and countries that border each other or are members of the gold club have greater bilateral trade flows.

The results in Table 6 also show that many of the channels we have quantified help account for the observed variation in bilateral trade across countries and colonies. First, the empirical estimates suggest that membership in a preferential trade agreement raised bilateral trade flows by 26 to 168 percent (depending on the econometric specification). The coefficient on the customs union variable is also economically and statistically significant. Membership in a customs union increased bilateral trade flows by 20 to 131 percent. This result provides a reason why, as shown in Table 2, the empire effect differed for Germany, France, and Britain. Metropoles differed in the nature and extent to which they set up explicit trade policies for their colonies.[32]

Table 6 also suggests that empire boosted trade by lowering transactions costs. Being part of an empire's currency union significantly increased trade by 17 percent to 371 percent, depending on which fixed-effects model was used. The currency union effect in colonial empires may also be capturing the impact of monetizing many African colonies that historically traded very little with the rest of the world, and largely relied on barter to exchange goods prior to

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[32] It is possible that preferential trading agreements may have changed the way in which countries oriented their economies towards producing goods for the metropoles. If this were the case, then colonial tariff policies may have lowered the prospects of long-term economic development, as suggested by Lewis (1970). As we have indicated

colonization. Countries and colonies that transacted in a common tongue also exhibited greater bilateral trade – approximately 20 percent more than those that did not. This result suggests that a lingua franca was another way in which empires may have lowered transactions costs and boosted trade.

The number of years that a colony has been part of an empire is also statistically significant in two of the four bilateral trade regressions, although the sign varies according to which specification is used. One interpretation of the positive relationship exhibited in the country-fixed-effects specifications is that trade in British Dominions, such as Australia, Canada, and New Zealand benefited most from strong social networks and shared customs, whereas newer colonies (many of which were in Africa) had a different cultural heritage and therefore benefited less; these would constitute the remaining colonies included the two dyad fixed-effects regressions.

It may be impossible to test empirically all of the ways in which empire impacted trade. The channels that we have identified nevertheless account for a significant amount of the cross-sectional variation in empire and help shed additional light on the "empire effect" reported earlier in the paper.[33]

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throughout, the focus of this paper is to analyze the determinants of bilateral trade flows and the impact of empire on international exchange rather than to construct a counterfactual of trade in the absence of empire.

[33] We also tested for the possibility that metropoles may have increased bilateral trade by building out or financing infrastructure development in their colonies. The infrastructure variable, defined as the interaction between empire and railroads was only statistically significant in the fixed-effects model. However, the coefficient on infrastructure in the fixed-effects model was not economically significant; empire*railroads increased bilateral trade flows by approximately 0.2 percent.

V. Conclusion

What is the impact that empires have on trade flows? Do metropoles use their political control to tilt the balance of trade through preferential trade policies or customs unions? Do they lower transactions costs by standardizing language and currency and creating social networks? We provide some perspective on these questions using a new database of over 21,000 bilateral trade pairs collected from primary sources for the period 1870-1913. We find strong empirical evidence that membership in an empire more than doubled bilateral trade during the Age of High Imperialism. Moreover, it was quantitatively more important in explaining bilateral trade flows during the first era of globalization than either membership in the gold standard or a non-empire currency union. This empire effect appears to be robust to a variety of econometric specifications, including instrumental variables regressions, fixed-effects specifications that account for multilateral resistance, propensity score estimates, and a number of selection models.

We suggest two broad channels through which empire may have boosted trade during this period: transactions costs and trade policies. Our empirical findings suggest that membership in an empire-currency union, sharing a common language, preferential trading agreements and customs unions were important in accounting for the observed variation in bilateral trade flows. Moreover, variation in colonial trade policies and currency-union arrangements helps to explain why the effect that empires have on trade differ. Empire currency unions were especially prevalent in the British, French, and German Empires while preferential trading agreements were widely used by France and some of the British Dominions. Although we have not fully accounted for all the channels through which empire may have impacted trade, transactions costs and trade policies account for over 50 percent of the cross-sectional variation in empire, and

appear to have played a significant role in boosting trade within empires during the Age of High Imperialism.

An interesting avenue for future research would be to analyze how the positive relationship between empire and trade impacted productivity and economic growth.[34] For example, metropoles may have increased productivity by creating "free trade" zones that promoted competition and intercolonial trade. The free trade systems established by empires may have promoted specialization within colonies and increased their productivity. This would be consistent with a model developed by Alcala and Ciccone (2004) where the greatest impact of trade on productivity occurs in the traded goods sector rather than the non-traded, service sector through a Balassa-Samuelson effect.[35]

In creating the machinery for trade (that sometimes included a new production technology and an enhanced market with a quasi-monopsonist buyer of exports), empires may have also imparted institutions that either fostered or undermined productivity and growth. Some scholars have argued that trade can transform political institutions and foster the development of property rights, which in turn can lead to greater investment and growth as it did in the North Atlantic economies between 1500-1850 (Acemoglu, Johnson, and Robinson, 2005). Some settler colonies' institutions, for example, may have benefitted favorably from the trade and openness that the British empire promoted. On the other hand, empires may have undermined long-run productivity and growth by leaving extractive institutions, such as those suggested by Acemoglu, Johnson, and Robinson (2001).

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[34] For an analysis of the impact of trade and growth or income levels, see Frankel and Romer (1999) and Irwin and Tervio (2002).

[35] The Balassa-Samuelson effect can cause changes in the relative price of nontradable goods, which introduces a bias in the use of nominal openness to measure the productivity gains from trade. Alcala and Ciccone employ a measure of real openness, measured as imports plus exports in exchange rate US$ divided by GDP in purchasing power parity US$, to control for cross-country differences in the relative price of non-tradable goods.

Understanding the relationship between empire and trade and long-run outcomes such as productivity and growth is complicated by the fact that the institutional footprints of empires varied, not only across empires and colonies, but even within colonies. For example, some colonies' exports were produced in very controlled plantations systems whereby colonists owned and controlled the land and capital that coffee, sugar, rubber or other crops were grown on and employed low-wage, local labor in the production of these commodities. Other tradables sectors of the same colony may have been left untouched. This raises questions about how such parallel specialization impacted the growth prospects of these economies. To thoroughly assess the long-run impact of trade and empire on productivity and growth, future research will need to examine the institutional variation within and across colonies as well as the changes in trade relations that took place after independence.

References

Accominotti, Olivier and Marc Flandreau. (2005). "Does Bilateralism Promote Trade? Nineteenth Century Liberalization Revisited." Sciences Po Working Paper.

Acemoglu, Daron, Simon Johnson, and James Robinson. (2005). "The Rise of Europe: Atlantic Trade, Institutional Change, and Economic Growth." *American Economic Review* 95(3): 546-579.

Acemoglu, Daron, Simon Johnson, and James Robinson. (2001). "The Colonial Origins of Comparative Development: An Empirical Investigation." *American Economic Review* 91(5):1369-1401.

Alcala, Francisco and Antonio Ciccone (2004). "Trade and Productivity." *Quarterly Journal of Economics* 119(2): 613-46.

Alesina, Alberto. (2002). "The Size of Countries: Does it Matter?" Harvard University Working Paper.

Anderson, James E, and Eric van Wincoop. (2003). "Gravity with Gravitas: A Solution to the Border Puzzle. *American Economic Review* 93(1): 170-92.

Bae, Kee-Hong and Warren Bailey. (2003). "The Latin Monetary Union: Some Evidence on Europe's Failed Common Currency." Cornell University Working Paper.

Bairoch, Paul. (1989). "European Trade Policy 1815-1914," in Peter Mathias and Sidney Pollard (eds.), *The Cambridge Economic History of Europe*, vol. VIII: *The Industrial Economies: The Development of Economic and Social Policies.* Cambridge University Press.

Baldwin, Richard. (2005). "The Euro's Trade Effects." Prepared for *What effects is EMU having on the euro area and its member countries?* European Central Bank (June).

Banks, Arthur S. (1976). "Cross-National Time Series: 1815-1973." [Computer file]. ICPSR ed. Ann Arbor, MI: Inter-university Consortium for Political and Social Research [producer and distributor].

Barbieri, Katherine. (1996). "Economic Interdependence and Militarized Interstate Conflict, 1870-1985." Ph.D. Dissertation, Binghampton University.

British Board of Trade. Various years. *Statistical Abstract for the Principal and other Foreign Countries.* London: Board of Trade.

British Board of Trade. Various years. *Statistical Abstract for the Several British, Colonies, Possessions, and Protectorates*. London: Board of Trade.

British Board of Trade. Various years. *Statistical Abstract for the United Kingdom.* London: Board of Trade.

Butlin, S.J. (1986). *The Australian Monetary System.* Sydney: Ambassador Press Pty Ltd.

Clemens, Michael and Jeffrey G. Williamson. (2004). "Wealth Bias in the First Global Capital Market Boom." *Economic Journal* 114(495): 304-47.

Colonial Tariff Policies. (1922). United States Tariff Commission. Washington: Government Printing Office.

Deardorff, Alan V. (1998). "Determinants of Bilateral Trade: Does Gravity Work in a Neoclassical World?" in Jeffrey A. Frankel (ed.) *The Regionalization of the World Economy* Chicago: Chicago University Press.

Edison, Hali J., and Michael Melvin. (1990) "The Determinants and Implications of a Choice of Exchange Rate Regime." In William S. Haraf and Thomas D. Willett (eds.) *Monetary Policy for a Volatile Global Economy* AEI Press: Washington, DC.

Estevadeordal, Antoni, Brian Frantz, and Alan M. Taylor. (2003). "The Rise and Fall of World Trade, 1870 - 1939." *Quarterly Journal of Economics* 118 (May): 359-407.

Evenett, Simon J. and Wolfgang Keller. (1998). "On Theories Explaining the Success of the Gravity Equation." NBER Working Paper 6529.

Feenstra, Robert C., James Markusen and Andrew Rose. (1998). "Understanding the Home Market Effect and the Gravity Equation: The Role of Differentiating Goods" NBER Working Paper 6804.

Ferguson, Niall. (2004). *Colossus: The Price of American Empire*. New York: Penguin Press.

Ferguson, Niall. (2003). "British Imperialism Revised: The Costs and Benefits of Anglobalization." Development Research Institute Working Paper No. 2, New York University.

Ferguson, Niall. (2002). *Empire: The Rise and Demise of the British World Order and the Lessons for Global Power.* New York: Basic Books.

Ferguson, Niall and Moritz Schularick. (2004). "The Empire Effect: The Determinants of Country Risk in the First Age of Globalization, 1880-1913." Unpublished paper, New York University.

Flandreau, Marc. (2000). "The Economics and Politics of Monetary Union: A Reassessment of the Latin Monetary Union, 1865-71." *Financial History Review* 7(1): 25-43.

Flandreau, Marc and Mathilde Maurel. (2001). "Monetary Union, Trade Integration, and Business Cycles in 19th Century Europe: Just Do It." Centre for Economic Policy Research, Discussion Paper Series No. 3087 (November).

Flandreau, Marc and Frederic Zúmer (2004), *The Making of Global Finance*. Paris: OECD.

Frankel, Jeffery A. and David Romer (1999). "Does Trade Cause Growth." *American Economic Review* 89(3): 379-99.

Frieden, Jeffry A. (2006). *Global Capitalism: Its Fall and Rise in the Twentieth Century*. New York: W.W. Norton & Company.

Glick, Reuven, and Andrew K. Rose. (2002). "Does a Currency Union Affect Trade? The Time-Series Evidence." *European Economic Review* 46: 1125–51.

Glick, Reuven and Alan M. Taylor. (2006). "Collateral Damage: Trade Disruption and the Economic Impact of War." NBER Working Paper 11565.

Greif, Avner. (1997). "Contracting, Enforcement, and Efficiency Economics Beyond the Law," in Michael Bruno and Boris Pleskovic (eds.), Annual World Bank Conference on Development Economics. Washington, DC: World Bank.

Hobson, J.A. (1902). *Imperialism: A Study*. London: Nisbet.

Irwin, Douglas and Marko Tervio. (2002). "Does Trade Raise Income? Evidence from the Twentieth Century. " *Journal of International Economics* 58:1-18.

Lal, Deepak. (2004). *In Praise of Empires: Globalization and Order*. New York: Palgrave Macmillan.

Lal, Deepak. (2001). "Globalization, Imperialism, and Regulation." *Cambridge Review of International Affairs* 14(1): 107-121.

Lenin, V.I. (1916). *Imperialism: The Highest Stage of Capitalism*. Moscow: Foreign Languages Publishing House, 1947.

Lewis, W. Arthur. (1970). *Tropical Development, 1880-1913*. London: George Allen and Unwin.

Lopez-Cordova, J. Ernesto and Christopher Meissner. (2003). "Exchange-Rate Regimes and International Trade: Evidence from the Classical Gold Standard Era." *American Economic Review* 93(1): 344-53.

Lopez-Cordova, J. Ernesto and Christopher Meissner. (2000). "Exchange-Rate Regimes and International Trade: Evidence from the Classical Gold Standard Era." CIDER-IBER Working Paper 118, UC Berkeley.

Maddison, Angus. (1995). *Monitoring the World Economy, 1820-1992*. OECD: Paris.

McMillan, John and Christopher Woodruff. (1999). "Interfirm Relationships and Informal Credit in Vietnam." *Quarterly Journal of Economics* 114: 1285-1320.

McMillan, John. (1997). "Markets in Transition," in David M. Kreps and Kenneth Wallis (eds.) *Advances in Economics and Econometrics: Theory and Applications*. Cambridge: Cambridge University Press.

Meissner, Chris. (2005). "A New World Order: Explaining the Emergence of the Classical Gold Standard." *Journal of International Economics* 66: 385-406.

Monetary Systems of the Colonies: A Fully Revised Reprint of Eight Authoritative Articles which Appeared Between July 1948 and February 1949 in The Banker: (1950). London.

Nye, John V. (1991). "The Myth of Free-Trade Britain and Fortress France: Tariffs and Trade in the Nineteenth Century." *Journal of Economic History* 51(1): 23-46.

O'Brien, Patrick K. (ed.). (1991). *Oxford Atlas of World History* New York: Oxford University Press.

Officer, Lawrence. (2004). "The Gold Standard." EH-Net Encyclopedia Entry. http://www.eh.net/encyclopedia/?article=officer.gold.standard.

Olson, James S. (ed.). (1991). *Historical Dictionary of European Imperialism*. New York: Greenwood Press.

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

Pick, Franz and Sedillot, Rene. (1971). *All the Monies of the World*, New York: Crown Advertising Press, Inc.

Porter, Andrew (1999). *The Oxford History of the British Empire, Vol. III, The Nineteenth Century*. Oxford: Oxford University Press.

Rauch, James E. and Vitor Trindade. (2002). "Ethnic Chinese Networks in International Trade." *Review of Economics and Statistics* 84: 116-30.

Rose, Andrew K. (2004). "A Meta-Analysis of the Effect of Common Currencies on International Trade." NBER Working Paper 10373 (March).

Rose, Andrew K. (2002). "Do We Really Know That the WTO Increases Trade?" National Bureau of Economic Research Working Paper 9273 (October).

Rose, Andrew K. (2000). "One Money, One Market: The Effect of Common Currencies on Trade." *Economic Policy* 15: 7–33.

Sarkees, Meredith Reid (2000). "The Correlates of War Data on War: An Update to 1997," *Conflict Management and Peace Science*, 18(1): 123-144.

Tableau General du Commerce Exterieur. France: Direction Generale des Douanes, Various Years.

Townsend, Mary Evelyn. (1966). *The Rise and Fall of Germany's Colonial Empire 1884-1918*. New York: Howard Fertig.

Table 1: The Effects of Empire on Trade, 1870-1913

Independent Variables	Pooled OLS	Pooled OLS	Pooled OLS
Empire Membership	1.306***	1.278***	1.502***
	(0.19)	(0.19)	(0.25)
Gold Standard	0.169*	0.263**	0.379***
	(0.10)	(0.10)	(0.14)
Distance	-0.557***	-0.561***	-0.565***
	(0.07)	(0.07)	(0.09)
Border	0.681***	0.627***	0.699***
	(0.20)	(0.20)	(0.21)
Number Landlocked	-0.307	-0.231	-0.076
	(0.23)	(0.23)	(0.25)
Railroad Track	0.184***	0.197***	0.144***
	(0.02)	(0.03)	(0.04)
Population	0.372***	0.368***	0.454***
	(0.03)	(0.03)	(0.04)
Non-Empire Currency Union	0.653*	0.619*	0.383
	(0.33)	(0.32)	(0.36)
War	0.165	0.217	-0.443
	(0.20)	(0.20)	(0.27)
War (-1)	0.418*	0.481**	0.678
	(0.22)	(0.21)	(0.57)
War(-2)	0.25	0.202	-0.16
	(0.16)	(0.17)	(0.38)
War(-3)	0.18	0.254	0.137
	(0.16)	(0.17)	(0.34)
War(-4)	0.008	0.012	-0.355
	(0.19)	(0.20)	(0.37)
War(-5)	-0.056	0.018	-0.676*
	(0.26)	(0.27)	(0.37)
War(-6)	0.006	0.101	-0.44
	(0.23)	(0.24)	(0.44)
Exchange Rate Volatility			2.69
			(2.93)
Year Dummies	NO	YES	YES
Observations	21630	21630	11045
R-squared	0.41	0.42	0.47

Robust standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 2: The Effects of Empire on Trade, 1870-1913: Sensitivity Tests and IV Estimates

Independent Variables	Pooled OLS	Country Fixed Effects	Country Yr. Fixed Effects	Dyad Fixed Effects	Dyad Yr. Fixed Effects	Instrumental Variables
Empire Membership		1.764***	1.768***	0.472***	0.429***	1.331***
		(0.04)	(0.04)	(0.12)	(0.12)	(0.04)
British Empire Membership	1.168***					
	(0.20)					
French Empire Membership	1.088*					
	(0.62)					
German Empire Membership	1.017***					
	(0.30)					
US Empire Membership	2.153***					
	(0.52)					
Spanish Empire Membership	2.458***					
	(0.20)					
Distance	-0.555***	-0.723***	-0.750***			-0.565***
	(0.07)	(0.01)	(0.02)			(0.02)
Gold Standard	0.302***	0.375***	0.448***	0.343***	0.169***	0.260***
	(0.10)	(0.03)	(0.05)	(0.02)	(0.02)	(0.03)
Border	0.635***	0.595***	0.705***			0.623***
	(0.20)	(0.04)	(0.04)			(0.05)
Number Landlocked	-0.24	0.69***	0.747***			-0.225***
	(0.23)	(0.12)	(0.13)			(0.06)
Railroad Track	0.195***	0.096***	0.636	0.187***	0.059***	0.197***
	(0.03)	(0.01)	(0.51)	(0.01)	(0.01)	(0.01)
Population	0.364***	0.226***	0.020	0.336***	0.127***	0.371***
	(0.03)	(0.02)	(0.09)	(0.02)	(0.02)	(0.01)
Non-Empire Currency Union	0.591*	0.802**	0.733***	0.568***	0.165	0.629***
	(0.32)	(0.08)	(0.10)	(0.12)	(0.12)	(0.11)
Exchange Rate Volatility				-3.379***	-2.198***	
				(0.55)	(0.55)	
War	0.23	0.03	-0.254	-0.458	-0.512*	0.218
	(0.21)	(0.22)	(0.28)	(0.28)	(0.27)	(0.37)
War(-1)	0.489**	0.372	0.170	0.771***	0.704***	0.481
	(0.22)	(0.25)	(0.26)	(0.27)	(0.25)	(0.38)
War(-2)	0.213	0.218	0.122	-0.058	-0.015	0.202
	(0.17)	(0.22)	(0.26)	(0.26)	(0.25)	(0.38)
War(-3)	0.265	0.173	0.176	0.109	0.098	0.252
	(0.17)	(0.22)	(0.28)	(0.26)	(0.25)	(0.38)
War(-4)	0.021	0.003	0.170	-0.323	-0.187	0.012
	(0.21)	(0.25)	(0.33)	(0.25)	(0.24)	(0.38)
War(-5)	0.027	-0.013	0.024	-0.236	-0.181	0.019
	(0.27)	(0.26)	(0.33)	(0.23)	(0.22)	(0.38)
War(-6)	0.116	0.071	0.108	0.029	0.139	0.101
	(0.24)	(0.23)	(0.30)	(0.21)	(0.20)	(0.37)
Year Dummies	YES	NO	YES	NO	YES	YES
Observations	21630	21630	21630	11045	11045	21603
R-squared	0.42	0.69	0.76	0.26	0.33	0.42

Notes: Robust standard errors reported in parentheses. * indicates significant at 10% level; ** significant at 5% level; *** significant at 1% level.

Table 3. Colonial Tariff Systems

Countries	Assimilated	Preferential	Open Door
Belgium			Belgium Congo
France	Algeria		
	French Indo-China		
	Tunis		
	Madagascar		
	Reunion		
	Martinique		
	Guadeloupe		
	New Caledonia		
	French Guiana		
	Gabon		
Germany			German East Africa
			German Southwest Africa
			Kamerun
			Togo
			German Samoa
			New Guinea
			Kiaochow (leased territory)
Great Britain		*Dominions:*	British India
		Canada	Newfoundland
		Australia	Papua
		New Zealand	Norfolk Island
		Cook Islands	*Colonies in Asia:*
		Union of South Africa	Aden
		Rhodesia	Ceylon
			Straits Settlements
		Colonies:	Federated Malay States
		Trinidad	Protected Malay States
		British Guiana	Hong Kong
			Weihaiwei(leased territory)
		Jamaica and Caymans	
		Turks and Caicos	*Colonies in Africa:*
		Barbados	Nigeria
		Leeward Islands:	Gold Coast
		Dominica	Sierra Leone
		Montserrat	Gambia
		St. Christopher-Nevis	British Somaliland
		Virgin Islands	Kenya and Uganda
		Antigua	Zanzibar and Pemba
		Windward Islands	Nyasaland
		Grenada	Egypt
		St. Lucia	Anglo-Egyptian Sudan
		St. Vincent	*Other colonies:*
		British Honduras	Gibraltar

Table 3 (continued). Colonial Tariff Systems

Countries	Assimilated	Preferential	Open Door
		Bahamas	Malta
		Fiji	British North Borneo
			Brunei
			Sarawak
			Tonga
			Solomons
			Gilbert and Ellice Islands
			Mauritius
			Seychelles
			Falkland Islands
			Bermuda
			St. Helena
Italy		Eritrea	Italian Northern Somaliland
		Somalia	Rhodes
		Libya	
Japan	Formosa		Kwangtung
			Kiacochow (leased
	Saghalin		territory)
	Korea		
Netherlands			Dutch East Indies
			Curacao
			Dutch Guiana
Portugal		Mozambique	Macao
		Angola	Portuguese Congo
		Cape Verde Islands	
		Portuguese India	
		Timor	
		Sao Thome and Principe	
		Portuguese Guinea	
Spain		Fernandi Po	Canary Islands
		Spanish Guinea	Spanish Morocco
		Rio de Oro	
United States	Puerto Rico	Philippines	American Samoa
		Virgin Islands	Canal Zone
		Guam	

Source: Colonial Tariff Policies (1922).

Table 4. Empire Currency Unions, 1870-1913

	Dates
Belgium	
Franc Union	
Belgium Congo	1879-1913
England	
Gold Rupee Union	
India	1898-1913
Silver Rupee Union	
Aden	1870-1913
Ceylon	1872-1900
India	1870-1897
Maldives	1870-1913
Mauritius	1870-1913
Seychelles	1877-1913
Somaliland	1889-1913
Uganda	1870-1913
Sterling Union	
Australia	1870-1913
Bahamas	1870-1913
Barbados	1870-1913
Bermuda	1870-1913
Botswana	1870-1913
Canada	1870-1913
Cape of Good Hope/South Africa	1870-1913
Ceylon	1870-1871, 1901-1913
Cyprus	1878-1913
Falkland Islands	1870-1913
Fiji	1874-1913
Gambia	1870-1912
Gibraltar	1899-1913
Gold Coast	1886-1912
Ireland	1870-1913
Jamaica	1870-1913
Malta	1870-1913
Natal	1882-1913
New Hebrides	1878-1913
New Zealand	1870-1913
Newfoundland	1870-1913
Nigeria	1880-1912
Orange Free State	1870-1913
Rhodesia	1891-1913
St. Helena	1870-1913
Sarawak	1906-1913
Seychelles	1870-1876
Sierra Leone	1880-1912

Table 4 (continued). Empire Currency Unions, 1870-1913

Transvaal	1870-1913
Trinidad	1870-1913
Straits Union	
Brunei	1903-1913
Johore	1870-1913
Labuan	1870-1913
Straits	1870-1913
West African Currency Union	
Gambia	1913
Gold Coast	1913
Nigeria	1913
Sierra Leone	1913

France

Franc Union

Algeria	1870-1913
Guadeloupe	1870-1913
Madagascar	1900-1913
Martinique	1870-1913
New Caledonia	1870-1913
New Hebrides	1878-1913
Senegal	1870-1913
St Pierre and Miquelon	1870-1913
Tunis	1891-1913

Germany

Mark Union

German West Africa	1886-1913
German SW Africa	1901-1913
Togoland	1884-1913
Silver Rupee Union	
Burundi	1904-1913
Rwanda	1904-1913
Tanzania	1888-1913

Netherlands

Guilder Union

Indonesia	1870-1913
Surinam (Dutch Guiana)	1870-1913

United States

Dollar Union

British Honduras	1894-1913
Hawaii	1898-1913
Puerto Rico	1898-1913

Sources: Pick and Sedillot, 1971; www.dollarization.org, *Monetary Systems*, 1950.

Table 5: The Channels of Empire, 1870-1913

Panel A. Regressions

Independent Variables	**Pooled OLS**	**Pooled OLS**	**Pooled OLS**	**Pooled OLS**	**Pooled OLS**
Common Language	0.270***	0.187***	0.195***	0.189***	-0.028
	(0.06)	(0.05)	(0.05)	(0.05)	(0.02)
Years in Empire		0.011***	0.010***	0.010***	0.003***
		0.00	0.00	0.00	(0.00)
Customs Union			0.519***	0.533***	0.182*
			(0.10)	(0.10)	(0.10)
Trade Preferences				0.286***	0.281**
				(0.10)	(0.13)
Empire Currency Union					0.782***
					(0.03)
Observations	22580	22580	22580	22580	22580
R-squared	0.04	0.23	0.25	0.25	0.53

Robust standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Panel B. Correlation Matrix

	Common Language	Years in Empire	Customs Union	Trade Preferences	Empire Currency Union
Common Language	1				
Years in Empire	0.16	1			
Customs Union	-0.02	0.16	1		
Trade Preferences	0.11	0.18	-0.02	1	
Empire Currency Union	0.32	0.46	0.21	0.25	1

Table 6: The Effects of Empire on Trade, 1870-1913

	Country Fixed Effects	Country Yr. Fixed Effects	Dyad Fixed Effects	Dyad Yr. Fixed Effects
Independent Variables				
Gold Standard	0.187***	-0.015	0.387***	0.183***
	(0.03)	(.05)	(0.02)	(0.02)
Distance	-0.747***	-0.777***		
	(0.02)	(.02)		
Border	0.499***	0.601***		
	(0.04)	(.04)		
Number Landlocked	0.848***	0.919***		
	(0.11)	(.11)		
Railroad Track	0.099***	0.369	0.143***	0.030***
	(0.01)	(0.47)	(0.00)	(0.01)
Population	0.204***	0.340***	0.217***	0.063***
	(0.02)	(0.09)	(0.01)	(0.01)
Common Language	0.193***	0.253***		
	(0.04)	(0.04)		
Years in Empire	0.010***	0.008***	0.001	-0.004**
	(0.00)	(0.001)	(0.00)	(0.00)
Customs Union	0.362***	0.838***	0.329***	0.179*
	(0.12)	(0.16)	(0.10)	(0.10)
Trade Preferences	0.852***	0.984***	0.317***	0.235***
	(0.07)	(0.09)	(0.06)	(0.05)
Empire Currency Union	1.476***	1.549***	0.155**	0.255***
	(0.06)	(0.06)	(0.07)	(0.07)
Non-Empire Currency Union	0.658***	0.653***	0.219**	0.048
	(0.08)	(0.10)	(0.10)	(0.10)
War	0.072	-0.070	-0.18	-0.161
	(0.21)	(0.29)	(0.16)	(0.15)
War(-1)	0.404	0.246	0.212	0.23
	(0.28)	(0.28)	(0.16)	(0.16)
War(-2)	0.253	0.255	0.077	0.127
	(0.21)	(0.26)	(0.16)	(0.16)
War(-3)	0.205	0.198	-0.017	0.024
	(0.21)	(0.26)	(0.16)	(0.16)
War(-4)	0.037	0.162	-0.061	0
	(0.24)	(0.33)	(0.16)	(0.16)
War(-5)	0.015	0.060	-0.078	-0.003
	(0.26)	(0.33)	(0.16)	(0.16)
War(-6)	0.11	0.141	-0.038	0.043
	(0.23)	(0.31)	(0.16)	(0.15)
Observations	21630	21630	21630	21630
R-squared	0.7	.76	0.17	0.22

Robust standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Appendix Table 1. The Effects of Empire on Trade including GDP Estimates, 1870-1913

Independent Variables	Pooled OLS	Dyad Yr. Fixed Effects	Country Fixed Effects	Country and Yr. Fixed Effects	Country-Year Fixed Effects
Empire Membership	0.947**	0.960***	2.154***	2.174***	2.067***
	(0.41)	(0.10)	(0.09)	(0.09)	(0.10)
Distance	-0.510***		-0.437***	-0.445***	-0.48
	(0.10)		(0.02)	(0.02)	(0.02)
Gold Standard	0.193	0.122***	0.059	0.044	0.089
	(0.14)	(0.03)	(0.04)	(0.04)	(0.07)
Border	0.862***		0.856***	0.852***	0.804***
	(0.20)		(0.05)	(0.05)	(0.06)
Number Landlocked	-0.921**		-1.193***	-2.753***	1.538
	(0.44)		(0.44)	(0.48)	(2.23)
Railroad Track	0.203***	0.072***	0.072***	0.034*	0.617
	(0.05)	(0.01)	(0.02)	(0.02)	(0.07)
GDP	0.448***	0.365***	0.627***	0.287***	-0.196
	(0.14)	(0.05)	(0.07)	(0.10)	(0.67)
Population	-0.01	-0.019	-0.198	-0.187	2.042
	(0.11)	(0.07)	(0.13)	(0.13)	(1.91)
Non-Empire Currency Union	1.197**	-0.119	2.003***	2.021***	2.024***
	(0.50)	(0.23)	(0.12)	(0.12)	(0.13)
War	0.424*	0.019	0.281	0.254	-0.031
	(0.22)	(0.14)	(0.26)	(0.25)	(0.23)
War(-1)	0.285**	0.115	0.287	0.252	0.212
	(0.12)	(0.15)	(0.21)	(0.21)	(0.27)
War(-2)	0.335*	0.266*	0.363	0.367	0.353
	(0.18)	(0.15)	(0.22)	(0.23)	(0.31)
War(-3)	0.24	0.07	0.252	0.248	0.368
	(0.20)	(0.15)	(0.25)	(0.25)	(0.37)
War(-4)	0.032	-0.007	0.095	0.084	0.094
	(0.24)	(0.15)	(0.28)	(0.29)	(0.45)
War(-5)	-0.057	0.006	-0.005	0.016	-0.075
	(0.30)	(0.15)	(0.29)	(0.30)	(0.42)
War(-6)	0.008	0.047	0.108	0.119	0.075
	(0.29)	(0.14)	(0.26)	(0.26)	(0.36)
Year Dummies	YES	YES	NO	YES	NO
Observations	6671	6671	6671	6671	6671
R-squared	0.49	0.41	0.68	0.68	0.75

Robust standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%