Asymmetric influence of distance on French international trade (1850-1913): A comparison with Germany

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Abstract

This article uses a new database and a gravity model approach to test the influence of distance on French international trade during the first globalization. We highlight French specificities by introducing German mirror. As expected, distance has a globally negative impact on trade. However, compared to Germany, our results about the influence of distance on French exports in distant markets are in contradiction with the literature that shows the major role played by the fall in transaction costs on international trade development before World War I. We suggest that French geographical diversification was bad. France did not take advantage of the globalization that was occurring at the end of the period insofar as it did not intensify its exports to emerging countries that were enjoying rapid economic growth. In order to understand French difficulties to export to distant markets, we discuss the role of commercial policy and the role of price competitiveness.

Keywords: International Trade, Distance, Gravity Model, First Globalization.

JEL Classification: F10, N73.

Introduction

Global trade increased at a remarkable pace in the decades prior to World War I (Lewis 1981). According to Jacks et al. (2011), for the pre-World War I period, the decline in the cost of trade (linked to major technological breakthroughs such as the steamship, the telegraph, refrigeration, etc.) explains roughly 60% percent of the growth in global trade. As a consequence, new countries emerged on the international trade scene and new distant opportunities appeared for the long-established European industrialized countries.

At the same time French international trade stopped its development, especially its export capacity during the Belle Époque. Bairoch (1993) shows this impressively: France's share of world exports, which had risen from 9% to 15.9% between 1847 and 1865, fell to half of this figure (7.2%) in 1913. French trade suffered from structural current account deficits from the end of the 1870s, an imbalance which worsened in the 1880s. Indicators of trade openness tell a similar story. Evidence shows that the French index contracted at the beginning of the

1880s. In this respect, the situation in France contrasts with that of most of the other industrialized countries of the period, with the exception of the United Kingdom (Lewis, 1981; Foreman-Peck, 1998; Dedinger, 2006, 2012, Federico and Wolf, 2011; Huberman et al., 2015).

Once all these various assessments are considered together, the diagnosis of a downturn in French export capacity after 1870 becomes evident. However, such a conclusion faces limits that can be explained by a relative lack of perspective regarding historical data, especially at the time the studies were being conducted. Scholars have either devoted their efforts to short time spans or specific sectors (Tyszynski, 1951; Verley, 1988). Even sophisticated approaches such as those of Broder (1993) or Guillaumet (2002) have not used a comprehensive, disaggregated database. For a long time the practical solution for working out the complete trade nomenclature was to focus on selected benchmark years, as Weiller (1969), Bairoch (1974) and Verley (1997) have done.

Bairoch (1993) was surprised, among other things, by the weak and declining distribution of French exports in Latin American and Asian markets in 1890 and 1913. Comparing German and French export performance in Brazil and Argentina between 1880 and 1913, Broder (2013) highlights German success compared to French difficulties. Maizels (1963) applies shift-share analysis to French manufactured goods exports between 1899 and 1913 in order to explain French foreign trade decline in terms of poor geographical diversification.

To sum up, studies on French trade during the first globalization hint at a failure of French export trade to achieve market diversification. Even if these studies are based on partial evidence, the feeling of a French setback was already keenly felt by contemporary experts (Aubert, 1900). That is why in order to strengthen these previous analyses, we intend to explore the whole record for the entire period with an approach encompassing all of France's trading partner's by using a comprehensive annual database by countries for France's foreign trade. Moreover, by using two original databases we introduce German mirror in order to understand French specific difficulties particularly between 1880 and 1913.

The aim of the paper is to measure the influence of distance on bilateral export and import flows for France (1850-1913) and Germany (1880-1913) using a standard gravity model approach. By extension, we highlight French international trade market diversification. Did France lose out in the race for new distant export markets (United States, Latin America, and Asia)? On the other hand, did France appear as a new market for distant trading partners?

The article is structured as follows. The first and the second sections present respectively the data and focuses on key descriptive statistics. The third section sets out the gravity model specification and econometric framework. The results are presented the fourth section. The fifth section discusses those results and gives some explanations and suggestions for future research.

1. Data

The empirical analyses conducted as part of this article rely primarily on an original and disaggregated database for France's foreign trade recorded annually between 1850 and 1913. Our main sources are the '*Tableau général du commerce de la France avec ses colonies*

étrangères' (General Table of French trade with its overseas colonies) and, after 1896, the '*Tableau général du commerce et de la navigation*' (General Table of trade and navigation). Annual inflows from 41 countries and annual outflows to 63 destinations have been extracted from these statistical yearbooks.[1] From this database, we can also compute average tariffs on imports by country and by year. Moreover, the product dimension can be considered at a disaggregated level (corresponding to the STIC rev.3) in order to complete French trade analysis. Our definition of trade takes into account '*commerce spécial*' (special trade) rather than '*commerce général*' (general trade).

In order to estimate a gravity model we need to take into account some classical variables such as distance and GDP. Data on GDP are taken from the Maddison Project Database. As GDP is expressed in 1990 constant dollars, we convert export and import values into constant dollars using the USD/FRF exchange rates from Global Financial Data[2] and the US consumer price index from the Handbook of Labor Statistics (US. Department of Labor, Bureau of Labor Statistics). For data on distance, we use the GeoDist database from CEPII.[3] Our distance variable measures the distance between two countries based on bilateral distances between the biggest cities of those two countries, those inner-city distances being weighted by the share of the city in the overall country's population (Mayer and Zignago, 2011). We also consider in our analysis the influence of trade agreements. For this purpose, we use the database constructed by Pahre (2008) which records all commercial treaties signed by all countries in the world between 1815 and 1914.

Finally, the database used for the estimation of gravity models includes 32 countries: even if data on import and export flows are available we suffer from a lack of GDP data for some of the countries in our sample. For this reason we have to exclude old French colonies (Guadeloupe, Martinique, and La Réunion) and some British and Spanish colonies because of missing values. However, our final database still represents an average of 92.6% (81.7%) of total French export (import) flows over the period. It is worth noting that about 12% of imports and exports bilateral flows have zero-values in our database.

We split our sample into two groups depending on the distance from France (lower or higher than the average distance). Close countries (CC) include 16 European countries and 4 African countries (Algeria, Egypt, Morocco and Tunisia). There are 12 distant countries (DC).[4] To carry out our empirical investigation we divided DC countries into three groups: Latin America, the United States, and Asia Pacific (including Australia).

In order to highlight French specificities and to understand French difficulties on distant markets we introduce German mirror. For Germany, export and import flows are extracted from the RICardo[5] database for the period 1880-1913. Bilateral flows are measured in the same way as for French 'special trade' and are expressed in 1990 constant dollars. We take into account the same sample of countries and apply the same methodology to study the influence of distance. About 7% of German import and export flows display zero-values.

[1] The database is available upon request to the authors.
[2] https://www.globalfinancialdata.com/index.html
[3] http://www.cepii.fr/cepii/fr/bdd_modele/presentation.asp?id=6
[4] For the detail of the composition of each group please refer to Table A1 in the Appendix.
[5] The RICardo database gathers bilateral flows for 173 countries between 1814 and 2014. This database was computed by Béatrice Dedinger (Science Po Paris, Centre d'Histoire) and should be available in free access in 2015.

Moreover, to focus on the product dimension we use *Statistisch des Deutschen Reichs – Reue Folge Spezialhandel im Jahre* which offers annual data at a disaggregated level.

2. The evolution of the geographical structure of French and German international trade

Broadly speaking, external trade of both France and Germany has increased during the first globalization. But this general rise in trade flows conceals some disparities depending on the partner's distance as we can see from Figures 1 and 2.

Figure 1 shows the share of close (CC) and distant (DC) countries in French and German total imports. We can observe that for both countries the share of imports from CC declined over the period whereas the share of imports from DC rose. However, the trends are more pronounced for Germany than for France. The share of imports from CC falls from about 75% in 1850 to about 65% in 1913 for France and from 90% in 1880 to 60% in 1913 for Germany. Similarly, the share of imports from DC to France rises from 25% to 35% while the same share in German total imports increases from 10% to 40%.

Insert Figure 1

Figure 2 uses the same distance-based distinction for export flows from France and Germany. Both countries experienced different developments in terms of exports' geographical orientation. As expected, the share of exports from Germany to CC declined over the period 1880-1913 from 90% to less than 80% whereas the share of exports to DC rose from 10% to 20%. Conversely, the share of French exports to CC increased from about 70% to almost 90% when the share to DC declined from 30% to about 10%.

Insert Figure 2

To sum up, it seems that despite a fall in transaction costs that creates new markets opportunities for exports, France faced difficulties to reach distant countries. Figure 2 suggests a withdrawal of French exports to close markets. Compared to France, Germany seems to have been more successful in exporting its products to DC.

Figure 3 gives additional information by focusing on the evolution of the share of imports from different areas (Africa, Latin America, Asia Pacific and United States) in total French and German imports. It calls for three comments. First, the share of imports from United States decreased at the beginning of the period from more than 20% to less than 5%. It is only after the Civil War that they are raising again without however reaching their previous level.

Insert Figure 3

Second, concerning imports from African and Asian countries, their importance in France total import flows is higher than in Germany. For instance, the import's share of Africa in total German imports barely exceeds 2% whereas the same share in total French imports ranges between 8 and 10% at the end of the period. Third, a different story is highlighted for import flows from Latin America and the United States. Although the importance of the American continent is higher in French imports at the beginning of the period, Germany

rapidly overtakes it. Germany's progression is impressive: from 2% at the beginning of the period to 14% around 1910 for the import flows from Latin America and from 5% to more than 20% for those from the USA.

We can assume that French import strategy is partly based on its colonies in Asia Pacific and Africa (even if they each represents less than 10% of total imports) whereas German import strategy is based on the American continent where imports from Latin America and the USA represent more than 35% of total import flows.

In the same way as Figure 3, Figure 4 analyses the geographical structure of French and German exports. Several conclusions emerge depending on the country we look at. The share of France's exports to Asia Pacific and Africa rose over the period whereas the share of French exports to Latin America or the USA felt. If we have a closer look at the share of French exports to the USA, we can observe a decrease from 20% to less than 5% in 1862. Thereafter, it starts to increase again without being able to reach its previous level. France experienced the same fall with the share of exports to Latin America in total French exports. Indeed, it decreases from more than 10% in 1856 to less than 4% after 1900, before increasing up to 6% at the end of the period. It seems that the decrease of the American continent's share in French total trade was less than offset by the increase of the Asia Pacific's and Africa's shares. Indeed, French exports to Asia Pacific still represent less than 10% of total French exports and exports to Africa rise from 7% in 1850 to 13% in 1913. With regard to Germany, the share of exports to Africa in total German exports remains very low all over the period (about 2%) whereas shares of exports to the United States, to Latin America and to Asia Pacific increased very fast. The most significant increase concerned the share of German exports to Latin America. Starting at less than 2% in 1880, it rises to more than 8% of total German exports at the end of the period.

Insert Figure 4

In a nutshell, while Germany probably targets the American continent to sell its products, France seems to face difficulties to reach new emerging markets and to withdraw to proximity markets (Europe and its colonies in North Africa).

Table 1 and 2 complete our previous observations. They report respectively the average annual growth rate of per capita GDP[6] and the level of per capita GDP (expressed in 1990 constant dollars). Those tables indicate that France exports relatively less (particularly at the end of the period) to geographical areas that display the highest levels of per capita GDP and that are the most dynamic areas in terms of annual growth rate of per capita GDP (i.e. Latin America and United States). Contrary to France, German strategy seems to target the most dynamic areas in terms of economic growth (Latin America and the United States) at the cost of economically less developed areas (Asia Pacific and Africa).

Insert Table 1 and Table 2

[6] We apply the classic (unweight) average annual growth rate formula (or compound annual growth rate). Using this method, several differences may appear between our results and those of Maddison, even if broadly speaking both methods give similar results. Faced with missing values for GDP per capita, the number of countries included may differ according to the sub-period. In order to have at least one observation for the African area we decided to highlight the sub-period 1870-1913.

3. Econometric framework

3.1. Gravity model specifications

Since its transposition to the analysis of bilateral trade by Tinbergen (1962), the gravity model has been extensively used to explain and predict flows of such trade. In theory, trade between a pair of countries is supposed to be positively correlated with the sizes of their economies and negatively correlated with the distance between the countries. In this paper, we use a gravity equation based on the state-of-the-art model of Anderson and Van Wincoop (2003) that is expressed as follows for imports (1) and exports (2):

$$\ln M_{ijt} = \alpha_0 + \alpha_1 \ln Y_{jt} + \alpha_2 \ln N_{jt} + \beta \ln D_{ij} + \alpha_j + \lambda_t + \varepsilon_{ijt} \qquad (1)$$

$$\ln X_{ijt} = \alpha_0 + \alpha_1 \ln Y_{jt} + \alpha_2 \ln N_{jt} + \beta \ln D_{ij} + \alpha_j + \lambda_t + \varepsilon_{ijt} \qquad (2)$$

Where X_{ijt} is the value of French or German exports to partner j in year t, M_{ijt} is the value of French or German imports from partner j, Y_{jt} is the partner's GDP in year t and D_{ij} is the distance between France or German and its partner j. Our models also include partner country dummies (α_j) and year dummies (λ_t) to control respectively for partners countries heterogeneity and temporal dynamics (such as the evolution of French or German GDP). The error term ε_{ijt} has the usual standard properties.

Our main research question is how sensitive French and German bilateral trade (exports and imports) are to the geographical distance from their partners throughout the period 1850-1913 for France and throughout the period 1880-1913 for Germany. In line with the descriptive analysis in Figures 1 to 4, we suggest that at the end of the period, France exported relatively less to distant countries and imported relatively more from those same countries. In other words, we would expect the negative influence of geographical distance on French exports (imports) to have increased (decreased) over the period. For Germany, we observe a similar trend for imports but an opposite trend for exports. In other words, we would expect the negative influence of geographical distance on both German exports and imports to have decreased over the period.

To test those hypotheses, we draw on the methodology provided by Brun et al. (2005). More precisely, we include a time-trend (t) and an interaction term between this time-trend and the distance variable in the gravity equation. The influence of distance on bilateral trade is thus assumed to change over time. Our models for imports (3) and exports (4) are thus specified as follows:

$$\ln M_{ijt} = \alpha_0 + \alpha_1 \ln Y_{jt} + \beta_0 t + \beta_1 \ln D_{ij} + \beta_2 t.\ln D_{ij} + \alpha_j + \lambda_t + \varepsilon_{ijt} \qquad (3)$$

$$\ln X_{ijt} = \alpha_0 + \alpha_1 \ln Y_{jt} + \beta_0 t + \beta_1 \ln D_{ij} + \beta_2 t.\ln D_{ij} + \alpha_j + \lambda_t + \varepsilon_{ijt} \qquad (4)$$

3.2. Estimation issues

Our baseline regressions are estimated through OLS (Ordinary Least Squares) with robust standard errors. Nevertheless, it is now well documented that OLS estimates can lead to inefficient or even inconsistent estimates, due to the log-linearization of the empirical model (Santos Silva and Tenreyro, 2006; Siliverstovs and Schumacher, 2009; Westerlund and

Wilhemsson, 2009). Santos Silva and Tenreyro (2006) show that "the standard practice of interpreting the parameters of log-linearized models estimated by OLS as elasticities can be highly misleading in the presence of heteroskedasticity" (Santos Silva and Tenreyro, 2006: 641). Moreover, the log-linearization is incompatible with the existence of zero-values in trade data insofar it implies a loss of information linked to the truncation of the sample.

As an alternative to OLS, Santos Silva and Tenreyro (2006) recommend using the Poisson Pseudo Maximum Likelihood (PPML) estimator. The PPML approach deals with zero values in the dependent variable insofar as the gravity equation is estimated in its multiplicative form. This means that it is not required to express the dependent variable in its logarithm form. Moreover, Santos Silva and Tenreyro (2006) show that this estimator provides unbiased estimates in the presence of heteroskedasticity. The PPML approach has met with real success in the gravity model literature, even in the field of economic history. For instance, Lampe (2009) and Jacks et al. (2011) have adopted this methodology for the analysis of nineteenth-century trade data.

4. Results

Table 3 presents the estimates of gravity model for French imports and exports for the periods 1850-1913 and 1880-1913 and for Germany for the period 1880-1913. We systematically report OLS and PPML estimates including year dummies and either country dummies or area dummies (Europe, Africa, Latin America, Asia Pacific, United States).

4.1. Results for imports

For imports, the explanatory power of estimates is satisfactory with R-squared greater than 0.9 when country dummies are included and between 0.568 and 0.819 when area dummies are included. It is also worth noting that the quality of adjustment is higher for PPML estimates than for OLS estimates.

Results for GDP are fully in line with the literature on gravity models for imports. With the exception of OLS estimates with country dummies, the effect of GDP is significant and positive both for France and Germany. Coefficient estimates range from 0.414 to 0.865 for France and are quite similar over the period 1850-1913 and the period 1880-1913. For Germany, the GDP coefficient ranges from 0.343 to 0.737. This means that the sensitivity to GDP of French and German imports is quite comparable.

For France, the coefficient on the distance variable is systematically significant and negative when area dummies are included whereas its influence is more uncertain when country dummies are included. When significant, the elasticity of distance ranges between -1.017 and -1.362. For Germany, the distance is always significant at 1% level and negative. The coefficient value is about -0.7 when country dummies are included and about -1.1 when area dummies are included.

Our main result for imports lies in the influence of the interaction term between the time trend and the distance variable. This interaction term is significant (at least at the 5% level) and shows a positive sign. The negative effect of distance on imports therefore diminishes over time. The distance is less of an impediment to imports at the end of the period for both France and Germany. This main result is fully in line with the classic literature on international trade

during the first globalization since in gravity models, distance appears to be a proxy for transaction costs. Yet, according to Jacks et al. (2011) trade costs were declining over the period, promoting international trade and thus imports from distant countries.

4.2. Results for exports

The quality of adjustment of gravity models is better for exports than for imports, particularly for France with R-squared always greater than 0.8.

As for imports, our results about the impact of GDP on exports are consistent with the literature. Apart from the first regression (OLS estimates with partner country dummies for France, 1850-1913), the coefficient on GDP is systematically positive and significant at the 1% level, both for France and Germany. However, the positive effect of GDP on exports seems to be higher for France (coefficients between 0.842 and 1.204 for the period 1880-1913) than for Germany (coefficients between 0.400 and 0.659).

The distance variable has also its expected negative impact and is significant in all regressions with the exception of OLS estimates with country dummies for France for the period 1850-1913. When significant, coefficient estimates for the distance variable are quite volatile insofar as they range from -1.486 and -2.793 for France and between -0.383 and -0.903 for Germany. However, an interesting result lies in the fact that the coefficients on distance are greater in absolute terms for France than for Germany for the period 1880-1913. Such a result indicates that distance is less an impediment for Germany than for France between 1880 and 1913 and points out the relative difficulties of France to export to distant markets.

The interaction between the time-trend and the distance variable gives additional information on the effect of distance. For France, the negative sign for the coefficient on the interaction term between time-trend and distance is systematically negative and significant at the 1% level. This means that the negative impact of distance on exports from France strengthens over time. This conclusion is strictly opposed to that described above for imports and suggests that at the end of the period the distance appears to be more of an obstacle to French exports to distant countries than to imports from them. It means that despite the fall in transaction costs, France still had difficulty in reaching distant markets. For Germany, the opposite is true. The interaction term is significant and positive, indicating that the negative effect of distance on German exports decreases over time. This means that, contrary to France, Germany was relatively successful in exporting to distant markets at the end of the period.

Broadly speaking, our econometric results confirm our research hypothesis. Considering imports flows, the negative influence of distance has decreased over time, both for France and Germany, highlighting the decline in transaction costs, in accordance with standard theories of international trade. Our results tell a different story for exports. Compared to Germany, we highlight French difficulties to export to distant countries, particularly at the end of the period.

Insert Table 3

Insert Table 4

Insert Table 5

Insert Table 6

5. Discussion

Our results about the influence of distance on French exports to distant markets are in contradiction with the standard literature that emphasizes the major role played by the fall in transaction costs on international trade development before World War I (Jacks, 2009; Jacks et al., 2011). France did not take the opportunity offered by the first globalization. By contrast with Germany, French exporters failed to establish themselves in distant emerging markets (the United States, Latin America or Asia) which were enjoying strong growth. At the same time, these emerging countries get new market share in France. By extension, this reality questions French geographical diversification. From the 1880s, France had a chronic trade deficit and its exports' market share quickly declined probably because of an inefficient insertion strategy in new international labor division (Foreman-Peck, 1998).

How may this French lack of dynamism in distant markets be explained considering German mirror? Two research lines can be explored: an unappropriated commercial strategy towards distant market and a deficit of competitiveness on the same markets.

5.1 The role of commercial strategy

Comparing German and French export performance in Brazil and Argentina between 1880 and 1913 Broder (2013) observed a French lack in terms of trade network structures (banks, trading houses, etc.). For example the number of German banks' headquarters in Latin America increases from 3 to 41 between 1898 and 1906 (only from 5 to 12 for France). This invites us to deepen more broadly the role of commercial strategies.

In a first step, we include in our regressions the number of trade agreements signed by France or Germany with their partners as an explanatory variable in the gravity equation for exports (regressions 1, 3 and 5 in Table 4).[7] Considering France, the coefficient on the trade agreements variable is significant (at the 1% level) and positive both for the periods 1950-1913 and 1880-1913.[8] This could mean that the geographical structure of trade agreements might help to understand why France was not successful in exporting to distant markets at the end of the period. For Germany, the trade agreements variable is non-significant, indicating that German exports are weakly sensitive to its trade agreement policy. Table 5 presents the number of trade agreements signed by France and Germany by areas. France has concentrated its trade agreements' signature with European countries at the cost of distant countries.[9] This could partly explain French difficulties to reach distant markets. The geographical structure of German trade agreements is similar to French one. However, the number of commercial treaties signed is significantly lower indicating that this agreement channel is not crucial in order to boost export flows.

In a second step, we include the logarithm of the average tariff on imports in the gravity equation for exports (regressions 2 and 4 in Table 4). This variable, only available in our French Database, can be considered as a proxy for the nature of trade relationships between

[7] To deal with zero values, the variable is expressed as the logarithm of one plus the number of trade agreements.
[8] It is worth noting that when country dummies rather than area dummies are included, the trade agreements variable is no longer significant.
[9] According to Pahre (2008), interpreting the number of commercial treaties as a sign of easier market access can be misleading insofar as the signature of a large number of treaties with partners' countries can reveals commercial tensions.

France and its partners. A negative influence of this variable would indicate that import protection acts as a tax on France's export sector to foreign markets (Tokarick, 2006). Pahre (2008) shows the importance of bilateral approach in international trade between the 1880s and World War I. In line with Becuwe and Blancheton (2014) within the realm of foreign trade relations, a highly negotiated and strategic approach began to prevail after the end 1870s, with discrimination by countries and retaliatory tariffs. Results reported in Table 4 show that the average tariff variable is significant at the 1% level and negative both for 1850-1913 and 1880-1913. These results confirm the negative influence of import protection on exports performance and suggest that the geographical pattern of tariffs could contribute to explain French difficulties to reach distant markets. Table 6 reports the French average tariffs by areas. It shows clearly a higher level of tariffs for distant areas (Latin America, Asia Pacific and the United States) than for Europe and Africa, particularly between 1880 and 1913.

5.2 The role of competitiveness

A closer look at French exports in the middle of the nineteenth century suggests some similarities with the United Kingdom. Temin (1997) shows that after the industrial Revolution, the United Kingdom exported to plenty destinations. The exports' geographical diversification also happened in the French case from the middle of the nineteenth century (Verley, 1997).

During the first globalization new countries improved low-skill technologies and emerged as a workshop for the 'rich world'. They increased the number of exported products, and challenged British and French trade power. This was the case for new leaders in international trade (the United States and Germany) and also new emerging countries (Japan). Small European countries also competed British and French leadership: Belgium (Huberman et al. 2015), the Netherlands, Denmark or Switzerland. Nevertheless, despite the new competition from both emerging and developed countries, France still exported its old specializations. As an illustration, the share of finished textile products in total French exports remained at 18% in 1913 whereas Germany increased its productivity in the textile sector and managed to out-perform French industry at the beginning of the 20th century (Dormois, 2006).

The lower performance of France compared to Germany towards distant countries could be explained by a competitive disadvantage of French products. To test this hypothesis, we propose to compute a global competitiveness index by comparing the unit export value of French and German products (value of total exports divided by the quantity). As we suffer from a lack of German disaggregated data, and as we needed to have the same products' heading, we use French imports from Germany as a proxy for German exports. Our competitiveness index is an unweighted_average_of the ratio of unit values for French total exports to unit values for similar products of French imports from Germany.[10] Figure 5 shows the evolution of the index of relative competitiveness between 1880 and 1913.

Insert Figure 5

[10] The number of products taken into account ranges from 25 in 1880 to 50 in 1913. A value higher (lower) than 1 for this competitiveness index indicates that, on average, French products are more (less) expensive than German ones.

On average, French products are 15% more expensive than German's one over the period. This difference may partly explain the relative performance of both countries on distant markets. It is particularly true in Latin America and Asia-Pacific where export performance gap is the most important (see Figures 3 and 4). These geographical areas with low GDP per capita (see Table 2) are more likely to be sensitive to price competitiveness. If we consider that this price gap reflects a difference in terms of quality, French suppliers should rather be positioned in the high-end segments of the market. One might assume that for high-quality products it seems difficult to find significant solvent demand in low-income countries.

We have also included in Figure 5 the evolution of our competitiveness index for two iconic products of the respective specializations of France and Germany in the late 19th century: silk fabrics and machines and mechanicals. Table 7 also reports the Lafay index[11] for those two products from French and German customs statistics.[12]

Insert Table 7

Obviously, silk fabrics and machines and mechanicals are respective top specializations of French and German economies, as evidenced by the value of Lafay indexes and historical literature (Dormois, 2009). It is clear that France has no comparative advantage in the production of machines and mechanicals, which are German specializations. However, it can be assumed that these products are subject to sustained demand from distant developing countries.

Conversely, if Germany exhibits a lower Lafay Index than France for silk fabrics, its values are positive. This means that the German trade balance for this product is in surplus. Moreover, we can see in Figure 5 that Germany has a competitive advantage over France from 1890 with a gap in unit values reaching about 14% in 1900.

To summarize, we suggest that France cannot compete Germany on its core specialization (i.e machines and mechanicals). On the contrary, Germany seems to be able to compete France on its own (i.e silk fabrics). The German competitiveness on this product can be a significant advantage over distant countries whose income per capita is relatively low.

To highlight the development of French international trade, we suggest that further researches are needed to study the specialization pattern and the concentration of the French economy. This could be done by measuring intra-industry trade during the period 1850-1913. A possible French response to its difficulties could have been the development of intra-industry trade with proximity markets such as Belgium, Switzerland and Germany.

[11] The Lafay index (LFI) is a standard specialization index. For any given product i the its expression is:

$$LFIi = 100 \times \left[\left(\frac{xi - mi}{xi + mi}\right) - \frac{\sum_{i=1}^{N}(xi - mi)}{\sum_{i=1}^{N}(xi + mi)}\right] \times \frac{xi + mi}{\sum_{i=1}^{N}(xi + mi)}$$

Where xi and mi are export and import of product i and N the number of products.

Thus, a positive value indicates the existence of a comparative advantage in a given item (a specialization in the ith good). On the contrary, negative values points to a comparative disadvantage.

[12] For Germany, our statistical source only includes annual data on the 1897-1905 period.

Conclusion

Our econometric results confirm our research hypotheses about an asymmetric influence of distance on French international trade. For imports, the negative influence of distance has decreased over time, both for France and Germany, traducing the decline in transaction costs, in accordance with classical theories of international trade. Our results tell a different story for exports. Compared to Germany, we highlight French difficulties to export to distant countries, particularly at the end of the period. We explain these difficulties by an unappropriated commercial policy towards distant market and by a lack of competitiveness on those markets.

We suggest that French international trade situation during the current trade globalization echoes its situation in the nineteenth century. From the early 2000s, French market share in total world exports has decreased rapidly and its trade deficit is widening. France is failing to establish itself in emerging areas such as China or India, and suffers from a down-market shift in its exports. Perhaps, these temporal similarities may reveal structural or cultural difficulties that limit French development on these markets.

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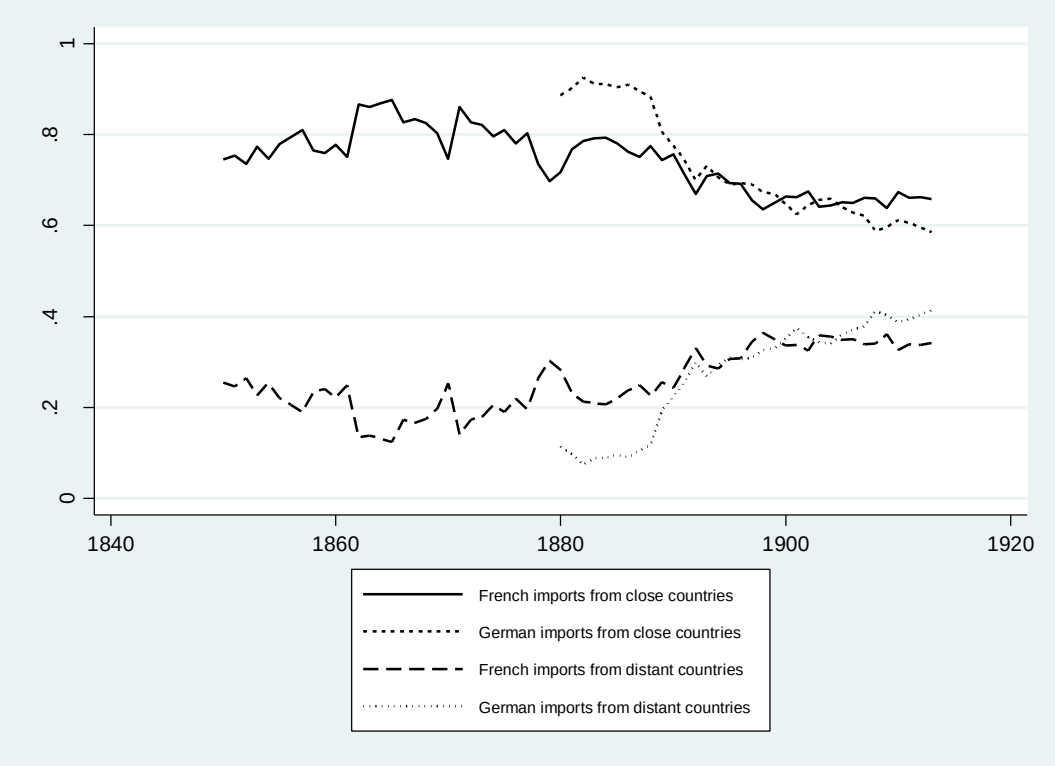
Table A1: Countries with their status in terms of distance from France (distant or close) and the geographical area they belong to.

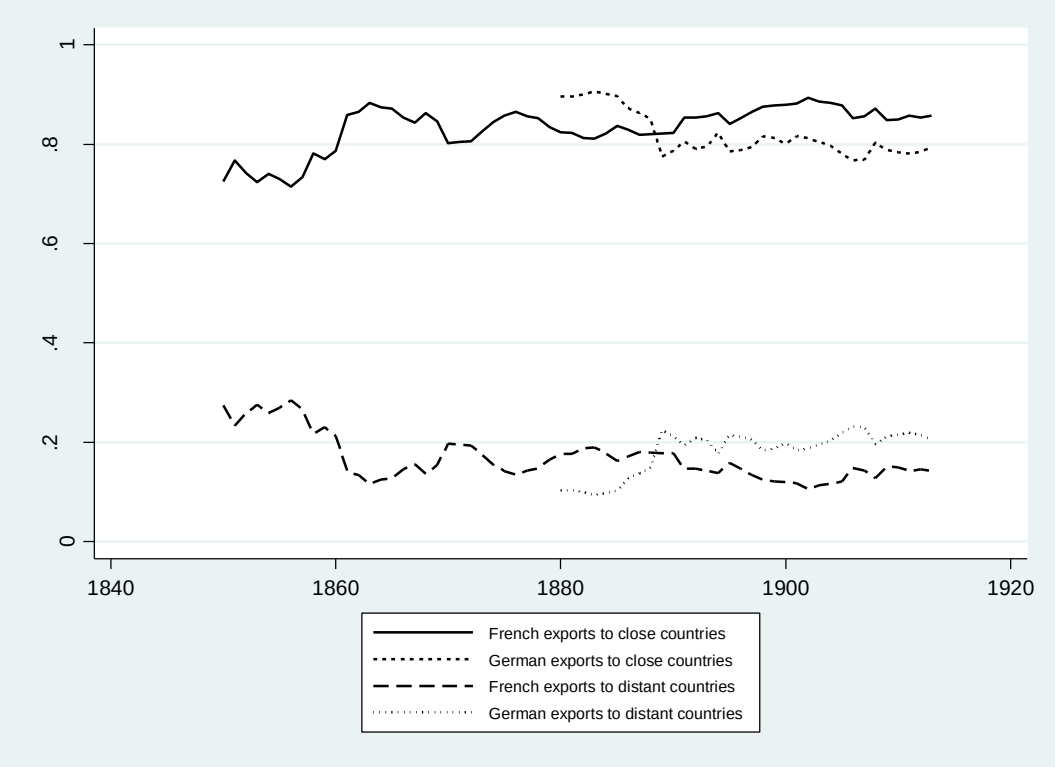
Country	Distance	Area	Country	Distance	Area
Algeria	Close	Africa	Mexico	Distant	Latin America
Argentina	Distant	Latin America	Morocco	Close	Africa
Australia	Distant	Asia Pacific	Netherlands	Close	Europe
Austria	Close	Europe	Norway	Close	Europe
Belgium	Close	Europe	Peru	Distant	Latin America
Brazil	Distant	Latin America	Philippines	Distant	Asia Pacific
Bulgaria	Close	Europe	Portugal	Close	Europe
Chile	Distant	Latin America	Romania	Close	Europe
China	Distant	Asia Pacific	Spain	Close	Europe
Colombia	Distant	Latin America	Sweden	Close	Europe
Denmark	Close	Europe	Switzerland	Close	Europe
Egypt	Close	Africa	Tunisia	Close	Africa
Germany	Close	Europe	Turkey	Close	Europe
Greece	Close	Europe	United Kingdom	Close	Europe
Italy	Close	Europe	United States	Distant	United States
Japan	Distant	Asia Pacific	Uruguay	Distant	Latin America

Figure 1: Share of close and distant countries in French and German imports



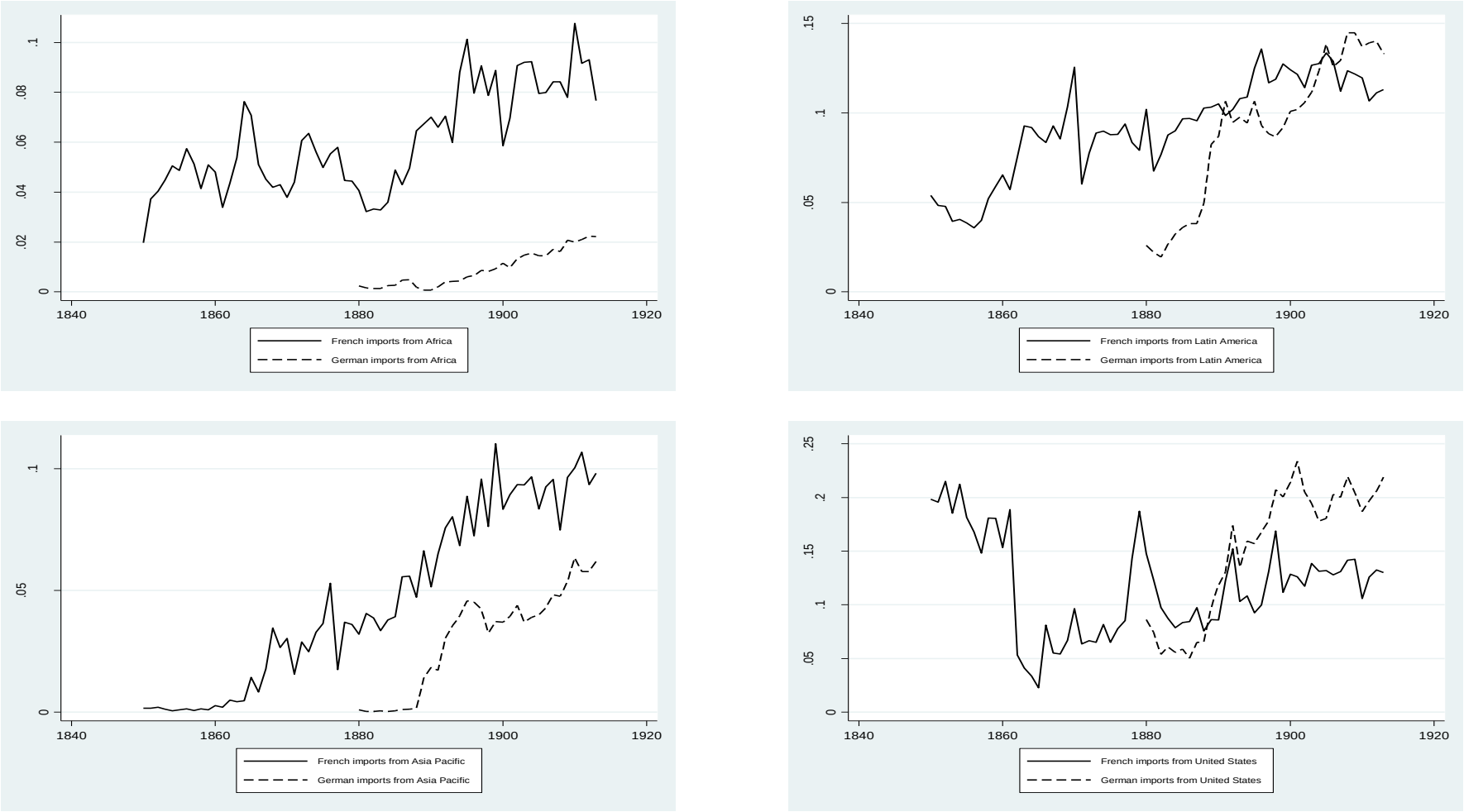
Source: Tableau général du commerce et Tableau général de la navigation (France); Ricardo database (Germany). Authors' calculation.

Figure 2: Share of close and distant countries in French and German exports



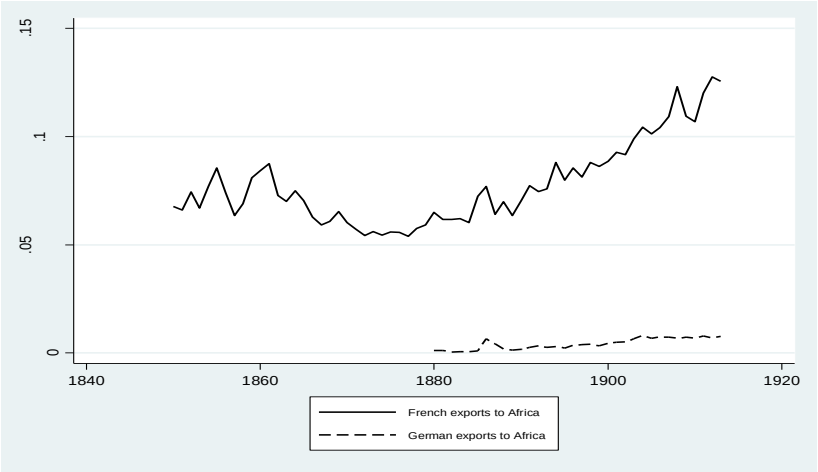
Source: Tableau général du commerce et Tableau général de la navigation (France); Ricardo database (Germany). Authors' calculation.

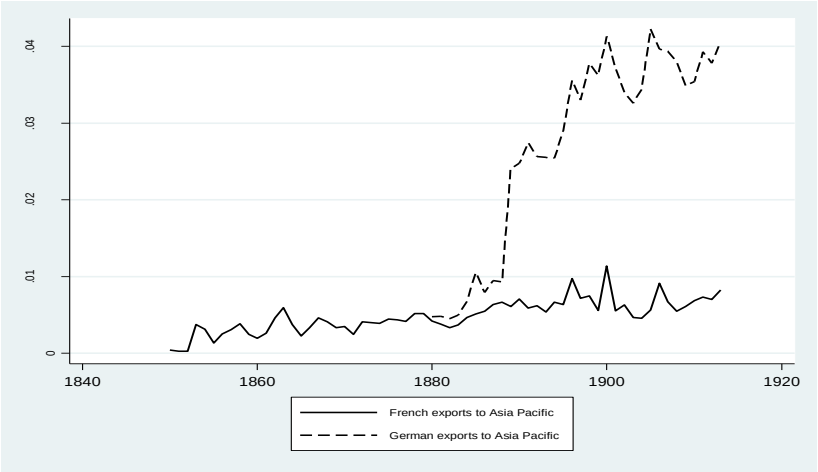
Figure 3: Share of different areas in French and German imports.

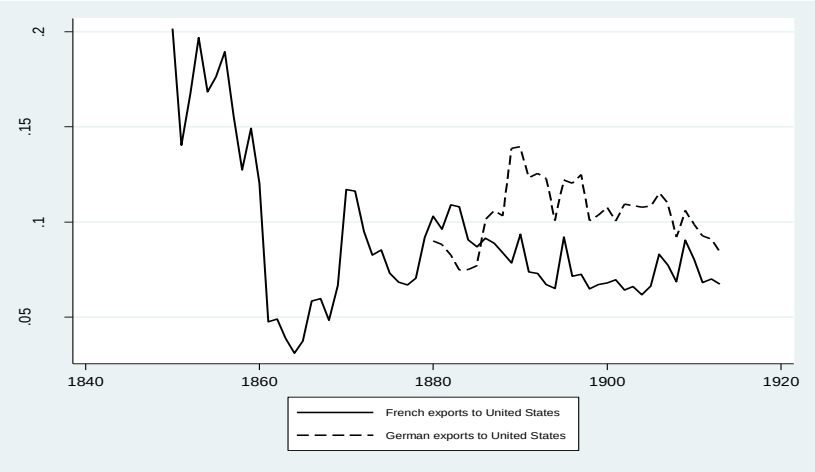


Source: Tableau général du commerce et Tableau général de la navigation (France); Ricardo database (Germany). Authors' calculation.

Figure 4: Share of different areas in French and German exports.







Source: Tableau général du commerce et Tableau général de la navigation (France); Ricardo database (Germany). Authors' calculation.

Table 1: Average annual growth rate of GDP per capita (%).

	1850-1913	1870-1913	1850-1870	1870-1890	1890-1913
Europe	1.22	1.30	1.03	1.27	1.38
Africa	na	0,81	na	na	na
Latin America	1.07	1.59	0.92	1.43	1.74
Asia Pacific	0.85	0.93	0.78	1.08	0.70
United States	1.72	1.82	1.53	1.65	1.96
All countries	1.17	1.25	1.01	1.29	1.39

Source: Maddison Project Database. Authors' calculation.

Table 2: Average GDP per capita (1990 constant dollars).

	1850	1870	1890	1913
Europe	1463	1645	2186	2872
Africa	na	640	na	915
Latin America	809	1234	1721	2129
Asia Pacific	1085	1291	2003	2021
United States	1806	2445	3728	5301
All countries	1353	1422	2094	2204

Source: Maddison Project Database. Authors' calculation.

Table 3: Gravity model estimates for France and Germany (imports and exports).

	IMPORTS											
	France 1850-1913				France 1880-1913				Germany 1880-1913			
	OLS	PPML	OLS	PPML	OLS	PPML	OLS	PPML	OLS	PPML	OLS	PPML
constant	8.176***	12.310	5.869***	2.793***	15.703***	6.691***	5.697***	3.651***	20.012***	14.175***	6.708***	20.784**
	(4.24)	(0.61)	(6.54)	(3.73)	(19.42)	(8.38)	(3.97)	(3.32)	(7.46)	(3.25)	(3.45)	(2.14)
ln(GDPj)	0.309*	0.414***	0.840***	0.671***	-0.093	0.491***	0.865***	0.673***	-0.205	0.343**	0.737***	0.487***
	(1.73)	(2.91)	(30.59)	(45.15)	(-0.54)	(2.71)	(27.29)	(36.04)	(-0.94)	(2.14)	(22.50)	(19.48)
ln(distance)	-0.288	-1.701	-1.248***	-1.362***	-0.164	-1.050***	-1.017***	-1.237***	-0.733***	-0.741***	-1.117***	-1.188***
	(-0.50)	(-0.87)	(-12.76)	(-15.41)	(-0.43)	(-2.61)	(-6.24)	(-9.59)	(-3.71)	(-5.66)	(-4.63)	(-8.07)
trend	-0.061***	-0.031***	-0.034**	-0.029***	-0.103***	-0.056***	-0.062***	-0.057***	-0.122***	-0.120*	-0.108***	-0.227
	(-5.92)	(-4.04)	(-2.35)	(-2.68)	(-8.47)	(-5.18)	(-2.63)	(-3.71)	(-6.89)	(-1.92)	(-3.22)	(-1.48)
trend * ln(distance)	0.012***	0.007***	0.007***	0.007***	0.015***	0.007***	0.006**	0.006***	0.025***	0.015***	0.019***	0.016***
	(9.74)	(7.35)	(4.71)	(4.99)	(10.37)	(5.60)	(2.39)	(3.62)	(9.97)	(9.97)	(4.61)	(6.70)
Country dummies	Yes	Yes	No	No	Yes	Yes	No	No	Yes	Yes	No	No
Area dummies	No	No	Yes	Yes	No	No	Yes	Yes	No	No	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1118	1145	1118	1145	705	706	705	706	688	706	688	706
R^2 overall	0.909	0.915	0.621	0.819	0.945	0.930	0.611	0.815	0.932	0.967	0.568	0.716
	EXPORTS											
	France 1850-1913				France 1880-1913				Germany 1880-1913			
	OLS	PPML	OLS	PPML	OLS	PPML	OLS	PPML	OLS	PPML	OLS	PPML
constant	9.804***	4.138***	9.331***	7.432***	13.623***	7.844*	8.258***	9.370	11.232***	3.083	4.856***	10.936
	(10.76)	(3.65)	(10.87)	(15.01)	(23.71)	(1.95)	(6.17)	(0.90)	(7.04)	(0.62)	(3.61)	(0.92)
ln(GDPj)	0.271	0.913***	0.825***	0.935***	0.784***	1.204***	0.842***	0.947***	0.400***	0.659***	0.634***	0.466***
	(1.40)	(9.19)	(30.43)	(51.50)	(4.50)	(9.93)	(31.76)	(40.87)	(2.74)	(4.53)	(23.53)	(19.53)
ln(distance)	-0.259	-1.638***	-1.757***	-2.699***	-1.673***	-2.418***	-1.486***	-2.793***	-0.903***	-0.695***	-0.592***	-0.383***
	(-0.63)	(-6.44)	(-19.86)	(-33.44)	(-4.29)	(-9.12)	(-10.30)	(-25.10)	(-6.11)	(-5.17)	(-3.64)	(-2.87)
trend	0.058***	0.072***	0.085***	0.074***	0.030***	0.038	0.070***	0.042	-0.042***	0.056	-0.023	-0.058
	(9.33)	(16.53)	(7.80)	(9.78)	(3.70)	(0.62)	(3.47)	(0.26)	(-4.02)	(0.79)	(-1.07)	(-0.31)
trend * ln(distance)	-0.004***	-0.009***	-0.009***	-0.009***	-0.003***	-0.010***	-0.009***	-0.008***	0.011***	0.002***	0.008***	0.003
	(-3.71)	(-12.54)	(-5.94)	(-9.34)	(-3.34)	(-11.55)	(-3.87)	(-5.76)	(8.46)	(2.77)	(3.06)	(1.33)
Country dummies	Yes	Yes	No	No	Yes	Yes	No	No	Yes	Yes	No	No
Area dummies	No	No	Yes	Yes	No	No	Yes	Yes	No	No	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1082	1145	1082	1145	671	672	671	706	688	706	688	706
R-squared	0.961	0.979	0.847	0.898	0.977	0.988	0.870	0.901	0.957	0.974	0.675	0.657

Notes: Robust t-statistics into brackets. OLS is ordinary least squares estimator and PPML is Poisson pseudo maximum likelihood estimator.

*** Significant at 1%; ** Significant at 5%; * Significant at 10%.

Table 4: Gravity model estimates (PPML) for French and German exports.

	France 1850-1913		France 1880-1913		Germany 1880-1913
	(1)	(2)	(3)	(4)	(5)
constant	9.674***	10.981***	10.698***	11.645***	7.408***
	(18.17)	(19.86)	(16.26)	(17.44)	(11.19)
ln(GDPj)	0.957***	0.960***	0.977***	0.963***	0.474***
	(53.91)	(48.16)	(42.80)	(39.85)	(20.16)
ln(distance)	-3.153***	-3.214***	-3.304***	-3.288***	-0.225***
	(-34.43)	(-34.60)	(-25.77)	(-28.88)	(-2.99)
ln(1 + nb trade agreements)	0.316***		0.293***		0.048
	(11.07)		(8.35)		(1.02)
ln(average tariff)		-0.138***		-0.144***	
		(-8.66)		(-7.83)	
Observations	1145	1095	706	688	706
R-squared	0.927	0.897	0.931	0.905	0.653

Notes: Robust t-statistics into brackets. Area dummies and year dummies included.

*** Significant at 1%; ** Significant at 5%; * Significant at 10%.

Table 5: Number of trade agreements signed by France and Germany.

	France 1850-1913	France 1880-1913	Allemagne 1880-1913
Close countries	64	43	25
Distant countries	27	11	7
Europe	64	43	25
Africa	0	0	0
Latin America	22	6	5
Asia Pacific	0	0	0
United States	5	5	2
Total	91	54	32

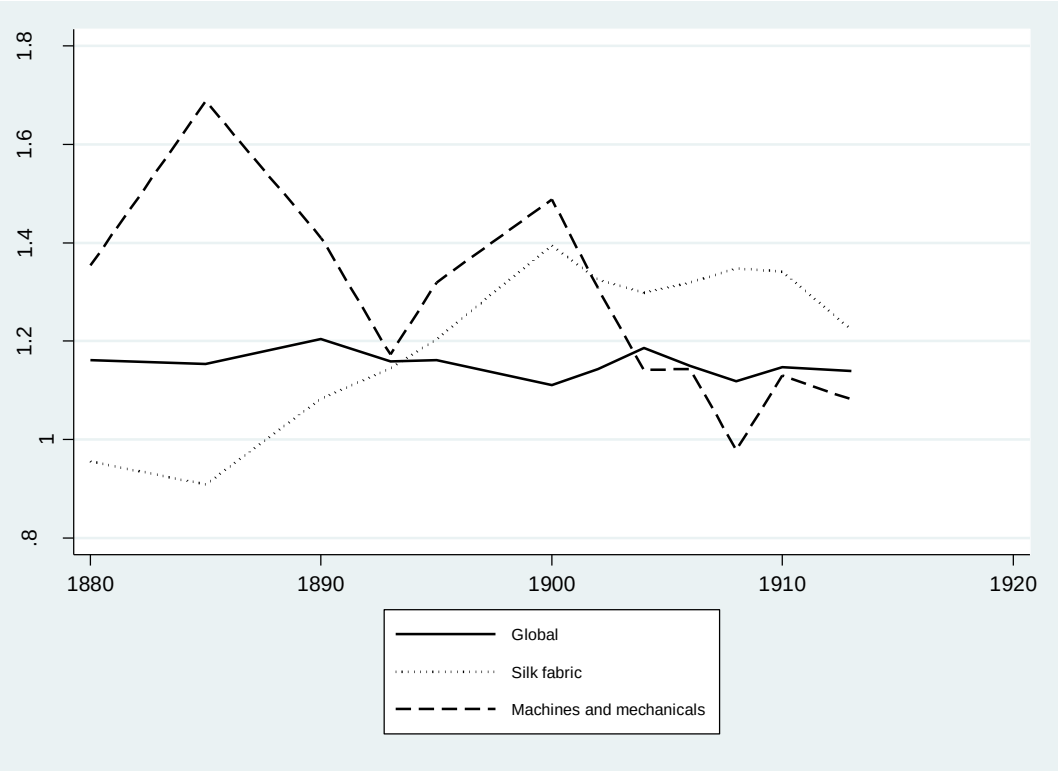
Source: Pahre (2008). Authors' calculation.

Table 6: France's average tariff rate (%).

	1850-1913	1850-1880	1880-1913
Europe	5.79	3.32	7.98
Africa	2.30	3.27	1.46
Latin America	9.01	7.65	10.26
Asia Pacific	10.76	12.57	9.08
United States	8.81	5.39	11.83
All countries	6.77	5.48	7.92

Source: Tableau général du commerce et Tableau général de la navigation. Authors' calculation.

Figure 5: Index of competitiveness of French products compared with German products.



Source: Tableau général du commerce et Tableau général de la navigation. Authors' calculation.

Table 7: Lafay index for silk fabric and machines and materials.

	1897	1898	1899	1900	1901	1902	1903	1904	1905
France									
Silk fabric	3.1	2.96	2.62	2.47	2.51	2.81	2.66	2.32	2.54
Machines and mechanicals	-0.25	-0.08	-0.41	-0.75	-0.68	-0.60	-0.43	-0.58	-0.63
Germany									
Silk fabric	0.07	0.45	0.34	0.35	0.34	0.22	0.32	0.29	0.20
Machines and mechanicals	1.94	2.11	2.12	2.42	2.4	2.26	2.38	2.38	2.48

Source: Tableau général du commerce et Tableau général de la navigation (France); Statistisch des Deutschen Reichs – Reue Folge Spezialhandel im Jarhe (Germany). Authors' calculation.