Protectionism and Imperialism 1872-1914

A THESIS

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Abstract

The purpose of this study was to find out what effect tariff rates had on the territorial

growth of late 19th century European, American, and Japanese empires. Many, if not

most, historical studies of late 19th to early 20th century imperialism have explained it as a

cultural phenomenon. Others have hypothesized that the territorial growth owes some

explanation to protectionism. This study found that, given a three year lag, tariff rates can

explain a little more than 50% of the aggregate territorial growth rate with diminished

results when observing country-by-country.

Keywords: (Protectionism, Imperialism, Historical Economics)

ON MY HONOR, I HAVE NEITHER GIVEN NOR RECEIVED UNAUTHORIZED

AID ON THIS THESIS

1/20/09

Scott Rogowski   Date

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CHAPTER I

INTRODUCTION

"Si vous n'étiez pas si acharnés protectionnistes vous ne nous trouveriez pas si gourmands de territoires"

"If you were not such persistent protectionists you would not find us so keen to annex territory."

> British Prime Minister Robert Cecil (3rd Marquess of Salisbury) to the
>
> French Ambassador – 1897[1]

Contemporary historians often attribute the territorial conquests of the late 19th to early 20th centuries to several factors. As the Encyclopedia Britannica states, "Sometimes [the conquests] were to protect economic interests, as when the British occupied Egypt in 1882, but more often it was for strategic reasons or in pursuit of national prestige."[2] Another popularly accepted explanation was the widespread belief in cultural supremacism best summarized by Rudyard Kipling's satirical 1899 poem, 'The White Man's Burden.' To some extent, these authors may be correct in their analysis. However,

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1   Platt, D. C. M. *Finance, Trade, and Politics in British Foreign Policy 1815-1914* (Oxford; London: Clarendon P. 1968), 365
2   Encyclopedia Britannica Online, *International Relations* (2009)

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is that the end of the story? Popular modern economist Steven E. Landsburg once wrote, speaking on the differences between theory and reality, "Our job as economists is not to tell auctioneers how to run their business. It is to assume that they know how to run their business and to figure out why their strategies are the right ones."[3] Considering, for a moment, auctioneers as prime ministers, it is then possible that Prime Minister Cecil was very rational in his pursuit of imperialism. If prime ministers are similar to CEOs, we might expect them to primarily base their decisions towards profit maximization for their shareholders (citizens). As a modern historian writes, "[The imperialist] was not immune to the political, emotional, ideological, patriotic, or even racial appeals which were so patently associated with imperial expansion. Nevertheless, if an economic connection can be established...it becomes much less plausible to put the full weight of explanation on these motives".[4] Exactly as British prime minister Cecil alludes to, the protectionism seen in France and among all the powers was part of the explanation for the imperialist tendencies of the period.

The period from 1870 to 1914 has two relevant historical characteristics as shown by Figure 1. First, the rapid expansion of the European, American, and Japanese empires resulted in new territorial acquisitions equaling more than 16% of the world's land mass in during this short period.[5] Second, was the increasing protectionism observed in most

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3   Landsburg, Steven E. *The Armchair Economist : Economics and Everyday Life* (New York: Free Press, 1993), 178
4   Hobsbawm, E. J. *The Age of Empire, 1875-1914* (New York: Scribner, 1975), 62
5   See Appendix I. This value assumes the world territorial size to be 134.94 million square kilometers not including Antartica. (source: Central Intelligence Agency, *World Factbook* (2009)). 'More than 15% of the world's remaining territory' because the size is only for the empires of Great Britain, France, Germany, Spain, Japan, and the United States.

world powers until around 1900 with tariff rates in France, the United States, and Russia

more than doubling.[6] With higher tariff rates, of course, comes higher barriers to trade.

In order then to restore the benefits of free trade countries have a few options. The first

option is to negotiate with nearby countries in order to secure trade deals and lower

tariffs. The second option is to expand one's own 'free-trade-block' to make up for lost

trade. In the modern world, the first option would probably be considered the rational

option. However, at the end of the 19th century, faced with strong enemies at home and

overseas territories which were easily colonized, the second option was, as this study

shall argue, rational. The study backs this conclusion by finding that, statistically, from

1872 to 1914, there is a correlation and a causality between the rise in tariffs and the

territorial conquest of 16% of the world's land.

Figure 1: Average Tariff Rates Vs. Territory Gained since 1860

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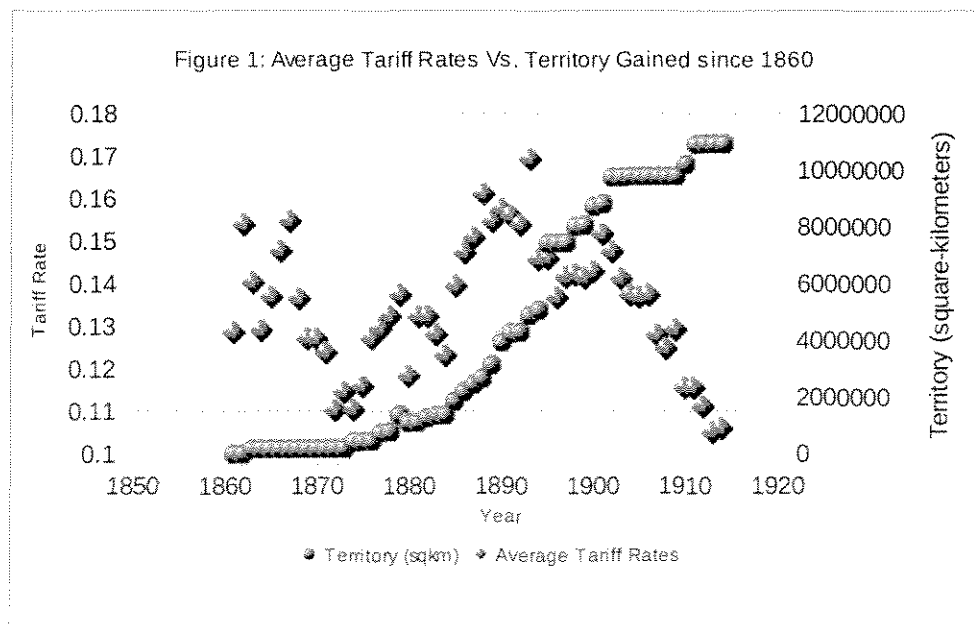
6 See Appendix II

Suitability of 1870-1914 for Economic Study

The ultimate goal of this study is to contribute to the economic literature on the dangers of protectionism by observing its effects in a particularly volatile period. The late colonial era, also popularly referred to as the era of 'new imperialism', is defined by this study as the period from the end of the Franco-Prussian war (1872) to the beginning of the First World War (1914). During these 43 years, the imperialists (most of Western Europe, the United States, and Japan), were in a fierce competitive battle over international power, stature, and access to resource markets.

This period was considered ripe for economic empirical study because it possessed the same three prerequisites that any modern economic empirical study must first obtain:

1. The period has available data.

2. The data is sufficiently detailed enough to establish statistical conclusions.

3. There is enough similarity between the goals and conditions of economic (political) actors to establish ceteris paribus.[7]

To expand upon the first prerequisite, rapidly industrializing states of the late nineteenth century found a need to expand their record keeping of fiscal statistics. Presumably, this would have happened in order to make better political and economic decisions. The most important fiscal statistic utilized by this study was historical tariff rates. While this exact statistic is often not found in available records, a simple method can be used to calculate

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7   That is, for the purposes of theory, when all entities have roughly equal goals and abilities, they can be treated as a homogeneous group.

these rates. By definition, average tariff rates are equal to total customs revenue divided

by total value of imported goods.[8] For reasons which are beyond the scope of this study,

government records prior to 1870 of either customs revenue or imports are sparse.

Similarly, during World War I, these records were either unreliable, and if reliable, could

be considered outliers due to the conditions of war. Thus, 1870 to 1914 is nestled a period

of continuous and defensible trade data.

The second reason for selecting this period was because of the continuity of

territorial gains. In order to perform a yearly or multi-yearly regression, any and all '0'

values should be minimized. In this case, '0' values are considered years or sets of years

in which a country did not gain territory. Unlike much of history, the late 19th century

saw enormous territorial gains made regularly by a few actors. In fact, during all 44

years, only 12 were observed as having no territorial gains made by any country.[9] This

continuity in expansion results in a more useful dataset.

Figure 2: Length of Railway Open
(An indication of industrial production)

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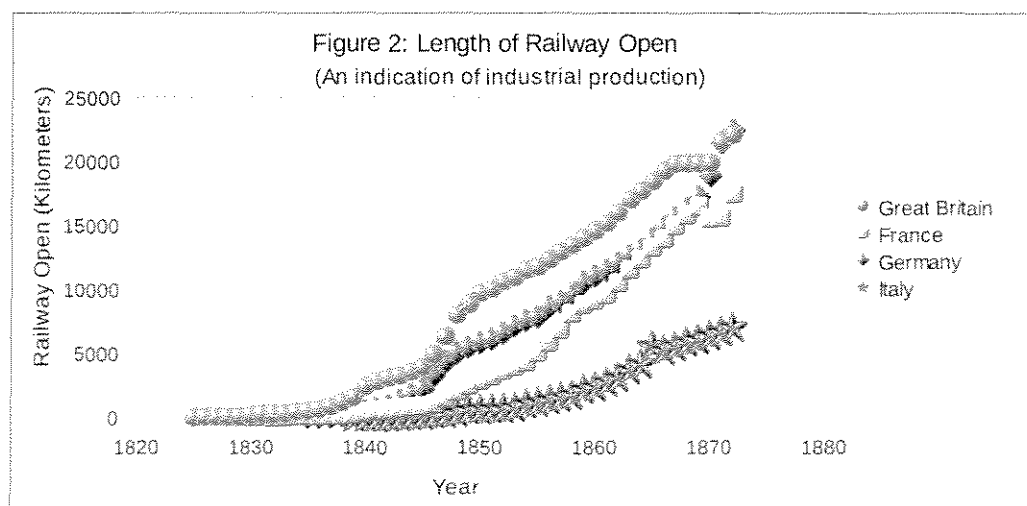
8 See Methods:Tariffs section
9 See Appendix I and Methods:Territory section

Competitiveness Between the Powers

The final reasons for the selection of this period were the common goals thought to be shared by the political actors. In order to understand why, a brief history must be recounted. France's imperial army during the Napoleonic wars (1797-1815) was generally considered to be the first professional army (a large standing army which is well trained and regulated) in modern history. After fifteen years of near continuous conquest, Napoleon's army eventually met defeat leaving not only France but the entire continent weakened. However, managing to resist all invasion, Britain found its position strengthened by the war. Because of British successes and the disarray of most other European powers, the British Empire quickly became the default world superpower. This led to what historians now call 'Pax-Britannica' or British peace.[10] Furthermore, Britain was the first country to industrialize. On the European continent, no other country could politically compete with the world's only industrialized superpower.[11]

This all began to change with the nationalist movements in the mid 19th century, notably the Italian and German unifications. With these unifications, not only were two powerful states created, but also many disputes over their territories by other powers were resolved.[12] Across most of the world's superpowers, industrialization began to replace traditional workshops with factories which caused economic output to explode (See Figure 2).

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10 Pax-Brittanica is an alteration of the original Latin Pax-Romana.
    Encyclopedia Britannica Online, *International Relations* (2009)
11 Encyclopedia Britannica Online, *International Relations* (2009)
12 Encyclopedia Britannica Online, *Nationalism* (2009)

With economic output, came, of course, greater tax receipts and greater military strength. The end result was the revival of continental power in several European states. Many of the countries that could challenge British dominance thus began competing with each other and the British Empire for the benefits that come with political dominance over one's neighbors. Thus, the increasing power of the continental powers resulted in a quest for preeminence only violently resolved by World War I.

The Increase in Tariffs

Starting with the panic of 1873, the world suffered through a prolonged depression called, at the time, the Great Depression. Ever since the Great Depression of the 1930s, historians now refer to this as the Long Depression. Monetarists often attribute the Long Depression (and, in fact, every depression) to a reduction in the supply of currency. Specifically, this deflation was due to the rapid worldwide adoption of the gold standard following the adoption of France and Germany's after the Franco-Prussian war.[13] This depression was not, however, like other depressions. That is, real GDP growth did not contract or even slow during this period (see Figure 3).[14] Instead, as a contemporary writes, "A depression of prices, a depression of interest, and a depression of profits; there is that undoubtedly. I cannot see any reason for believing that there is any considerable

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13 France's loss in the war and resultant reparations resulted in a chain of events leading to both France and Germany's adoption of the Gold Standard. Because both countries were previously such large silver economies, the remaining silver and bimetallic economies were forced to adopt the winning standard. Flandreau, Marc. "The French Crime of 1873: An Essay on the Emergence of the International Gold Standard, 1870-1880." *The Journal of Economic History* 56, no. 4 (Dec. 1996): 862-897.

14 For some countries, GDP growth did slow. According to the National Bureau of Economic Research, 65 months of contraction were experienced within the United Stations.

depression in any other respect."[15] That is, the upper class of the period suffered while those who didn't own capital or property were mostly better off. From a modern historian, "The wail of distress did not come from the mass of the people, who were for the most part better off, but many from industrialists, merchants, and financiers, who felt the pinch of falling prices, profits, or interest rates, and who were best able to make their complaints heard."[16]

Contributing both to deflation and to negative sentiments felt, farmers across Europe saw the prices of agricultural goods fall significantly. Ultimately, this is regarded as a byproduct of falling transportation costs allowing non-European farmers (Americans and Australians among others) to export their agricultural produce to Europe. As Hobsbawm remarks, "In 1894, the price of wheat was only a little more than a third of what it had been in 1867, a splendid bonus for shoppers, but a disaster for the farmers, and farmworkers, who still formed between 40 and 50 percent of working males in the industrial countries'."[17]

The discontent felt by farmers and owners of capital would have in itself been enough to merit drastic government action. But, adding further to the malaise were the feelings of the wage earners. "As a contemporary remarked, although the standard of living was rising, 'conditions did not seem to be improving', since money wages were reduced."[18] The long depression event was evidently enough to force otherwise rational

15 Attributed to economist Alfred Marshall 1842-1924
Musson, A. E. "The Great Depression in Britain, 1873-1896: A Reappraisal." *The Journal of Economic History* 19, no. 2 (Jun. 1959): 199-228.
16 Ibid., 200
17 Hobsbawm, E. J. *The Age of Empire,* 62
18 Musson, *The Great Depression in Britain,* 201

governments into a protectionist stance.[19][20] Furthermore, this ideology was not limited

only to agricultural products but increasingly the manufacturing and raw material

industries were protected.[21] As calculated in Appendix II and shown in Figure 1, average

tariff rates did indeed rise dramatically among most of the major world powers. This, of

course, likely further contributed to the depression and caused shortages of both foreign

products and raw materials. This study will attempt to prove that this regime of

increasing tariffs ultimately caused the world powers to pursue other methods of foreign

trade.

Figure 3: Average GDP

Taken from OECD figures of Great Britain, France, Germany, Spain, the United States, Japan, Italy, Belgium, the Netherlands, and AustriaHungary

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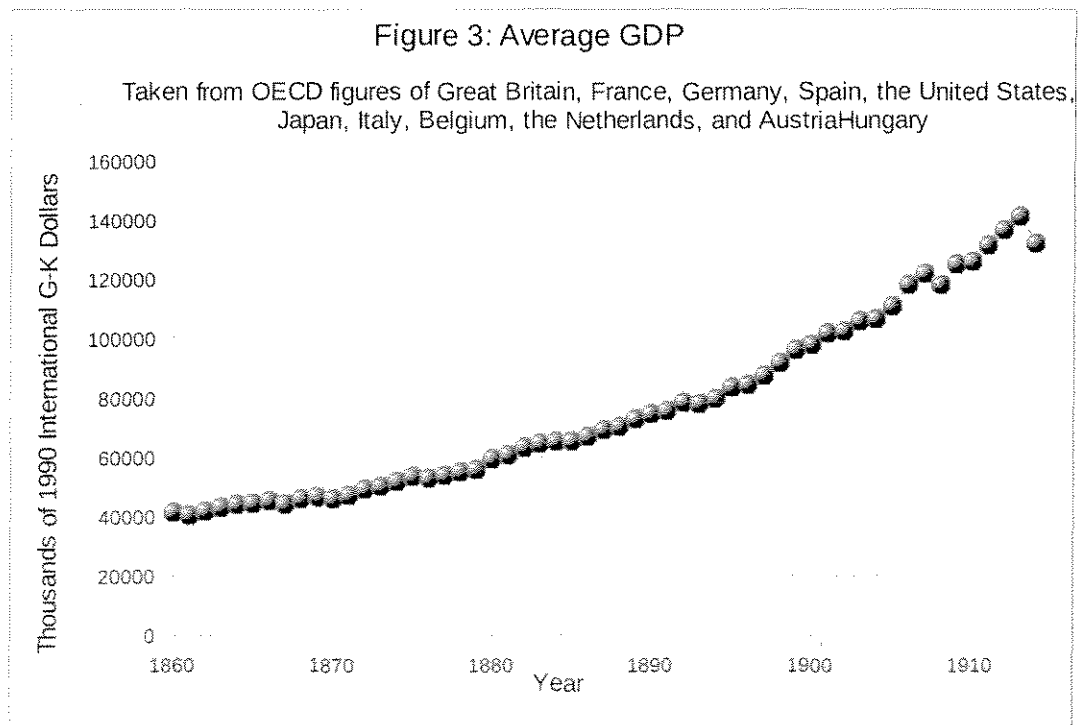
19 Ibid., 222
20 The 1888 presidential election in the United States was won by a staunchly protectionist candidate, Benjamin Harrison. (Source: Encyclopedia Britannica Online, *Benjamin Harris* (2009))
21 Musson *The Great Depression in Britain*, 227

CHAPTER II

THEORY

"There is no avoiding war; it can only be postponed to the advantage of others."

Niccolo Machiavelli. The Prince. 1513

The increase in tariffs by the major world powers observed from 1872 until 1914 resulted

in a decrease in trade between these powers from levels which may be expected (see

Figure 4). A decrease in trade, according to the theory of comparative advantage, would

lead to a decrease in welfare for industries and consumers. This decrease in welfare, as

with all recessions, would be seen as a major problem which required immediate steps

toward resolution. Because of this, coupled with the close integration between industries

and imperial governments, rational governments would need to do something to restore

the lost welfare. Due to the conditions of the late nineteenth century, the rational option

would have been to enlarge their economies by enlarging their empires (the tariff rates

within empires, while existent, were generally much lower than those between empires).[1]

Looking again at Figure 1 and taking into account a slight lag, some relationship between

high tariffs and imperial expansion seems evident.

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1   Alesina, Alberto, and Enrico Spolaore. *The Size of Nations* (Cambridge, Mass.: MIT Press, 2003) 190

Figure 4: Trade across the British Channel vs. GDPs
1854-1914
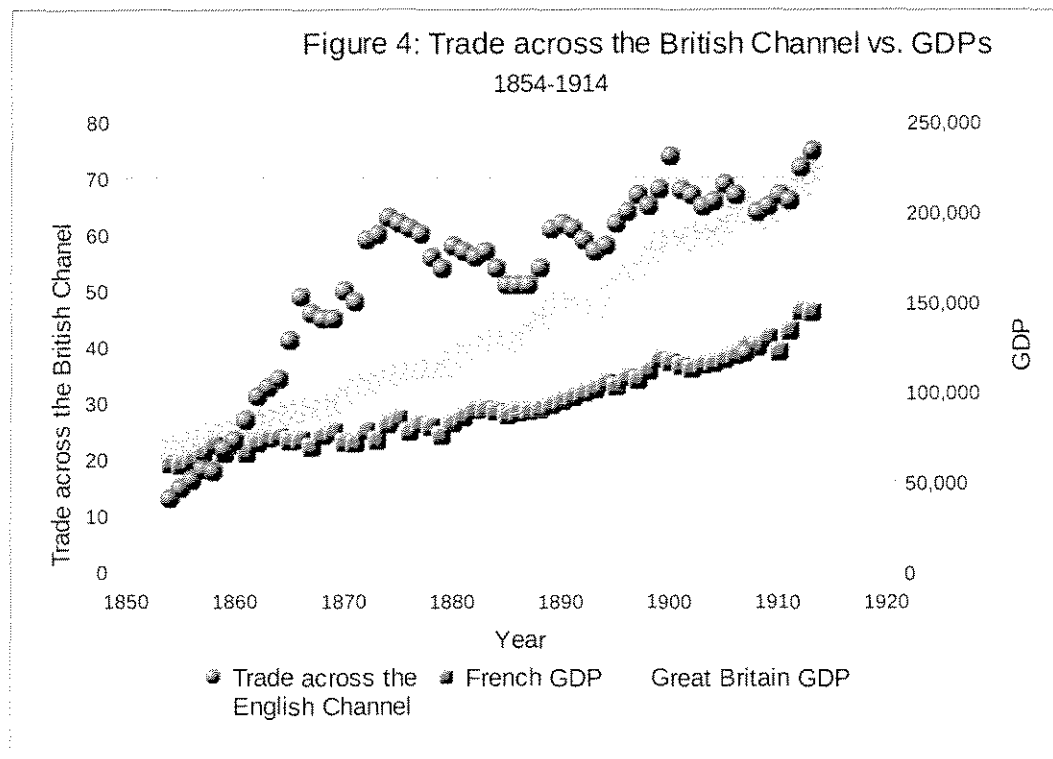
The impact of tariffs & the gravity model

The theory of comparative advantage has been well accepted since David

Ricardo's *On the Principles of Political Economy and Taxation* (1817). Among other

conclusions, the theory suggests that between countries, higher tariffs will result in a

reduced welfare for the citizens of both countries.[2] This theory is meant to hold

consistent across all economies throughout time. Presumably then, the late 19th century

should have been no different. However, as shown by Figure 3, even when tariffs were at

their highest during the 1890s, gross domestic product unexpectedly appeared to continue

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2   Ricardo, David. *On the principles of political economy and taxation..* 1817

growing regularly. Of course, there were a few minor recessions in 1861, 1867, 1877, 1893, and 1908 but nothing substantial. In fact, according to the OECD figures used to create this figure, this period was marked by prolonged economic growth.

Many theories attempt to explain why their was such a dramatic disconnect between theory and empirical evidence. Hobsbawm offers this anecdote, "A distinguished American expert, surveying the world economy in 1889... observed that it had, since 1873, been marked by 'unprecedented disturbance and depression of trade'"[3] The statistics available do show a decrease in the level of trade between the powers. Of course, this is still not reflected in GDP because, as Alesina remarks, "Without the fall in transportation costs and the adoption of the gold standard which facilitated trade, the protectionist moves of the major powers would have created much larger effects on trade."[4] The author, however, believes that the real effects of higher tariffs were not necessarily ones which could be found in statistics.

In the later part of the 19th century, as always, countries traded between each other the regular sets of goods. To take the commonly used economic example, the Scottish would have exchanged their wool for Spanish wine because of the Scottish comparative advantage in wool production and the Spanish comparative advantage in wine production. Between the European powers however, the economic-industrial developments began to necessitate the exchange of more exotic goods as well (exotic being defined as not readily

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3 Hobsbawm, E. J. *The Age of Empire*, 34
4 Alesina, Alberto, and Enrico Spolaore. *The Size of Nations*. 189

available in Europe). Better shipping technology and malarial control resulted in many new consumer imports from Africa and Asia including tea, ivory, and coffee. An especially interesting example is Shea butter.

Shea butter was (and still is) a natural oil imported from West Africa beginning in the early 19th century. The oil is extracted from the Shea tree which only grows in the savanna directly south of the Sahara in Africa. Originally, it was cultivated for use as a cooking oil. Upon British discovery in Gambia, it was found to serve as a great moisturizer, anti-inflammatory agent, and mild sunscreen when used as a cosmetic. Widely popular in Europe, with increasing tariff rates, the exotic skin product became more expensive.

Not only though did consumer products suffer from tariff barriers. Also notable were the raw material shortages suffered by industrialists. The factors which went into industrial production were not limited to coal and iron, rather, "technological development now relied on raw materials which were to be found exclusively or profusely in remote places"[5] Among these were rubber (found exclusively in the tropics), palm oil (for lubricating machinery and producing soap), cotton (to feed the spindles), and copper (a metal much more cheaply extracted in Central Africa than Europe). As of 1870, these resources were often mass produced in only one or two overseas colonies with other countries trading with the colonizer for the goods.

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5   Hobsbawm, E. J. *The Age of Empire*, 63

Considering all of these qualitative facts, it is obvious that with rising tariffs, there was some impact on utility which cannot be measured. This may be for two reasons eluded to previously. One, the increase in tariffs cleanly coincided with an acceleration of production coinciding with further industrialization. This might not be too far fetched considering the late start Continental Europe, the United States, and Japan got compared to Great Britain. Perhaps also the reason that increases in tariffs were not reflected in GDP was because the boost in colonial trade happened fast enough to ward off the negative impacts. Either way, in order to perform a working regression, it is necessary to, quantify the impact of tariffs upon income.

The gravity model offers one such method. First proposed in 1954 by Walter Isard,[6] the classical theory as clarified by Anderson states that the magnitude of bilateral trade flow between two countries will be determined by their economic sizes, their populations, the distance between the two, and an error term.[7] This relationship is shown in Equation 1.

Equation 1:
Classical Gravity Model according to Anderson (1979)

$$M_{ij} = Y_i^\alpha * Y_j^\beta * N_i^\chi * N_j^\delta * d_{ij}^\epsilon * U$$
$Where:$
$i : Home\ country$
$j : Foreign country$
$Y : Income$
$N : Population$
$U : Generic\ error\ term$

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6   Isard, Walter, and Merton J. Peck. "Location Theory and International and Interregional Trade Theory." *The Quarterly Journal of Economics* 68, no. 1 (Feb. 1954): 97-114.
7   Anderson, James E. "A Theoretical Foundation for the Gravity Equation." *The American Economic Review* 69, no. 1 (Mar. 1979): 106-116.

This equation is not a rule-of-thumb but instead a 'theoretical foundation'. The exponents on each term emphasize that the relative weights of each term (the importance of income vs. the importance of population) are unknown. From there, the gravity equation can be 'built' using different exponents calculated by the author. It is known that the distance term, d, represents a cost of doing trade (the cost of shipping). It is then expected to be inversely related to trade flows and have a negative exponent. Some authors have expanded this idea to include other variables, notably, tariff rates.[8] As with distance, tariff rates can be considered a cost of doing trade and are thus also expected to be inversely related to trade flows.

Tariff rates on a whole have been empirically shown to be good measures of bilateral trade with one study concluding that, in the modern world, a 5% across-the-board drop in tariff rates would raise welfare by 1%.[9] It is obviously difficult (if not impossible) to measure what might have happened to income if the protectionist regime of the 19th century did not occur. However, if we are to accept the precepts of basic trade theory coupled with the qualitative opinions of historians and contemporaries, the dramatic rise of tariffs seen in the late 19th century was not without consequence.

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8   Eaton, Jonathan, and Samuel Kortum. "Technology, Geography, and Trade." *Econometrica* 70, no. 5 (Sep. 2002): 1741-1779.
9   Ibid., 1774

The Endowment Effect & Public Choice

With the suffering inflicted by the long depression coupled with increasing tariff rates,

how must have the upper and lower classes reacted? The reader can assume from the

previous section that if there was not widespread pain, there was at least some manner of

adaptive pain felt. That is, cutting off cheap copper or Egyptian cotton to the

industrialists would have resulted in them either modifying their production lines or

accepting lower profits. Likewise, though not necessities to life, Shea butter, ivory, and

tea were valued by the average first world citizen for the simple luxuries they provided.

Furthermore, the trade of the above commodities likely provided an additional profit to

merchants , the loss of which filtered out through the economy. Under rational economic

conditions, this would be considered a small recession at best. National income would

have declined slightly and perhaps one year of contraction would have been felt.

Considering, though, the idea of a recession out of a rational economic context,

the situation changes dramatically. The current world recession (2007-present) and the

recession before that (2001) caused widespread discontent across the world. Accordingly,

the governments of the world are pumping trillions of dollars into the world economies.

According to basic macroeconomic theory, these rescues, by definition, have reduced the

savings and investment rates, hurting the long run capital accumulation of the world

economy. Whether or not these rescues were proper economic policy is a matter of

debate which will not be explored in this study. The purpose of the anecdote is instead to

point out two important points. First, people tend to react strongly to losses (or perceived

losses) in income, wealth, or welfare. Second, depending on your interpretation,

governments will often address recessions in an excessive manner.

Addressing the first point, the idea of a strong reaction to losses is by no means

novel. The endowment effect states that there is a psychological tendency toward valuing

what one believes he or she has ownership over more than what would be rationally

expected. In other words, consider two people, one of whom is already in possession of

10 dollars and one who has the opportunity to gain 10 dollars. The person who already

has the 10 dollars will work much harder to keep it than the person who does not have the

10 dollars will work to earn it.[10] Losses are seen as much more devastating than gains are

joyous. In fact, some have even found that the endowment effect results in a valuation of

ones property over potential future property by a magnitude of two or more.[11]

Furthermore, the endowment effect has been demonstrated to simply be a manifestation

of the psychological tendency known as loss aversion.[12] This explains why people react

so strongly to news of recessions which have cut GDP to levels of only a few years prior.

For them, a reduction in income of $1000 may be the exact opposite of an increase of

$2000. It also helps explain why a reduction in the importation of palm oil would be seen

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10 Kahneman, Daniel, and Amos Tversky. "Prospect Theory: An Analysis of Decision Under Risk."
    Econometrica 47, no. 2 (Mar. 1979): 263-291.
11 Kahneman, Daniel, Jack L. Knetsch, and Richard H. Thaler. "Experimental Tests of the Endowment
    Effect and the Coase Theorem." *The Journal of Political Economy* 98, no. 6 (Dec. 1990): 1325-1348.
12 Ibid.

as calamitous to people of the 19th century. Although real production and real consumption were rising during most of the era, the reduction in trade led those affected to conclude that they were facing a serious problem.

Regardless of the type of government facing this situation, whether American democracy or German kingdom, the theory of public choice would dictate the choice of action taken by the governments. According to the theory as outlined by Buchanon and Tullock,[13] governments are simply agents of their constituencies. Since both the wealthy capitalists and the poor wage-earners were united in their dissatisfaction with their economic situation, the leaders of the countries had no choice but to react in some way.[14] In Great Britain, some clearly outlined their opinion of the governments purpose, "the logic of the conservative position after 1832 dictated the policy of accommodation with the business and commercial interests."[15] In the United States, a country theoretically 'by the people and for the people', the presumed reasons for action were different. In both cases, the citizens ultimately caused the government to react. The next section will explore why governments chose to do as they did.

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13 Buchanan, James M., and Gordon Tullock. *The Calculus of Consent, Logical Foundations of Constitutional Democracy* (Ann Arbor: University of Michigan Press, 1962)
14 Ibid.
15 Blake, Robert. *Disraeli* (New York: St. Martin's Press, 1967; 1966) 758

Transaction Costs

Noble Prize winning economist R. H. Coase's 1937 study, "The Nature of the Firm",

explained why it makes sense for organizations to exist. The theory is based around the

idea of transaction costs. The market defined by Adam Smith assumes that the price

mechanism (the invisible hand) would be able to govern all transactions between free

individuals with different resources and abilities and assure a perfectly fair, immediate,

outcome for all transactions. That is, under the simple model, it wouldn't be rational to

work for an organization (or to hire employees). A perfectly competitive, perfect

information labor market would allow freelancers to easily exchange money with one

another for goods and services. However, this would require a tremendous amount of

time and money spent finding the best independent contractors, negotiating on a price,

then ensuring that the work is completed successfully. The cost of doing these things is

often so high that it becomes prohibitively expensive to engage in trade. But, under

organizations, these costs are significantly reduced and streamlined. The hiring process

and wage negotiation occur infrequently and the work of employees is monitored

regularly as a condition of maintaining their employment and wages.[16]

Likewise, on an international scale, one person countries would make sense except

for transaction costs. Instead of contracting out your defense, designing your own

infrastructure, or conducting your own diplomacy, states will form for the mutual defense

and prosperity of the people. The end result is the existence of governments to provide

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16 Coase, R. H. "The Nature of the Firm." *Economica* 4, no. 16 (Nov. 1937): 386-405.

these services within their respective countries.[17] Of course, within this international

system, transaction costs between rival national governments are still absolutely

applicable. Since governments have to regularly reach agreements with each other on

issues such as trade, borders, water, or nuclear weapons control, these costs occur

frequently and depending on the situation may become very high.

In 1979, Carl Dahlman expanded upon Coase's idea and defined the three types of

transaction costs that economic entities face while attempting to conduct trades. These

three types are search and information costs, bargaining and decision costs, and policing

and enforcement costs.[18] Search and information costs stem from the costs incurred by

seeking out traders in a market and determining whether their products and services are

of sufficient quality. Bargaining and decision costs stem from the costs incurred by

traders deciding on prices and then determining among themselves whether they are

acceptable and will result in a benefit to them. Finally, policing and enforcement costs

refer to actions that are required to ensure that the trades occur as agreed upon and, if not,

enforcing penalties.

To these three costs, this study will consider a forth cost which is not technically a

transaction cost and is thus not expressed in any of Dahlman's transaction costs. This

type of cost shall be referred to as an 'abettor cost', the cost incurred by a firm who aids a

competitor. In the modern world, the best analogy may by the scenario of two software

companies; both designing and marketing multiple products. The only assumption is that

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17 Alesina, Alberto, and Enrico Spolaore. *The Size of Nations.*
18 Dahlman, Carl J. "The Problem of Externality." *Journal of Law and Economics* 22, no. 1 (Apr. 1979): 150

each company must market a product which is a perfect, or near perfect, substitute for the other companies product. We shall refer to this as the 'competitive product'. Now, consider an otherwise mutually advantageous trade not involving the competitive product. If this trade financially benefits company 1 more than company 2, company 1 could use the money toward improving or marketing their competitive product. If executed correctly, this would weaken company 2. Furthermore, if the competitive product formed a large part of their revenue, company 2 could risk going out of business.

In the international system, ignoring this 'abettor cost' has far higher consequences than in business. Aiding a rival power through the use of trade treaties, international partnerships, or military alliances would, in the short term, benefit both countries. However, if the rival country benefited more from a partnership than your own, the results could prove disastrous. The rival country could attack you country diplomatically, economically, or even militarily. This assumes, of course, that the countries remain rivals and one has something to gain from the other's demise. In a world of imperfect information, these are probably good assumptions to make.

Returning to the late 19th century, with the pain from increasing tariffs being felt across most of the world, governments needed to chose what to do to solve their situation. That is, exactly as happens today, the powers had to negotiate with each other in order to secure trade from one another. The types of costs faced by governments engaging in this diplomacy would be the same as Dahlman defined. There would be search and information costs, bargaining and decision costs, policing and enforcement costs, and as

the author has defined, 'abettor' costs. The only difference between the costs incurred in the late 19th century and the costs incurred today would have been how these costs were expressed (see Table 1).

Search and information costs in the international system are the costs associated with determining the needs of foreign governments and determining what they might to offer in exchange. In the 19th century, this would all be done while traveling back and forth, in either a ship or a carriage and dealing with high cultural and language barriers requiring a good deal of time and money. If a telegraph line happened to exist between the capitals, some of this cost may be cut down. Obviously, though, it is difficult to hammer out international agreements using only Morse code. Tariff reductions could then only be agreed upon slowly.

Bargaining and decision costs follow much the same idea, with consistent travel required during the negotiating process. Still, a larger manifestation of decision costs are the costs associated with pleasing a disillusioned citizenry. Since the tariffs of the late 19th century were put in place to satisfy the demands of affected workers, manufacturers, and industrialists, a reduction of tariffs (even if the deal was fair) might be seen as an assist for rival agriculture and industry. The governments must thus spend time either justifying the decision to their people or ensuring their posts by taking on another popular cause.

Policing and enforcement costs again contain these elevated travel costs but also embody another greater cost. One hundred years ago, international organizations like the UN, IMF, NAFTA, NATO, or the WTO were non-existent. There was therefore no international court to judge disputes in transactions between states. Without any international bodies to either monitor or enforce trade agreements, countries had to take it upon themselves to ensure that trade was being conducted fairly. While this may have been relatively easy for Great Britain, for its continental neighbors such as Belgium, enforcing trade agreements would have been near impossible.

Next, the abettor cost in the 19th century deserves special attention. For any student of history, it should be standard knowledge that conflict within Europe was common throughout the most of its history. This, of course, includes the period prior to 1872.[19] In fact, the peace enjoyed by Western Europe since 1945 has been, by far, the longest period of peace in recorded history. Likewise, Japan and the United States were not immune to conflict. In the case of Japan, its consistent rivalries with China are notable. Similarly, the US had concluded its war with Mexico only 20 years prior. It should then be obvious that the competitiveness between the superpower countries in the 19th century was much greater than the competitiveness between countries seen today. The abettor cost, as defined by the author, states that the act of trading with ones rivals carries huge risks. The risks are due to the possibility that one country will benefit more

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19 To better establish how competitive the era as a whole was, consider that in the 20 years prior to 1872, three major wars were waged in Europe, the Crimean war between Russia and France and Great Britain, the Austro-Prussian war, and the Franco-Prussian war. In the 20 years prior to this writing, no wars have been fought between any of the G8 nations.

than its rival in partnerships. In a period of imperfect information, it would be unclear to both countries whether their agreement would benefit one of them more than the other. Judging by the destructiveness of World War I, it could easily be argued that abstaining from economic partnerships was the rational choice.

Many governments, faced with pressure from both the wage-earners and the wage-payers, were forced to do something concerning the high tariff rates. There are essentially two possibilities for governments facing this situation, they could restore economic wellbeing or they could create economic wellbeing. In more words, the leaders of the 19th century had a choice between either attempting to lower tariff barriers around them to restore what trade was lost, or, finding new sources for the goods they needed. Clearly, this is not a one or the other situation, and governments, modern or past, will attempt both possibilities in their search for trade. However, as certain costs are associated with both, rational governments will devote more of their attention to one than the other. It is important also to reiterate, because of the theory of public choice, rational governments with the ability to do something would be forced to do something by their citizenry. Doing nothing for them was not an option.

Considering Table 1, it is clear that the costs of negotiating in the 19th century were, by far, higher than in the 21st century. Of the four costs considered, the three transaction costs and the abettor costs, there were clear disadvantages to negotiating trade

agreements in the 19th century over negotiating in the 21st century. The advantages laid out make it clear that to simply, 'lower tariff barriers', while difficult today, would have been still more costly in the 19th century.

The second option, expand one's own trade, could manifest itself in two forms. First, merchants of the country could make a protracted effort to peacefully increase their trade in places with low trade barriers. Otherwise, colonies could be acquired formally and defended as such. The apparent benefits of the first method of expanding trade are obvious. This method requires very little upfront capital, is morally justifiable, and, if done properly, will incur the same trade benefits as the second method. The second method though does have some innate advantages. Formally occupying a colony provides a strategic military base, cuts off trade to rival powers (and thus minimizes the abettor cost), allows one to develop the colonies resources, and as must be mentioned, is a rewarding stimulus for the nationalist ideology. As Hobsbawm states, "Imperialism encouraged the masses ... to identify themselves with the imperial state and nation, and thus endow that state with with justification and legitimacy."[20] At the same time, it should not be forgotten that occupying a colony was not an easy task and was definitely not guaranteed to be successful (South Africa, Ethiopia, Afghanistan, and Cuba as examples, among others).

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20 Hobsbawm, E. J. *The Age of Empire*, 70

Table 1

Attempted transaction – a reduction in tariffs in exchange for a reduction in one's own tariffs

	Definition	19th century costs	21st century costs	The costs are likely higher in the...
Search & Information Costs	Costs associated with finding potential partners of trade, determining their legitimacy, and learning what they know	Traveling slowly via carriage or ship to foreign capitals with the help of a telegram machine	Quick fast finding with the help of modern inventions such as the airplane and the internet	19th century
Transaction Costs — Bargaining & Decision Costs	Costs associated with negotiating the terms of trade and deciding whether it is the best choice.	Same travel costs apply. New century. Costs associated with why trade barriers are being lowered.	Travel is cheaper than 19th century. Costs associated with justifying a reduction in tariff barriers exist but are presumed lower due to better education.	19th century
Transaction Costs — Policing & Enforcement Costs	Costs associated with assuring that trade is being conducted fairly and dealing with problems that may arise if any	Same travel costs apply. Most international organizations police and enforce trade arrangements without the help of aid in the enforcement of trade agreements	International organizations (WTO, EU, UN, IMF, etcetera)	19th century
Other Costs — Attrition Costs	Costs associated with aiding potential rivals who may or may not use their gains against one's own country	19th century considered a very volatile time. Fears of aiding one's neighbors are high. Words in the past 20 years. Better information allows for more equal trades.	Presumably more peaceful than the 19th century. No major conflicts between superpowers	19th century

Colonialism is often a development from peaceful trade to formal rule.[21] As

demonstrated by the Portuguese across their 15th century empire and later by the British in

India, simply pursuing trade in distant lands works well for a while. As the trade

becomes more involved though, traders may set up small enclaves to facilitate easier

access to the markets.[22] A permanent presence puts one under the regulations and whims

of states and state-like entities around the enclave. As written by Landes, "the

merchants...sought trade not territory as such...but they did not want to be robbed or

bullied by native dealers or officials...so they called on their home government to help"[23].

This quickly evolves into the nationalization of the merchant companies and, eventually,

formal colonization.[24]

By 1873, "The colonies were, after all, considered to be economic extensions of

their 'home' countries "[25]. Though peaceful trade with foreign nations was doubtless

continued, more and more, the first-world realized that formal occupation was inevitable.

Some even began to blur the line between the two; ""Territorial expansion', said an

official of the US State Department in 1900, 'is but the by-product of the expansion of

commerce.'"[26] For the period, then, expanding trade with non-traditional partners was

seen as the same as an expansion of territory overseas. Furthermore, it was the only trade

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21 Encyclopedia Britannica Online, *Colonialism* (2009)
22 For the Portuguese empire, the best examples may be Luanda, Goa, and Macau. For British India, Madras and Calcutta.
23 Landes, David S. *The Wealth and Poverty of Nations : Why some are so Rich and some so Poor* (1st ed. New York: W.W. Norton, 1998) 426
24 Parliament formally acquired British India from the merchants in 1858 following the Indian Uprising of 1857
   Encyclopedia Britannica Online, *East India Company* (2009)
25 Emmer, P. C., Olivier Pétré-Grenouilleau, and J. Roitman. *A Deus Ex Machina Revisited :Atlantic Colonial Trade and European Economic Development* (Leiden; Boston: Brill, 2006) 25
26 Hobsbawm, E. J. *The Age of Empire*, 45

creation method that could be effectively pursued by the government. As the efforts today by the US government to encourage charity are seen as redundant or even wasteful to some, likewise, encouraging traders to go to places where they might be 'robbed or bullied by native dealers or officials', was ineffective. Instead, imperialism was seen as the only alternative to a peaceful reduction of trade barriers.

Table 2: Costs and Benefits of Imperialism

Costs	Description	Cost presumed lower in the 19th or the 21st century.
Cost – Acquisition	The actual process of acquiring power whether peacefully, by deception, or by violence.	19th Century
Cost – International Opinion	The cost of dealing with those who believe that the acquisition was an immoral land grab	19th Century
Cost – Internal Management	The cost of ensuring a peaceful interior and broadcasting authority	19th Century
Cost – Development	The cost of building institutions, transportation, and commercial enterprises	21st Century
Cost – Transport to and from colonies	The cost of the constant trips required between a colonizer and its protracted empire	21st Century
Cost – Defense	The cost of defending the territory from neighboring lands and other imperialists	21st Century
Cost – Moral	The personal cost associated with ruling over a people without mandate	19th Century
Benefits		Benefits presumed higher in the 19th or 21st century
Benefit – Raw Materials	A pivotal point in the study. Unhindered access to products not found in a colonizing country was an extraordinary benefit.	19th Century
Benefit – Export Markets	A place to sell manufactured goods was important to industrialists suffering through the long depression.	19th Century
Benefit – Revenue	Revenue, whether tax or excise, is always a benefit to governments.	21st Century
Benefit – Population	In a period of mass conscription, having a larger population could mean the difference between victory or defeat.	19th Century
Benefit – Defense	A worldwide defensive network is considered by some to be strategically important.	21st Century

Table 2 shows the costs and the benefits associated with formal imperialism. Like Table 1, it outlines the differences in these costs between the 21st and the 19th centuries. Unlike the Table 1, the cost differences between the two centuries are not entirely clear. While the author believes, in the 19th century, most of the costs of acquiring colonies are lower, and most of the benefits higher, this was by no means a clear majority. For

instance, while the cost of acquiring colonies might be lower in the 19th century because of the greater inequality between the first-world and the rest, the cost of defending colonies may have been higher due to the competitive atmosphere.

There are, though, two costs of imperialism that the author believes were very low in the 19th century and much higher in the 21st. The first cost is that of international opinion. For the 21st century, any attempt to increase territorial size is met with suspicion if not outright military action. On the other hand, the period from 1872 to 1914 was ultimately named the era of 'New Imperialism' by modern historians. The name alone illustrates a more lenient attitude toward colonial acquisitions which had to be justified only marginally. The justification and moral defense costs of acquiring colonies were thus drastically lower in the 19th century. Second, the cost of managing the colonies in an era before self-determination was much lower than trying to manage independent nations as colonies in the modern era. Before the worldwide advent of strict territorial borders and the sacred sovereignty of states, people would have been much more likely to accept foreign rule since the concept of national rule was ill-developed. For many, in fact, their new colonial status was simply a change from one ruling foreign nation to another.[27] This essentially limited the popular revolutions which are common in occupied states today. Because of this, colonies were much easier to manage than their 21st century counterparts.

From the standpoint of rulers facing popular discontent with the long depression and the high tariff barriers worsening the situation, two solutions were apparent. The first would be to negotiate with neighboring countries to reduce trade barriers. The second

27 Encyclopedia Britannica Online, *Nationalism* (2009)

would be to pursue formal imperialism with the ultimate goal of restoring lost trade and

generating even more than before. In the modern period, a platform of the pursuit of

formal imperialism may be seen as irrational or even laughable. It may even destroy

political careers because of how dangerous the idea is. However, the 1870s, 80s, and 90s,

had different conditions though which dictated different actions. As Howsbawm wrote,

"The belief that the overproduction of the Great Depression could be solved by a vast

export drive was widespread."[28] He continued, "Tariff and expansion became the

common demand of the ruling class"[29] and "They hoped to carve out for themselves

territories which, by virtue of ownership, would give national business a monopoly

position or at least a substantial advantage."[30] Political leaders agreed; "he [Disraeli] saw

that jingoism[31] might be a vote winner ... the tradition which he started was probably a

bigger electoral asset in winning working-class support during the last quarter of the

century than anything else."[32] With the costs of negotiating tariff barriers high and the

costs of imperialism low, the result was clear. By the end of the era, Great Britain,

France, Germany, Portugal, and Spain all had carved out colonies in the Savannah

allowing for cheap importation of Shea Butter among other benefits. As any basic

economics textbook would conclude, imperialism was the rational option.

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28 Hobsbawm *The Age of Empire* 66
29 Hobsbawm *The Age of Empire* 73
30 Hobsbawm *The Age of Empire* 66-67
31 As defined by the Oxford Dictionary (2009)
    Jingo - One who brags of his country's preparedness for fight, and generally advocates or favours a
    bellicose policy in dealing with foreign powers; a blustering or blatant 'patriot'; patriotism in the form
    of aggressive foreign policy
32 Blake *Disraeli* 760

Supplemental Variables and the Hypothesis

The necessity of imperialism was clear to the wage earners, the upper-class, and the

governments of the period. Imperialism represents a desire to conquer new territory.

What has not yet been explained is how this translates into real territorial growth. In

order to run a scientific regression, as many variables as possible must be accounted for.

The author believes that the success of attempted territorial expansions (or literally any

human action) can ultimately be reduced to two variables. First, there must be a desire to

expand. This has been partially (but not fully) explained by the impact of tariff rates.

Second, the ability to actually achieve and manage territorial conquests must be

accounted for. The overall set of equations developed is shown in Equation 2.

Beginning with the 'desire' variable, the impact of tariff rates has already been

discussed at length. Also discussed was the use of the gravity model to quantify the

impact of tariff rates an impact on income. What has not yet been discussed is how the

gravity model will be applied specifically to this study. Anderson's classical method

(Equation 1) outlines 4 variables used to calculate bilateral trade flows, population, GDP,

distance, and an error term. To this, we can safely add the tariff coefficient. Anderson's

method though does not provide estimates for the weight of variables. Instead, the

gravity equation is something to be 'built' via statistical analysis. Because the weights

applied to each statistic are not static and instead change regularly,[33] using modern

estimates of the gravity equation cannot be done. Also, building our own estimate using

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33 Jeffrey H. Bergstrand, _The Gravity Equation in International Trade: Some Microeconomic Foundations and Empirical Evidence_ 475

methods developed would be impossible because, by doing so, we would have to lump together the inter-empire trade flows with the intra-empire trade flows. Because the study connects a reduction in inter-empire trade flows to what is essentially an increase in intra-empire flows, using these variables to build a regression would be redundant at best and self-confirming at worst.

What can be done is to build a gravity equation using modern estimates and a few logical assumptions. Modern researchers have found that GDP usually has an exponent of around .8 while distance usually has an exponent of around .7.[34] Because it can be assumed that distance mattered more in the 19th century than the 20th, for simplicity, it can be assumed that the two variables carry equal weight. The impact of tariff rates vs. distance is more complex still. In order to simplify the model, tariff rates have also been given equal weight to distance. Therefore, essentially disregarding all weighting, the gravity equation used, aptly named cost of foreign tariffs, is shown in Equation 2. While the author acknowledges that this simplification is an unrealistic model, he does believe it is logical. Assuming that GDP over distance represented bilateral trade flows in a world without tariff rates, including tariff rates if expressed as a percentage simply reduces bilateral trade flows by a factor equal to the increased cost of trade. Summing this equation across as many countries as possible provides the statistic. Then, by dividing this equation by the GDP of the home country, one can develop an index which better explains the real cost of foreign tariffs over time. This variable then represents a sort of misery term which would contribute to the desire to colonize felt by governments.

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34 Ibid., 475

As the discipline of history will point out, there may be hundreds of reasons, not correlated to tariff rates, for a country to pursue territorial expansion. Because this study does not seek to be a meta-analysis of imperialism, those shall not be considered here. Instead, only one other 'desire' variable will be considered only because it has already been mentioned. As the European continent was progressing through the 19th century, nationalism and its derivatives were affecting all modern nations. Most drastically, this resulted in the unifications of Italy and Germany. It also later fed into the fascist movements of the early 20th century. This nationalism was often expressed in what some have termed 'ultra-nationalism' which sometimes took on cultural supremacist and racist tones.[35] Ultimately, ultra-nationalism was what Kipling was alluding to in his poem, 'The White Man's Burden'. Because this was a cultural movement, one cannot predict with ease its effect on territorial expansion or even what variables could be used to explain its existence. One only knows that its effect was significant, positive, and different for every country. Thus, a constant will be included in the regression to account for this effect and any other historical trends not captured by tariff rates.

From the other side is the ability variable. Most simply, the ability variable attempts to measure the resources a country has free to pursue their imperialism. It also must measure their ability to effectively use these excess resources (the stability and power of a government). This variable could be expressed as any number of statistics which are all likely correlated with each other. The easiest way might be to use the GDP of a country. This, however, does not explain situations like the large GDP of 19th century

35 Encyclopedia Britannica Online, *Nationalism* (2009)

China or the small GDP of 19th century Belgium considering their relative roles in imperialism. That is, while a GDP may be large, this does not mean that a government is stable or powerful enough to effectively apply it to territorial expansion. Another possible ability variable might be population. This would be a measure of military strength. Again, however, this would not explain the entire story. Measures of industrialization (railroad miles) could help to explain industrialization and wealth at the same time. Finally, GDP per capita and railroads per capita could be utilized as a better measure of overall wealth of the country. Because it would be difficult to chose one ability term, regressions will be run with all ability terms.

The other part of the ability term considered in this study was the world territory not claimed by any of the six countries. While this might seem at first to be redundant, there is a very good reason for the inclusion of this variable. Because of the principle of increasing marginal costs and decreasing returns to scale, each piece of territory conquered represents more cost and less benefit to the sponsor country. In other words, there is a reason that South Africa was claimed long before the Sahara. There is a certain difference in quality between the land in the two regions. Presumably, as rational agents, governments would have devoted more of their resources towards the acquisition of the most valuable, most uninhabited places and comparatively less towards others. Therefore, as the amount of unclaimed territory goes down, the ability to acquire new territory similarly goes down.

In order to cover still more bases, the theory has been divided into two broad tests. Regressions will be run on both the aggregate broad hypothesis and the country-by-country narrow hypothesis. The broad hypothesis, instead of including effective-export markets, instead tests imperialism as a world wide phenomenon and considers average world tariff rates. Also included is the cultural drive constant, the ability variable (summed over six countries), and the standard error term. The country-by-country hypothesis describes how individual territorial gains are made. The effective-export-market iteration of the gravity model is used is used in addition, again, to a constant cultural drive term, the ability variable (for only the one country), and the standard error term. In both cases, it is changes which are tested rather than aggregate values.

Equation 2 : Hypothesis

Basic Theory :
$Imperial Territory = Desire + Ability + \varepsilon$

Where :
$Desire = $ Cultural Drive + Tariff Rates
Ability
$= $ Territory Left + Either GDP, Population or Industrialization

Broad Hypothesis :
$\Delta\, World Imperial Territory$
$= \beta_0 + \beta_1 * Average\, World\, Tariff\, Rate + \beta_2 * Territory\, Left + \beta_3 * Ability\, Measure_{six\, countries}$

Country by Country Hypothesis :
$\Delta\, Imperial Territory$
$= \beta_0 + \beta_1 * Cost\, of\, Foreign\, Tariffs + \beta_2 * Territory\, Left + \beta_3 * Ability\, Measure_{single\, country} + \varepsilon$

Where :
$$Cost\, of\, Foreign\, Tariffs = \sum_{j}^{n} \left[\frac{GDP_j * Average Tariff_j}{Distance_{ij}} \right] / GDP_i$$
   subscript i $(_i)$ represents the home country
   subscript j $(_j)$ represents a foreign country
   n is the number of countries

And :
$\beta_0, \beta_1,$ *and* β_2 *are all expected to be positive coefficients*
ϵ *represents the error coefficient*

Chapter III

Methods

Choice of Empires

As of 1870, the largest countries as defined by estimates of GDP were, in order, China,

Great Britain, the United States, Russia, Germany, France, Italy, Japan, the Ottoman

Empire, Spain, Belgium, the Netherlands, and Austria-Hungary.[1] It can then be assumed

that these 13 countries were the most powerful in the world. Furthermore, of these, all

could be considered imperial powers in the sense that they controlled other nations via

empire or hegemony.[2] However, there are problems with simply using data on the

imperial expansion of these countries. First of these reasons, the territorial expansion or

loss for Italy, the Ottoman Empire, Belgium, the Netherlands, and Austria-Hungary was

simply too small and/or infrequent to statistically analyze. For China, Russia, and the

Ottoman Empire, gains and losses were made but were not well-defined enough to satisfy

the author. For example, though Russia continued its expansion southward into Central

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1   Figures are calculated in international 1990 Geary-Khamis dollars
     Maddison, Angus. *Statistics on World Population, GDP and Per Capita GDP, 1-2006 AD* (Online
     database, last updated October 2008)
2   As defined by the Oxford English Dictionary (2009):
Empire – An aggregate of subject territories ruled over by a sovereign state.
Hegemony -The leadership or predominant authority of one state of a confederacy or a union over others.

Asia during the period, they did not annex distinguishable pieces of land but instead slowly absorbed their frequent conquests. Thus, six countries which gained or lost significant amounts of definable territory, Great Britain, France, Germany, Spain, the United States, and Japan were chosen to be studied.

Territorial Change – The Dependent Variable

One of the largest challenges to the economic analysis of history is attempting to quantify abstract concepts. As of 1872, the question of ownership over territory or governance over a people was much less clear than it is now in the modern world where nearly every piece of land on earth is considered part of a single state. In 1872, overseas colonies were often, in theory, governed by locals who had close ties to one or another imperialist government.[3] In practice, there were often power struggles between the colonialists and the indigenous peoples whom they claimed to represent. Due to the principle of *uti possidetis* and the intense competition at the time, countries rushed to occupy and formally claim (as annexations, protectorates, etcetera) as much territory as possible.[4] As might be expected, their claims were often made without full control of the interior which was sometimes established only much later. Because of the uncertainty over the ownership and sizes of territories, a general and exhaustive territorial history of the world has never been compiled to the author's knowledge.

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3 Encyclopedia Britannica Online, *International Relations* (2009)
4 Uti possidetis is latin for 'as you possess'. The principle requires states to actively control all territory they claim to possess.

Of course, in order to pursue this study, the author had to make some concessions and accept that it was not possible to be exact in establishing the size and ownership of colonies over time. Therefore, the author's best estimates [found in Appendix I] were based on the following guidelines:

1. The main source for territorial acquisition dates and nations was Olson's *Historical Dictionary of European Imperialism*. This reference was the best source found for historical dates of acquisitions after a thorough search conducted by the author within the limited scope of this study.

2. If an exact size of a historical territory could not be established due to an uncertainty over borders, the size of the successive corresponding modern state(s) or province(s) was used. For example, the French territory of Upper Volta was the historical predecessor to modern Burkina Faso. Because this administrative division was at first claimed by the French as a collection of tribes,[56] the exact territorial size was uncertain. Later, of course, lines were officially drawn by the French, leading directly to Burkina Faso, whose modern size was the one cited for this study.

3. The sole source for modern territorial sizes (and historical when available), was the Encyclopedia Britannica Online.

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5   The idea of fixed border was a relatively new one for the world. The idea (along with the state system) was only established in Europe by the Peace of Westfalia (1648). For many nations throughout the rest of the world, the idea of having rigorously defined borders was foreign.

6   The tribal administrations were called cercles by the French. Encyclopedia Britannica Online, *Burkina Faso* (2009)

4. In the case of condominiums (joint governance) or competing legitimate claims, the territorial size is divided into equal parts. The best example of both possibilities may be Vanuatu. In the late 1880s (cited by Olson as 1888) Great Britain and France both staked competing claims on the island chain. In 1906, they agreed to jointly govern. Therefore, from 1888 until 1914, Vanuatu's territory was divided equally between France and Great Britain.

5. The dominions of the British Empire as of 1870 (Canada, Australia, and New Zealand) were not considered part of the British Empire because of their nominal independence from the parliament.[7] They were only part of the Empire in name. The territory of the dominions were thus not included in the initial territorial size of the British Empire nor were the territorial gains or losses of the dominions taken into account.

6. The growth of the territory of South Africa, which was only granted dominion status in 1910, was not treated by this study like the empire's older dominions of Canada, Australia, and New Zealand. Instead, the territory was attributed to the British Empire even after it achieved nominal independence in 1910. This was done because dropping the territory from the empire as it obtained dominion

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7 Concerning the dominions: "They are autonomous Communities within the British Empire, equal in status, in no way subordinate one to another in any aspect of their domestic or external affairs, though united by a common allegiance to the Crown, and freely associated as members of the British Commonwealth of Nations." Balfour Declaration of 1926

status in 1910 would imply that the British had somehow lost a tremendous amount of imperial territory due to an outside force when in reality it was due to a simple political progression.

7. Any further conflicts not answered by any previous rules were decided based on the author's personal interpretation of the specific situation using relevant historical interpretations.

Using raw territorial gains and losses per year, to preform a regression would have been ideal for this study. However, two glaring issues would have resulted. First, over the 42 years and across the six empires, a meager 45 out of 252 observations were made in which an imperial power experienced a territorial gain or loss in one year. Obviously, this overwhelming number of 'zero' observations would have resulted in a poor regression. Therefore, the territorial gain and loss data was expressed as the total amount of territory gained or lost over the prior five years. When this is done, the number of non-zero observations increases to a more useful 116 out of 252. Furthermore, the author believes that spreading the changes over five years is a better method. As previously noted, this study struggled with how to determine the sizes of territories and under what circumstances to change their 'ownership' status. By lagging the data, the author believes he has created a more accurate tallying method.

The remaining problem with using unaltered acquisition and loss magnitudes in regressions would have been the overemphasis of gains made by already large empires and the underemphasis of gains made by smaller empires. That is, the gain of Kenya by

the British Empire would have been seen as a greater accomplishment than the gain of Korea by Japan simply because Kenya is a slightly larger territory. The author believes it is a safe assumption that the gain of Korea increased the prominence of the Japanese Empire much more than the gain of Kenya increased the prominence of the British Empire. To remedy this, percentage changes in empire sizes were applied rather than simple magnitude increases. Combining this with the five year method, the dependent variable can be expressed as the total five year percentage change in the size of an empire.

Tariffs

Mean tariff rate statistics were not available for the 19th century for the same reasons that governments do not publish their own mean tariff rates today. Notably, most countries maintain different tariff rates for different commodities and choose to calculate and collect these tariffs in multiple ways. For example, some countries chose to value goods and collect tariffs at their ports. Others chose to collect lump sums based upon volumes of goods imported. However, two important pieces of data were recorded by the governments. The first was total import value, the estimate of the total cost of imported goods. The second was government customs revenue, the amount collected by the government for import/export activities. By definition, an average tariff rate would be exactly the value of customs tax collected divided by total import value. This then serves as a good method for tariff estimation.

Average World Tariff Rates

While exactly six countries are represented by the regressions, average world tariff rates were not calculated as the average tariff of these six countries. Rather, four more countries, Italy, Belgium, the Netherlands, and Austria-Hungary were averaged into the world tariff rates.[8] This was done in order to better express what countries across the world were facing in terms of trade barriers. It was also especially important to increase the sample size because Great Britain demonstrated a reluctance to raise their tariff rates as high as other imperial powers.[9] The reason for the exclusion of the other largest economies, China, Russia, and the Ottoman Empire, was simply because the OECD did not, at the time of this writing, estimate year by year Gross Domestic Products for these three states.[10] GDP figures are necessary to calculate the weighted average tariff rate variable described in the next section.

Weighted Average Tariffs

In order to better capture still what costs were really being experienced by merchants, it was necessary to weight the tariffs of, for example Great Britain higher than those of Belgium. Thus, the final representation of the world average tariff rate was weighted by Gross Domestic Products. The average tariff rate calculated is then best thought of as an expression of the resistance of world trade.

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8   These four countries were selected over others because of their economic size, proximity to Western Europe, and available monetary records.

9   See Appendix II

10 Maddison, Angus. *Statistics on World Population, GDP and Per Capita GDP, 1-2006 AD* (Last Updated October 2008)

Cost of Foreign Tariffs

The cost of foreign tariffs equation mentioned in the hypothesis section of this study

(Equation 2) and shown again in Equation 3, is used to calculate the cost of foreign tariffs

variable. However, like the average world tariff rate calculation, the cost of foreign tariffs

is again calculated by taking into account the tariff rates of Italy, Belgium, the

Netherlands, and Austria-Hungary. Thus, to calculate the cost of foreign tariffs, one starts

with the foreign GDP. Then, this is multiplied by the foreign average tariff and divided

by the capital-to-capital distance. What results is essentially the size of a foreign

economy reduced by the factors of resistance to international trade (tariffs and distance).

The sum of the nine foreign countries is then divided by the GDP of the home country.

This serves to equal out the variable over time and ensure that it remains useful as an

explanatory variable in a linear regression. The final variable is shown in Equation 3.

$$Equation\,3: Cost\,of\,Foreign\,Tariffs$$

$$Cost\,of\,Foreign\,Tariffs = \sum_{j}^{n} \left[\frac{GDP_j * AverageTariff_j}{Distance_{ij}} \right] / GDP_i$$

$subscript\,i\,(_i)\,represents\,the\,home\,country$
$subscript\,j\,(_j)\,represents\,a\,foreign\,country$
$n\,is\,the\,number\,of\,countries$

GDP – Utilized as an independent variable and to calculate cost of foreign tariffs

The GDP figures from 1870 to 1913 for the six countries considered has been taken from

Angus Maddison's online database.[11] Maddison's GDP data is denominated in millions of

1990 International Geary-Khamis Dollars.[12] To the author's knowledge, this dataset is the

only one sufficiently developed to offer the required figures for the required time period.

Distances – Used to calculate cost of foreign tariffs

Assuming a linear relationship between shipping distance and shipping cost, the gravity

model can be used to estimate relative magnitudes of international trade. The distances

between countries found in Appendix III represent capital-to-capital geodesic distances

drawn from the CEPII (Research Center in International Economics) dataset. Using

capital-to-capital distance makes sense because, during this period capitals not only

tended to contain the most people but also tended to be near modern weighted centers of

population and economic activity. Furthermore, the capitals likely experienced much, if

not most, foreign trade. Thus, a distance measurement from one capital to another results

in a good estimation of the shipping distance from one country to another.

Gaps in Data

11 Angus Maddison is an emeritus professor of economics at the University of Groningen. Part of his work is the calculation of historical GDP and Population Statistics for the OECD (Organization for Economic Cooperation and Development).
    Maddison, Angus. *Statistics on World Population, GDP and Per Capita GDP, 1-2006 AD* (Last Updated October 2008)
12 The Geary-Khamis dollar is a hypothetical unit of currency with the same purchasing power as 1990 US dollar. It is a calculated with purchasing power parity and the price of commodities as inputs.
    Maddison, Angus, and Organisation for Economic Co-operation and Development. *The World Economy: A Millennial Perspective*. Paris, France : Development Centre of the Organisation for Economic Co-operation and Development:2001.

Thus far, throughout this study, the 'new imperial period has been referred to as being from the end of the Franco-Prussian war to the beginning of World War I. It has may have been implied that all necessary data for the years of 1872 through 1914 has been collected. This is not the case. The year of 1914 has not been used in the regression. Presumably, because of the start of World War I in 1914, the data became markedly more erratic. In the authors opinion, this was enough to justify its emittance. The year of 1872 however showed no significant erratic behavior due to war and thus was included. There were then exactly 42 years worth of observations made. Also notable, no import statistics could be found for Germany before 1880. This does ultimately affect the effective-export-market equation though most likely in a minor way. Essentially, for all countries but Germany, the magnitude of the total effective-export-market is expressed as an average of eight countries from 1872 to 1879 and an average of nine countries from 1880 to 1914. Ultimately, this should be worrisome except for its minor impact as shown graphically (see Figure 5). The effect should therefore be negligible.

Figure 5: World Average Tariff With and Without Germany
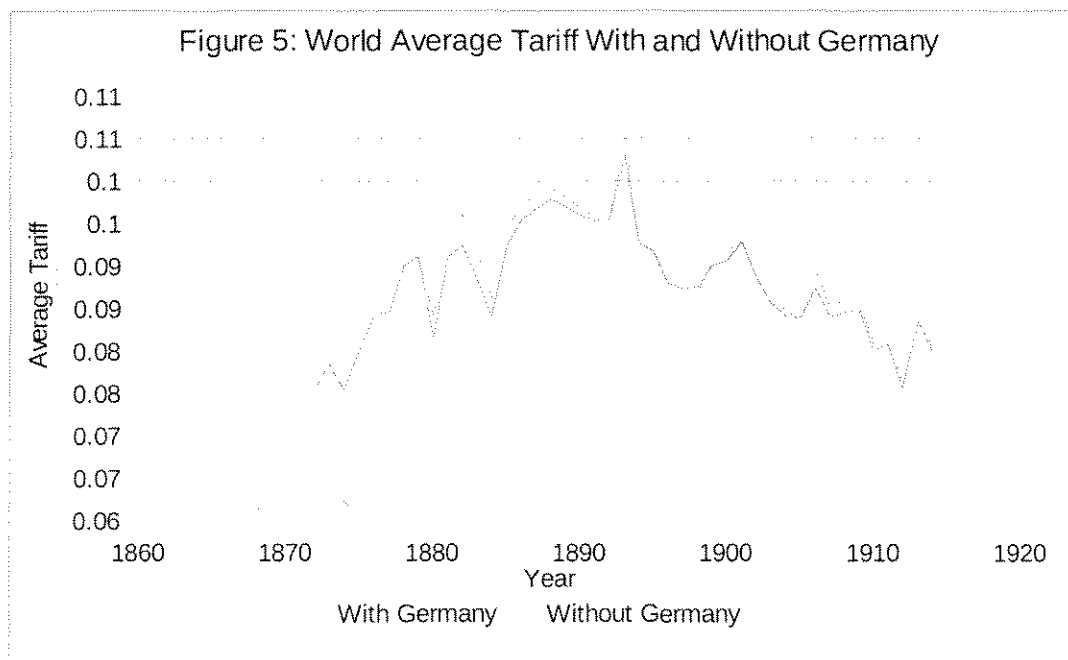
CHAPTER IV

DATA ANALYSIS

The ultimate goal of this particular study was to establish, if significant, how important

tariff rates were to the territorial gains of imperial countries. Under the model, territorial

gains are simplified as square kilometers regardless of the quality of the territory. The

hypothesis developed in this study (Equation 2) would predict that tariff rates have a

positive correlation with territorial growth. Several other variables were also mentioned

as potentially explanatory. The measures of ability (GDP, population, railroads open,

GDP per capita, and railroads per capita) were hypothesized to be the 'how' variables for

countries who desired to pursue imperialism. The amount of territory remaining was

seen as important because the marginal cost of acquiring territory was expected to

increase as the amount of territory not colonized decreased. Also included was a constant

term which represented a territorial drive. All three sets of supplementary variables were

expected to be significant and positive.

The data analysis chapter has been divided into two sections. The first section tested the 'broad hypothesis' with six-country aggregate percentage change in territorial size being a factor of average tariff rates, unclaimed territory, an ability variable, and a constant. The second section tested the 'country-by-country' hypothesis in which individual imperial percentage changes are similarly a factor of the cost of foreign tariffs, unclaimed territory, an ability variable, and a constant.

Both linear and logarithmic regressions were performed in order to capture as much information as possible. All regressions were performed in a robust manner. The significance level was always set at 5%. When the R-squared is referenced, it refers to the adjusted R-squared unless otherwise stated.

Broad Hypothesis

The first analysis performed compared average tariff rates and world territorial expansion. More specifically, the goal was to determine the lag time between a tariff rate level and the subsequent change in territorial size. This relationship was first seen in Figure 1 (chapter 1). The regression results are presented in Table 3. Although all lag times are significant, the highest R-squared of .5063 occurs when using a three year lag time. Of course, the real lag time between a tariff rate and the completion of imperial policy probably varies significantly over countries and time. However, because the lag time can

be graphically seen to be within this range and the real lag time likely varies significantly

over time and country, a three year lag time was subsequently utilized for the rest of the

analysis.

Table 3: World territorial change under different lags

	No Lag	1 year lag	2 year lag	3 year lag	4 year lag	5 year lag
Coefficient on Weighted Average Tariff	**0.8398**	**0.8496**	**0.8577**	**0.8673**	**0.8735**	**0.8817**
Standard Error	0.1417	0.1423	0.1421	0.1448	0.1477	0.1517
Observations	42	41	40	39	38	37
R-squared	0.5015	0.5056	0.5060	0.5063	0.5020	0.4980

From this initial result, the aggregate hypothesis was tested under all five ability

measures with and without the constant variable. The results are shown in Table 4.

Several points are interesting. First, it is obvious that the constant variable contributes

nearly nothing to the regression as the R-squared is nearly cut in half when it is included.

Second, as expected under the hypothesis, all of the 'ability' variables improved the R-

squared in a significant and roughly equal way. The surprise was that, all variables other

than the average tariff came out with negative coefficients. Because this makes no sense

to the model and because most of the explanatory power still comes out of the average

tariff, there is no other choice but to disregard these variables.

Taking the natural log of all variables results in much the same result (Table 5)

except for the role of territory left. In this regression, unclaimed territory is shown to be

both positive and significant as expected under the hypothesis. The R-squared for the

weighted average tariff and unclaimed territory was .8509. This was the best rational R-

squared found in the entire data analysis. As for all the other variables, the same

conclusions as ordinary linear regression applied. The ability variables are all negative or

non-significant and the constants again prove to be more deleterious than helpful.

Table 4: Aggregate Hypothesis

	1	2	3	4	5	6	7	8	9	10	11	12	13
Weighted average tariff	0.86727	1.20663	2.26830	4.67847	4.81227	5.30224	4.83831	5.31932	3.93456	4.08083	4.52138	3.94235	4.56218
	0.14479	0.66613	0.58558	1.39801	1.44111	1.60816	1.42542	1.74672	1.40940	1.46238	1.50249	1.52307	1.51320
Unclaimed Territory (millions of square km)		-7.000E-10		-0.00395	-0.00051	-0.00499	-0.00207	-0.00355	0.02951	0.02157	0.01372	0.02552	0.01460
		1.200E-9		0.00163	0.00117	0.00199	0.00125	0.00181	0.01991	0.01305	0.00828	0.01756	0.00629
Total GDP			-2.522E-7	-3.335E-7					2.327E-7				
			8.860E-8	1.109E-7					3.473E-7				
Total population					-1.867E-6					6.440E-7			
					6.205E-7					1.600E-6			
Total open railroads in km						-6.698E-7					-9.000E-8		
						2.201E-7					2.822E-7		
Total GDP per capita							-0.13705					0.07405	
							0.04414					0.13698	
Total open railroads per capita								-0.23813					-0.02744
								0.08428					0.07658
Constant									-2.43249	-1.94447	-1.30534	-2.21857	-1.36077
									1.45327	1.15686	0.60778	1.40279	0.50665
Adjusted R-squared	0.506	0.508	0.638	0.638	0.640	0.628	0.640	0.602	0.339	0.336	0.335	0.337	0.335

Table 5: Logarithmic Aggregate Hypothesis (39 obs)

	1	2	3	4	5	6	7	8	9	10	11	12	13
ln(Weighted average tariff)	1.3654	1.7366	3.7073	6.5451	6.3795	7.0408	6.6871	6.9475	3.4527	3.2745	3.2371	3.9232	3.3045
	0.0936	1.0584	1.0220	1.5387	1.5041	1.7865	1.5665	1.9583	1.6418	1.6299	1.5300	1.7218	1.4888
ln(Territory remaining)			0.2710	2.0823	3.3613	1.7944	0.8295	0.6870	31.4157	32.5493	21.4644	27.6593	18.5880
			0.1241	0.7388	1.2772	0.6915	0.2461	0.2412	9.2305	9.2446	6.1028	10.0635	5.5812
ln(Total GDP)		0.0576		-1.9873					3.9088				
		0.1729		0.8132					1.7545				
ln(Total population)					-4.0222					9.8580			
					1.6701					3.9570			
ln(Total open railroads)						-1.6038					1.9263		
						0.7362					0.7458		
ln(Total GDP per Capita)							-3.9024					5.3770	
							1.5758					3.5242	
ln(Total railroads per capita)								-2.2913					2.3185
								1.2254					0.9214
Constant									-612.5560	-703.3630	-406.3420	-496.9650	-330.7120
									188.0760	212.1510	116.5000	185.5130	100.2520
R-squared	0.8439	0.8442	0.8509	0.8875	0.8866	0.8761	0.8880	0.8665	0.4060	0.4212	0.4086	0.3916	0.4044

Table 6: Great Britain Hypothesis

	1	2	3	4	5	6	7	8	9	10	11	12	13
Great Britain cost of foreign tariffs	0.34	0.1104	0.9240	0.8058	0.8506	0.9392	0.7490	0.7809	0.6296	1.1227	0.2579	0.5682	-0.6327
	0.06	0.1339	0.3514	0.3543	0.3266	0.3808	0.3630	0.3745	0.5790	0.6905	0.8208	0.4672	0.5378
Unclaimed territory (millions of square km)		0.0015		0.0031	0.0078	0.0076	0.0063	0.0216	0.0229	-0.0133	0.0386	0.0276	0.0051
		0.0009		0.0011	0.0023	0.0024	0.0025	0.0094	0.0363	0.0442	0.0337	0.0188	0.0087
Great Britain GDP			-1.53E-006	-2.459E-6					0.0000				
			9.12E-007	1.047E-6					0.0000				
Great Britain population					-1.806E-5					0.0000			
					6.367E-6					0.0001			
Great Britain open railroad (km)						-2.557E-5					0.0000		
						9.710E-6					0.0001		
Great Britain GDP per capita							-0.1397					0.0469	
							0.0683					0.2223	
Great Britain open railroad per capita								-2.1111					9.4996
								0.9860					3.9155
Constant									-1.5661	2.1531	-3.1982	-2.0274	-6.8598
									2.8990	4.4956	3.3917	1.9113	2.3761
Adjusted R-squared	0.4540	0.4722	0.4926	0.5528	0.5613	0.5502	0.5443	0.5229	0.1871	0.1990	0.1917	0.1885	0.2942

Table 7: Logarithmic Hypothesis Great Britain (36 obs)

	1	2	3	4	5	6	7	8	9	10	11	12
ln(Great Britain cost of foreign tariffs)	**2.3788**	0.2255	**2.4411**	**2.3773**	**2.6790**	**2.3416**	**-2.2316**	1.1999	**6.1050**	4.6171	0.9778	-0.0566
	0.2268	0.4218	0.6711	0.6194	0.6851	0.7700	0.7747	1.3785	2.4200	2.7379	0.8804	1.8623
ln(Unclaimed territory in millions of sqkm)		**-0.5543**	**8.0801**	**11.2493**	**11.5722**	**2.2690**	**3.5972**	23.9446	-31.1394	-1.2084	**26.9921**	11.5481
		0.1336	2.2297	2.6895	2.8279	0.9548	0.8828	2.5136	36.0394	17.2614	8.3800	7.2294
ln(Great Britain GDP)			**-2.8319**					-14.6586				
			0.7391					5.0766				
ln(Great Britain population)				**-4.4550**					-27.6789			
				1.0205					20.3487			
ln(Great Britain railroads open)					**-4.6952**					-15.5431		
					1.1000					14.3896		
ln(Great Britain GDP per capita)						**-7.0689**					6.7214	
						2.4818					5.4120	
ln(Great Britain railroads per capita)							**62.1428**					30.4243
							13.3987					27.0258
Constant								-130.7830	512.6530	165.8970	**-122.9280**	-40.9471
								-121.2150	-331.0060	-220.0220	-41.9132	-35.8425
R-squared	0.7306	0.7892	0.8602	0.8678	0.8665	0.8416	0.8622	0.3475	0.4189	0.3645	0.3708	0.3631

Country by Country Hypothesis

Being the largest empire of all time and the principle empire of the period, the British Empire was utilized for setting precedents for all the other countries (see Table 6). The set of regressions were mostly the same as those performed on the aggregate hypothesis. Of course, instead of average tariff, the cost of foreign tariffs variable was used along with the supplementary variables. Beginning with the linear regressions, again, much the same results as the broad hypothesis are seen. First, the constant does not seem to hold an important enough role to even be considered as part of the regression. Second, all of the ability coefficients are again negative. So, as before, under linear regression, the tariff rates (expressed as cost of foreign tariffs) seems to be the only variable which has a predictive role.

Using the framework developed under the analysis of Great Britain, linear regressions for the remaining five empires are shown in detail in Appendix IV. In these regressions, the constant variable has been completely disregarded to simplify the tables. The logistic regressions are shown in Table 7 for Great Britain and Appendix V for the remaining five. For the logistic regressions, it is important not to take the astronomical R-squares as completely rational. The logistic regressions of every country are suspect because of the sample size used. In a logistic regression, every negative or zero value must be dropped because the logarithm for values less than or equal to zero is undefined. For countries like Spain, the United States, or Japan, this has a huge effect. Out of the 42

years, only seven logarithmic observations were made. Because of the nature of robust logarithmic regressions, the number of observations are not reflected in the adjusted R-squared. Most of the country by country logarithmic regressions can then be disregarded.

Observing the detailed country-by-country linear regressions, it is clear that the same conclusions drawn can be drawn again. Again, only the tariff (cost of foreign tariff) variables are significant. To simply this finding, linear regressions utilizing only the cost of foreign tariffs variable are shown in Table 8. As might be expected because of the continuousness of British imperial expansion, no country demonstrates as good of a compliance with hypothesis as Great Britain does. All countries with the exception of Spain however did show some compliance with the hypothesis.

Table 8: One variable country by country hypothesis

	Great Britain	France	Germany	Spain	United States	Japan
Cost of Foreign Tariffs	**0.3430**	**0.2344**	**2.7173**	0.0086	**0.2033**	**0.5240**
	0.0628	0.0467	1.1139	0.0256	0.0867	0.1415
R-squared	0.4540	0.4137	0.1478	0.0035	0.1390	0.2766

Spain's poor significance and R-squared does make statistical sense. Although Spain was technically considered an imperial power, the country was a net loser from 1872 to 1914 and was ultimately thrown in to provide for exactly this sort of questioning of the theory. Observing the detailed Spanish linear regression, it does not seem that any variables developed in this study can explain why Spain gained and lost the territory that it did when it did. The only conclusion that can be drawn is that the hypothesis developed works well for the successful imperial powers but less so for other countries.

CHAPTER V

CONCLUSION

Between 1872 and 1914, 22.6 million square kilometers or more than 16% of the Earth's surface was conquered by the countries of Great Britain, France, Germany, Spain, the United States, and Japan.[1] This brought a total of 43% of the globe under the control of these six governments.[2] If we also consider the next five most prolific empires of Russia, Italy, the Netherlands, Portugal, and Belgium, 67% of the world's landmass is accounted for in 1914 by only 11 governments.[3] At the same time, this historical period witnessed to an end of the free trade regimes developed during the mid 19th century and a return to increasing protectionism. This paper attempted to correlate and explain the two.

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1   See Appendix I. Again, world territorial size is assumed to be 134.94 million (source: Central Intelligence Agency, *World Factbook* (2009))

2   See Appendix I. Total is 17,990,405 additional square kilometers of controlled empire (This includes the home countries) and another 17,994,570 square kilometers for the dominions of the British Empire (Canada, Australia, and New Zealand) *Location Theory and International and Interregional Trade Theory*) totaling 58,634,202.

3   Assuming modern day territorial sizes of Russian Empire, Italy, Libya, Eritrea, Somalia, Netherlands, Indonesia, Portugal, Angola, Mozambique, Belgium, and the Democratic Republic of the Congo totaling 31,693,127 square kilometers

It is clear that there is a significant correlation between tariff rates and imperial expansion in the 19th century.[4] To explain this correlation, one must view an increase in foreign and domestic tariff rates as being the cause of a direct loss of income for the citizens of these countries. In order to regain this lost income, the theories set forth suggest that countries pursue imperial expansion over trade diplomacy as the most rational course of action.

From the regressions run, the hypothesis was all but confirmed. That is, it was shown that certain tariff rate levels could predict, after a three year lag, about half of imperial expansion from 1872 to 1914. While the supplementary explanatory variables did not prove significant, this did not alter the main point of this study. Of course, the regressions run do not inevitably imply that the theory developed explained this. As is always the case, correlation does not imply causation. Correlation furthermore doesn't prove any sort of relationship. It is simply a statement of a relationship between numbers. To establish a logical relationship then, one must look to the contemporaries of the period to get some idea of what was happening. Prime Minister Cecil's statement to the French ambassador, *"If you were not such persistent protectionists you would not find us so keen to annex territory,"* might lead us to believe that high tariff rates result directly in increasing colonization.

In an era in which colonization is, more or less, non-existent, one might wonder how the conclusions drawn in this study apply to modern economics. In fact, the author believes that the conclusions drawn are essential to understanding some modern trends.

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4   See Figure 1.

For example, the phenomena of trade blocks (EU, NAFTA, South American, East Asian, etcetera) which are arbitrarily defined by geographic and cultural borders might be the same thing as 19th century imperialism under different methods. Whether these might lead to a more united or a more divided world is a matter of debate. One thing however is certain. Protectionism, while often politically convenient, has far reaching consequences, whether in the 19th century or in the modern day.

APPENDIX I – TERRITORIAL DATES AND SIZES

(For methodology, see methods section)

Year	Type (1 gain, 2 loss)	ISO3	Territory	Size	Total Territory	GBR Territory	FRA Territory	DEU Territory	ESP Territory	JPN Territory	USA Territory
<1860			Already in the possession of one of the six countries		17990405	4982479	3237619	357021	954949	377873	8080464
1860	1	ESP	Ifni (Morocco)	1502	17991907	4982479	3237619	357021	956451	377873	8080464
1862	2	ESP	British Honduras (Belize)	22966	17968941	4982479	3237619	357021	933485	377873	8080464
1862	1	GBR	British Honduras (Belize)	22966	17991907	5005445	3237619	357021	933485	377873	8080464
1863	1	FRA	Cambodia	181035	18172942	5005445	3418654	357021	933485	377873	8080464
1867	1	USA	Alaska	663268	18836210	5005445	3418654	357021	933485	377873	8743732
1867	2	RUS	Alaska	663268	18172942	5005445	3418654	357021	933485	377873	8743732
1874	1	GBR	Gold Coast (Ghana)	238535	18411477	5243980	3418654	357021	933485	377873	8743732
1874	1	GBR	Fiji	18274	18429751	5262254	3418654	357021	933485	377873	8743732
1875	1	GBR	Perak	21006	18450757	5283260	3418654	357021	933485	377873	8743732
1877	1	GBR	Transvaal	283918	18734675	5567178	3418654	357021	933485	377873	8743732
1879	1	PRT	Portuguese Guinea (Guinea Bissau)	36544	18771219	5567178	3418654	357021	933485	377873	8743732
1880	1	FRA	Congo-Gabon	609745	19380964	5567178	4028399	357021	933485	377873	8743732
1880	2	GBR	Transvaal	283918	19097046	5283260	4028399	357021	933485	377873	8743732
1880	1	FRA	Tahiti and dependencies	1045	19098091	5283260	4029444	357021	933485	377873	8743732
1881	1	FRA	Tunisia	163610	19261701	5283260	4193054	357021	933485	377873	8743732
1881	1	GBR	Sabah (Northern Borneo)	76115	19337816	5359375	4193054	357021	933485	377873	8743732
1882	1	FRA	New Hebrides (Vanuatu)	12189	19350005	5359375	4205243	357021	933485	377873	8743732
1882	1	GBR	½ Egypt	501225	19851230	5860600	4205243	357021	933485	377873	8743732
1882	1	FRA	Vietnam	331690	20182920	5860600	4536933	357021	933485	377873	8743732
1884	1	DEU	German New Guinea	249500	20432420	5860600	4536933	606521	933485	377873	8743732
1884	1	GBR	Southeast New Guinea	213340	20645760	6073940	4536933	606521	933485	377873	8743732
1884	1	DEU	Cameroon	475422	21121182	6073940	4536933	1081943	933485	377873	8743732
1884	1	DEU	German Southwest Africa (Namibia)	835100	21956282	6073940	4536933	1917043	933485	377873	8743732
1884	1	DEU	Togoland	295320	22251602	6073940	4536933	2212363	933485	377873	8743732
1885	1	ESP	Cape Juby	32898	22284500	6073940	4536933	2212363	966383	377873	8743732
1885	1	GBR	Bechuanaland (Botswana)	600370	22884870	6674310	4536933	2212363	966383	377873	8743732
1885	1	ESP	Rio de Oro	184000	23068870	6674310	4536933	2212363	1150383	377873	8743732
1885	1	BEL	Congo	2344858	25413728	6674310	4536933	2212363	1150383	377873	8743732
1885	1	ESP	Carolines	13000	25426728	6674310	4536933	2212363	1163383	377873	8743732
1886	1	FRA	Comoros Islands	2235	25428963	6674310	4539168	2212363	1163383	377873	8743732
1886	1	GBR	Kenya	582646	26011609	7256956	4539168	2212363	1163383	377873	8743732
1886	1	DEU	Rwanda	26379	26037988	7256956	4539168	2238742	1163383	377873	8743732
1886	1	GBR	Burma	676578	26714566	7933534	4539168	2238742	1163383	377873	8743732
1886	1	GBR	Jubaland (Southern somalia)	87000	26801566	8020534	4539168	2238742	1163383	377873	8743732
1886	1	DEU	Tanzania	945090	27746656	8020534	4539168	3183832	1163383	377873	8743732
1886	1	DEU	Marshall Islands	181	27746837	8020534	4539168	3184013	1163383	377873	8743732
1886	1	DEU	Burundi	27816	27774653	8020534	4539168	3211829	1163383	377873	8743732
1887	1	FRA	Wallis Islands	775	27775428	8020534	4539943	3211829	1163383	377873	8743732
1888	1	GBR	Brunei	5765	27781193	8026299	4539943	3211829	1163383	377873	8743732
1888	1	GBR	Cook Islands	240	27781433	8026539	4539943	3211829	1163383	377873	8743732
1888	1	DEU	Nauru	21	27781454	8026539	4539943	3211850	1163383	377873	8743732
1888	2	FRA	.5 New Hebrides	6094.5	27775360	8026539	4533849	3211850	1163383	377873	8743732
1888	1	GBR	Zimbabwe	390757	28166117	8417296	4533849	3211850	1163383	377873	8743732
1888	1	GBR	Zambia	752618	28918735	9169914	4533849	3211850	1163383	377873	8743732
1888	1	GBR	.5 New Hebrides	6094.5	28924829	9176009	4533849	3211850	1163383	377873	8743732
1889	1	DEU	1/3 Samoa	1010	28925839	9176009	4533849	3212860	1163383	377873	8743732
1889	1	USA	1/3 Samoa	1010	28926849	9176009	4533849	3212860	1163383	377873	8744742
1889	1	GBR	Tokelau Islands	10	28926859	9176019	4533849	3212860	1163383	377873	8744742
1889	1	GBR	1/3 Samoa	1010	28927869	9177029	4533849	3212860	1163383	377873	8744742
1890	1	GBR	Zanzibar	1651	28929520	9178680	4533849	3212860	1163383	377873	8744742
1890	1	ITA	Eritrea	117600	29047120	9178680	4533849	3212860	1163383	377873	8744742

Year	#	Country	Territory								
1891	1	GBR	Gazaland (Gaza Province of Mozambique)	75709	29122829	9254389	4533849	3212860	1163383	377873	8744742
1891	1	GBR	British Central Africa Protectorate (Malawi)	116484	29241313	9372873	4533849	3212860	1163383	377873	8744742
1891	1	PRT	Zambo Region (Tete Mozambique)	100724	29342037	9372873	4533849	3212860	1163383	377873	8744742
1892	1	FRA	Dahomey (Benin)	112622	29454659	9372873	4646471	3212860	1163383	377873	8744742
1892	1	FRA	Senegal	196723	29651382	9372873	4843194	3212860	1163383	377873	8744742
1892	1	FRA	Mali	1240192	30891574	9372873	6083386	3212860	1163383	377873	8744742
1892	1	GBR	Gilbert and Ellice (Tuvalu) Islands	302	30891876	9373175	6083386	3212860	1163383	377873	8744742
1893	1	FRA	Laos	238800	31130676	9373175	6322186	3212860	1163383	377873	8744742
1894	1	GBR	Uganda	326040	31456716	9699215	6322186	3212860	1163383	377873	8744742
1895	1	GBR	Federated Malay States -- Perak	50565	31507281	9749780	6322186	3212860	1163383	377873	8744742
1895	1	JPN	Liaodong	145900	31653181	9749780	6322186	3212860	1163383	523773	8744742
1895	1	JPN	Pescadores	141	31653322	9749780	6322186	3212860	1163383	523914	8744742
1895	1	JPN	Taiwan	35801	31689123	9749780	6322186	3212860	1163383	559715	8744742
1896	1	FRA	Upper Volta (Burkina Faso)	274000	31963123	9749780	6596186	3212860	1163383	559715	8744742
1896	1	GBR	Sierra Leone	71740	32034863	9821520	6596186	3212860	1163383	559715	8744742
1896	1	FRA	Madagascar	587041	32621904	9821520	7183227	3212860	1163383	559715	8744742
1898	1	USA	Hawaii	28311	32650215	9821520	7183227	3212860	1163383	559715	8773053
1898	1	USA	Phillipines	300000	32950215	9821520	7183227	3212860	1163383	559715	9073053
1898	1	USA	Guam	541	32950756	9821520	7183227	3212860	1163383	559715	9073594
1898	2	ESP	Phillipines	300000	32650756	9821520	7183227	3212860	863383	559715	9073594
1898	1	USA	Cuba	11861	32662617	9821520	7183227	3212860	863383	559715	9085455
1898	1	USA	Wake Island	7	32662624	9821520	7183227	3212860	863383	559715	9085462
1898	1	USA	Puerto Rico	9104	32671728	9821520	7183227	3212860	863383	559715	9094566
1898	2	ESP	Guam	541	32671187	9821520	7183227	3212860	862842	559715	9094566
1898	2	ESP	Cuba	11861	32659326	9821520	7183227	3212860	850981	559715	9094566
1898	2	ESP	Puerto Rico	9104	32650222	9821520	7183227	3212860	841877	559715	9094566
1898	1	FRA	Guinea	245857	32896079	9821520	7429084	3212860	841877	559715	9094566
1898	2	ESP	Wake Island	7	32896072	9821520	7429084	3212860	841870	559715	9094566
1899	2	GBR	1/3 Samoa	1010	32895062	9820510	7429084	3212860	841870	559715	9094566
1899	1	USA	1/3 Samoa	1010	32894052	9820510	7429084	3212860	841870	559715	9093556
1899	1	FRA	Central African Republic	622984	33517036	9820510	8052068	3212860	841870	559715	9093556
1899	1	USA	American Samoa	200	33517236	9820510	8052068	3212860	841870	559715	9093756
1899	1	DEU	German Samoa	2830	33520066	9820510	8052068	3215690	841870	559715	9093756
1899	2	DEU	1/3 Samoa	1010	33519056	9820510	8052068	3214680	841870	559715	9093756
1899	1	DEU	Northern Marianas	477	33519533	9820510	8052068	3215157	841870	559715	9093756
1899	1	DEU	Carolines	13000	33532533	9820510	8052068	3228157	841870	559715	9093756
1899	1	GBR	.5 Sudan	1252906.5	34785440	11073416	8052068	3228157	841870	559715	9093756
1899	1	DEU	Marshall Islands	181	34785621	11073416	8052068	3228338	841870	559715	9093756
1900	1	GBR	Northern Solomon Islands	9300	34794921	11082716	8052068	3228338	841870	559715	9093756
1900	1	GBR	Niue and Tonga	1008	34795929	11083724	8052068	3228338	841870	559715	9093756
1900	1	GBR	Ocean Island	6.5	34795935	11083731	8052068	3228338	841870	559715	9093756
1900	2	DEU	Northern Solomon Islands	9300	34786635	11083731	8052068	3219038	841870	559715	9093756
1901	1	GBR	Nigeria	923768	35710403	12007499	8052068	3219038	841870	559715	9093756
1902	1	GBR	.5 South Africa not already possessed	1022660	36733063	13030159	8052068	3219038	841870	559715	9093756
1902	2	USA	Cuba	11861	36721202	13030159	8052068	3219038	841870	559715	9081896
1903	1	USA	Panama Canal Zone	1432	36722634	13030159	8052068	3219038	841870	559715	9083327
1904	2	RUS	.5 Sakhalin	39000	36683634	13030159	8052068	3219038	841870	559715	9083327
1904	1	JPN	.5 Sakhalin	39000	36722634	13030159	8052068	3219038	841870	598715	9083327
1904	1	JPN	Korea	223170	36945804	13030159	8052068	3219038	841870	821885	9083327
1909	1	GBR	Unfederated Malay States	60793	37006597	13090952	8052068	3219038	841870	821885	9083327
1910	1	GBR	Bhutan	47000	37053597	13137952	8052068	3219038	841870	821885	9083327
1911	1	ITL	Libya	1759541	38813138	13137952	8052068	3219038	841870	821885	9083327
1912	1	ESP	Spanish Sahara (Western Sahara)	349719	39162857	13137952	8052068	3219038	1191589	821885	9083327
1912	1	FRA	French Morocco (~95%)	423747.5	39586605	13137952	8475815	3219038	1191589	821885	9083327
1912	1	FRA	Mauritania	1030700	40617305	13137952	9506515	3219038	1191589	821885	9083327
1912	1	ESP	Spanish Morocco (~5%)	22327.5	40639632	13137952	9506515	3219038	1213917	821885	9083327

APPENDIX II – TARIFF CALCULATIONS

(Customs and Imports are drawn from Mitchell's *International historical statistics*)

Year	GBR Tariff Calculation			FRA Tariff Calculation			DEU Tariff Calculation			ESP Tariff Calculation			USA Tariff Calculation			JPN Tariff Calculation		
	Customs	Imports	Tariffs	Customs	Imports	Tariffs	Customs	Imports	Tariffs	Customs	Imports	Tariffs	Customs	Imports	Tariffs	Customs	Imports	Tariffs
1860	23	213	0.11	136	1887	0.07				59	376	0.16	53	360	0.15		664	
1861	24	217	0.11	138	2442	0.05				68	454	0.15	40	265	0.14		1478	
1862	24	225	0.11	155	2199	0.07				85	464	0.7	49	192	0.26		5068	
1863	23	246	0.09	167	2426	0.07				65	568	0.12	69	247	0.28		3553	
1864	23	275	0.08	144	2923	0.05				58	568	0.1	102	316	0.32		6951	
1865	21	271	0.08	125	2642	0.05				57	472	0.12	85	242	0.35		14296	
1866	22	295	0.07	171	2784	0.06				53	426	0.12	179	438	0.41		2894	
1867	23	275	0.08	173	3697	0.04				54	358	0.15	176	401	0.44		16676	
1868	22	295	0.07	176	3364	0.04				44	446	0.1	164	362	0.45	700	10698	0.07
1869	22	295	0.07	74	3183	0.02				51	386	0.13	186	424	0.43	900	20784	0.03
1870	20	303	0.07	82	2867	0.03				52	394	0.13	195	452	0.43	900	33743	0.03
1871	20	331	0.06	106	3667	0.03				56	466	0.12	206	534	0.39	1100	23917	0.05
1872	21	355	0.06	110	3570	0.03	95			53	603	0.09	216	632	0.34	1300	20175	0.05
1873	20	371	0.06	142	3655	0.04	120			62	414	0.15	188	656	0.28	1700	28107	0.06
1874	19	370	0.05	157	3608	0.04	104			67	526	0.13	163	578	0.28	1500	23452	0.06
1875	20	374	0.05	162	3637	0.04	111			72	478	0.15	157	540	0.29	1700	29076	0.06
1876	22	375	0.06	206	3968	0.05	135			83	529	0.16	148	469	0.32	3000	23968	0.03
1877	20	394	0.05	196	3680	0.05	100			88	496	0.18	131	466	0.28	2400	27421	0.09
1878	20	389	0.05	217	4176	0.05	101			107	482	0.22	136	453	0.29	2496	32875	0.07
1879	19	363	0.05	237	4605	0.05	135			111	522	0.21	137	461	0.3	2700	32953	0.08
1880	18	411	0.05	262	5033	0.05	154	2614	0.06	114	624	0.18	187	683	0.28	2600	36827	0.07
1881	19	397	0.05	285	4863	0.06	181	2962	0.06	121	574	0.21	198	654	0.3	2600	31191	0.08
1882	20	413	0.05	289	4822	0.06	187	3099	0.06	145	707	0.21	220	733	0.3	2800	29447	0.09
1883	20	429	0.05	306	4804	0.06	191	3221	0.06	130	838	0.16	216	734	0.29	2700	28445	0.09
1884	22	393	0.06	291	6343	0.07	309	3216	0.06	123	701	0.18	195	683	0.29	2800	29675	0.09
1885	20	371	0.05	294	4088	0.07	216	2923	0.07	126	696	0.18	181	696	0.1	2100	29357	0.07
1886	20	352	0.06	308	4208	0.07	232	2874	0.08	133	726	0.18	193	693	0.1	3000	32168	0.09
1887	20	382	0.05	325	4326	0.08	252	3109	0.08	134	690	0.19	217	709	0.31	4100	44364	0.09
1888	20	348	0.06	302	4107	0.07	283	3253	0.09	100	676	0.15	219	739	0.3	4600	65455	0.07
1889	20	438	0.05	351	4317	0.08	350	4015	0.09	127	628	0.14	226	763	0.29	4700	66164	0.07
1890	20	421	0.05	366	4437	0.08	368	4162	0.09	134	645	0.18	230	810	0.28	4400	62060	0.09
1891	20	435	0.05	385	6768	0.08	378	4151	0.09	134	742	0.18	226	863	0.25	4900	63000	0.07
1892	20	424	0.05	430	4188	0.1	360	4010	0.09	129	644	0.2	177	847	0.21	5000	71000	0.07
1893	20	405	0.05	431	3854	0.11	337	3952	0.09	143	615	0.23	203	869	0.23	5100	88000	0.06
1894	20	406	0.05	496	3860	0.13	363	3942	0.09	127	754	0.17	132	668	0.2	5800	117000	0.05
1895	21	417	0.05	387	3720	0.1	385	4119	0.09	113	707	0.16	152	752	0.2	6800	129000	0.05
1896	21	442	0.05	407	3790	0.11	434	4307	0.1	121	867	0.15	160	809	0.2	6700	172000	0.04
1897	22	453	0.05	426	3956	0.11	441	4661	0.09	93	902	0.1	177	796	0.22	8000	221000	0.04
1898	21	471	0.04	470	4472	0.11	475	5076	0.09	104	826	0.13	150	647	0.23	9100	282000	0.03
1899	24	485	0.05	430	4558	0.1	462	5463	0.08	75	1025	0.07	256	728	0.34	16500	224000	0.07
1900	27	523	0.05	415	4838	0.09	466	5769	0.08	198	1089	0.18	233	888	0.26	17000	292000	0.06
1901	31	522	0.06	361	4369	0.08	494	5421	0.09	188	1144	0.16	238	859	0.28	14000	262000	0.05
1902	36	528	0.07	365	4394	0.08	498	9635	0.05	146	1085	0.13	254	931	0.27	16000	271000	0.06
1903	34	543	0.06	422	4802	0.08	508	6003	0.08	144	1176	0.12	284	1060	0.27	17000	327000	0.05
1904	36	551	0.07	401	4502	0.09	490	6364	0.08	141	1179	0.12	261	1019	0.26	23000	383000	0.06
1905	35	565	0.06	416	4779	0.09	626	7128	0.09	164	1206	0.14	262	1145	0.23	37000	502000	0.07
1906	33	608	0.05	478	5627	0.08	557	8121	0.07	183	1037	0.18	300	1271	0.24	42000	437000	0.1
1907	32	646	0.05	509	6203	0.08	645	6746	0.07	160	1047	0.15	302	1499	0.2	50000	512000	0.1
1908	29	593	0.05	494	5640	0.09	545	7663	0.07	156	1015	0.15	296	1228	0.23	42000	461000	0.09
1909	30	625	0.05	526	6246	0.08	660	8519	0.08	157	960	0.16	301	1325	0.22	36000	431000	0.08
1910	33	678	0.05	586	7174	0.08	683	8927	0.07	188	1382	0.13	334	1882	0.23	40000	528000	0.08
1911	34	680	0.05	758	8066	0.1	734	9683	0.08	177	1219	0.15	314	1577	0.2	49000	581000	0.08
1912	33	746	0.04	685	8251	0.08	728	10674	0.07	181	1349	0.13	311	1700	0.18	68000	684000	0.1
1913	33	769	0.04	778	8421	0.09	679	10751	0.06	225	1501	0.16	319	1854	0.17	74000	796000	0.09
1914	33	697	0.05	803	5462	0.05	582			196	1093	0.18	292	1924	0.15	44000	671000	0.07

APPENDIX III – DISTANCES BETWEEN CAPITALS

(Distances are taken from CEPII online dataset)

Distances between Capitals

	GBR	FRA	DEU	ESP	USA	JPN	ITL	BEL	NLD	AUT
GBR	0	342.95	495.36	1263.38	5901.34	9574.24	1438.43	323.78	360.32	1238.2
FRA	342.95	0	880.19	1054.66	6169.15	5838.16	1109.9	262.38	427.92	1035.14
DEU	495.36	880.19	0	1873.13	6717.54	8927.67	1187.3	653.14	577.86	523.94
ESP	1263.38	1054.66	1873.13	0	6092	10777.42	1366.76	1316.64	1481.37	1812
USA	5901.34	6169.15	6717.54	6092	0	10918.79	7224.74	6222.86	6196.85	7129.67
JPN	9574.24	5838.16	8927.67	10777.42	10918.79	0	9869.28	9463.26	9303.38	9141.06
ITL	1438.43	1109.9	1187.3	1366.76	7224.74	9869.28				
BEL	323.78	262.38	653.14	1316.64	6222.86	9463.26				
NLD	360.32	427.92	577.86	1481.37	6196.85	9303.38				
AUT	1238.2	1035.14	523.94	1812	7129.67	9141.06				

APPENDIX IV – LINEAR COUNTRY-BY-COUNTRY REGRESSIONS

France Hypothesis

	1	2	3	4	5	6	7	8
France cost of foreign tariffs	**0.2344**	-0.0511	0.2140	0.3627	0.4756	-0.7451	0.2239	-0.8051
	0.0467	0.1765	0.3910	0.3708	0.4916	0.5390	0.3729	0.5388
Unclaimed territory (millions square kilometers)		0.0026	0.0030		0.0126	**0.0038**	0.0034	**0.0035**
		0.0016	0.0016		0.0081	0.0018	0.0017	0.0017
France GDP			0.0000	0.0000				
			0.0000	0.0000				
France population					0.0000			
					0.0000			
France open railroad (kilometers)						0.0000		
						0.0000		
France GDP per capita							-0.0822	
							0.0908	
France open railroad per capita								0.4572
								0.3234
Adjusted R-squared	0.4137	0.4430	0.4513	0.4153	0.4645	0.4607	0.4534	0.4643

Germany Hypothesis

	1	2	3	4	5	6	7	8
Germany cost of foreign tariffs	**2.7173**	10.6523	14.9671	**8.6047**	15.9580	19.4075	15.6932	23.3538
	1.1139	7.7093	9.1412	3.2385	9.4288	10.3699	9.2244	11.5746
Unclaimed territory (millions square kilometers)		-0.0444	-0.0361		-0.0145	-0.0538	-0.0159	-0.0444
		0.0402	0.0442		0.0428	0.0469	0.0435	0.0462
Germany GDP			**0.0000**	**0.0000**				
			0.0000	0.0000				
Germany population					**-0.0001**			
					0.0000			
Germany open railroad (kilometers)						**-0.0001**		
						0.0000		
Germany GDP per capita							**-1.4366**	
							0.5498	
Germany open railroad per capita								**-5.2676**
								2.1653
Adjusted R-squared	0.1478	0.1571	0.2475	0.2414	0.2369	0.2387	0.2617	0.2337

Spain Hypothesis

	1	2	3	4	5	6	7	8
Spain cost of foreign tariffs	0.0086	-0.0883	**-0.4794**	**-0.3966**	**-0.5028**	-0.5727	**-0.4108**	-0.5135
	0.0256	0.0737	0.1371	0.1269	0.1833	0.3068	0.1169	0.3310
Unclaimed territory (millions square kilometers)		0.0018	-0.0044		-0.0122	**0.0028**	-0.0091	0.0016
		0.0011	0.0025		0.0067	0.0011	0.0040	0.0012
Spain GDP			**0.0000**	**0.0000**				
			0.0000	0.0000				
Spain population					**0.0001**			
					0.0000			
Spain open railroad (kilometers)						0.0000		
						0.0000		
Spain GDP per capita							**0.6212**	
							0.2129	
Spain open railroad per capita								0.8371
								0.6960
Adjusted R-squared	0.0035	0.0409	0.3108	0.2265	0.2216	0.1254	0.2983	0.0886

United States Hypothesis

	1	2	3	4	5	6	7	8
United States cost of foreign tariffs	**0.2033**	1.1001	1.4692	0.1507	1.3913	1.2307	1.4353	1.0205
	0.0867	0.6212	0.7609	0.0975	0.7279	0.6802	0.7432	0.6200
Unclaimed territory (millions square kilometers)		-0.0004	-0.0006		**-0.0007**	-0.0005	-0.0007	-0.0005
		0.0002	0.0003		0.0003	0.0003	0.0003	0.0003
United States GDP			**0.0000**	0.0000				
			0.0000	0.0000				
United States population					**0.0000**			
					0.0000			
United States open railroad (kilometers)						**0.0000**		
						0.0000		
United States GDP per capita							**0.0029**	
							0.0014	
United States open railroad per capita								**0.0035**
								0.0016
Adjusted R-squared	0.1390	0.1791	0.2190	0.1420	0.2362	0.2280	0.2116	0.2141

Japan Hypothesis

	1	2	3	4	5	6	7	8
Japan cost of foreign tariffs	**0.5240**	**1.7671**	0.8209	-0.2814	0.6092	0.4660	0.7218	0.2288
	0.1415	0.7057	0.9603	0.4267	0.9721	0.8026	0.9666	0.8075
Unclaimed territory (millions square kilometers)		-0.0048	-0.0037		**-0.0066**	-0.0010	**-0.0049**	-0.0004
		0.0025	0.0025		0.0028	0.0027	0.0024	0.0028
Japan GDP			0.0000	0.0000				
			0.0000	0.0000				
Japan population					0.0000			
					0.0000			
Japan open railroad (kilometers)						0.0000		
						0.0000		
Japan GDP per capita							0.2566	
							0.1775	
Japan open railroad per capita								1.2402
								0.5551
Adjusted R-squared	0.2766	0.3142	0.3443	0.3230	0.3498	0.3705	0.3521	0.3872

APPENDIX V – LOGARITHMIC COUNTRY-BY-COUNTRY HYPOTHESIS

Logarithmic Hypothesis France (22 obs)

	1	2	3	4	5	6	7	8
ln(France cost of foreign tariffs)	2.8752	1.6964	1.6648	3.8067	3.4422	6.5552	3.9792	9.5002
	0.5137	1.8454	1.7300	2.0687	2.0823	3.5103	2.0319	5.8689
ln(Unclaimed territory in millions of sqkm)		-0.1789		3.8832	6.2329	5.9626	0.7492	0.6511
		0.2237		0.7116	3.2260	2.5624	0.5333	0.6401
ln(France GDP)			-0.0667	-1.3590				
			0.0742	2.1127				
ln(France population)					-2.4183			
					1.2164			
ln(France railroads open)						-2.1847		
						0.8603		
ln(France GDP per capita)							-2.7473	
							1.5496	
ln(France railroads per capita)								-5.1955
								2.7863
R-squared	0.6493	0.6538	0.6549	0.6658	0.6648	0.6766	0.6656	0.6844

Logarithmic Hypothesis Germany (15 obs)

	1	2	3	4	5	6	7	8
ln(Germany cost of foreign tariffs)	3.2183	16.9466	3.4025	-42.8083	-42.4971	-39.3651	-39.9965	-22.0198
	1.0934	12.9633	20.4130	14.3947	15.3400	13.8451	13.1975	10.3296
ln(Unclaimed territory in millions of sqkm)		3.2409		39.6134	73.1552	50.2097	-2.0263	-8.2020
		3.1733		2.7580	12.0338	6.5470	2.3185	2.7768
ln(Germany GDP)			0.0155	-18.0402				
			1.7350	5.3757				
ln(Germany population)					-32.4693			
					5.6147			
ln(Germany railroads open)						-23.6004		
						3.4759		
ln(Germany GDP per capita)							-38.4346	
							5.5715	
ln(Germany railroads per capita)								-70.1711
								9.5026
R-squared	0.3755	0.4095	0.3755	0.7873	0.7365	0.8050	0.8272	0.8787

Logarithmic Hypothesis Spain (7 obs)

	1	2	3	4	5	6	7	8
ln(Spain cost of foreign tariffs)	-1.3256	1.4312	1.6331	0.1464	-0.0647	-0.2567	0.6219	-0.3716
	2.2488	0.3048	0.3502	0.0579	0.1135	0.2750	0.0937	0.5637
ln(Unclaimed territory in millions of sqkm)		-0.3156		-2.2686	-3.0824	-1.8846	-0.6079	-0.0612
		0.0128		0.0287	0.1313	0.1913	0.0279	0.0710
ln(Spain GDP)			-0.1274	0.7900				
			0.0059	0.0702				
ln(Spain population)					1.1813			
					0.0566			
ln(Spain railroads open)						0.7169		
						0.0878		
ln(Spain GDP per capita)							2.2470	
							0.2238	
ln(Spain railroads per capita)								1.6566
								0.4770
R-squared	0.0266	0.9900	0.9865	0.9999	0.9999	0.9994	0.9994	0.9978

Logarithmic Hypothesis United States (11 obs)

	1	2	3	4	5	6	7	8
ln(United States cost of foreign tariffs)	1.7796	-5.3676	6.0702	39.4031	28.3127	19.5400	81.3073	-4.1771
	0.2580	8.8258	13.3703	12.2649	11.5945	12.1863	22.9487	9.8850
ln(Unclaimed territory in millions of sqkm)		-6.1547		-31.1368	-43.4347	-35.8488	32.4181	-8.8445
		7.5266		3.3689	6.1439	8.5308	11.3501	9.5742
ln(United States GDP)			1.2369	21.2702				
			3.8657	5.5646				
ln(United States population)					24.7575			
					4.0555			
ln(United States railroads open)						16.9539		
						4.2249		
ln(United States GDP per capita)							116.4300	
							28.5825	
ln(United States railroads per capita)								10.9500
								20.9240
R-squared	0.8257	0.8435	0.8270	0.9384	0.9328	0.9083	0.9432	0.8459

Logarithmic Hypothesis Japan (10 obs)

	1	2	3	4	5	6	7	8
ln(Japan cost of foreign tariffs)	0.5342	-0.1768	-0.0684	-0.0648	-0.0413	-0.0360	-0.1268	-0.0338
	0.0151	0.0276	0.0048	0.0081	0.0139	0.0114	0.0155	0.0110
ln(Unclaimed territory in millions of sqkm)		-0.2403		0.0063	0.1065	-0.1095	-0.2178	-0.2243
		0.0099		0.0037	0.0184	0.0057	0.0054	0.0032
ln(Japan GDP)			-0.0778	-0.0798				
			0.0006	0.0116				
ln(Japan population)					-0.1162			
					0.0059			
ln(Japan railroads open)						-0.0403		
						0.0013		
ln(Japan GDP per capita)							-0.2110	
							0.0284	
ln(Japan railroads per capita)								-0.0614
								0.0021
R-squared	0.9930	0.9997	1.0000	1.0000	1.0000	1.0000	0.9999	1.0000

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