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# Three essays on French colonial trade

A dissertation submitted in partial fulfillment of the requirements for the degree of

## PHD IN BUSINESS ADMINISTRATION FROM ESSEC BUSINESS SCHOOL

To be presented and defended publicly the 28th of June 2016 by

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# Abstract

This thesis consists of three empirical papers on French colonial trade patterns: Chapter 1 presents an original database on colonial trade statistics from French archives. Its main purpose is to describe the construction of this dataset and to present some stylized facts about the dynamic and trend of French sectoral trade with French and non-French colonies and well as with other sovereign countries for the period starting 1880 until the eve of the WWI. The statistics highlight a common stylized fact regarding French trade with French colonies. In particular, we found that French trade with its colonies was mainly based on imports of primary products and exports of manufactured goods meaning that the Empire was used as the main dispenser of French exports and their main provider of natural resources. Statistics also emphasize that the event of colonization was followed by an increase in trade between France and its own colonies, while colonization from Britain and other metropolis did not impact trade between France and British/ other colonies. The chapter finally reveals that trade with French colonies was unbalanced and unidirectional, they do not reveal any advantage in favor of those colonies. Chapter 2 investigates how the colonial strategy through the settlement decision affected French trade patterns. Using a gravity model, results show that French colonies with more European settlements traded more with France, whereas the opposite is true for other colonies. The chapter provides a framework to discuss different factors through which European settlements might have affected the French trade pattern with colonies, namely, the establishment of formal institutions, the use of common language with Europeans and the duration of colonization. We find that better formal institutions brought by European settlements had a negative impact on trade with French colonies, while they promoted French trade with British colonies. These results are consistent with the extractive nature of French trade relations with its colonies. As for the use of common language and the duration of colonization, the stronger those ties the

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higher the overall French trade with French colonies but the lower French trade with other colonies. Finally in the last chapter we investigate the relation between the type of goods colonies exported to France and those economies' later development. A common explanation for the export-growth nexus is the quality of institutions established in those colonies during the colonial period. In order to investigate the impact of colonial trade on current growth through the mediation of institutions, we apply the Partial Least Squares Structural Equation Modelling. With this method we are able to simultaneously derive the relative importance of trade and of institutions on growth, while taking into account multicollinearity between the variables, their measurements errors and small sample size issues. The results suggest an important joint role for both trade and institutions in determining economic development in the long run. In particular French colonies who exported raw material developed extractive institutions, which negatively affected development today, while those who exported manufactured goods experience better economic performance today. Among British and other colonies, however, higher exports of both raw materials and of manufactured goods to France are associated with better institutions, which lead to better economic performance in the long-run.

# Résumé

Cette thèse se compose de trois études empiriques sur le commerce colonial Français. Le premier chapitre présente une base de données originale sur les statistiques commerciales coloniales provenant des archives Françaises. Son but principal est de décrire la construction de cet ensemble de données et de présenter quelques faits stylisés au sujet de la dynamique et de la tendance du commerce sectoriel Français avec les colonies françaises et non-françaises, ainsi qu'avec d'autres pays souverains pour la période étalant de 1880 à la veille de la première guerre mondiale. Les statistiques mettent en évidence un fait stylisé commun du commerce Franco-colonial. En particulier, le commerce de la France avec ses colonies a été principalement basé sur les importations de produits de matière première et sur les exportations de produits manufacturés. Cette évidence confirme que l'Empire colonial a été un débouché principal pour exportations de la France et un réservoir essentiel de matières premières. Les statistiques montrent également que suite à la colonisation des colonies Françaises, les échanges commerciaux entre la France et ses colonies ont augmenté, tandis que la colonisation de la Grande-Bretagne et des autres métropoles n'a pas affecté le commerce entre la France et colonies Anglaises et Européennes. Le chapitre révèle que le commerce de la France avec ses colonies ne présentait pas d'avantage comparatif en faveur de ces dernières. Le deuxième chapitre étudie comment la stratégie coloniale illustrée par le nombre des colons Européens installés dans les colonies a affecté la structure du commerce Français. On applique un modèle de gravité dont les résultats montrent que les colonies Françaises ayant plus de colons Français dans leurs territoires s'engagent plus dans des relations de commerce avec la France, alors que l'inverse est vrai pour les autres colonies. Ce chapitre examine en outre des canaux par lesquels l'installation des colons Européens pourrait avoir affecté les échanges commerciaux entre la France et les colonies: la mise en place d'institutions formelles, l'utilisation d'un langage commun avec les Européens et

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la longue durée de la colonisation. Les résultats montrent que meilleures sont les institutions dans les colonies Françaises, moins est le commerce avec la France, alors que ces meilleures institutions facilitent le commerce de la France avec les colonies anglaises. Ces résultats sont cohérents avec la nature extractive du commerce Franco-colonial. L'utilisation d'un langage commun et la longue durée de colonisation ont un impact positif sur le commerce de la France avec ses colonies, mais un impact négatif sur le commerce avec les autres colonies. Enfin, dans le dernier chapitre, on étudie la relation entre le type de biens que les colonies exportent vers la France et la croissance économique ultérieure de ces pays. Une explication commune pour le nexus exportations-croissance est la qualité des institutions établies dans ces colonies pendant la période coloniale. Afin d'étudier l'impact du commerce colonial sur la croissance économique par l'intermédiaire des institutions, on applique l'approche PLS du modèle d'équations structurelles. Grâce à cette méthode, nous sommes en mesure de tirer simultanément l'importance relative et du commerce et des institutions sur la croissance, tout en tenant compte des problèmes de multicollinéarité entre ces variables, leurs erreurs de mesures et des problèmes de taille de petits échantillons. Les résultats évoquent un rôle commun et important du commerce colonial et de la qualité des institutions en déterminant la croissance économique des pays à long terme. En particulier les colonies françaises qui ont exporté des matières premières à la France ont développé des institutions extractives, ce qui a affecté négativement leur développement aujourd'hui, tandis que celles qui ont exporté des produits manufacturés performant mieux économiquement aujourd'hui. Parmi les colonies anglaises et les autres colonies européennes, les exportations de matières premières et de produits manufacturés vers la France ont contribué à de meilleures institutions et donc à un meilleur développement économique à long-terme.

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# Introduction

A number of former colonies have struggled to attain high levels of economic development and remained lagging behind other countries. Such disparities were subject to long lasting debates on their causes. Some explanations attributed them to colonial legacies and what they brought about in terms of technological advances, human capital (Glaeser et al., 2004), economic exploitation through trade (Alam, 1994; Dollar and Kraay, 2003; Bates and Block, 2010), and, most prominently, institutions (Acemoglu, Johnson, and Robinson, 2001, 2005). While others attributed those disparities to geographical conditions, initial endowments, and access to natural resources (Engerman and Sokoloff, 1997; Sachs and Warner, 1995).

The explanations mentioned above acknowledge a link between colonial legacies on one hand, institutions and trade on the other. As a matter of fact, historians report that colonial trade boosted during the period of colonial expansions by the British and the French (Pakenham, 1992) suggesting that colonial acquisitions had trade motives. Historians further argue that economic exploitation through trade is associated with the type of institutions introduced by those colonizers. This aspect of colonialism had a longstanding influence on current economic disparities among the former colonies (Acemoglu et al., 2001; 2012 Alam, 1994; Bertocchi and Canova, 2002; Kwon, 2011; Lange et al., 2006; Nunn, 2008). However, research on French historical trade statistics prior to 1950 was modest. This was mainly due to the lack of reliable data and to the fact that the focus of history departments, in most countries, was on social rather than on economic history.

My thesis contributes to the literature by putting together and exploring a new dataset on colonial French trade that was previously underutilized and only recently is being looked into (Becuwe et al., 2015), and by investigating the long-term impact of French colonial trade on institutional choice and economic performance in the former colonies today.

In what follows we attempt to highlight the link between colonial French trade patterns, the Europeans settlement decisions, and institutions during colonial era and how those factors influenced economic performance in the colonies today. The thesis also compares French trade patterns with French colonies to those patterns with other colonies. We finally argue that those factors could partially explain the economic disparities highlighted above. Overall, the conclusions lend support to the hypothesis that long term economic growth partially depends on institutional colonial legacies shaped by the trade patterns.

We constructed a new data set with more than 20,000 observations containing information on the value of French imports and exports with each of its trading partners between 1880 and 1912. Given the size of the data, the collection and organization of French trade statistics was a challenging task. The data were collected from "Tableau General du commerce" which is the most complete and reliable source, as it is the official database of the French Customs. Our data contain information on the exports and imports of France, dis-aggregated into four sectors: agricultural raw materials, food, raw material necessary for industry, and manufactured goods.

Throughout the three chapters, this thesis will study French trade patterns with the different groups of colonies and their key role in institutional and economic development. Our data can further help economists interested in trade, economic development and early globalization to explore new questions. We note that some ideas, figures and appendices are repeated across chapters because each one is written in the form of a self contained article.

Chapter one provides a comprehensive description on the collection, mining and organization of French trade statistics. In order to gain some perspective on the French trade patterns with its various trading partners during the colonial reign, and in an attempt to answer the ambiguity of whether French colonial trade was solely extractive, this paper presents some stylized facts of French imports and exports by sector from 1880 until 1912 with French colonies, British colonies, other colonies, former colonies, European and sovereign non-European countries.

That chapter first describes the data and highlight some quantitative indicators from the statistics that can give a flavor of whether the nature of trade was extractive or not.

Previous historians tried to understand the impact of colonial trade with France on the colonies. Jacques Marseille (1984), for instance, spent a decade and a half trying to dig into the question of profitability of French colonial policy, concluded that French colonial markets were used as



both a buffer to the French trade in times of crisis, and as profitable outlets for French products in times of expansion. Others argue that European powers viewed their colonies as a way of setting up trade policies that would favor trade with the metropole (Estevadeordal et al., 2002), ensuring both favorable and secured markets for trade (Crowder, 1968), expropriating cheap land and labor (Lenine, 1916), and exploiting natural resources (Alesina, 2002).

More generally, Karl Marx regarded trade as the driving force of mercantilism and imperialism, and its most visible result, colonialism (Svedberg, 1961). Hobson (1902) and Lenine (1916) suggested that colonization was a mean for the capitalist economies to exploit low wage labor, low cost land and capital, extracting the full economic profit through the exchange of goods. Furthermore, Mitchener and Weidenmier (2008) argue that, prior to the industrial revolution, colonial acquisitions were continuously sought by imperial powers to complement their growing economies, which ultimately affected colonial trade.

The opponents of the Marxist theory claim that exploitation could not have been the main reason behind colonization, since the share of colonial trade in the international French markets before World War I did not exceed 15% (essays from various officials, cited from Marseilles, 1984). However, the calculation of those percentages does not take into account the size of countries nor their population, hence only account for the importance of such exchange at the metropolis level but not at the colony level. Moreover, as Cohen (1968) states, the fact that the empire represented only a relatively limited source for raw materials and it was not the major recipient of French capital exports does not prove that expansionism was not motivated by commercial motives.

Our interpretation of those statistics allows us to conclude that, on average, French exports towards the French colonies grew after the colonization event, whereas colonization did not affect French trade with other countries. France seem to be the main trading partner of its colonies, importing their raw agricultural goods and exporting to those colonies their manufactured products. Statistics also show that the French colonies have a "revealed comparative advantage" in agricultural goods with France.

Finally, the first chapter of this thesis offers an overview of French trade with each of its trading partners during the colonial reign, containing many informative figures and stylized facts regarding French sectoral exports and imports that are compatible -without excluding other explanations- with Jules Ferry's extractive policy. Our findings are compatible with those of (Amin, 1971, 1973) and

(Lavallee Lochard, 2012), who deduced that the French benefited from low-cost imports, especially agricultural goods, and from some trade agreements that gave large advantages to French exports.

Chapter two explores the idea that colonial trade has been emphasized as one of the main tools of colonial extraction, while the extraction itself is widely held to have been the driver of colonization. European powers established their colonial control by settling in the colonies and exploiting their resources through trade. This assertion is not new to the literature and can be traced back to Hobson, Lenin and on down to Marxist thinkers, who regarded trade as the prime cause of imperialist expansion (Kleiman, 1976). French colonization in particular offer a representative example: French colonizers settled namely in the form of military troops, imposed territorial powers, and set up trade policies and preferential trade agreements in order to transfer resources from the colony to themselves and secure favorable markets for their products (Crowder, 1968).

In particular, this second chapter investigates whether the number of European settlers (hereafter ES) in 1900's in the colonies affected France's trade values and patterns with those colonies, as well as whether trade patterns differ if the trading partner were a French colony or other colonies. Investigating the impact of ES on trade, rather than using just a colonization dummy, may offer new insights. Colonization as an abstract event cannot be quantified; however, its degree can be measured through the number of citizens that actually settled in a colony. Settling in their colonies was a way to concretize colonization. Second, the presence (or absence) of European settlers actually affected the type of institutions set by the colonial administration and trade patterns of European trading companies. In some French colonies in Africa, for instance, where production was in the hands of domestic farmers, European settlers facilitated large companies to lobby the colonial government and establish a controlled system of marketing based on an oligopoly of firms, and in turn the colonial administration generally supported the activity of trading companies by implementing coercive institutions (Hopkins, 1973). Differently, in British colonies production was often controlled by the European settlers who already had a political influence before the colonial government. Hence, the cost of imposing extractive institutions was higher (Tadei, 2013). Whether production was organized through small domestic farmers or plantation companies, trade revolved around the activity of European trading firms whose relation with settlers is necessary. Therefore, colonies with different levels of settlement were not likely to experience the same degree of control from the empire. The first part of this chapter hypothesizes that, if the French settled in their colonies for the purpose of

exploiting their raw materials and using their markets to sell their products, one would expect more French imports of raw materials and exports of manufactured goods as a result of this settlement. However, if the British or other Europeans settled in their respective colonies, this would not necessarily increase French imports of other colonies' raw materials. Those colonies are more likely to engage in favorable trade with France, that is, trade that is mutually beneficial. Our empirical investigation was carried on using the same data set on the value of French imports and exports we have initially constructed.

We find that higher French settlement increased the overall French imports and exports from French colonies. The impact is stronger with respect to imports of raw materials, suggesting that French settlements did facilitate the extraction through trade. The British or other European settlements in their respective colonies had a negative impact on the trade of those colonies with France.

The second part of this chapter seeks to identify the channels through which those settlements impacted French trade patterns with the various groups of colonies. We argue that ES had two interrelated effects on colonial trade, the first one is related to sharing a common language with the European settlers and to the duration of colonization. Those two indicators can contribute to strengthening some networking ties developed through the settlers presence and through the reduction of transaction cost. For what follows, and for simplicity we will name those two items as the networking effect. The second effect is related to the type of formal institutions the colonizers established namely the level of democracy and level of the constraints on the executive.

With respect to the network effect, in a recent study on the causal relationship between migration and trade, Canavire Bacarreza and Ehrlich (2006) show that the presence of foreign immigrants in Bolivia and of Bolivian emigrants abroad have positive and significant effects on Bolivian bilateral trade. A similar argument can be applied to the colonial era. European settlers brought more than just formal institutions to the New World: they brought informal ones as well in the form of human and physical capital. Settlers also promoted their language and culture and also got acquainted with the culture, habits, and traits of the colonies, thereby reducing transaction costs and facilitating trade.

The other channel we exploit through which ES may impact trade refers to the relation between ES and the establishment of formal institutions. In their paper on the colonial origins of development, Acemoglu, Johnson and Robinson (2001) (hereafter, AJR) argue that European set-

tlers established European-style institutions with property rights, checks and accountability for the governor, and higher levels of democracy. Those institutions persisted and impacted positively the economic performance of those countries who inherited the "good" institutions. Recent studies, on their turn, show that a higher quality of institutions exerts significant positive effects on bilateral trade flows due to the lower transaction cost and higher level of trust they produce (Briant et al., 2009; De Sousa and Lochard, 2010; De Groot et al. 2004; Linders, 2004).

Combining these two arguments, we claim that the establishment of "good" introduced by the colonizer would promote favorable trade between the colonizer and the colonies. More specifically, if, for instance, British settlers introduced good institutions, this would result in favorable trade between France and British colonies. On the other hand, if French settlements introduced policies that perpetuated inequality and exploitation, it should increase the level of extractive trade.

We then examine the impact of ES through formal institutions and common language and duration of colonization separately. As argued earlier, common European language and duration of colonization of the European colonizer are capturing some networking ties, while the formal institutions are reflected under democracy and constraints of the executive variables. We estimate the predicted value of ES explained by each of these variables to try and disentangle the part of ES corresponding to common language and to duration of colonization and the part corresponding to the formal institutions.

We find that, in French colonies, the worse the formal institutions, the higher the French imports of raw material and the French exports of manufactured goods from those colonies to France. These results confirm our hypothesis stated earlier that France was better at exploiting its colonies in the presence of extractive institutions. On the other hand, higher institutional quality in the British colonies is associated with higher trade between those colonies and France confirming also that better formal institutions promote favorable trade in the absence of power imbalance between the two trading partners.

As for the networking effect (expressed by common language and duration of colonization), we find that stronger networking between France and its colonies increased French exports and imports in French colonies, with the highest magnitude attributed to French imports of raw agricultural goods. In the French colonies, the positive impact of networking effect of ES is complementary to that of the negative impact of formal institutions in the sense that extractive policies can be more

easily implemented whenever the colonizer have acquired greater power through longer period of colonization and sharing some common language. This in turn, would boost extractive trade. We also find that the longer the British colonized and their respective colonies the more they share a common language with the indigenous population, the lesser the trade between those colonies and France.

Chapter three investigates the puzzling phenomenon of "Natural resource curse" that some countries and regions that specialize in exporting their abundant natural resources and agricultural commodities become trapped in their resource advantages, so that such trade have no or even negative impact on the growth of the country. In particular, we explore the idea that the impact of exports and the exploitation of natural resources on growth may be mediated by the quality of domestic institutions introduced during colonial era. Actually, according to Auty (2001), Mikesell (1997) and Gelb (1988), a negative relation between growth and specialized trade may be the result of the quality of institutions. A weak governance disables a country to transform its resources into other productive assets.

In particular, we argue that resource abundant colonies tended to attract extractive institutions built for the purpose of transferring resources from the colony to the colonizer. Lange et al. (2006) states that Spain settled in regions rich in minerals and set up complex mercantile systems of monopolies and trade regulations in order to obtain gold and other valuables; Britain based its decision to settle (among others) on the natural characteristics of the country that would favor agricultural production.

To help address this issue, our empirical investigation rests on three premises: First, according to Sachs and Warner (1995) and to Mehlum et al. (2006), resource abundance is usually associated with the relative size of primary exports. Empirical evidence provided by Leamer (1984) and Treffer (1995) confirms that the relative abundance of oil leads to net exports of crude oil and that of coal and mineral leads to net exports of raw materials. In our empirical analysis, we will study the colonial exports of primary goods to France, which we argue to be an indicator of the abundance of natural resources in the colony. Second, there were various types of colonial institutions. At one extreme, there were the extractive states, which "main purpose was to transfer as much resources from the colony to the colonizer" (Acemoglu et al., 2001, p. 2). There were also colonies with institutions that replicated the European style ones, with constraints and checks over government

power. In particular, the mix of products that the colonizer imports from the colony is informative about the type of institutions set by the colonizer. Whenever the colony is rich in raw material, such as sugar or gold, with potential extraction opportunities, institutions tend to be coercive in order to facilitate such extraction (Acemoglu et al., 2001). On the contrary, if the country specializes in the production of manufactures, trade empowers merchants that supported pro-business institutions and constraints on the executive. Finally, the colonial institutions set during the colonial reign persisted and had a long-term impact on today's economic growth (Acemoglu et al., 2001).

The relation between French imports from colonies and colonial institutions depend in part on whether those institutions were necessary to increase the rent extracted from the colonizer through colonial trade: A negative relation establishes that colonies exporting relatively more to France developed worse institutions. This result would suggest that the colonizer favors more extractive institutions to increase the rent from trade. A positive relation, on its turn, would imply that trade is beneficial to both parties and that good institutions are necessary to increase such trade. For instance, if domestic merchants and not only the colonizer were gaining from trade with France, they would push for better institutions.

We apply a new estimation method, namely, Partial Least Square Structural Equation Modeling (PLS-SEM), initially proposed by Herman Wold (1966), which is a particular form of Structural Equation Modeling (SEM). This method, which combines both factor analysis and traditional multivariate regression models, has a number of attractive statistical features not present in the traditional econometric models. In particular, it allows the conduction of several regressions simultaneously under one model, where the variables used in those regressions could be either observed or unobserved. This method also deals with multicollinearity issues. Furthermore, this model allows for comparisons of coefficient results across different groups of colonies and then produces a multi-group analysis to see whether there are any significant differences among the coefficients of each colonial group.

We find, at the pooled sample level, that more colonial exports to France, of either primary or manufactured products, are correlated with better colonial institutions. Moreover, we find that colonial institutions are positively correlated with current institutions, and that better current institutions are correlated with better economic outcomes. French imports did not have a direct significant impact on economic performance. However, its impact through better institutions was positive and

significant.

Within the multigroup analysis, we find that, among French colonies, higher colonial exports of raw material to France is associated with worse colonial institutions, while higher colonial exports to France of manufactured goods does not affect the type of colonial institutions. These results confirm the hypothesis that France set up extractive institutions to be able to extract more. Such impacts are significantly different from the impacts of trade on institutions in British and in other colonies. Among British colonies, there is no significant effect of French imports on the British colonial institutions, whereas we find that higher French imports from former/other colonies are associated with better colonial institutions in those colonies. In all cases, the channel through which French imports affect current economic performance goes entirely through institutions.

Finally, among the pooled and the colonial group sample, both the indirect effect of colonial institutions and the direct effect of current institutions on GDP per capita are positive and significant, meaning that institutions persisted over time and have a positive impact on economic growth. Moreover we quantified the indirect effect of colonial institutions on economic performance through the channel of current institutions. While using an econometric technique different from the traditional OLS, our results are still in line with results found in the literature regarding the relation between institutions and growth (Acemoglu et al., 2001).

# Chapter 1

## The French Colonial Trade Patterns: Facts and Impacts

### Abstract

This chapter presents an original database on colonial trade statistics from French archives which will be explored in empirical studies in the other two chapters of this thesis. Its main purpose is to describe the construction of this dataset and to present some stylized facts about the pattern and trend of French sectoral trade with French and non-French colonies, as well as with other sovereign countries for the period starting in 1880 until the eve of the WWI. We detected some interesting patterns in our statistics regarding trade of France with its own colonies and with other colonies. We found that French trade with its colonies was mainly based on imports of primary products and exports of manufactured goods, which is consistent with the idea that the Empire was used as the main dispenser of French exports and their main provider of natural resources. Statistics also indicate that the event of colonization was followed by an increase in trade between France and its own colonies, while colonization from Britain and other metropolis did not impact trade between France and those colonies. Finally, French trade with their own colonies was unbalanced and unidirectional.

### 1.1 Introduction

*"In the area of economics, I am placing before you, with the support of some statistics, the considerations that justify the policy of colonial expansion, as seen from the perspective of a need, felt more and more urgently by the industrialized population of Europe and especially the people of our rich and hardworking country of France: the need for exports. [...] Yes, what our major industries [textiles, etc.], lack more and more are new markets. Why? Because [...] not only are these great markets (Germany and USA) shrinking, becoming more and more difficult to access, but these great states are beginning to pour into our own markets products not seen there before. [...] That is an*



*extremely serious problem. It is so serious, gentlemen, so acute, that the least informed persons must already glimpse, foresee, and take precautions against the time when the great South American market that has, in a manner of speaking, belonged to us forever will be disputed and perhaps taken away from us by North American products. Nothing is more serious; there can be no graver social problem; and these matters are linked intimately to colonial policy."* (Ferry, 1884)

In his speech above, before the chamber of deputies in 1884, Jules Ferry, France prime minister (1880-1881, 1883-1885) lists a variety of reasons for why colonial expansions are necessary for France. The most prominent one is the need to engage in trade in order to promote their local manufactures in new markets. The thrust of his argument was that, while European markets were becoming harder to access, colonial markets could become a profitable alternative in order for France to sell its products and to acquire raw materials. He restates the same argument thirty years later in his speech to the parliament in 1911 "Colonial policy is the "daughter" of industrial policy" (Brunschwig, 1966, p.80).<sup>1</sup>

Actually, one infers from Ferry's speech, that extracting the colonies' raw materials and securing solvable markets for French products is the real reason behind colonization. To gain some perspective on the French trade patterns with its various trading partners during the colonial reign, I constructed a new data set with more than 20,000 observations containing information on the value, in French Francs, of French imports and exports with each of its trading partners between 1880 and 1912. The data were collected from "Tableau General du commerce" which is the most complete and reliable database, as is the official data of the French Customs. Our data contain information on the exports and imports of France, dis-aggregated into four sectors: agricultural raw materials, food, raw material necessary for industry, and manufactured goods.

The dataset allows the conduction of a comprehensive description of French imports and exports by sector from 1880 until 1912 with French and non-French colonies as well as with European and sovereign non-European countries. I compute some trade indicators and derive some stylized facts from those statistics that help describing the nature of trade between France and its partners. Through those indicators I try to identify the extractive nature of colonial trade. The main purpose of this chapter is a descriptive one. The remaining two chapters of the thesis will exploit this dataset to test the hypothesis that European settlers impacted trade through channels of formal and informal institutions, as well as whether colonial trade impacted current economic performance through the

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<sup>1</sup> La politique coloniale etait fille de la politique industrielle.

channel of persisting institutions.

Previous studies, such as Marseilles (1984) and Markovitch (1966) explored French colonial trade using data on total exports and imports with French colonies (completed with some products). While more recent studies are also currently exploring French trade statistics for the same period (Becuwe et al., 2015). However, the latter studies do not have the bilateral dimension of the trade data, while the former studies do not have exports and imports data by sector, as in this dataset. The analysis of those authors could be enriched with our more comprehensive data.

There is an extensive literature on the role of trade in colonization. In particular, Marseilles (1984) investigated the question of profitability of French colonial policy, and concluded that French colonial markets were used both as a buffer to the French trade in times of crisis and as profitable outlets for French products in times of expansion. Others argue that European powers viewed their colonies as a way of setting up trade policies that would favor trade with the metropolis (Estevadeordal et al., 2002), ensuring both favorable and secured markets for trade (Crowder, 1968), expropriating cheap land and labor (Lenine, 1916),<sup>2</sup> and exploiting natural resources (Alesina, 2002). The opponents of this interpretation claim that exploitation could not have been the main reason behind colonization since the levels of colonial share in the international French markets before World War I did not exceed 15% (essays from various officials, cited from Marseilles, 1984). However, those percentages do not take into account the size of the trading partner nor its population, therefore they reflect the importance of such trade for the metropolis, not the colony. Moreover, as Cohen (1968) states, the fact that the empire represented only a relatively limited source for raw materials, and was not to become the major recipient of French capital exports does not prove that expansionism was not motivated by commercial motives.

Other French officials claim that French colonization was a civilizing mission aiming at cultural, institutional, and economic transmission to less developed men in the overseas territories (essays from colonial governors 1914, cited in Marseilles, 1984). Actually, France adopted the policy of colonial assimilation<sup>3</sup> in its colonies "France considered the counties of Papeete and Dakar and

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<sup>2</sup>In his book, *Imperialism, supreme stage of capitalism*, Lenine criticized France for exercising during the colonial reign "the highest stages of Capitalism".

<sup>3</sup>The French Assimilation concept was based on the idea of expanding French culture to the colonies outside France in the 19th and 20th century. Natives of these colonies were considered French citizens as long as the culture and customs were adopted. This also meant they would have the rights and duties of French citizens.

Insulah only as the distant suburbs of Paris" (Betts, 1961, p.32). However, the fact that the groups advocating imperial expansion were made up predominantly of intellectuals rather than businessmen does not prove that expansionism was not connected with commercial greed (Cohen, 1968).

Bairoch (1989) states in his book that France did not actually depend on its colonies' raw materials; the accounts show the other way around: Acquiring a territory incurred more costs than revenues to the metropolis. According to him, the real reason behind former colonies' lack of growth today is because the metropolis spent a lot of easy money on them making them languorous without any incentive to industrialize or to grow. However, Huillery (2014) claims that the financial transfers from the metropolis to French west Africa account for only 0.007 percent of total metropolitan expenses. On the other hand, Amin (1972) and Lavallée and Lochard (2012) state that the French benefited from low-cost imports, especially agricultural goods, and from trade agreements that gave large advantages to French exports. Those papers approached French colonial legacies from different angles while using different types of data. While (Becuwe et al., 2015), is currently exploiting the same data, our paper adds to their research project the bilateral dimension that allows us to cover almost all countries and hence make a comparative analysis of French relations among various groups.

The statistics suggest that, on average, French exports towards the French colonies grew after the colonization event, whereas such event did not affect French trade with other countries. The French colonies seem to be the main trading partners of France providing it with the raw agricultural goods and importing its manufactures. Statistics also show that the French colonies have a "revealed comparative advantage" with France in agricultural goods. Our overview of French sectoral exports and imports with each of its trading partners during the colonial reign reveal trade patterns compatible -without excluding other explanations- with Jules Ferry's extractive policy.

The paper is organized as follows. Section 2 provides a historical perspective on the link between colonization and trade. Section 3 explains and describes how the data was constructed. Section 4 presents a thorough radiography of the French trade statistics, and the last section concludes.

## **1.2 Colonization and trade: a historical perspective**

Throughout history, it has been known that colonial quests were sought for glory and power rivalry. Colonial imperialism was not only about economic exploitation but rather about the "rela-

tive importance of the totality of economic concerns and the contending totality of non economic concerns" (Frieden, 1994, p.562). For instance, Britain may have increased its size, in part, because it felt threatened – economically, politically, or militarily – by Germany or France's territorial acquisitions. As a result, France had an urgent desire to become a strong and respected global power within the "race" among European powers. In less than thirty years, starting from mid 1870's, most of Africa was colonized and divided up between the British and the French (Pakenham, 1992). Historians have noted that European rivalries were the primary reason why the Great Powers sought out new colonies during the second half of the nineteenth century (Brunschwig, 1966, Coquery-Vidrovitch, 1970; Gallagher and Robinson, 1953; Griffiths, 1993). In particular, Brunschwig (1966) argues that the main motive of French expansionism was the search for national glory, rather than commercial interests.

However, aside from the geopolitical and ideological reasons that lead to colonization, economic reasons such as potential investments, search of raw material and extraction of resources have compounded the struggle for new territorial conquests. Karl Marx, for instance, relates colonization to the relentless search for new markets because of the falling rate of profits, J.A. Hobson to the maldistribution of income, and Rosa Luxemburg to the impossibility of a capitalist system to find an internal market for its products (Griffin and Gurley, 1985).<sup>4</sup> It might have been that Ferry's speech exalting the commercial advantages of empire building were only meant to appease the business community and that the underlying reason behind colonization was still political, but "Ferry knew better" (Brunschwig, 1966). His speeches aimed at showing that, in any case, colonial expansion exists because France needed a commercial outlet, and in order to meet the imperialist objective, one had to engage in trade as a "true, wise and economical policy".

As a matter of fact, the Marxist paradigm has traditionally regarded trade as the driving force of mercantilism and imperialism, and, its most visible result, colonialism (Svedberg, 1961). Hobson (1902) and Lenin (1916) suggested that capitalist economies used coercive means in order exploit low wage labor, low cost plant and capital, to extract the full economic rent from the exchange of goods and capital. This is only applicable in the case of a dependency, hence the urge to colonize.

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<sup>4</sup>Karl Marx was a German philosopher, economist, sociologist, historian, journalist, and revolutionary socialist; J.A. Hobson an English economist and critic of imperialism; and Rosa Luxembourg was a Marxist theorist, philosopher, economist and revolutionary socialist of Polish Jewish descent.

By colonizing, the metropolises become a form of a monopoly gaining complete guarantee against all contingencies in the struggle against competitors and securing favorable markets for their products to export to under-developed countries. However, in the presence of some internal democracies within the colonies, full exploitation becomes difficult, and a legitimate way to extract resources would be through trade. Betts (1961) and Kwon (2011), also relate the expansion of imperial control to mercantile economic policies, which led to demands for formal political control.

Furthermore, Mitchener and Weidenmier (2008) argue that, prior to the industrial revolution, colonial acquisitions were continuously sought by imperial powers to complement their growing economies, which ultimately affected colonial trade. Hilferding (1970) also found that colonial acquisitions expand the national territorial customs leading to a full domination of the financial capital by excluding any other country from this privilege; Profits will increase and flow solely to the metropolis. Let us consider few examples. Exports boomed in French West Africa—namely, in Senegal and the Ivory Coast—between 1897 and 1913. Timber exports from the Ivory Coast increased by a factor of six in twenty years (Frieden, 2006), as colonial imports of European manufacturers grew. In Indochina (which was under French colonial regime), the area of cultivated land dramatically increased, allowing it to become the third largest producer of rice in the world (Mitchener and Weidenmier, 2008). The same applies in Algeria, as noted by Louis Faidherbe<sup>5</sup>: "In Algeria and Senegal the aim is the same, to dominate the country at as low cost as possible and through commerce get the highest advantages".

In other colonial territories, Lange et al. (2006) states that Spain settled in regions rich in mineral wealth and set up complex mercantile systems of monopolies and trade regulations in order to obtain gold and other valuables; Britain based its decision to settle (among others), on the natural characteristics of the country that would favor agricultural production. The Belgian colonizers in the Democratic Republic of Congo transferred many of the colony's resources to their homeland. Between 1905 and 1914, 50% of French Dahomey GDP was extracted by the French (Manning, 1982).

Colonial trade was not only the result of extraction, though. A colony's tendency to trade with its empire might have been driven by preferential treatments or comparative advantages for

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<sup>5</sup>French general and colonial administrator. He created the Senegalese Tirailleurs when he was governor of Senegal.

some products favoring such trade, even in the absence of colonial domination. For instance, the existence, between colonies and the metropolitan country, of some longstanding commercial and banking connections would make trade more likely between the colony and the metropolis rather than between the colony and another partner. Indeed, Robinson and Gallagher (1961) state that the period of British expansion after 1870 represents an essential continuity to the earlier mid-Victorian era, which was characterized by a belief in the benefits of free trade, and by a conviction that British informal influence would secure these economic benefits at the lowest possible cost for the British government. British leaders throughout the nineteenth century thus held the conviction that the government was responsible to intervene in imperial matters only when it was necessary to safeguard the empire of free trade. Bauer (1976, p.149) also wrote "the establishment of colonial rule in Africa and Asia has promoted and not retarded material progress [...] the colonial governments encouraged the inflow of external resources, technical skills and capital."

With our data, we try to build a comprehensive overview of the relation between colonization and trade. One interesting feature of our data set is that it allows comparing the trade patterns of France with its own colonies to the other colonial groups. The trend and type of goods traded might help us understand the nature of colonial trade. For example, if British colonies traded with France, this indicates that, regardless whether they were forced or not to trade with their own empire, they were also allowed to engage in favorable trade with external partners such as France.

### **1.3 Data Construction**

In order to have a comprehensive overview of French trade statistics, we constructed a detailed and new database of annual French sectoral trade from French statistical primary sources. In particular, we relied on numerous volumes of the "Tableau Général du commerce de la France", the "Tableau décennal du commerce de la France" and "Annuaire Statistique de la France". The data include more than 20,000 observations of French bilateral imports and exports from 1880 to 1912 for three main sectors: agricultural raw material, raw materials necessary for industry and manufactured goods. The cross section includes a total of 118 countries, constituted of 27 French colonies, 37 British colonies, 17 other colonies, 17 former colonies, 4 countries that are not European and were never colonized, and 16 European countries. Table 1.1 presents the names of the countries included in each colonial group as they are re-partitioned in the year 1900. We chose this year as an

example since most colonies were acquired by their empires by that period.

The three sectors as originally presented in the primary sources were registered in French as: "objets d'alimentation, Matières nécessaires à l'industrie, and objets fabriqués". When translating into English, we named the first sector as food products for the exports, and as agricultural raw material for the imports. We decided to name the sector differently for exports and for imports to better reflect their content: France's exports of "objets d'alimentation" consisted mainly of food products produced in France such as flour, refined sugar, wine among others, while its imports consisted of agricultural raw material such as corn, wheat, vegetables and fruits. The other two sectors were translated as raw material for industry and manufactured goods, respectively.

In the "Tableau du commerce général", two values of trade were reported for each observation, the "commerce général" and the "commerce spécial". The former is the value registered at arrival of the merchandise and the latter is the portion of that value that enters the country for consumption. So we use the latter "commerce special", since we would like to exclude the trade that does not enter the French territory for domestic consumption.<sup>6</sup>

We chose to start our sample in 1880 because trade, along with colonial quests of the second French empire, grew substantially starting on 1878. Actually, many historians state that, starting on 1880, French colonial expansion began to grow rapidly and trade figures grew dramatically while before that year trade was still marginal. In less than 30 years colonial territories jumped from 0.9 millions Square Kilometer to 12 millions Square Kilometer with a population increase from 3 to 50 million (Lenine, 1917; Marseilles, 1984; Bairoch, 1989). This justifies our choice of starting our sample in 1880 and not before. We stopped one year prior to the beginning of the war because values of trade in the "tableau général" during those years are discontinuous, with a lot of missing data.

The trade data as collected from the original source were aggregated by country, colonial group and geographical region, wherein some countries had different names and borders than nowadays, and regions comprised groups of countries. The European countries, are all recorded individually, except for two divisions and one aggregation we had to apply: "Pays bas" that we divided into Luxembourg and Netherlands, "possessions anglaises de la mediterranee" that were divided into

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<sup>6</sup>Note that difference is not significant in value.

Gibraltar and Malta, and "mer baltique", "mer blanche" et "mer noire" that we added into Russia. Europe was also subject to the creation of new countries throughout the sample, namely Bulgaria (1898), Serbia, Montenegro (1905), and Ireland (1906). Those countries were omitted from our sample in order to keep the data as balanced as possible.

With respect to the other countries that were part of a region in our original data, we dis-aggregated the trade value of each region to assign values to specific countries using as weights the data on population from Mitchell (2007) and Madison (2005). Alternatively, we have also performed the dis-aggregation weighting the values using arable land area from Nunn (2009). The values on trade for each country using the two different weights were not very different from each other. We chose to report here the results with the data we constructed using population as weight.

The regions were divided in terms of colonial possessions and geographical location. Note that, since the composition of colonial possessions changed over time, we had to repeat the dis-aggregation procedure on a year by year basis as countries were either included or excluded in the groupings of the original data. We managed to conduct the dis-aggregation as accurately as possible, making sure that all countries were accounted for without misplacing any country under the wrong region in any given year. Moreover, in the original data, the countries were grouped in a way that we cannot mix a French colony in the American continent with a British colony in the same continent. For example, the American continent is divided in the following manner: Individual countries were USA, Mexico, Guatemala, Costa Rica, Honduras, Nouvelle Grenade, Venezuela, Brazil, Uruguay, Argentina, Ecuador, Peru, Bolivia, Chili, and the sub-groups were "colonies Anglaises des Antilles", "colonies Espagnoles des antilles", and "colonies Hollandaises des Antilles". The African continent contains the following regions: "Etats Barbesques" which were divided into Libya, Tunisia and Morocco, "Côte Occidentale du Maroc au Cap de la bonne-esperance", reflecting the western coast of Africa, "Colonies anglaises: Partie Occidentale" and "Colonies anglaises: Partie Orientale (y compris l'île Maurice)", and "autres pays". For instance, the name of the sub-group "Colonies anglaises: Partie Orientale (y compris l'île Maurice)" is geographically and historically self explanatory which makes it easier for us to divide it into the following countries: Malawi, Tanzania, Kenya, Somalia, Uganda, Sudan and Mauritius. The French colonies were grouped separately and contained both individual countries like Algeria, Guadeloupe, Martinique, and sub-groups like "Etablissements Francais dans l'Inde", "Nouvelle Caledonie", "Cochinchine et Tonkin", "Senegal et Golfe



du Guinée". The sub-groups were dis-aggregated based on the geographical location indicated by their names. If, in some cases, an African country was already considered an unofficial possession of the French empire (hence, cannot go under the sub-group of Western African coast **excluding** French possessions of the African continent) but not yet an official colony, (hence, it cannot go under the group of French colonies), its share of trade would go under the region called "other African Countries".

It is worth noting that Lavallée and Lochard (2012) constructed a sample of former French, British and Other colonies which matches with ours, i.e. Belgium colonies (Burundi, Congo, Rwanda), Netherlands colonies (Indonesia, Suriname, Netherlands Antilles), Portugal colonies (Angola, Cape Verde, Guinea Bissau, Mozambique, Sao Tome and Principe) French equatorial Africa (Gabon, Republic of Congo, Central African republic, Chad), which is in line with our construction procedure. Table A.1 in the appendix presents the dis-aggregation of the countries from the group level to the individual level for the year 1880 as an example.

Additionally, the time frame of our data falls during the Empire's expansions, hence the political statuses of some countries changed over time as new colonies were being acquired. In that case, countries would change their placement within the sample from one region to another depending on whether they had become a colony or not, or depending on any other geopolitical change that they may have been subject to.<sup>7</sup> Therefore, in order to take into account, on a yearly basis, those political and historical events (i.e. colonization, independence, creation of a nation, new groups entering the sample), we constructed 3 new variables describing the status of the country: the name of the colonizer, the year of colonization, and the year of independence. Each country's history was studied carefully throughout colonization periods and was attributed a dummy variable in the data set reflecting whether the country was a French, British, other, former colony, non-European or European country.<sup>8</sup>

The colonial dummies were constructed based on the Geo CEPII data from Mayer and Zignago (2011) who made available a large historical data set about colonial reigns transmissions. For the dates of colonization, we collected information from various historical sources. We defined the year

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<sup>7</sup> Merger or split of countries, or the creation or destruction of countries.

<sup>8</sup> Table A.1 in the appendix also put forward those political statuses.

of colonization as the year the colonizer officially established the colony, not the year he acquired the land. In addition, we considered the year of independence of the colony, to be the year of decolonization from the colonizer, not the year where civil or other conflicts ended. If many colonizers established colonies in the same area, we considered only the most recent one (if established before 1880); otherwise, the colonizers changed from 1880 to 1912 so will the colonial dummy for the country.

Let us take one illustrative example to understand how some countries move from one section to another according to the political changes. Mauritania, up until 1895, the year of its colonization by the French, was part of the sub-group "Western coast of Africa from Morocco to Cap de Bonne Esperance" (translated by the author). In 1895, this country shifted to French colonies group under the subcategory of "Senegal et Etablissement Français du golfe du Guinée". Guinea in 1890, Ivory coast in 1889, Benin in 1892, Gabon in 1885, Congo in 1903, moved from the same African sub-group to the group of French colonies each under its correspondent subcategory. The same applies for the British and other colonies and for countries that acquired independence during the sample period. It is worth noting that whenever French or English colonies are removed from the region of African west coast, a decrease in the value of trade in this category is paralleled with an increase in the value of trade in the categories of containing French or other possessions. This gives us insight that trade was mainly higher with a country that belonged to an empire rather than with independent countries. Such insight was empirically confirmed in the results of a paper by Mitchener and Weidenmier (2008).

Time series analysis requires work on values expressed in constant francs. The INSEE has published an index of prices for the period 1880 until 1938 in "Annuaire Statistique de la France, issue (1966)". This index, computed from gross prices of 45 products (base 100 in Francs of 1914), is not the perfect deflator, it actually reflects the average national and imported products. We note that the share of those two is highly volatile depending on the year and the basket of goods used in that index, so it does not fully reflect the goods traded in some years. In spite of its limitations, this is the only available index for that period, hence we use it to deflate our exports and imports.<sup>9</sup>

## Data Description

In order to accurately describe our data, we made a deep investigation and tried to collect the products traded between France and its trading partners during that period from both Marseilles (1984) and Markovitch (1966). Taking a closer look at the products constituting each of the three sectors, we notice that the sectoral division is wide making it less representative of the actual products traded within each sector. Also, products traded under one sector may not be the same depending on the identity of the country of origin or of destination. For instance, as mentioned above, the French exported mainly food products to their colonies (flour, wine, oil) while they mainly imported from them agricultural raw materials (i.e., wheat, sugar, fruits). In fact, French exports of food account for more than 80% of French total exports to their colonies (Marseilles, 1984). In the original dataset, both food and agricultural raw material were reported under the same sector. The raw materials necessary for industry consist of mining products such as gold, cobalt, phosphate, iron, wood, and wool. The manufactured goods exported to the colonies consisted of low value products such as wooden products, while the exchange with the European countries of high value products such as jewellery and cars, among others. Finally, we were able to differentiate French trade with its colonies compared to trade with the European countries. We retrieved the following (translated by the author):

### *French Exports to their colonies:*

- Food: Wheat flour, refined sugar, wine, peanut oil.

Table 1.1: Countries by colonial group

French Colonies	British Colonies	Other Colonies	Former Colonies	Non-European Countries	European Countries
Algeria, Benin, Burkina Fasso, Cambodia, Central African Republic, Chad, Congo, French Guiana, French Polynesia, Gabon, Guadeloupe, Guinea, Ivory Coast, Laos, Madagascar, Mali, Martinique, Mauritania, New Caledonia, Vanuatu, Niger, Reunion, St Pierre and Miquelon, Senegal, Vietnam, Morocco, and Tunisia	Antigua and Barbuda, Australia, Bahamas, Bangladesh, Barbados, Botswana, Virgin Islands, Cyprus, Dominica, Fiji, Gambia, Ghana, Gibraltar, Grenada, Guyana, Jamaica, Kenya, Malawi, Malta, Mauritius, Myanmar, New Zealand, Nigeria, Pakistan, Saint Lucia, Sierra Leone, Solomon Islands, Somalia, South Africa, Sudan, Tanzania, Trinidad and Tobago, Uganda, Zambia, Zimbabwe, Egypt, and India	Angola, Aruba, Cameroon, Cuba, DR Congo, Equatorial Guinea, Guinea Bissau, Indonesia, Mozambique, Namibia, Philippines, Puerto Rico, Sao Tome and Principe, Suriname, Togo, Virgin Islands (US), and Western Sahara	Argentina, Bolivia, Brazil, Canada, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, Guatemala, Haiti, Honduras, Mexico, Peru, USA, Uruguay, and Venezuela	Turkey, Japan Thailand and China	Denmark, Belgium, Russia, Switzerland, Germany, Italy, Portugal, Greece, Romania, United Kingdom, Netherlands, Luxembourg, Sweden, Spain, Austria, and Norway

<sup>9</sup>The index had been used also by Marseilles to deflate his data.

- Manufactured goods:

1. Textile: Silk fabric, wool, cotton clothes and linen, leather fabric.
2. Metals industry: Iron and steel, machinery and mechanical, carroseries and automobiles, metallic tools, and articles, paper, soap, chemicals (drugs), tires, cement and candles.

*French Imports from their colonies:*

- Agricultural raw materials: Grain and rice, cattle, sugar, oil seeds and peanuts, olive oil, palm oil and palm kernel oil, cocoa, coffee, tea pepper and vanilla.
- Food: wine and alcohol, dry and fresh vegetables, eggs, fruits.
- Raw material necessary for industry:
  1. Minerals: Phosphate, iron, ore, tin, nickel, cobalt, lead, copper, zinc.
  2. Energy sources: Coal and oil.
  3. Textile raw materials: Wool, silk, silk wads, cotton, hides and furs, raw wood and rubber.

*France exports to European countries:*

- Food: Wine, sugar, oil, fruit, salt marshes, molasses, refined sugar.
- Raw material necessary for industry: Iron, steel.
- Manufactured goods: Clothes, paper, glass, crystal, clothing, thistles, brandy, liqueurs hides, linen or hemp skins prepared articles (tableterie brush), fabrics, dressed skins, chemicals, jewelry, paper, watches, collectible articles, musical instrument, wood extracts.

*French Imports from European countries:*

- Food: cereals, oil seeds, ice, fish
- Raw material necessary for industry: Silk floss rawhide potassium, copper, tar (asphalt), drill, wood oats, coal.

- Manufactured good: Skin fabric, jewelry, beer, cardboard, machine tools, metal, pottery, industry's meat smoking section, scotched flax, and tow work, rubber, cotton wool, fabric, coffee, bitumen, straw hat.<sup>10</sup>

Our database includes bilateral exports and imports covering a large and comprehensive set of countries on an annual basis. It accounts not only for the total trade values, but is also dis-aggregated into four sectors: agricultural goods, food, raw materials for industry and manufactured goods. It contains information on 98 colonies, which includes most existing colonies during the focal time period; all have identified colonial status. This detailed and comprehensive data allows comparing the pattern of French trade with their own colonies, British colonies, other colonies (including German, Belgian, Spanish and Portuguese), former colonies, European and non-European countries.

## 1.4 French Trade patterns

### 1.4.1 Impact of Colonization Event on French Trade

We start by investigating whether the event of colonization impacted trade of France with the different groups of colonies. To that end, let us take a closer look at the evolution of trade between colonial groups (French, British, and other colonies) and France five years prior to and five years after the colonization event. The vertical axis in the graphs of Figure 1.1 represents the trade volumes, whereas the horizontal axis represents time, as set in relation to the year of colonization (i.e. zero corresponds to the year of colonization, -1 corresponds to one year prior to it, and so on). Figures 1.1a, 1.1b, and 1.1c depict the evolution of imports and exports computed as the average of, respectively, nine French colonies that were acquired between 1885 and 1912, eight British colonies acquired within roughly the same period, and three colonies from other Empires being one Spanish, one German and one Belgian. Those figures will give us an insight on whether colonization event

<sup>10</sup>

"A l'exportation de la France, nous avons retenu 19 articles:

Produits alimentaires: la farine de froment, les sucres raffinés, les vins, l'huile d'arachide. Produits textiles, manufacturés: les tissus de soie, de laine, de coton, les vêtements et lingerie, les ouvrages en peau et en cuir. Produits en métaux manufacturés: les fer et aciers, machines et mécaniques, carrosseries et automobile, outils et ouvrages en métaux. Produits manufacturés: papiers, applications, savons, produits chimiques, pneumatiques, ciment et bougies.

A l'importation 32 articles sont retenus:

Matieres premieres agricoles: cereales, riz, vins et alcool, legumes frais et secs, oeufs, fruits de table, bestiaux, sucres, graines oleagineuses, et arachides, huile d'olive, huile de palme amande de palmiste, cacao, cafe, the, poivre et vanille. Matieres premieres minieres: phosphate, mineraux de fer, etain, nickel, et cobalt, plomb, cuivre et zinc. Sources d'energie: houille et petrole. Matieres premieres textiles: laines soie et bourres de soie coton, peaux et pelleteries brutes, bois et caoutchouc" (Marseilles, 1984, p.56).

affected the trade relation between France and those countries. We note, however, that this picture is not comprehensive in describing whether colonization event affected trade with all the colonies, since some countries were colonized prior to the beginning of our sample and others after the last year available in our sample, hence not included in the graphs.

Figure 1.1(a) shows that, within the five years following colonization, French exports to French colonies were three times greater for manufactured goods and two time greater for food products. As for the French imports from their colonies, the value of raw agricultural goods did not increase much during the first four years after colonization, but doubled during the 5th year. The figure also shows that imports of raw material for industry from French colonies had been progressively decreasing by a ratio of two third over the five years prior to colonization. At the event of colonization, they started to increase again, rising above their original value on the fourth year of colonization. Interestingly, those figures are in accordance with the widespread idea that the main reasons behind colonial expansions were economic exploitation (through imports) and the use of colonial markets as an additional outlet to dispense their own products (through exports).

For instance, cocoa exports boomed in the Gold Coast and timber exports from the Ivory Coast multiplied by a factor of six precisely in in the last twenty years of the nineteenth century, which was the period of the largest expansion of colonialism (Frieden, 2006). Also, in Indochina (under the French colonial regime), the land under cultivation dramatically increased, allowing it to become the third largest producer of rice in the world. Upon colonization, colonies that had manufacturing ambitions were forced to switch to primary production (Lenine, 1971).

In accordance to our findings, Lenine (1917) explains in his book that colonial expansions took place precisely when monopolies started to develop in Europe. "It is precisely after that period that the tremendous "boom" in colonial conquests began, and that the struggle for the territorial division of the world becomes extraordinarily sharp" (Lenin, 1917, p. 26). The partition of the world became clear by 1900 as the need of external markets became evident. Once the core capitalist markets in Western Europe could no longer absorb the output of the European countries, they had to secure foreign markets, through either colonial expansion or economic domination. By that time, cartels<sup>11</sup> started to develop, dividing the markets among themselves, fixing the quantity of goods to

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<sup>11</sup> Cartel is an association of manufacturers or suppliers with the purpose of maintaining prices at a high level and restricting competition. Historically, it is defined as a coalition or cooperative arrangement between political parties intended to promote a mutual interest.

be produced, the prices, and the profits among the various enterprises.

Those stylized facts are compatible with the view that French colonial conquests had an impact on French trade with those colonies acquired. Interestingly enough, British colonization had no impact on the bilateral trade relations between British colonies and France as shown in Figure 1.1(b). One can infer from this result that the British were flexible allowing their colonies to continue trading with France as they used to before the event of colonization. Moreover, we notice that for the German, Spanish and Belgian colonies, the trade, if any, of their newly acquired colonies with France decreased to almost null, as shown in Figure 1.1(c). This is an indicator that their colonizer has deviated their trade away from France, towards empire colony trade. One explanation to this is that colonial expansions gave some sort of authority to the colonizer to bias trade towards its own colonies. Actually, metropolitan countries had the power to control the flow of goods traded into their colonies. Some colonial powers used (or abused) this power to bias trade towards those colonies, some others pursued a more liberal policy.

### **1.4.2 French Exports and Imports**

In this section we will describe the evolution of French trade with the different groups of countries. From the statistics of total French trade, we have that the share of trade with French, British, other and former colonies in the total French trade did not exceed 20%. The share of trade with Europe, on its turn, was much higher, accounting for about 70% of total French trade and making of those countries the main trading partners of France. In this session we are interested in highlighting the importance of trade with France from the point of view of the economy of the partner country. Even though trade of France with colonies was much smaller than with European countries, it is likely that the economic importance of that trade was greater for the colonies, which were poorer, than for the richer European countries. Hence, for the statistics presented in this section, we computed, for each partner country, their per capita trade with France, thereby using population size as a proxy for the partner country's economic size.

Table 1.2 presents some descriptive statistics of the average French exports and imports per capita to five different groups of countries: French, British, Other and former colonies and to Europe. Those figures report the trade per capita for each group, rather than total trade, emphasizing

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in a way the trade intensity from the partner country's perspective, rather than total values between France and each of her trading partners. The use of trade per capita also eliminates the bias resulting from: the uneven number of countries present in each group (i.e. Europe contains 16 countries whereas British colonies 37), and the uneven size of each country in each group (i.e. Germany's population was around 50,000,000 in year 1913 whereas Benin's population was around 500,000 around the same year). However, it is important to keep in mind that these shares should be interpreted as the relative importance of trade with France for the economy of the trading partner.

The statistics in the table show that, on average, the highest level of per capita trade is for French colonies, with a stable and low coefficient of variation not exceeding the 25%. Moreover, French per capita imports of primary products from French colonies have the highest mean value with a coefficient of variation between 30 and 40%. The coefficient of variation of trade with French colonies is not volatile and low in magnitude, indicating that France traded with all the countries within its empire roughly equally. The share of average French trade per capita with Europe and with other colonies is lower in magnitude than the one with French colonies, and shows a higher coefficient of variation for most sectors, meaning that French trade with other groups was more volatile. France might have been trading a lot with one country in a certain colonial group and not at all with another country belonging to the same group. Trade was mainly country oriented rather than colonial group oriented.

Figures 1.2, 1.4 and 1.6 also depict the values of the average exports and imports per capita between France and different groups of trading partners for each of the four sectors. Figures 1.3, 1.5, and 1.6, on their turn, represent the percentage share for each trading partner in the total French trade, all measured as imports and exports per capita. Just like the interpretation in the table above, these shares should be interpreted as the relative importance of trade with France for the economy of the trading partner.

In a first visual inspection, we notice that the average bilateral imports and exports per capita between France and its colonies are the highest for most of the sectors compared to the trade with other partners. This means that trade with France is more important for the economies of French colonies compared to the other groups of countries. This is particularly true for exports and imports of food products and agricultural raw material, as shown in Figures 1.2 and 1.3. The share of per capita French exports of Food products to French colonies, in Figure 1.3, is over 80%, meaning that



trade was relatively much more important for the economies of those colonies compared to the other groups of countries. French imports of Agricultural Raw material from its colonies, in Figure 1.3, were even more important for the French colonies in relation to the other countries, given that their shares are even higher.

As Figures 1.4 and 1.5 highlight, the relative share of French imports of raw material necessary for industry is more important for the French colonies compared to the other groups of colonies. The share of per capita French imports of metal, textile and energy (coal and oil), and raw materials necessary for industry from its colonies is around 70%. This percentage also depicts the relative importance of those French imports to the economies of French colonies compared to the other colonies. We note that mining industries founded in the French colonies reached a share of 42% of the total industries founded in those colonies (Marseilles, 1984). This is consistent with the increase of the share of per capita French imports of raw materials for industry from French colonies from 30% in 1887 to 70% in 1894-5 as shown in figure 1.5. The trade of raw material necessary for industry was also important for European countries and former colonies economies, whose share of per capita French imports of those materials ranged between 20% and 30%. While French exports of raw material for industry were low in general, they were mainly relatively important to Europe with a share of per capita exports of 60%. This important share to the European economies coincides with the shift of Europe towards manufactures.

Figures 1.6 and 1.7 illustrate, respectively the average per capita value and the percentage share of French bilateral exports and imports of manufactured goods. We notice that French exports of manufactured goods to French colonies account for 80% of French total exports of manufactured goods, in per capita terms. Indeed, by mid 1890's, France main dispenser of its manufactures was its own colonies and the statistics show the relative importance of such exports to the French colonies.

Regarding per capita imports of manufactured goods, Figures 1.6 and 1.7 show that their values are low compared to the other sectors, with the highest average share attributed to Europe (50%) followed by the French colonies (40%). Such low per capita values mean that the French imports of manufactured goods from French colonies were not important for those colonies' economies. Note that the French imports of manufactured goods from Europe consisted of jewelry, machine tools, metal, pottery, automobiles, while those from the colonies of lower value manufactures such as clothing and wood material among others.

Finally, Figure 1.8 shows the average repartition of French trade by sectors and colonial groups. Similar to the results above, we see that on average, the most important exchanges between France and its colonies, with respect to those colonies economies, are French imports of raw material and exports of food and manufactured goods. Those figures can relate to a very common theory, namely, the one of complementarity (Lenin, 1917, p): "In order for the colonizer to pursue his objective of trade, the economies of colonies must be complementary to the industrial economies of the imperial powers. That is, colonies must eliminate their manufactures and specialize in the production of primary goods to export them. The returns from those exports should finance the imports of manufactured imported from the colonizers' countries. Usually this complementarity is forced in a power relation."

Commenting on the yearly increase of the percentage share of per capita French imports of raw material necessary for industry from French colonies as described earlier in Figures 1.4 and 1.5, the "Annuaire statistique de la France" also highlights a shift in the domestic production of France from agriculture to manufactures. Actually, the shift from primary to industrial production in France, which occurred around the 1880's during of French colonial expansion, is paralleled by an increase in the share of French imports of raw agricultural and raw industrial material from their colonies. Such increase is explained by the metropolis need for raw material in order to increase its production. Moreover, according to Marseilles (1984), the French empire rose to the second largest trading partner of France between 1902 and 1908. Starting from the late conquests until the eve of the first world war, the empire was in the forefront of France trading partners justifying the hopes of Jules Ferry<sup>12</sup> that colonial policy was the daughter of industrial policy. Those findings are also in accordance with the argument of Svedberg (1961) that the more capitalism is developed, the more strongly the shortage of raw material is felt, the more intense the competition and the hunt for sources of those raw material throughout the whole world, the more desperate the struggle for the acquisition of colonies.

Crowder (1968) also argued that, in order to be able to extract as much as possible from their colonies, the French developed a system that allowed them to exercise unchallenged control over their new acquisitions. Furthermore, the high share of manufactured exports towards the colonial

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<sup>12</sup>France prime minister (1880-1881, 1883-1885), as mentioned earlier in the introduction

market explains the role played by this market during the economic crisis as a “compensator and amortizer”. Bouteville (1913, p...) wrote: “As a whole, our colonies are no longer a burden to the metropolis but a source of profit which importance increases each year. Since 1898 the general trade of our possessions has continued to develop in a consistent way. This commercial and industrial activity must be put in forward in order to justify a posteriori the work (conquests) already accomplished.” (translated by the author)

### **1.4.3 French Trade Patterns Indicators**

The previous section highlights some interesting features: France’s trade with its own colonies reports highest shares of (i) average per capita imports of raw agricultural material, and of (ii) average per capita exports of manufactured goods, emphasizing the importance of such trade to those colonies economies. Also, we observe an increasing trend in the Franco-colonial trade after French colonization, but we do not observe any increase in the trade between France other colonial groups in the aftermath of colonization from Britain or other metropolis. In fact, the prevailing view in the economic history literature is that the French applied coercive labor policies to exploit their colonies, bias production towards primary products, depress wages, and create monopolies to extract all rent from trade (Tadei, 2013). Louis Faidherbe, a French general, colonial administrator and governor of Senegal wrote that the function of the French officials was “to maintain tranquility so that the natives could work and produce, and so that the French could get the highest advantages from commerce at as low cost as possible” The governors were entrusted with the safety and tranquility of the circles and instructed to make sure that the inhabitants of their territory demonstrated the fidelity and obedience that they owed France (Cohen, 1971).

Marseilles (1984), who concentrated on roughly the same period but looking only at the trade relations between France and its empire, similarly claims that France applied extractive policies and used the colonial market to dispense its manufactured products. In order to further explore trade patterns between France and her trading partners, we calculate some trade indicators that will help us understand some trade features and whether those features are in accordance with the above claims about the nature of French colonial trade. For the statistics presented in this section, we use again the total trade with France to compute the economic indicators.

## Balassa Revealed Comparative Advantage

The revealed comparative advantage index, developed by Balassa (1965), is an index that captures the relative advantage or disadvantage of a certain country in a certain product or class of products or services as evidenced by trade flows. Initially, the revealed comparative advantage index is computed as the ratio of the share of exports of country  $i$  in sector  $s$  to the share of the world's exports in sector  $s$ . Since we do not have data on world trade, we can only compute the ratio of the share of exports of each colonial group in sector  $s$  **to France** to the share of the world's exports in sector  $s$  **to France**. Hence, we can only measure the revealed comparative advantage of each colonial group as a measure of their economy's specialization in a specific sector **with respect to trade with France**, and not to the world. We denote this index  $RCA^F$ , and we compute it as follows:

$$RCA^F = \frac{(ex_{isFR}/EX_{iFR})}{(ex_{sFR}/EX_{FR})} \quad (1.1)$$

where  $ex_{isFR}$  denotes exports to France in sector  $s$ , where  $s \in \{\text{agricultural raw material, raw material for industry, manufactured goods}\}$ , from a group of countries  $i$ ,  $i \in \{\text{French colonies, British colonies, Other colonies, Former colonies, Non Europe, Europe}\}$ .  $EX_{iFR}$  denotes total exports from group  $i$  to France. The numerator constitutes the share of exports in sector  $s$  from group  $i$  to France, and is divided by  $ex_{sFR}/EX_{FR}$  which represents the share of exports from all countries in sector  $s$  to France. Figure 1.9 shows, for each of the three sectors, the  $RCA^F$  with respect to trade with France for French, British, Other, and Former colonies and Europe.

With respect to trade with France, the French colonies had a comparative advantage in raw agricultural material, with an  $RCA^F$  steadily above 2 for the whole period. It is worth noting that the  $RCA^F$  of French colonies in agricultural sector is overestimated compared to the RCA computed with respect to world trade since, according to other sources, French colonies exports of agricultural goods to France exceeded 80% of their world exports in that sector (Marseilles, 1984 and Markovitch, 1966). We can infer from the above that the share of exports of French colonies to France in agricultural raw material (the numerator in our RCA) is close to that share with respect to world trade (the numerator in the world RCA), which is not the case for our denominator.<sup>13</sup>

<sup>13</sup>This does not hold for the  $RCA^F$  for other and British colonies, since the share of exports in a certain sector with respect to France is not similar to that share with respect to world trade. Those colonies might trade more with their own metropolis in a particular sector. However we do not have data to confirm or reject this assertion.

The  $RCA^F$  of French colonies of raw material for industry is slightly below 1 whereas the one for manufactures is almost zero. The  $RCA^F$  values could simply reflect that French colonies had a comparative advantage in primary agriculture due to low labor cost and availability of land, but could also mean that the French colonizer was exploiting those colonies. Unfortunately, the information generated from  $RCA^F$  values does not exclusively confirm nor refute that France exploited their colonies' agricultural and natural resources by importing all their raw material.

However, historically, scholars favor the theory of exploitation rather than that of comparative advantage: Lenin (1971) states that colonizers exploit under-developed countries, because profits are usually high, capital is scarce, the price of land is relatively low, wages are low, and raw materials are cheap. Alam (1994) also states that colonizers usually impose a high level of imperial control in order to offset the costs generated from low labor productivity especially in land-scarce countries. Moreover, land scarcity implies that there is little room for growth based on primary production unless technology is changed. Since these countries are also prevented from developing their long run comparative advantage in manufactures, they cannot achieve growth by only specializing in primary production. Furthermore, even while specializing in primary agricultural production (which explains a high RCA in that sector with respect to trade with France), colonies face terms of trade that aim at only increasing the rent for the metropolis. Chailley -a prominent colonial governor-, thinks that the French were stifling the growth of their colonies by pursuing only a course leading to immediate economic ends, advantageous to the mother country, and by failing to wait until the colonies would prosper (Betts, 1961). He further states that it was only the colonists themselves who could guarantee that an economically sound colony can import and export as they saw fit.

The  $RCA^F$  of British colonies is high for the sector of raw materials for industry. British colonies might have had a comparative advantage in exporting raw material necessary for industry to France such as iron, tin, copper, wool, and rubber, which they were able to export due to the "open door" policy imposed by Great Britain.<sup>14</sup> This  $RCA^F$  is only partially representative of what might have been the main specialization of those colonies, since British colonies traded relatively less with France compared to French colonies. If we computed the RCA of that sector relative to world trade

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<sup>14</sup> An open door trade policy refers to a tariff regime where there is no distinction made between the products of the mother country and non-empire trading partners.

instead of that to France (for which we do not have data), we may find a different result.

Figure 1.9(c) shows that, up until mid 1890's, "Other" colonies specialized in exporting raw agricultural material to France, whereas after 1896, they shifted their exports to France towards raw materials for industry, as the  $RCA^F$  in the figure show. We know that it was not the colonization event that shaped this shift, since colonization of Namibia by the Germans, Western Sahara by the Spanish, and Democratic republic of Congo by the Belgians, occurred around mid 1880's, that is, ten years earlier. We also know that trade between France, on one side, and Namibia and Western Sahara, on the other, was scarce. Hence, the shift towards exporting raw material for industry to France should have been from the Belgian colony. The Belgian Congo was known to be rich in natural resources, such as gold and other precious metals, and fully exploited by the Belgian colonizers. If we assume that excavation did not immediately occur at the event of colonization, but a few years later, this would explain the shift in the  $RCA^F$  in mid 1890's in that particular sector.

The former colonies, mainly represented in our sample by the Southern American countries, had a steady comparative advantage in exporting primary products to France instead of manufactures. This is because the land in this continent is favorable for agriculture and is rich in natural resources. As for the European countries, the high  $RCA^F$  (around 2) for the manufactured products is evident, because it was the era of industrial revolution and all European countries were already specializing in manufactures.

## Contribution to Trade Balance

Another indicator that helps describe the Franco-colonial trade patterns at the end of the nineteenth century is the contribution to trade balance (CTB). This indicator can be an alternative for "revealed" comparative advantage as it focuses on a country's specialization profile by comparing its trade balance in a sector  $s$  with that of the country (Dedinger, 2012). As defined by the OECD (2009), "contribution to trade balance reveals an economy's structural strengths and weaknesses in terms of technological intensity. It indicates whether an industry performs relatively better (or worse) than the total, and can be interpreted as an indicator of revealed comparative advantage that

is based on countries' trade specialization." The CTB is calculated as follows:

$$CTB_{si} = \left[ \frac{(EX_{si} - IM_{si}) - (EX_i - IM_i) \frac{EX_{si} + IM_{si}}{EX_i + IM_i}}{EX_i + IM_i} \right] \times 100$$

If there were no comparative advantage or disadvantage for any sector  $s$ , a country's total trade balance (surplus or deficit) should be distributed across industries according to their share in total trade and CTB should be close to zero. A positive value for a sector or industry indicates a structural surplus, and a negative one a structural deficit, hence the country specializes in this sector relative to the other sectors. The indicator is additive and by construction, the sum over all sectors is zero. To allow comparisons across countries or groups of countries, the indicator is generally expressed as a percentage of total trade.

Figures 1.10 and 1.11, respectively, plot the path of France's CTB relative to each trading group and the path of each group of countries' CTB relative to France. France trade in manufactured goods exhibit a structural surplus of 25% with its colonies and of around 10% with the remaining trading partners. This result indicates that France specializes in manufactured goods. France exhibits a deficit of 25% towards its colonies in trade of raw materials for industry. Meaning that compared to other sectors, France had a structural deficit in raw materials necessary for industry in the trade with its own colonies. The CTB of French trade of agricultural goods shows a slight structural deficit with the French colonies and Europe, and a slightly positive one with British and other colonies. This indicator along with the previous ones also gives a flavor of the reality of exploitation of primary products during the French colonization.

On the other hand, French colonies contribution to trade of agricultural goods towards France exhibit a slight surplus of 5%. We can not infer from this specific result that French colonies had a comparative advantage in exporting primary agricultural products even though we know from our previous results that they were the main providers of agricultural products to France. Actually, when colonies "specialize" in primary production, this substitutes a wide range of skills previously present or potential to develop in the manufacturing sector without creating new skills.

The remaining colonial groups exhibit neither an advantage nor a disadvantage in agricultural products (structural surplus almost null). We notice a structural surplus of 5 to 15% in primary products for industry in those remaining colonial groups and in Europe which is lesser than in the

French colonies CTB. Also, all groups have a structural deficit in the trade of manufactured goods to France with the highest deficit attributed to French colonies. This shows that the trade relation between France and the other groups is smoother and more balanced than with its own colonies.

### **Trade Balance**

We calculated the trade balance of France with each group of countries for the total trade as well as for the trade by sector. Trade balance is just the difference between exports and imports as shown in the equation below.

$$TB_{is} = EX_{is} - IM_{is}$$

The results in Figure 1.12 show that the trade balance of France with Europe is in surplus. Trade balance with former colonies exhibit a deficit that can be explained by the high share of French imports from those colonies of raw material and in particular raw material for industry. Interestingly, the trade balance with French colonies is almost null because French imports of primary products from those colonies were offset by the French exports of manufactured goods to the same colonial group. Actually, looking at the French trade balance by sector with its own colonies, we see France exhibit a long-run deficit in both agricultural raw material and raw material necessary for industry and a long-run trade surplus in manufactured goods. The fact that France has a deficit trade balance in raw material with these countries in the long run may suggest that France is capable of extracting its raw materials without "paying" them with comparable exports. Comparing the French trade balance for each sector with its own colonies to that with the British colonies, we notice that for the three sectors, the balance is close to zero. Hence, as statistics show, France was not likely able to exploit British colonies agricultural goods since the trade balance here is almost null.

### **Share of manufactures in total exports or imports**

Finally, we compute the percentage share of manufactures in total exports and imports. For the percentage share of manufactured goods in exports for France, we compute the ratio between French exports of manufactured goods to the group of countries  $i$ ,  $ex_{miFR}$ , and French total exports to that group of countries,  $EX_{iFR}$ . The second equation represents the same ratio for imports. .



$$\begin{cases} X_{imFR} &= \frac{ex_{imFR}}{EX_{iFR}} \times 100 \\ M_{imFR} &= \frac{IM_{imFR}}{IM_{iFR}} \times 100 \end{cases}$$

For the different groups of countries, we use the following equations:

$$\begin{cases} X_{FRm_i} &= \frac{ex_{FRm_i}}{EX_{FR_i}} \times 100 \\ M_{FRm_i} &= \frac{IM_{FRm_i}}{IM_{FR_i}} \times 100 \end{cases}$$

where  $ex_{FRm_i}$  represents the exports of manufactured goods from the group of countries  $i$  to France, while  $EX_{FR_i}$  is the total exports of group  $i$  to France. Analogously,  $IM_{FRm_i}$  and  $IM_{FR_i}$  represent those values for imports of group of countries  $i$ .

Figure 1.13 shows the percentage share of French exports and that of colonial exports of manufactured goods. We note that 60% of total French exports to its colonies are composed of manufactured products whereas only 10% of French colonies exports to France are of manufactured goods. If we calculate the share of French colonies' exports of primary products to France, we find that 90% of French colonies exports to France are composed of primary production. It is worth noting that, while the percentage share of French imports of manufactured goods in the total French imports from the colonies is below 10%, French imports of manufactured goods from Europe accounted for almost 20% of total French imports from Europe.

All those indicators are compatible with our initial suggestion on the nature of French trade: France used the colonial land to exploit colonies' resources and the colonial markets to dispense French manufactured products. Terms of trade with French colonies were in general unfavorable to the latter and favorable to the former. The colonial power gave room to interference in trade policies in favor of the metropolis. As for the trade with Europe and former colonies, those were free from any foreign powers and hence able to apply policies in favor of their national and commercial interest (Maddison, 1989).

#### 1.4.4 The Role of Trade Policy

The trade statistics that we have described in the previous sections present some interesting patterns. In particular, the large bilateral trade between France and its colonies of raw agricultural goods and of manufactured goods, where France imports agricultural goods from its colonies and exports man-

ufactured goods to them. We suggest that this pattern stems from policies imposed by France on its colonies and from trade policies imposed by other colonial powers on their respective colonies. Many economists in the international trade literature praise the benefits of preferential trade agreements and of common currency areas in boosting international bilateral trade (Estevadeordal et al., 2002; Glick and Rose, 2002; Rose, 2000-2004; Lopez-Cordova and Meissner, 2003). In particular, such trade policies were even more effective during the colonial reign, since they may have been shaped by colonial ties. European powers viewed colonies as a way of setting up protective legislations, preferential trading relationships, and of ensuring solvable markets, in the interest of the mother country (Estevadeordal et al., 2002; Alesina, 2002).

The literature provided some evidence that imperialism imposed during colonization tended to bias colonial production towards primary products and domestic one towards manufactures. This practice, defined by Myrdal (1957) as complementarity, is when metropolis and colony complement each other, with one supplementing raw material and the other manufactured goods. Colonizers would favor such practice by imposing preferential trade agreements for their advantage. They would hence monopolize trade opportunities to exclude any rival from accessing the colonial markets.

In particular, French trade policies played a major role in shaping colonial trade between France and its own colonies in the age of high imperialism. Unlike the British who adopted liberal policies, France adopted protectionist policies, for they benefited from it, forcing the colony's population to "buy their imports for more and to sell their exports for less than world prices" (Kleiman, 1976, p. 1). One of the events that actually shaped that protectionist decision was this particular incident prior to the Franco Prussian war, where Germany, a great trading partner to France, set a tariff in 1879 intending to stop the French exports from accessing the German market. One reaction was that, in 1881, the French government passed a new tariff law (later revised in 1884-5) a protectionist legislation, which applied to Germany, and increased tariffs mainly on food products (Dedinger, 2012). Those policies urged France to start searching for alternative outlets for their exports, which were found most profitable in colonies. A nice quote by the British premier's as a response to the French ambassador in 1897 regarding French trade policy: "If you were not such persistent protectionists you would not find us so keen to annex territories." (Alesina, 2002, p.20).

We have historically identified three forms of preferential trade agreements that prevailed trade

during colonial period and on: tariff assimilation, preferential tariff policies, and open door policies. As defined by Mitchener and Weidenmier (2008) "Tariff assimilation is a policy regime where the tariff rates on goods are the same in the metropolis and the colony. Under this arrangement, the metropolis and colony form a custom union. Preferential tariff system describes a trade policy where colonies and the mother country have differential tariffs but non-empire goods are generally taxed at a higher rate. An open door trade policy refers to a tariff regime where there is no distinction made between the products of the mother country and non-empire trading partners." (Mitchener and Weidenmier, 2008, p.1819).

Table 1.3, extracted from Mitchener and Weidenmier (2008), shows the colonial tariff systems between each colonial power and its corresponding colonies. France and most of its colonies adopted either tariff assimilation or a customs union.<sup>15</sup> This regime allowed the colonies to enjoy free trade with France for most products, while non-colonies had to pay tariffs. This policy aimed mainly at promoting trade within the empire in order to, first, acquire primary products at low prices, and, second, to ensure profitable markets for its products in times of economic crisis, or of saturation of the European markets (Marseilles, 1984; Alesina, 2002).

Even when the world entered into the free trade competitive era during the industrial revolution, France did not find it profitable to let go of its colonial market, for it had developed a careful system of trade agreements to secure imports of agricultural products - the major production of French colonies - guaranteeing that the French market is the preferred one for the French colonial exports (Lavallée and Lochar, 2012)<sup>16</sup> and ensuring that its exports are dispensed back in the colonies (Bairoch, 1989).<sup>17</sup> On the other hand, the British system applied quite loose trade policies, giving the opportunity to its colonies to trade outside the empire. While most of British colonies adopted an open door policy, some of them like Jamaica, British Guiana, and Bahamas adopted differential import duties in order to promote their own manufactures. Bairoch (1989) noted that Britain had a free trade colonial policy and colonial trade was open to all foreign countries.

<sup>15</sup>Algeria, Indochina and Tunis, three of France's most important colonies, formed customs union with the metropolis.

<sup>16</sup>"For instance, bananas, cocoa, coffee and citrus fruit enjoyed tariffs and quotas preferences in France; cereals and oil seeds a guaranteed market price above world level; cotton and other were protected by licensing and by a purchasing cartel." (Lochar and Lavallée, 2012, p.5).

<sup>17</sup>Morocco was also forced to accept a maximum import duty of 10%. (Bairoch, 1989, p.139)

Table 1.4 from Marseilles (1984) reports the share of French colonial imports from France in their total imports. The table is grouped by colonies adopting same trade agreements. It indicates that colonies who adopted an assimilated trade agreement with France traded the most with it while those who adopted an open door traded the least. Figure 1.15 reports the repartition of French colonies imports from France by tariff system. Those shares are also retrieved from Marseilles (1984) and are only available for the years 1912-1913. Although they do not comprise all years in our sample, they still show that colonies with preferential trade agreements with France had a biased trade towards the metropolis. According to the figures in the table, colonies forming a custom union with France imported more than 90% of their total imports from France, making the latter their main provider of products. Those under preferential tariff system imported 30% of their imports from France while colonies under the "open Door" policy only imported 10% of their imports from France.

#### 1.4.5 Comparison with Jacques Marseilles Data

According to the trade patterns and the stylized facts highlighted in the previous sections, we concluded that France mainly imported agricultural goods from its colonies and exports manufactured goods to them. In order to take an alternative overview on those patterns and confirm our conclusion, we checked Jacques Marseilles (hereafter JM, 1984) statistics about French colonial trade. His dataset is constituted of French imports and exports between France and its own colonies and covers the period from 1880 till 1930.. We collected it from the original manuscript of Marseilles' thesis (1984).<sup>18</sup> The data was originally collected from similar primary resources as ours, namely, "The tableau général du commerce de la France". We will first present some of JM conclusions and then we will present his data, in order to highlight the converging points from our statistics and his. According to the overall conclusion drawn by JM about the profitability of colonization to France, colonial French market was a safe outlet for France in times of crisis. That same market also provided France with natural and agricultural raw material. He stated that the French imports from their colonies were always satisfied by those colonies during periods of expansions and recessions, while French exports were highly oriented to the French colonies during recessions but towards the

<sup>18</sup>Thanks to the university library services that managed to get the original manuscript.

rest of the world during expansions. He also quoted in his conclusion parts of a French official speech: "As a whole, our colonies are no longer a burden to the metropolis but a source of profit [...] We should put in evidence the commercial and industrial activity to justify a posteriori the work already accomplished" (Marseilles, 1984, p. 54) (translation by the author).<sup>19</sup> According to him, the colonial policy aimed strictly at securing the exclusivity of raw materials towards the mother country and providing outlets for the French products. His findings are in line with the exploitative nature of colonization through the use of international trade.

Another conclusion drawn by JM was that, while the rest of the world was opening their markets to free trade, allowing for technology and factor transfer and for poorer countries to industrialize, France was isolated within its empire, imposing prices and quantities through trade agreements that favor its terms of trade especially during crisis periods. Such periods were concurrent with more land acquisitions. Actually, the French thought of any external opening to the rest of the world as only a mere compromise to shortages of internal opportunities that necessitate acquiring new markets, instead of a permanent driver of growth. Although such a protectionist policy was thought to be a source of benefit to the mother country, it had been a brake for the modernization of France by protecting old fashioned industries, such as iron steel and textile, through protectionist policies.

His data, is more detailed than ours in terms of sector segregation: Information is available for the main products constituting each of the three sectors in our data. As stated earlier, France exported high quality manufactured goods to Europe while she exported low quality manufactures to its colonies. As we will see in the next paragraphs, many converging points can be brought forward between Marseilles's and our trade patterns.

Figure 1.16 and its corresponding Table A.2 in the appendix from Marseilles' statistics present the percentage share of French total exports and of French exports of some selected products to French colonies in the total French exports and in the French exports of those selected products. His statistics show that the share of total French exports to the colonies, prior to WWI, did not exceed 10%. However, for some products the share of French exports to French colonies is high while this share is low for other products. In total, this makes the share of French exports to colonies

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<sup>19</sup>"Dans leur ensemble, nos colonies ne sont plus une charge pour la metropole mais bien une source de profit [...] il faut mettre en evidence cette activite commerciale et industrielle pour justifier a posteriori l'oeuvre deja accomplie." Originally from: H. Bouteville, preface de l'ouvrage d'H. Paulin, l'outillage economique des colonies francaises, paris 1913

not very high. For instance, Figure 1.16, shows that French colonies absorbed around 35% of the cotton industry's exports, roughly the same share of equipment, machines and mechanics, and 30% of refined sugar. However, the share of exports of "expensive manufactures" such as silk and leather fabrics to colonies in the total French exports was almost null. Actually JM stresses the fact that there were some manufactured products that were not exported to the colonies but rather exported to the the European countries, such as real leather fabrics, chemicals, jewelry, watches, objects for collection, musical instruments, perfumes, among others; whereas other manufactured goods were mostly exported to those colonies, like weapons, ammunition, powder, flour, metal tools, wine, food for colonial consumption, brandy, fabric trimmings, wool and cotton fabric. Figure 1.17 reports the geographical distribution of French exports by main countries: Algeria occupied the first rank advancing respectively Tunisia, West Africa, Indochina and Madagascar by almost eighteen times in the first decade. A multiple that dropped to six times in the second decade of the sample and slightly five times in the last period of the sample.

Figure 1.18 and its corresponding Table A.3 in the appendix report the French colonial share in the French total imports. French imports from their colonies were in large modest not exceeding the 10%. Remarkably, imports of agricultural raw materials from colonies had increased from 8% in 1880 to 40% in 1890's -the period of the French African conquests-. The imports of wine and spirits from the empire were between 70-80% by the year 1900. Imports of oil seeds and peanuts from colonies, grew from 10% in 1880's to 30% around 1900's. The imports of rice from colonies, occupied the highest rank averaging a share of 80% of total French imports of rice; this increase is noticed around the year 1890. The colonial share of French imports of textile and cotton did not exceed 5%, as for mining raw materials, France imported from its colonies a share of around 10%. This low share is due to the lack of such resources in the colonial land. Figure 1.19 also reports the geographical repartition of countries of origin of French imports. Almost the same trading partners that absorbed the biggest share of French exports, were the providers of French imports, with a highest share attributed to of Algeria.

Marseilles (1984) general conclusion can be summarized as follows: Between 1880 and 1906, French imports from the rest of the world were low. This is due to the slowdown of industrial production in the world. This stagnation of imports was accompanied by an increase of imports from the French empire "from 244.6 millions in 1880 to 524.1 millions in 1906" (Marseilles, 1984,

p.65). By 1900's the colonial "réservoir" was amongst the main providers of raw materials to France namely in agricultural raw materials. For the domestic food industry and chemical industry, the colonial reservoir, prior to 1914, was an essential source of procurement to the metropolis.

We used JM's trade data in order to compare its general interpretation to ours validating the suggestions drawn from the description of our statistics in terms of the types of products traded between France and its colonies, and of the exploitative aspect of such trade. In fact, he tried to answer the universal question of whether colonialism contributed or not in the economic development of the Western industrialized societies and in particular France. His analysis, which was based on historical events and on descriptive statistics can be summarized under the following two statements: 1) given that practically all the industrial powers have sought to develop a colonial empire, it must be that such empire was beneficial for their economy and especially for their industries. 2) Since the colonies had suffered economically from colonization, the colonizer (Europe) would necessarily had been extracting profits.

## 1.5 Concluding Remarks

The main motive of this chapter was to describe the construction of a new data set on French trade statistics between 1880 until the eve of the WWI, and investigate the trade patterns as well as some stylized facts we can identify from this data . To build the data set, we relied on various primary historical sources containing information on the value of French trade split in three sectors -Agricultural raw material, food, raw material for industry and manufactured goods- with each of its trading partners during the period of 1880-1912. The first part of the chapter has been devoted to the definition and the construction of the dataset and the historical background. We then proceeded to the description of French trade patterns and compared them across French , British , other and former colonies, as well as European and sovereign non-European countries.

First, we found that, at the event of French colonization, trade between France and its own colonies increased, while colonization from Britain and other metropolis did not impact trade between France and those colonies. The French colonies provided France with raw agricultural goods and imported its manufactured goods. During times of crisis, the empire was used as buffer to dispense the metropolis products. Colonial markets were considered a privileged island in the international markets. The exchange between France and its colonies was very important to the economy

of those colonies.

Our stylized facts also show that the French colonies had a "revealed comparative advantage with respect to France" in agricultural goods. Also, France exhibited a long-run deficit in both agricultural raw material and raw material necessary for industry and a long-run trade surplus in manufactured goods. The deficit trade balance in raw material with its colonies suggest that France is capable of extracting the colonies' raw materials without "paying" them with comparable exports.. We also found that the French colonies that traded the most with France had signed preferential trade agreements with the metropolis, which suggested that those trade patterns may stem from trade policies between France on its colonies such as custom unions and assimilated tariff systems.

Finally, after comparing our data to that of Jacques Marseilles, we concluded similarly to him, that colonial French market was a safe outlet for France in order to sell its products, and a provider of natural and agricultural resources.



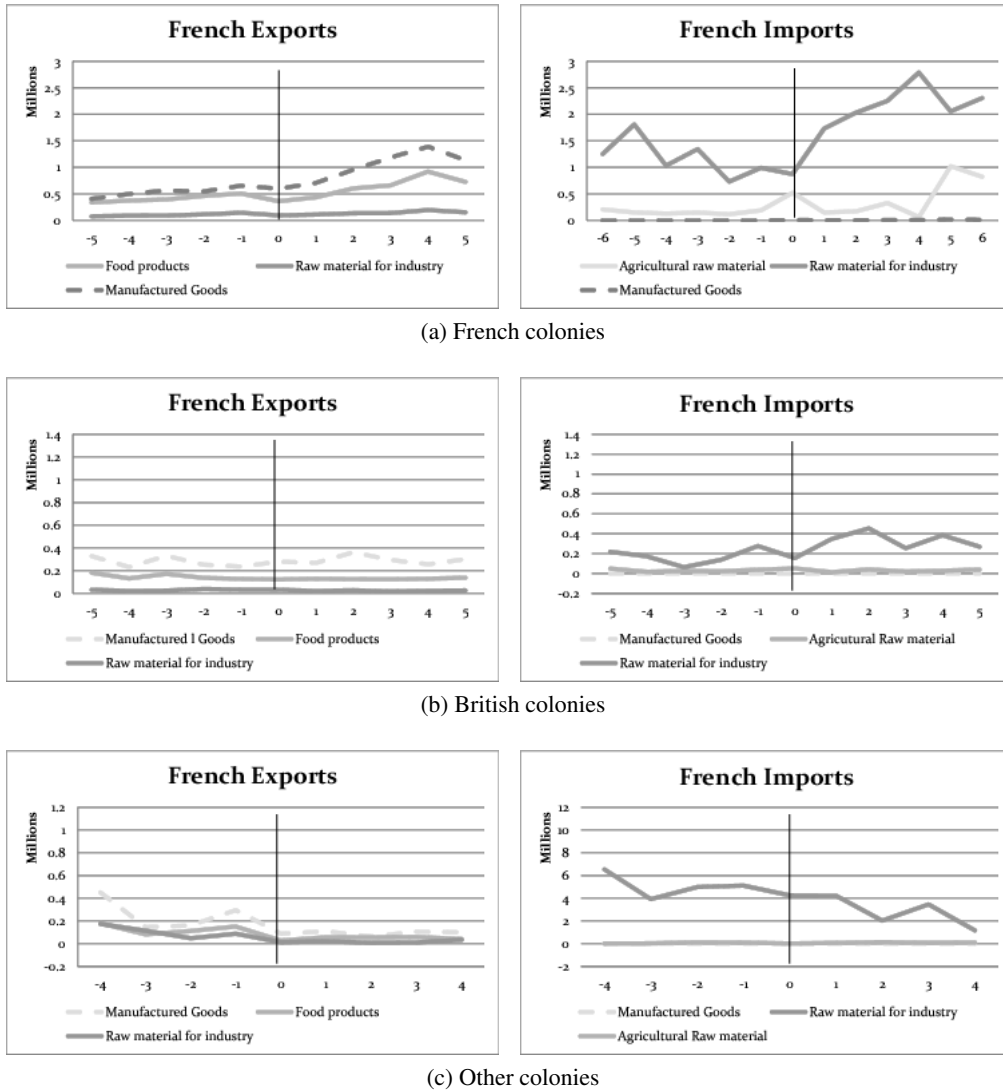


Figure 1.1: Impact of colonization on French bilateral trade

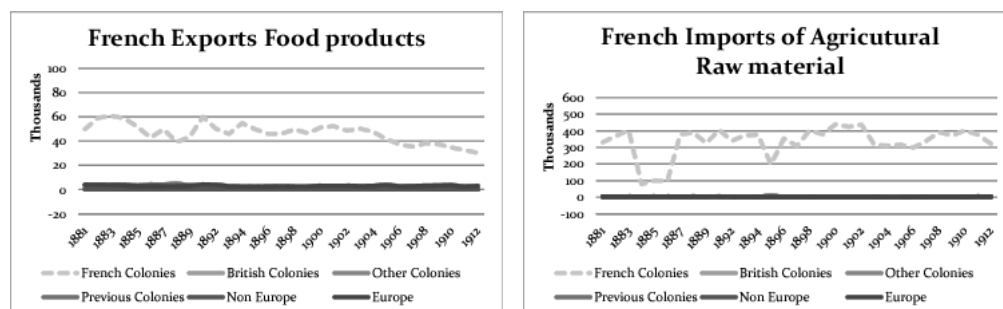


Figure 1.2: Agricultural Goods

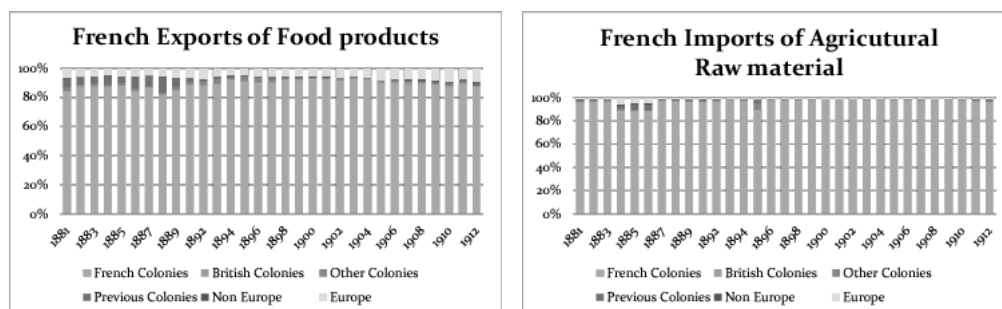


Figure 1.3: Share of trade of agricultural goods

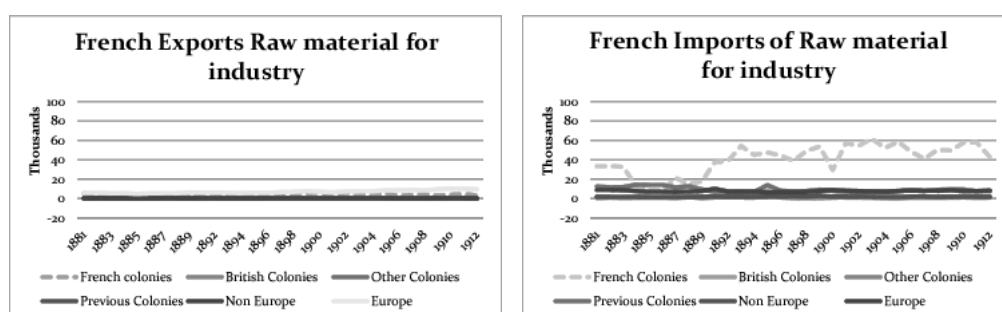


Figure 1.4: Raw materials for industry

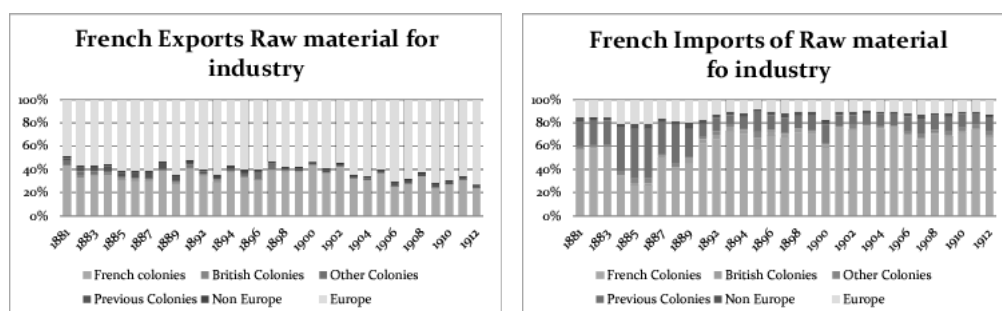


Figure 1.5: Share of trade for raw materials for industry

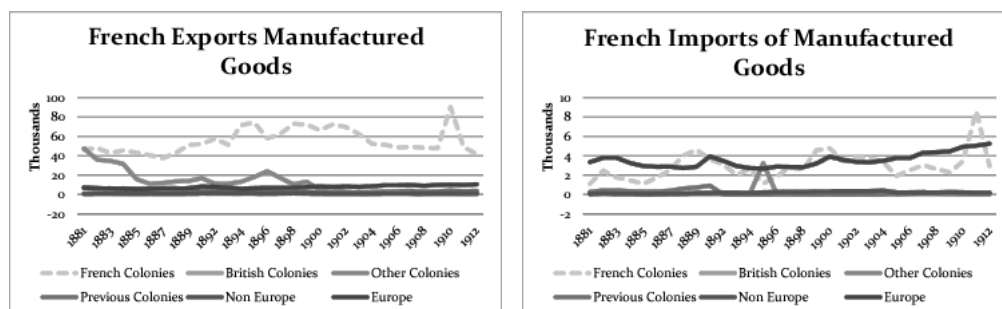


Figure 1.6: Manufactured Goods

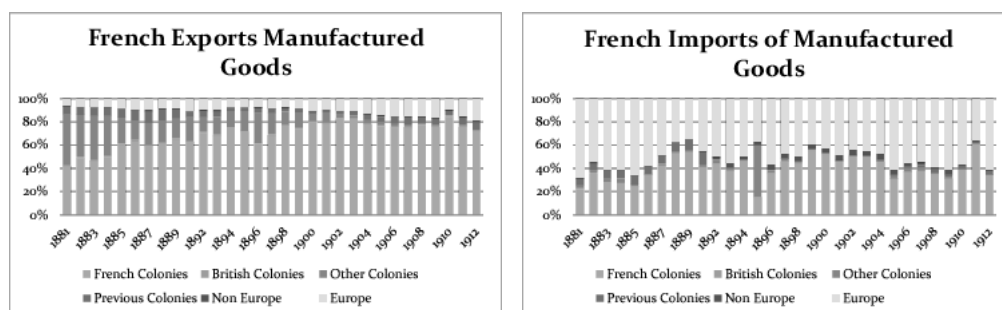


Figure 1.7: Share of trade of manufactured goods

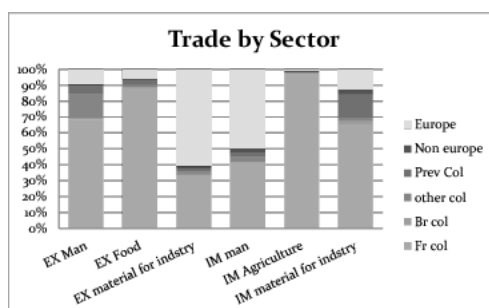


Figure 1.8: Share of trade by sector

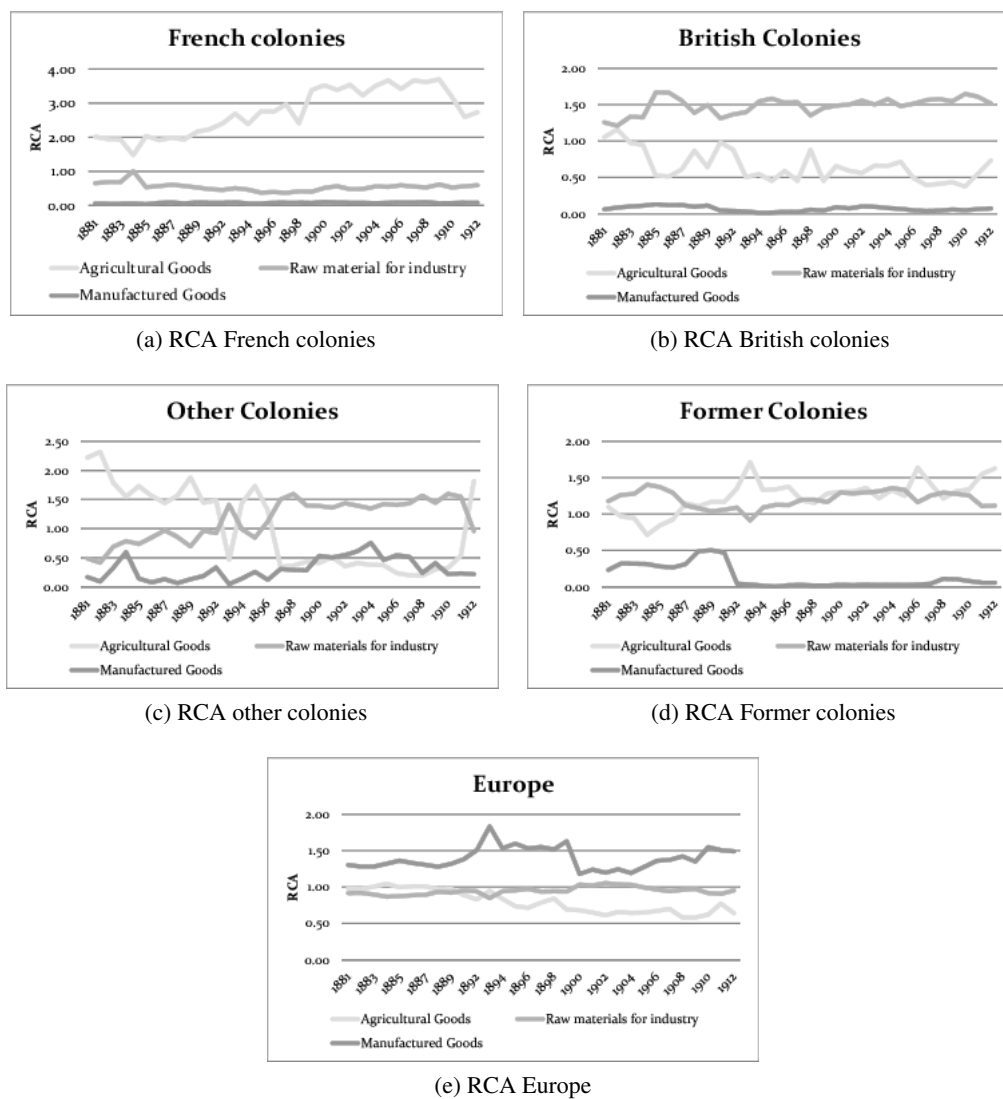


Figure 1.9: Revealed Comparative advantage of French trade

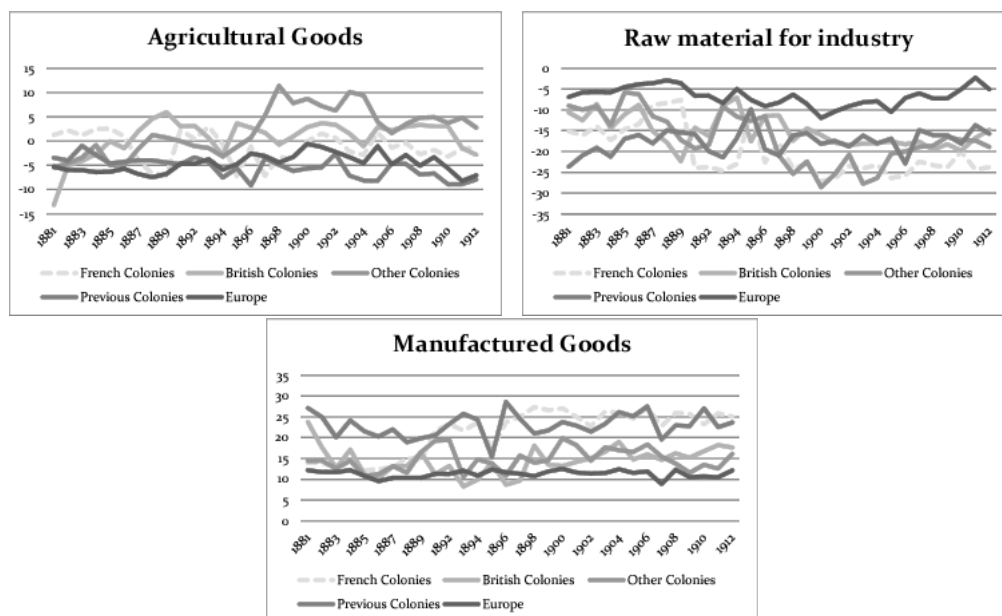


Figure 1.10: France Contribution to Trade Balance

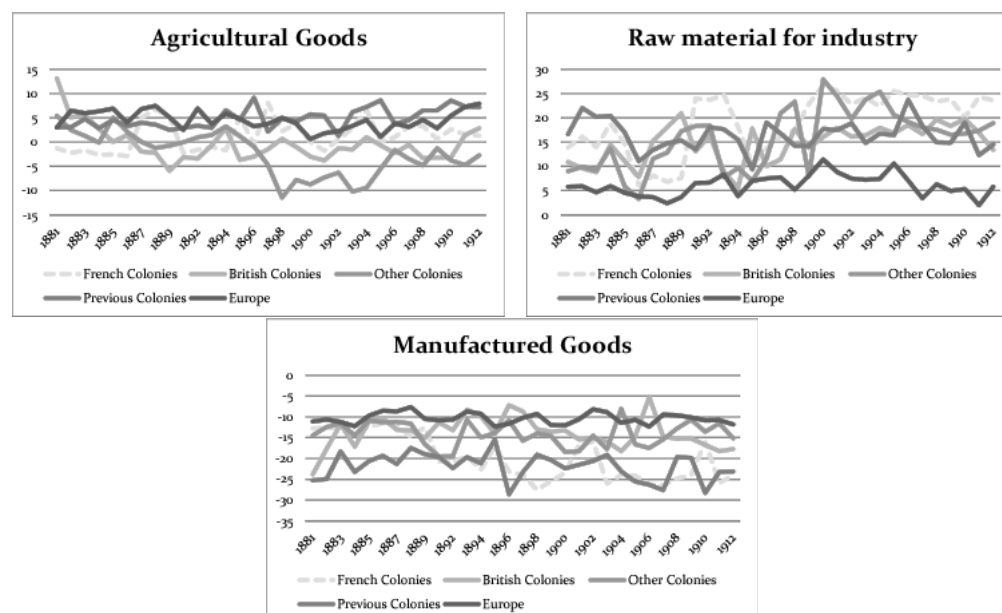


Figure 1.11: Colonial Contribution to Trade Balance with respect to France

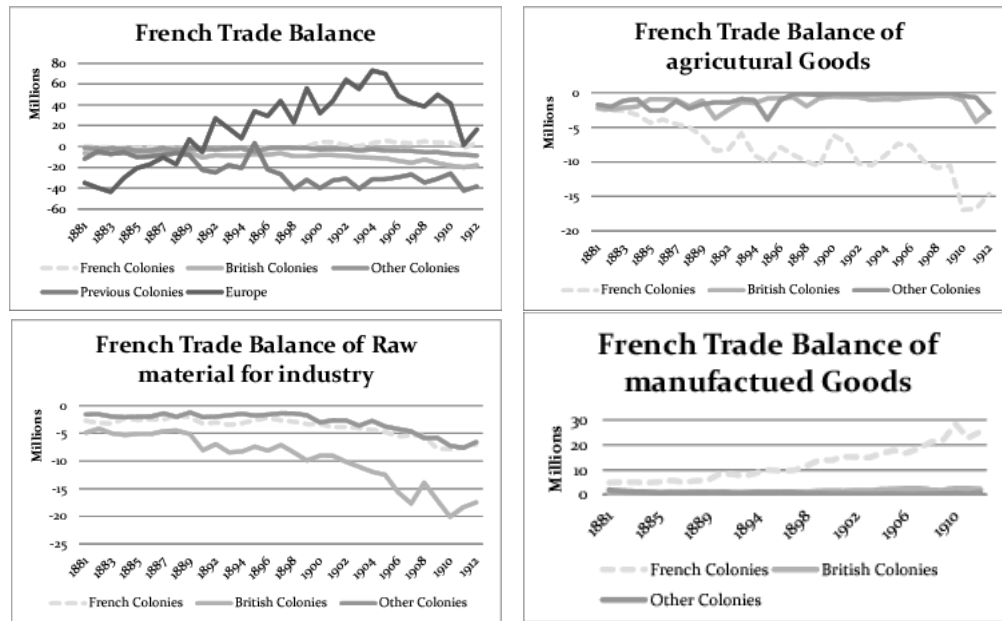


Figure 1.12: Trade Balance

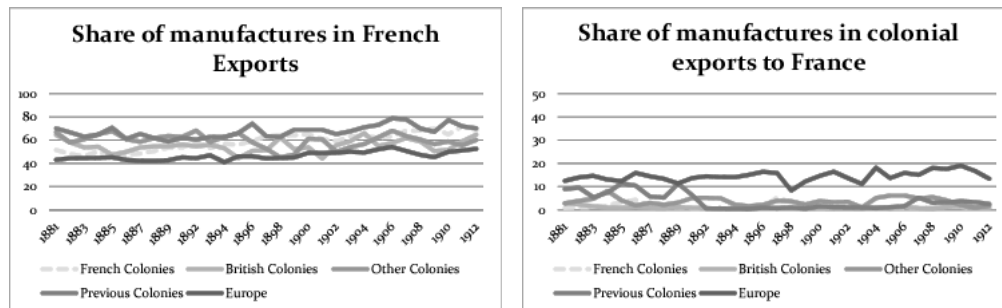


Figure 1.13: Share of manufactures in total Exports

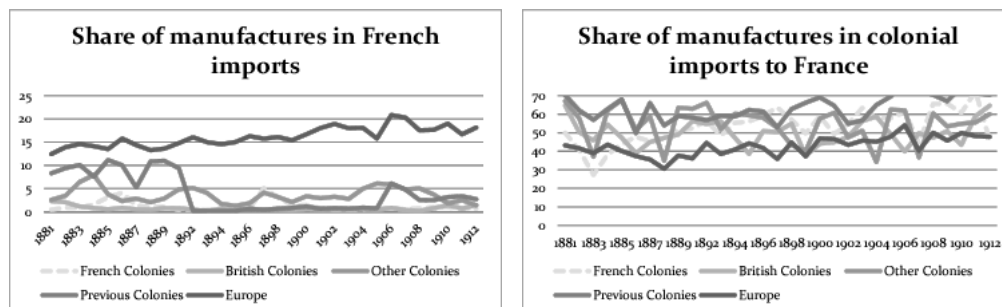


Figure 1.14: Share of manufactures in total Imports

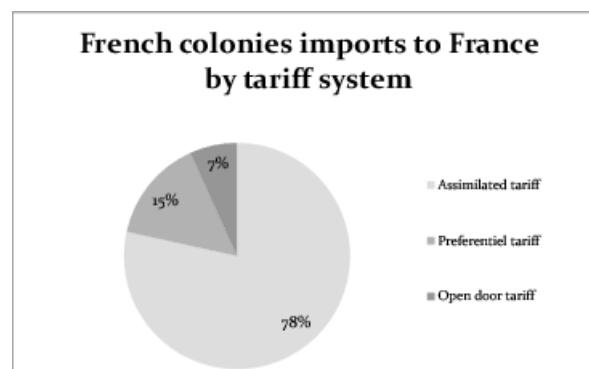


Figure 1.15: Percentage share of colonial imports from France



Figure 1.16: JM: Percentage share of French Exports to French colonies

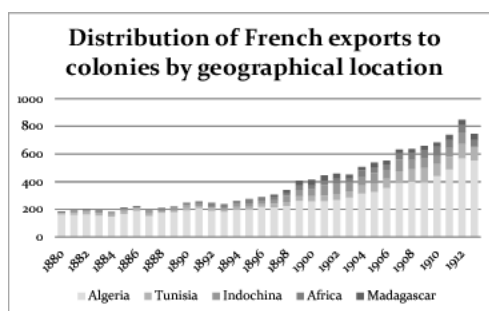


Figure 1.17: JM: Share of French exports to colonies by country

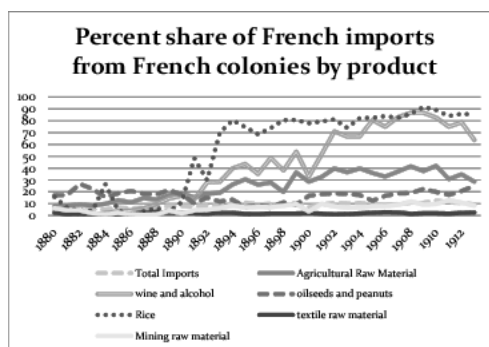


Figure 1.18: JM: Percentage share of French Imports from French colonies



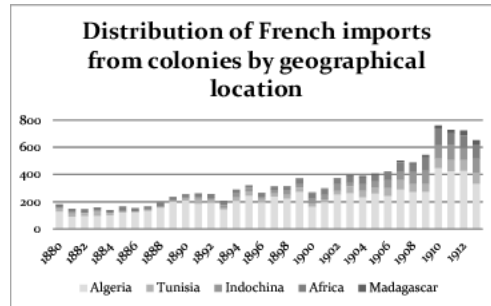


Figure 1.19: JM: Share of French exports to colonies by country

Table 1.2: Descriptive statistics of French Trade in thousand French Franc

	Sector	Colonial group	Mean	SD	Min	Max	Coefficient of variation	N
French Exports	Food	French	<b>46490.65</b>	8131.26	30251.74	60864.03	17%	27
		British	273.96	168.37	93.41	688.11	61%	37
		Other	712.63	416.14	185.32	1505.14	58%	17
		Former	1735.36	1503.67	455.86	5039.27	87%	17
		Non Europe	133.25	28.61	85.51	186.79	21%	4
		Europe	3229.51	476.95	2509.65	4369.76	15%	16
	Raw material for industry	French	<b>3836.47</b>	910.00	2456.67	5706.04	24%	27
		British	83.13	36.11	48.99	242.04	43%	37
		Other	123.89	140.77	9.41	535.52	114%	17
		Former	266.67	98.57	147.65	555.34	37%	17
		Non Europe	187.89	34.20	144.82	278.11	18%	4
		Europe	6956.29	1543.02	4850.53	10282.80	22%	16
	Manufactured Goods	French	<b>55501.91</b>	12761.49	37442.91	90238.56	23%	27
		British	796.13	187.99	521.85	1392.64	24%	37
		Other	12141.26	12071.18	277.97	47513.16	99%	17
		Former	3985.78	1586.39	1882.89	7573.04	40%	17
		Non Europe	922.62	193.11	659.19	1282.71	21%	4
		Europe	7661.09	1507.34	5492.77	10457.37	20%	16
French Imports	Raw agricultural Goods	French	<b>334417.93</b>	93903.53	79325.54	439899.61	28%	27
		British	872.88	655.80	260.19	2622.54	75%	37
		Other	1348.97	2225.49	181.91	12562.41	165%	17
		Former	3732.18	1206.92	2149.00	6873.42	32%	17
		Non Europe	878.20	471.80	391.32	1799.34	54%	4
		Europe	3659.37	1214.09	2017.53	5574.25	33%	16
	Raw material for industry	French	<b>40448.68</b>	15698.26	8439.85	61731.22	39%	27
		British	872.88	655.80	260.19	2622.54	75%	37
		Other	1415.66	889.39	447.02	5240.50	63%	17
		Former	9269.00	2577.37	6303.70	14283.54	28%	17
		Non Europe	1867.15	318.89	1335.38	2808.04	17%	4
		Europe	7680.44	807.33	6227.54	9981.70	11%	16
	Manufactured Goods	French	<b>2959.76</b>	1467.88	1103.72	8626.90	50%	27
		British	11.73	11.66	2.70	57.28	99%	37
		Other	203.29	569.30	5.71	3247.78	280%	17
		Former	203.74	225.58	12.52	915.50	111%	17
		Non Europe	205.35	101.86	62.58	399.55	50%	4
		Europe	3533.78	722.42	2679.84	5252.41	20%	16

Table 1.3: Colonial Tariff Systems

Countries	Assimilated	Preferential	Open Door
France	Algeria, French Indo-China, Madagascar, Reunion, Martinique, Guadeloupe, New Caledonia, French Guiana Gabon		
Great Britain		Dominions: Canada Australia New Zealand Cook Islands Union of South Africa Rhodesia Colonies: Trinidad British Guiana Jamaica and Caymans Turks and Caicos Barbados Leeward Islands: Dominica Montserrat St. Christopher -Nevis Virgin Islands Antigua Windward Islands Grenada St. Lucia St. Vincent British Honduras Bahamas Fiji	British India Newfoundland Papua Norfolk Island Colonies in Asia: Aden Ceylon Straits Settlements Federated Malay States Protected Malay States Hong Kong Weihaiwei
Germany			German East Africa German Southwest Africa Kamerun Togo German Samoa New Guinea
Spain		Fernandi Po Spanish Guinea	Canary Islands Spanish Morocco
Belgium			Belgium Congo

Note: Assimilated tariff system is where the tariff rates on goods are the same in the metropolis and the colony. Preferential tariff system is where colonies and the mother country have differential tariffs but non-empire goods are generally taxed at a higher rate. An open door tariff regime does not distinguish between the products of the mother country and non-empire trading partners.

Table 1.4: Percentage share of French colonial imports from France between 1912 and 1913

Custom Unions (Assimilated)	Percentage
Algeria	98.9
Indochina	90.7
Madagascar	98.9
Guadeloupe	94.5
Martinique	94.9
Reunion	98.8
New Caledonia	78.7
Gabon	30.6
Preferential Tariff System	
Tunisia	32.9
Senegal	16.3
Sudan	11.5
Guinea	9.8
Open door	
Cote-d'ivoire	9.3
Dahomey	1.2
Morocco	13.7

# Appendices

Table A.1: The country dis-aggregation data

Regions as defined in the Tableau du Commerce general de la France			Countries Segregated	Colonizer	Year of Colonization	Year of independence
Europe	Possessions anglaises de la mediterranee		Gibraltar	GBR	1700	2012
			Cyprus	GBR	1878	1960
			Malta	GBR	1802	1964
Afrique	Egypte		Egypt	GBR	1882	1922
	Etats Barbaresques	Regence De Tripoli	Libya	ITA	1910	1947
		Tunisie	Tunisia	FRA	1881	1956
		Maroc	Morocco	FRA	1912	1956
	Cote occidentale (Du maroc au cap de bonne esperance)		Western Sahara	ESP	1884	1965
			Mauritania	FRA	1895	1960
			Guinea Bissau	PRT	1800	1973
			Guinea	FRA	1890	1960
			Liberia	USA		1847
			Ivory Coast	FRA	1889	1960
			Togo	FRA	1918	1960
			Benin	FRA	1892	1960
			Cameroon	FRA	1918	1960
			Equatorial Guinea	ESP	1844	1968
			Gabon	FRA	1885	1960
			Congo	FRA	1903	1960
			Dr Of Congo	BEL	1885	1960
			Namibia	DEU	1884	1949
			Angola	PRT	1500	1975
			Sao Tome And Principe	PRT	1500	1975
			Botswana	GBR	1885	1966
Afrique	Possessions Anglaises	Sierra Leone	GBR	1808	1961	
		Gambia	GBR	1888	1965	
		Ghana	GBR	1874	1957	
		South Africa	GBR	1806	1910	
		Nigeria	GBR	1800	1914	

			Partie Orientale (Y Compris L'île Maurice)	Malawi	GBR	1891	1964
				Tanzania	GBR	1918	1961
				Kenya	GBR	1888	1963
				Uganda	GBR	1894	1962
				Somalia	GBR	1884	1960
				Sudan	GBR	1899	1960
				Mauritius	GBR	1835	1968
				Zimbabwe	GBR	1888	1965
				Zambia	GBR	1899	1964
Afrique		Autres Pays (Y Compris L'île De Madagascar)		Mali	FRA	1892	1960
				Niger	FRA	1922	1960
				Chad	FRA	1900	1960
				Burkina Fasso	FRA	1897	1960
				Ethiopia			
				Mozambique	PRT	1500	1975
				Madagascar	FRA	1883	1960
				Central African Republic	FRA	1889	1960
Asie et Oceanie		Indes Comptoirs	Anglais	India	GBR	1857	1947
				Myanmar	GBR	1857	1948
				Pakistan	GBR	1857	1947
				Bangladesh	GBR	1857	1971
			Hollandais (Java Et Sumatra)	Indonesia	PRT	1600	1945
Asie et Oceanie		Philippines Chine Royaume De Siam Japon Australie		Philippines	ESP	1521	1898
				China			
				Thailand			
				Japan			
				Australia	GBR	1750	1901
		Autres Iles De L'océanie		Fiji	GBR	1700	1970
				Solomon Islands	GBR	1893	1978
				New Zealand	GBR	1840	1907
Amerique	Septentrionale	Etats Unis	Ocean Atlantique Ocean Pacifique	United States	GBR	1600	1776
		Mexique		Mexico	ESP	1650	1810
Amerique	Centrale	Guatemala-CostaRica- Honduras		Guatemala	ESP	1519	1821

			Costa Rica	ESP	1522	1821		
			Honduras	ESP	1520	1821		
		Nouvelle Grenade	Colombia	ESP	1525	1808		
Amerique	Meridionale	Cote est	Venezuela	Venezuela	ESP	1490	1821	
			Brezil	Brazil	PRT	1500	1822	
			Uruguay	Uruguay	ESP	1500	1821	
			(MonteVideo)					
			Republique Argentine	Argentina	ESP	1500	1816	
		cote ouest	Equateur	Ecuador	ESP	1500	1822	
			Perou	Peru	ESP	1500	1821	
			Bolivie	Bolivia	ESP	1500	1825	
			Chili	Chile	ESP	1500	1810	
		colonies anglaises		Canada	Canada	GBR	1763	1867
					Barbados	GBR	1650	1966
					Bahamas	GBR	1650	1973
			Jamaica	GBR	1650	1962		
			Guyana	GBR	1700	1966		
Amerique	Antilles et possessions Europeennes	Autres Y Compris Les Antilles	British Virgin Islands	GBR	1672	1967		
			Dominica	GBR	1805	1978		
			Grenada	GBR	1763	1974		
			Saint Lucia	GBR	1750	1979		
			Trinidad And Tobago	GBR	1750	1962		
			Antigua Et Barbuda	GBR	1632	1981		
		Haiti Et Republique Dominicaine		Haiti	FRA	1697	1804	
				Dominican Republic	ESP	1500	1865	
		Colonies espagnoles	Cuba-Porto Ricco	Cuba	ESP	1492	1898	
				Puerto Rico	ESP	1493	1898	
				Saint Thomas	Virgin Islands (Us)	DNK	1600	1917
		Colonies Hollandaises		Aruba	PRT	1600	1986	
				Suriname	PRT	1683	1975	
		Algerie		Algeria	FRA	1830	1962	



		Tunisie	Tunisia	FRA	1881	1956
		Maroc	Morocco	FRA	1912	1956
		Congo	Congo	FRA	1903	1960
		Senegal	Senegal	FRA	1850	1960
		Etablissement Francais De La Cote Occidentale D'afrique	Guinea	FRA	1890	1960
Colonies Francaises			Central African Republic	FRA	1889	1960
			Gabon	FRA	1885	1960
			Ivory Coast	FRA	1889	1960
			Benin	FRA	1892	1960
			Mali	FRA	1892	1960
			Mauritania	FRA	1895	1960
			Burkina Fasso	FRA	1897	1960
			Chad	FRA	1900	1960
			Togo	FRA	1918	1960
			Cameroon	FRA	1918	1960
Colonies Francaises		Madagascar Et Dependences	Madagascar	FRA	1883	1960
		Mayotte	Madagascar	FRA	1883	1960
		Noisy-Be	Madagascar	FRA	1883	1960
		Ile De La Reunion	Reunion	FRA	1642	2012
		Cote Des Somalis	Djibouti	FRA	1896	1977
		Etablissement	Laos	FRA	1880	1949
		Francaise De L'inde	Cambodia	FRA	1863	1953
		Indo-chine Francaise	Vietnam	FRA	1859	1945
	Etablissements Francais de l' oceanie	Nouvelle Caledonie	New Caledonia	FRA	1853	2012
		Autres Etablissements	French Polynesia	FRA	1842	2012
			New Hebrides (Vanuatu)	FRA	1880	1980
		Guyane Francaise	French Guiana	FRA	1814	2012
		Martinique	Martinique	FRA	1685	2012
		Guadeloupe	Guadeloupe	FRA	1635	2012

	Saint Pierre Et Miquelon Et Grande Peche	Saint Pierre Et Miquelon	FRA	1814	2012
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Table A.2: Percentage share of French Exports to French colonies

	Total Exports	Clothes and leather	Fabric and silk	Equipment	Machinery and Mechanicals	Refined sugar
1880	6.30	6.80	0.20	10.90	10.00	8.90
1881	6.60	6.40	0.20	10.40	11.90	10.70
1882	6.90	6.60	0.10	5.80	12.50	10.70
1883	7.00	7.00	0.10	11.20	10.40	10.90
1884	6.90	6.80	0.70	11.10	10.90	14.90
1885	7.40	7.20	0.30	15.20	9.60	15.50
1886	7.50	7.40	0.30	16.80	14.10	13.00
1887	0.60	6.00	0.50	14.70	12.30	9.40
1888	7.40	8.20	0.60	15.50	10.50	13.20
1889	6.80	7.50	0.80	10.90	7.40	11.10
1890	7.80	9.10	1.30	11.00	8.10	12.70
1891	8.40	9.70	0.90	14.80	11.70	15.70
1892	8.50	6.30	0.60	17.00	13.90	15.30
1893	0.60	8.50	0.60	16.70	12.40	14.80
1894	10.40	11.20	0.90	19.00	15.80	14.90
1895	9.60	10.40	1.00	21.60	17.70	18.60
1896	10.10	10.90	0.80	18.80	15.80	18.00
1897	9.90	11.80	0.80	19.30	16.30	15.00
1898	11.10	12.80	0.90	23.10	22.10	18.90
1899	11.40	14.10	0.50	24.80	18.60	21.10
1900	11.60	15.19	0.50	25.50	20.60	18.00
1901	12.70	16.00	0.90	33.60	21.70	18.00
1902	12.00	14.50	0.60	34.40	24.91	21.80
1903	11.90	14.40	0.60	34.00	28.10	29.10
1904	12.50	15.10	0.70	31.40	27.30	29.00
1905	12.00	14.60	0.90	27.10	23.50	29.10
1906	11.40	12.50	0.60	26.40	21.80	30.40
1907	12.20	35.00	0.80	26.70	25.90	32.60
1908	13.50	16.60	0.60	27.50	29.70	38.30
1909	12.40	14.80	0.50	26.40	20.15	38.90
1910	11.80	13.70	0.60	29.40	25.10	43.50
1911	13.10	14.60	0.50	33.40	29.50	47.60
1912	13.50	14.80	0.80	32.40	29.70	43.80

Table A.3: Percentage share of French Imports from French colonies

	Total Imports	Agricultural Raw Material	Wine and Alcohol	Oil seeds and Peanuts oil	Rice	Textile Raw Material	Mining Raw Material
1880	4.80	7.80	0.20	17.10	15.80	2.50	6.30
1881	4.80	8.40	0.10	17.40	5.80	1.30	4.40
1882	5.20	9.20	0.10	26.70	4.50	1.50	4.40
1883	5.30	8.40	0.80	22.50	4.10	1.40	1.90
1884	5.20	9.90	2.10	15.50	26.60	1.00	1.20
1885	6.70	13.00	3.70	18.70	4.50	1.30	2.20
1886	6.10	11.20	4.20	20.80	-	1.30	1.10
1887	6.50	14.70	6.00	18.40	3.50	2.40	0.60
1888	7.20	13.60	9.70	17.80	6.30	3.20	0.90
1889	7.90	17.30	14.40	21.40	3.50	2.40	4.20
1890	8.10	18.70	16.80	17.80	11.10	2.00	1.80
1891	7.50	15.50	13.80	10.40	48.40	2.00	4.40
1892	8.50	18.40	28.10	15.20	29.90	1.70	5.00
1893	8.20	19.10	26.50	11.80	70.00	2.40	6.20
1894	10.20	26.20	39.90	13.40	80.40	2.30	8.40
1895	11.00	30.60	43.60	7.40	74.80	1.60	6.80
1896	9.40	25.10	35.10	8.18	88.50	1.40	7.40
1897	10.00	27.90	48.80	7.40	73.90	1.80	7.30
1898	9.20	19.90	3811.00	1102.00	80.60	1.80	8.30
1899	10.40	38.50	53.90	9.20	80.70	1.80	9.80
1900	7.70	28.60	33.00	16.70	78.00	2.10	3.50
1901	9.10	32.70	51.70	18.00	79.40	1.70	10.00
1902	11.00	39.90	71.10	18.00	81.30	1.10	7.80
1903	10.40	33.60	66.60	18.30	74.10	1.40	6.70
1904	10.80	39.80	56.70	17.40	82.30	1.50	7.00
1905	9.40	35.90	80.60	12.00	82.60	2.40	7.80
1906	9.30	33.00	75.00	16.70	84.00	2.90	0.10
1907	9.80	37.10	83.10	18.80	62.50	2.60	9.00
1908	10.90	41.60	86.80	18.90	85.90	1.50	12.00
1909	10.70	37.60	86.80	22.50	91.70	2.00	9.30
1910	12.80	42.00	82.70	20.00	88.50	2.00	9.80
1911	11.10	30.80	75.00	17.50	84.10	1.70	13.00
1912	10.70	34.90	78.60	20.70	65.80	2.30	10.90

Note: We note that the share of total agricultural raw material in total French imports ranges between 25% and 30%, the share of total textile raw material in total French imports ranges between 20% and 25%, while the share of total mining raw material in total French imports ranges between 2% and 7%.

## Chapter 2

# French Colonial Trade Patterns and European Settlements

### Abstract

We construct a new database relying on various primary historical sources containing information on the value of French sectoral trade between 1880 and 1913 in order to assess the contemporaneous effects of colonial European settlements on French trade patterns. Our empirical results show that French colonies with more European settlements traded more with France, whereas the opposite is true for other colonies. We also investigate different factors through which European settlements might have affected the French trade pattern with colonies, namely, the establishment of formal institutions, the use of European languages and the duration of colonization. We find that better formal institutions brought by European settlements had a negative impact on trade with French colonies, while they promoted French trade with British colonies. These results are consistent with the extractive nature of French trade relations with its colonies. As for the use of common language and the duration of colonization, the stronger those ties the higher the overall French trade with French colonies but the lower French trade with other colonies.

### 2.1 Introduction

Colonial trade has been identified as one of the main tools of colonial extraction, while the extraction itself is widely held to have been the driver of colonization. Although political rivalry might have been another driver of colonial expansions, economic motives remain its ultimate goal. This economic aspect of colonialism had a longstanding influence on current economic disparities among the former colonies (Acemoglu et al., 2001 and 2012; Alam, 1994; Bertocchi and Canova, 2002;

Kwon, 2011; Lange et al., 2006; Nunn, 2008). European powers established their colonial control by settling in the colonies and exploiting their resources through trade. This assertion is not new to the literature and can be traced back to Lenin and further back to Hobson and Marxist thinkers, who regarded trade as the primary cause of imperialist expansion (Kleiman, 1976). The French colonization offers a quite representative example: French colonizers settled in the form of military troops, imposed territorial powers, and set up trade policies and preferential trade agreements in order to transfer resources from the colony to themselves and secure favorable markets for their products (Crowder, 1968).<sup>1</sup>

Colonizers exploited their colonies in a "legitimate form" through trade. For that reason, we look at the trade relations with the French empire and the different groups of colonies during the age of high imperialism to shed some light on this feature of the colonial strategy. More specifically, in this paper we investigate whether the amount of European settlement (hereafter ES) in 1900 affected France's trade patterns with the colonies, and how those trade patterns differ if the trading partner were the French colonies or other colonies.

We argue that investigating the impact of ES on trade, rather than using just a colonization dummy, may offer new insights. First, colonization as an abstract event cannot be quantified; however, its degree can be measured through the number of citizens that actually settled in a colony. Settling in their colonies was a way to concretize colonization. Second, the presence (or absence) of European settlers actually affected the type of institutions set by the colonial administration and the insertion of European trading companies. In some French colonies in Africa, for instance, where production was in the hands of domestic farmers, European settlers facilitated large companies to lobby the colonial government and establish a controlled system of marketing based on an oligopoly of firms, and in turn the colonial administration generally supported the activity of trading companies by implementing coercive institutions (Hopkins, 1973). Differently, in British colonies production was often controlled by the European settlers who already had a political influence before the colonial government. Hence, the cost of imposing extractive institutions was higher (Tadei, 2013). Whether production was organized through small domestic farmers or plantation companies,

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<sup>1</sup>Trade with territories politically dependent on the country is more profitable than trade with the rest of the world. In cases where trade monopolies were imposed by empires, they need not, in theory at least, **to bias the colony's choice of trade partners**. "But the growing internal democratization of the colonial powers [...] required a trade structure biased towards the metropolitan country as a necessary condition for the economic exploitation of colonial territories through trade [...]" (Kleiman, 1976, p.459).

trade revolved around the activity of European trading firms whose relation with settlers is necessary. Therefore, colonies with different levels of settlement were not likely to experience the same degree of control from the empire.

The transmission mechanism for the impact of ES on trade is represented in Figure 2.1. We hypothesize that, if the French settled in their colonies for the purpose of exploiting their raw materials and using the colonial markets to sell their products, one would expect more French imports of raw materials and more French exports of manufactured goods as a result of this settlement, as arrows 1 and 2 in Figure 2.1 illustrate.<sup>2</sup> However, if the British or other Europeans settled in their respective colonies, this would not necessarily increase French imports of other colonies' raw materials. Those colonies are more likely to engage in favorable trade with France, that is, trade that is mutually beneficial. This type of trade corresponds to arrows 1 and 3 of Figure 2.1.<sup>3</sup> Once this relationship established as a starting point, we can turn to investigate the channels through which ES might have impacted trade.

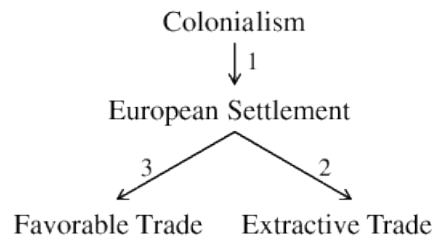


Figure 2.1: Motivation scheme: impact of ES on Trade

Besides investigating whether colonial settlements mattered for French trade with the French colonies compared to other colonies, we seek to identify the channels through which those settlements impacted French trade patterns with the various groups of colonies. We argue that ES had two interrelated effects on colonial trade. The first one is related to sharing a common language with the European settlers and to the duration of colonization. The second effect is related to the type of formal institutions the colonizers established, namely, the level of democracy and level of

<sup>2</sup>While quantifying extraction is best through considering prices paid to domestic producers, such data is unavailable for the time being. We try to identify some evidence of exploitation by taking the value and pattern of trade together and compare them across colonial groups.

<sup>3</sup>Favorable trade is defined in this context as the one that is mutually profitable to both parties, different from the "forced trade" or the extractive trade that is a form of resources exploitation.

the constraints on the executive.

With respect to the effect of language and duration of colonization, those two indicators can contribute to strengthening social ties developed through the settlers presence and through the reduction of transaction costs. Indeed, in a recent study on the causal relationship between migration and trade, Canavire Bacarreza and Ehrlich (2006) show that the presence of foreign immigrants in Bolivia and of Bolivian emigrants abroad have positive and significant effects on Bolivian bilateral trade. A similar argument can be applied to the colonial era. European settlers brought more than just formal institutions to the New World, they also brought human, physical and social capital. Settlers also promoted their language and culture and got acquainted with the culture, habits, and traits of the colonies, thereby reducing transaction costs and facilitating trade between their country of origin of and the colony in which they settled. In sum, those variables may be interpreted as capturing informal institutions, networking and cultural ties between the metropolis and the colony. This channel is captured by arrows 1, 2 and 4 in Figure 2.2.

The other channel we exploit, through which ES may impact trade, refers to the relation between ES and the establishment of formal institutions. In their paper on the colonial origins of development, Acemoglu, Johnson and Robinson (2001) (hereafter, AJR) argue that European settlers established European-style institutions with property rights, checks and accountability for the governor, and higher levels of democracy. Those institutions persisted and impacted positively the economic performance of those countries who inherited the "good" institutions. Recent studies, on their turn, show that a higher quality of institutions exerts significant positive effects on bilateral trade flows due to the lower transaction cost and higher level of trust they produce (Briant et al., 2009; De Sousa and Lochard, 2010; De Groot et al. 2004; Linders, 2004).

Combining these two arguments, we claim that the establishment of "good" institutions introduced by the colonizer would promote favorable trade between the colonizer and the colonies. More specifically, if, for instance, British settlers introduced good institutions, this would result in more favorable trade between France and British colonies. This channel is depicted by arrows 3, 5 and 7 of Figure 2.2. On the other hand, if French settlements introduced policies that perpetuated inequality and exploitation, it should increase the level of extractive trade, as indicated by arrows 6 and 8 in the Figure 2.2.



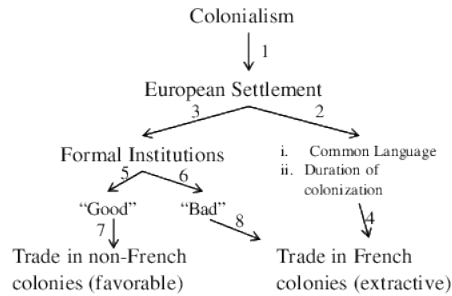


Figure 2.2: Motivation scheme: Transmission Channels

To carry on our empirical investigation, we constructed a new data set with more than 20,000 observations containing information on the value, in French Francs, of French imports and exports with each of its trading partners between 1880 and 1913. The data were collected from "Tableau General du commerce" which is the most complete and reliable database, for it is the official data of the French Customs. Our data set is more detailed than those used in previous works in the sectoral and directional dimensions, since it contains information on the exports and imports of France with each of its trading partners, dis-aggregated into four sectors: agricultural raw materials, food, raw material necessary for industry, and manufactured goods.

A number of studies have investigated the impact of colonial status on both historical and current trade (Estevadeoral et al., 2003; Mitchener Weidenmier, 2008, De Sousa and Lochard, 2012), while others have examined the impact of independence on post-colonial trade (Head et al., 2010; Lochard and Lavallée, 2012). Some of these studies look at the effect of colonization on bilateral trade<sup>4</sup>, but using colonial dummies and total trade, instead of ES and sectoral bilateral trade as we do. They show that being colonized exerts a positive impact on total bilateral trade. To our knowledge, no study has investigated the impact of colonial settlements on trade.

We find that higher French settlement increased the overall French imports and exports with French colonies. The impact is stronger with respect to imports of raw materials suggesting that French settlements did facilitate the extraction of those inputs. The British or other European settlements in their respective colonies had either a negative or a non-significant impact on the trade of those colonies with France.

A noteworthy result is that, once we control for ES in the colonies, colonial dummies exert either

<sup>4</sup>Mitchener and Weidenmier (2008); Rose (2000, 2002); De Sousa and Lochard (2012).

insignificant or negative effects on French exports and imports, indicating that European settlement captures the observed increase in trade associated with being a colony.<sup>5</sup> This result goes one step beyond Mitchener and Weidenmier (2008), who claim that being part of an empire (being colonized) increases bilateral trade.

We then examine the impact of ES through formal institutions, captured by the variables democracy and constraints on executive, and through common language and duration of colonization. We estimate the predicted value of ES explained by each of these variables to try and disentangle the part of ES corresponding to common language and to duration of colonization and the part corresponding to the formal institutions.

We find that the worse the formal institutions in French colonies, the higher the French imports of raw material and the French exports of manufactured goods to those colonies. These results confirm our hypothesis that France was better at exploiting its colonies in the presence of extractive institutions. On the other hand, higher institutional quality in the British colonies is associated with higher trade between those colonies and France confirming also that better formal institutions promote favorable trade in the absence of power imbalance between the two trading partners.

As for the effect of common language and the duration of colonization, we find that stronger ties between France and its colonies captured by those two variables increased French exports and imports with French colonies, with the highest magnitude attributed to French imports of raw agricultural goods. Among French colonies, the positive impact of ES through language and duration is complementary to the negative impact through of formal institutions in the sense that extractive policies can be more easily implemented whenever the colonizer have acquired greater power through longer period of colonization and sharing some common language. This, in turn, would boost extractive trade. We also find that the longer the British colonized and their respective colonies and the more they share a common language with the indigenous population, the lesser the trade between those colonies and France. These results still hold after controlling for endogeneity.

This paper is organized as follows. Section 2 presents an overview of the literature examining the link between colonialism and trade. Section 3 presents the empirical model, the data, and the baseline results. Section 4 explores the channels through which settlement might have affected

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<sup>5</sup>The insignificant effect emphasizes that settlement is the main engine of trade-creation. The negative and significant effect is puzzling though.

trade. The last section concludes.

## **2.2 Colonization, Settlement and Trade**

The economics and history literature suggest a variety of reasons to explain why colonization might have affected the patterns of trade during the imperialism period. As the main goal of colonialism, trade was initiated by principles of mercantilism and of imperialism. Betts (1961) and Kwon (2011) relate the expansion of imperial control to mercantile economic policies, which led to demand for formal political control. Mitchener and Weidenmier (2008) further argue that, prior to the Industrial Revolution, colonial acquisitions were continuously sought by imperial powers to complement their growing economies, which ultimately affected colonial trade. The authors find that belonging to an empire doubled trade relative to those countries that were previously not part of an empire.<sup>6</sup> These findings are consistent with previous literature suggesting that colonial domination has increased colonies' trade with their metropolitan countries (Bairoch, 1999; Kleiman, 1976).

In its extreme form, colonization reflects some form of "forced trade", which implies some monopolization of colonial trade, "forcing the colony's population to buy their imports for more and to sell their exports for less than going world prices" (Kleiman, 1976, p. 1). To a lesser extreme, colonies are not entirely subjugated to the colonizer and have some level of internal sovereignty; hence, exploitation in its literal sense becomes difficult and "a trade structure biased towards the metropolitan country is needed for the economic exploitation of colonial territories through trade" (Kleiman, 1976, p. 1). Colonization facilitates trade by using power to impose preferential trade policies, currency and custom unions (Crowder, 1968; Estevadeordal et al., 2002; Ferguson and Schularick, 2006; Lal, 2004; Mitchener and Weidenmier, 2008). Using French colonization as an example, the French benefited from low-cost imports, especially agricultural goods, and from some trade agreements that gave large advantages to French exports (Amin, 1972; Lavallée and Lochard, 2012).

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<sup>6</sup> Agricultural exports boomed in the Gold coast, including Senegal, Ivory Coast and other French colonies in West Africa; in return, these colonies began to import Europeans manufactured goods. In Indochina (a French colony), the land under cultivation dramatically increased, allowing it to become the third largest producer of rice in the world (Mitchener and Weidenmier, 2008)

According to Head et al. (2010), former colonies' trade with the metropolis, three decades after acquiring its independence, would shrink by more than 60% due to the termination of some forms of formal or informal trade agreements. Hostile separations put an end to any form of influence or domination, leading to immediate reductions in trade. Similar results were put forth by Lochard and Lavallée (2012), who show that an independence event reduces the overall post-independence trade mainly within the French colonies. These results suggest that colonial trade was upheld against the interests of the inhabitants of the colonies and, consequently, the attainment of sovereignty would be followed by a decrease in bilateral trade.

Nevertheless independence lead to a decrease but not to a total elimination of trade, suggesting that at least part of the trade was beneficial to the colony. Thus, colonization and the resulting trade agreements only partially relate to extractive trade. A colony's tendency to trade with its empire might be driven by preferential treatment or other conditions favoring such trade, even in the absence of colonial domination. One aspect distinguishing various types of dependencies is whether colonies were free to decide what, and with whom to trade outside their colonial empire. This distinction can be made using our data: for example, if British colonies with higher level of democracy and more constraints on the governor traded with the French empire, this indicates that, regardless whether they were forced or not to trade with their own empire, they were also allowed to engage in favorable trade with external partners such as France.

The main premise of this research is that European settlements in colonies in the 1900's might have had a direct and an indirect impact on the trade relations. On the one hand, settlements deepened the establishment of the colonizers' connections through sharing a common language and a longer history of colonization, enabling them to maintain more extractive policies and exploit resources more easily with the country's own colonies. Egger et al. (2012) argue that migrants acquire economic, cultural and institutional knowledge about both the home and the host markets enabling them to mediate economic exchanges between those markets.

On the other hand, settlements led to the creation of European style institutions that lowered the level of enforced trade and increase that of favorable trade with all colonies. AJR (2001) argue that, whenever Europeans found viable areas, they tended to settle, build infrastructure, and promote European-style institutions that have persisted until today; wherever they faced tropical soils and diseases, they confronted the high costs of cultivation, building and trade, which demotivated the

settlers, leaving them with only extractive institutions.

In order to empirically investigate how European settlements affected the French trade patterns with the various colonial groups and to assess their importance on trade as compared to other factors that might also affect trade, we use an augmented gravity model, as explained in the next section.

## 2.3 Empirical Model and Data

### 2.3.1 Baseline model

The gravity model is the workhorse model for examining bilateral trade flows and it is used extensively in the literature due its good fit to the data. In its basic form, the model suggests that the larger the trade partner, the greater the trade is, whereas the greater the distance between them, the lesser the trade. For our empirical analysis, we use an augmented version of the gravity model to include the share of European settlers in 1900 in the host country as additional explanatory variable, together with size, distance and a number of economic and geographical variables (i.e., currency and custom unions, tariffs, wars, landlocked and colonial dummies).

More specifically, our baseline regression is based on the following gravity equation:

$$\ln(Trade)_{its} = \beta_0 + \gamma_0 ES_i + \sum_{j \in J} \gamma_j D_{ijt} ES_i + \sum_{j \in J} \beta_j D_{ijt} + \alpha X_{it} + \varepsilon, \quad (2.1)$$

where indices  $i$ ,  $t$  and  $s$  represent, respectively, the country France is trading with, the year, and the sector. Trade is divided into four sectors: food, agricultural raw materials, raw materials for industry and manufactured goods.  $j \in J$  refers to the colonial group within the set of colonizers  $J = (Great\ Britain, other\ empires, former\ colonies)$ . France is not included under  $J$  because French colonies are the reference group in all the coming regressions.

$D_{ij}$  are colonial dummies that equal one when country  $i$  is within the colonial group  $j$  and zero otherwise. The colonial status dummies are relevant as they indicate whether the colonial status per se affected trade.  $ES_i$  represents European settlements in 1900 in country  $i$ . The interaction term between European settlements and colonial dummies allows us to identify whether the impact of French settlements differs from other European settlements in their own colonies, under the presumption that European settlements in other colonies was carried out mostly by citizens from their respective metropolis.

$X_{it}$  is a vector of control variables composed of population density in 1900 (in log), the distance between France and its trading partner (also in log), and dummies for being landlocked and a dummy capturing whether France was in a state of war, and another dummy indicating whether the trading partner was at war. Those variables are relevant because they affect the volume of trade (Martin et al., 2008). We acknowledge that we are only accounting for trade resistance between France and its trading partners, without considering multilateral trade resistance (MTR), the barriers to trade that each country faces with all its trading partners. Such limitation should not have a major drawback on our estimates because first, we only have bilateral trade with France, and second, the countries in our sample were not independent at the time. Hence barriers to trade were more likely driven by political statuses rather than geographical ones. Following earlier studies, we also incorporated historical-institutional dummies: nine distinct dummies capture whether the country was part of a formal or informal trade preference agreement, currency union or custom union with its European colonizer. These variables are relevant to control for, since such trade agreements are likely to increase trade with its agreement partner, possibly also affecting trade with other partners. Finally, we control for climate indicators (temperature and humidity). Those variables are particularly relevant because they affect agricultural productivity and the main trade between France and its colonies is based on agricultural products.

We estimate equation (2.1) using pooled ordinary least squares, with year fixed effects to control for random annual shocks. We do not control for country fixed effects because most of our control variables are invariant over time. We tried, however, to incorporate a large number of control variables in order to capture cross country differences and to mitigate the lack of country fixed effect. Notice that, by controlling for each variable individually, we can explain the economic effect of those variables on trade rather than accounting for unobserved heterogeneity through country fixed-effects.<sup>7</sup> Finally, there was no or little missing values in our data, so we do not encounter the zero problem in our gravity equation.

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<sup>7</sup>In a different set of regressions, not reported here, we added country fixed effects to our existing variables. They show insignificant coefficients for most of the countries.

### 2.3.2 Data

We have constructed a large database of annual French sectoral trade from French statistical primary sources. In particular, we relied on numerous volumes of the "Tableau Général du commerce de la France" and the "Tableau décennal du commerce de la France". The data include more than 20,000 observations of French bilateral imports and exports in French Francs from 1880 to 1913 for a total of 98 colonies, including 27 French, 37 British, 17 colonies from other empires and 17 former colonies.<sup>8</sup> Notice that, although we have data from 1880, we chose to base our analysis on data starting on 1890. The reason for this choice is to keep the time frame closer to that of our main explanatory variable, European settlement, which is available only for the year 1900.<sup>9</sup> All data is deflated using the INSEE published index of prices calculated from the gross prices of 45 products (base 100 Francs 1914).

The data are dis-aggregated into the following sectors: food; agricultural raw materials; raw materials for industry; and manufactured products. We note that France largest share of exports to its colonies consisted of food sector, accounting for more than 80% of French colonial exports. The raw materials for industry consist of mining products such as gold, cobalt, phosphate, iron, wood, and wool. The manufactured goods consist of things produced by either France or the colonies such as: machinery, tools, fabric, weapons.

Notice that our database significantly improves upon historical trade data used in previous studies, for it includes data on exports and imports separately, as well as dis-aggregated trade data into sectors, as described in the previous paragraph. We have yearly data covering all French trading partners. This detailed and comprehensive data allows comparing French trade with its own colonies, to French trade with other colonies (including German, Belgian, Spanish and Portuguese) as well as former colonies.

<sup>8</sup>French colonies: Algeria, Benin, Burkina Fasso, Cambodia, Central African Republic, Chad, Congo, French Guiana, French Polynesia, Gabon, Guadeloupe, Guinea, Ivory Coast, Laos, Madagascar, Mali, Martinique, Mauritania, New Caledonia, Vanuatu, Niger, Reunion, St Pierre and Miquelon, Senegal, Vietnam, Morocco, and Tunisia. British colonies: Antigua and Barbuda, Australia, Bahamas, Bangladesh, Barbados, Botswana, Virgin Islands, Cyprus, Dominica, Fiji, Gambia, Ghana, Gibraltar, Grenada, Guyana, Jamaica, Kenya, Malawi, Malta, Mauritius, Myanmar, New Zealand, Nigeria, Pakistan, Saint Lucia, Sierra Leone, Solomon Islands, Somalia, South Africa, Sudan, Tanzania, Trinidad and Tobago, Uganda, Zambia, Zimbabwe, Egypt, and India. Other colonies: Angola, Aruba, Cameroon, Cuba, DR Congo, Equatorial Guinea, Guinea Bissau, Indonesia, Mozambique, Namibia, Philippines, Puerto Rico, Sao Tome and Principe, Suriname, Togo, Virgin Islands (US), and Western Sahara. Former colonies: Argentina, Bolivia, Brazil, Canada, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, Guatemala, Haiti, Honduras, Mexico, Peru, USA, Uruguay, and Venezuela.

<sup>9</sup>Extrapolating European settlement in 1900 twenty years backwards (i.e. back to 1880) is a stronger assumption and harder to justify. Nevertheless, we used the full sample for robustness check and our main results were unchanged.

The trade data were originally collected at the aggregate level by colonial groups and geographical regions and were subject to continuous changes throughout the years of the sample. Taking into account, on a yearly basis, the political and historical events (i.e. colonization, independence, creation of a nation, new groups entering the sample), we were able to assign the appropriate countries to each colonial group, using population collected from Mitchell (2007) and Madison (2005) as a weight to assign trade values for each country.<sup>10</sup> The dis-aggregation from the group to the country level is presented in Table A.1 in the appendix of chapter one.<sup>11</sup>

Figure 2.3 shows the world map containing all the countries included in our sample and how they were divided among the colonial powers. Table 2.1 presents the total value of trade with each group of countries, as well its exporting and importing shares per sector. For instance, it shows that the value of trade between France and its colonies accounts for 92% of the total value of French trade with all the colonies (first line of Table 2.1). Moreover, 69% of the value of trade between France and French colonies is attributed to the imports of raw agricultural goods (fifth column). Notice that French exports of raw materials for industry (third column of the table) and their imports of manufactured goods (fourth column) were very small compared to trade in other sectors: they correspond to not more than 1% of total trade. We then choose not to include them in our regression, since they are not economically significant.

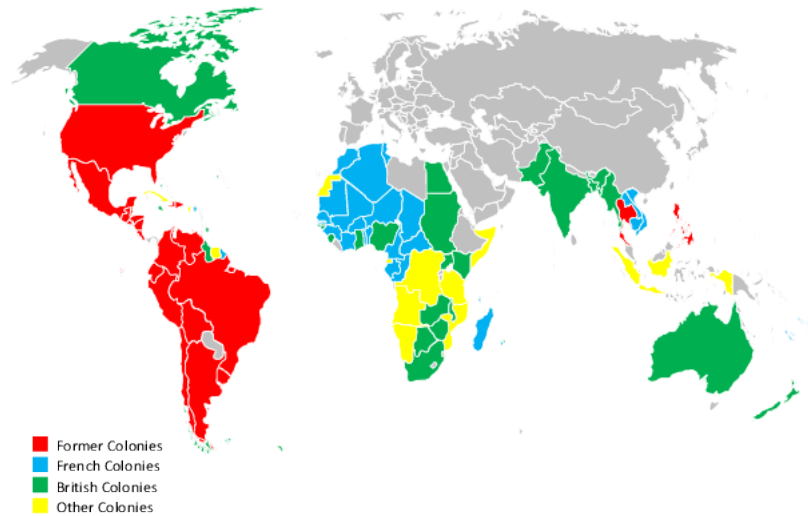
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<sup>10</sup>We have also conducted an alternative weight measure using arable land area as a robustness check. Those results are similar to the ones found in our initial specification and are reported and commented for in the robustness checks section

<sup>11</sup>The groups are well defined in terms of geographical location and identity of the colonizer so we were able to accurately conduct the dis-aggregation process with minor losses of information. The first chapter of the thesis details the data construction.



Figure 2.3: The trading partners of France per colonial group



European settlement in the 1900s is the percentage of the population that was European or of European descent in the year 1900. The data on ES is from Acemoglu et al. (2001), and the missing values for some French colonies were completed using data from Huillery (2011). Huillery's data were collected at the district level for the countries of West Africa; thus, we aggregated it to the national level and transformed the share from per mil into percentages to match the data from Acemoglu et al. (2001), as shown in Table B.1 in the Appendix.

We would have liked to include GDP as a measure of size in our gravity model; however, reliable estimates of GDP are not available for our period of study. We therefore use population per square kilometer from Nunn and Qian (2011), and missing data were adjusted and interpolated from available data based on population growth from Madison (2006) and Mitchell (2007). Actually, in the pre-industrial, Malthusian era, population density can be used as a good approximation for a society's economic performance since, at the time, any technological improvement led to population increases rather than per capita income increases (Engerman and Sokoloff, 1997). Michael Kremer (1993), Galor (2005) and Ashraf and Galor (2011) provide theoretical and empirical analysis of the relationship among population size, population density, and long-term growth in Malthusian times.

The geographical distance between France and its trade partners is from CEPII, constructed by Mayer and Zignago (2011). The basic idea is to calculate the distance between two countries based on the distance between their biggest cities, with the distances being weighted by the share of the city in the country's overall population. Landlocked data were collected from the Geo CEPII data

(Mayer and Zignago, 2011) and from Nunn (2008).

Following previous studies (Mitchener and Weidenmier, 2008; Rose, 2000), who found a significant impact of trade agreement on trade, we included dummies for preferential trade agreements, custom and currency unions to indicate whether the country was in any form of agreement with France, Britain or a third colonial power. These variables are from Mitchener and Weidenmier (2008).<sup>12</sup> The data on whether each country was at war in a particular year were constructed based on the data from the Correlates of War website. The climate variables, average temperature and average humidity, are from AJR (2001), completed with those from Parker (1997).<sup>13</sup> We took the average temperature in Centigrades and the average humidity in percentages.

The colonial status dummies were constructed based also on the Geo CEPII data constructed by Mayer and Zignago (2011). For the dates of colonization, we collected information from various sources. We defined the year of colonization as the year the colonizer established the colony, not the year it acquired the land. In addition, the year of independence is the year of decolonization. As the sample spans a long period, political states often changed, as did countries' colonial status within the sample, and the colonial status dummies capture those changes.

## 2.4 The impact of settlements on trade

### 2.4.1 POLS results

Table 2.2 reports the pooled ordinary least-squares (POLS) regressions of equation (2.1). The estimated coefficient for ES in 1900 is significant for most sectors and interaction terms, as well as for the reference group, which are the French colonies. Column (1) presents the results for the impact of the explanatory variables on the total trade with France. As indicated by the coefficient of ES, we find that a higher share of settlers in French colonies is associated with more trade with France. The interaction term between ES and the colonial dummies is negative and significant for British and other colonies, indicating that the impact of ES in those colonies on trade with France is smaller than that for French colonies. Actually, the absolute impact of ES in British colonies is not signifi-

<sup>12</sup>We thank Marc Weidenmier and Kris Mitchener for generously sharing their data.

<sup>13</sup>Note that the original source of AJR is Parker (1997) from which we also double-checked AJR data.

cantly different from zero, whereas for other colonies it is negative. This result is compatible with the presumption that settlers in other colonies were mainly their respective colonizers; once they settled, they constrained the colonial trade with France, particularly in colonies other than British.

Empirical evidence from Mitchener and Weidenmier (2008) indicates that membership in an empire increased bilateral trade. Our results go one step further by showing that the level of ES captures the impact of being a colony on trade. Interestingly, once we control for this ES in the colonies, colonial dummies are negatively correlated with trade with France. For the colonies from other empires, this negative coefficient is compatible with the idea that their trade might have been more intense with their own colonizers, and they would trade less with other countries such as France. However, the French colonial dummy also has a negative coefficient: conditional on settling in a French colony, being a French colony is not positively correlated with trade with France, as we would expect. This is a puzzling result.

Columns (2) and (3) of Table 2.2 show the impact of ES on French exports of food and of manufactured goods, respectively. The coefficient of the reference group indicates that a higher share of French settlers in their colonies increased French exports of food and of manufactured products. This result corroborates our previous argumentation that colonization provided a way for the French to establish control through settlements and strengthen their trade ties in order to use the colonial market as the main consumer of its products. Marseilles (1984) observed that France, isolated within its empire and imposing the prices of products in the colonial markets through custom unions and trade preferences, exported its manufactured products to ensure the existence of solvable markets for the empire during times of crisis.

The coefficients of ES interacted with the British and with the other colonies dummies are negative, indicating that, for those colonies, ES has a smaller impact on French exports of food and of manufactured products compared to settlements in French colonies. In fact, the overall impact of ES in British and in other colonies on trade with France is not significantly different from zero.

As for the imports of raw agricultural goods, they are negatively correlated with ES in French colonies (our reference group), as shown in column (4) of the table. Such result might be related to reverse causality between settlements and trade, which are not corrected for in the POLS regressions. More specifically, one potential explanation is that the French might have been exploiting the natural resources even before formal colonization took place, so that they did not need to, nor were

they encouraged to settle in order to extract. Why would that be the case? Actually, the colonial vocation was generally not popular in France. The health conditions were deplorable; tropical diseases took a heavy toll in the colonial corps between 1887 and 1912 (16% died in the colonies) (Victor Marguerite, De La Justice, *Annals Colonials* XIII June 1, 1912). Consequently, administrators could not bring their families with them, and few men were willing to accept a lifetime career away from their families.<sup>14</sup> This being stated, as long as they were able to engage in trade, settlements overseas were limited to some traders and officers (Cohen, 1971). This effect should render the POLS coefficient smaller, and controlling for it we would be able to capture the positive impact of settlements on French imports of raw agricultural goods from its own colonies. This is actually the case, as we will see in the next subsection when comparing the POLS coefficient to the IV coefficients.

Also in column (4) of Table 2.2, we see that ES has a higher impact on French imports of raw agricultural products from British colonies, compared to French colonies. The net impact of British settlement is not significantly different from zero. This relation can be attributed to two possible explanations. On the one hand, reverse causality might have increased the POLS estimator. The idea is that it is not the British settlements that drove British colonies to trade with France. It may have been the case that France was already importing agricultural raw products from British colonies even before colonization, and Great Britain non-randomly sought those territories expecting economic profits.<sup>15</sup> On the other hand, after Britain established colonization, it set up certain trade policies with its colonies to encourage trade with other empires.<sup>16</sup> This second explanation can be confirmed by the positive estimator of trade agreements with British colonies, indicating that British colonies that signed trade agreements with Britain increased their exports of raw materials to France.

The standard gravity variables are controlled for, and reported in the table. As shown, most variables enter with the correct expected sign and are, for most sectors, statistically significant. In terms of geographical influences on trade, being landlocked or far away from the trading partner reduces

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<sup>14</sup>Cohen explains in his book that the rare French settlement is due to the fact that overseas French possessions were modest and scarcely populated. They consisted mainly of plantation owners, slaves and small trade forts on the coastline of West Africa and India which were occupied by a small number of French traders and officers. Relation with the indigenous population were limited to trade and the establishment of some form of diplomatic relations with the local states (Cohen, 1971).

<sup>15</sup>For further discussion of reverse causality between colonization and trade, see De Sousa and Lochard (2012).

<sup>16</sup>Britain established open door policies: An open door trade policy refers to a tariff regime where there is no distinction made between the products of the mother country and non-empire trading partners.

trade flows. Most specifications also show that richer countries (as measured here by population density) trade more. Furthermore, the interstate and French war variables significantly reduce trade. Coefficients of year fixed effects were insignificant for most years.<sup>17</sup>

Although we tried to control for most factors affecting trade, POLS results may be biased due to reverse causality issues. In particular colonization and the choice of settling in the colonies may be endogenous to trade. The fact that trade might have preceded colonial expansions or even lead to it, is a plausible possibility. In order to correct for this endogeneity problem we will employ a two-stage least square (2SLS) estimation method which will be described in detail in the next subsection.

## 2.4.2 Instrumental variables

One drawback of POLS estimation on the impact of European settlements on trade with France is that it does not take into account the possibility of reverse causality: pre-colonial trade is likely to have impacted settlement and colonization decisions. We use instrumental variables to try and control for possible reverse causality in the POLS results. We first describe the instrumental variables used, and then present the results from the two-stage least square regressions.

### 2.4.2.1 Identification of Instrumental Variables

Previous literature has used three instruments for European settlements in the colonies. The first one is pre-colonial population density (in the 1500s) from Acemoglu et al. (2002). Engerman and Sokoloff (1997) argue that Europeans were more likely to settle in previously poor and less populated regions because indigenous population density raised costs for Europeans to obtain and secure land for new settlers. Acemoglu et al. (2002) also argue that Europeans settlements in 1900 are negatively correlated with pre-colonial population in 1500 because the density of pre-colonial indigenous population affects the returns from setting up extractive institutions. Moreover, Fenske (2013) argues that population density is positively correlated with the formation of precolonial states. Strong pre-colonial states might have discouraged new settlers to settle because of the costs

<sup>17</sup>Note that the correlation between population, which we used to disaggregate the trade values across countries, and ES is -0.09, while the correlation between population and population density in 1900, our control variable in equation (2.1), is 0.2. Both correlations are low and should not bias the estimation of our coefficient. Correlation matrix is in the appendix below.

incurred from setting extractive trade institutions. Following the same line of arguments, Huillery's (2011) recent empirical results show that pre-colonial high population density would increase the risk of indigenous hostility and hence discourage new settlements. Based on this discussion, population density in 1500 might have had a significant impact on decisions related to European settlement in 1900. Moreover, we have no reason to believe that this instrument is likely to be correlated to trade in 1900.

The validity of our instrument is only threatened if other factors correlated with population density in 1500 affect trade in 1900, such as population density in 1900, climate conditions, disease environment, natural resources, education levels, technology, among others. In this regard, we investigate whether ES (instrumented by population density in 1500) have an impact on trade in 1900 while controlling for some of those variables that are likely to be correlated with population density in 1500 (population density in 1900 and climate conditions). We still find a negative and significant correlation between our instrument (population density in 1500) and ES in the first stage least square regression, and a positive impact of ES on trade in the second stage least squares regression.

Notice that the potential impact of population density in 1500 on trade through the remainder of the factors not controlled for, if such impact exists, should be a positive one, for they are likely to have a positive impact on economic activity, hence on trade expansion later on. Since we found a negative correlation between population density in 1500 and ES, and a positive correlation between ES and trade, we have that the impact of population density in 1500 on trade through ES is a negative one. Therefore, the impact we are capturing cannot be driven by these other factors.<sup>18</sup>

The second instrument for ES is latitude, measured as the distance from the equator. This variable has been used in previous works as instrument for European settlement in colonies, given its relation to land and climate conditions (AJR, 2001, 2002, 2005). Favorable conditions undoubtedly encouraged settlers to settle whereas unfavorable climate would have discouraged settlement. However, latitude is also correlated to climate and geographical conditions that affect agricultural performance, hence countries' comparative advantages and trade capacity. Latitude would then have a direct impact on trade, independently of the impact exerted through its correlation with European

<sup>18</sup>We also checked the correlation between our instrument and population density in 1900 on one side and population on the other. The values are respectively -0.003 and 0.01, hence such low correlation does not overturn the validity of our instrument.

settlement. Therefore, this variable does not qualify as a valid instrument for our purposes.

The third instrument is settler mortality from AJR (2001, 2002), who argue that historical mortality rates were influential in shaping the pattern of ES in former colonies. The main problem of using settler mortality data as an instrument of ES, aside from doubts about its various sources (Albouy, 2005) and endogeneity issues (Jones, 2013), is the fact that it can be correlated to low agricultural productivity due to the high burden of diseases. Thus, this instrument would not be valid since it would also have a direct impact on trade.

Altogether, population density in 1500 seems to be the most appropriate instrument because, following the discussion we presented above, the only channel through which population density in 1500 can affect trade in 1900 has to be through European settlements.

Our identification can be expressed as follows:

$$ES_i = \alpha_0 + \alpha_1 IV_i + \sum_{j \in J} \beta_j D_{ijt} + \alpha X_{it} + \vartheta \quad (2.2)$$

where  $IV_i$  is the instrumental variable and  $X$  is the vector of our explanatory variables as described previously in equation 2.1.

The results, reported in Table 2.3, show that the coefficient of our preferred instrument, the population density, has the highest magnitude with an R-square of 58%. The coefficients of latitude and settler mortality taken alone, have high magnitudes and strong explanatory power with R-square of, respectively, 50% and 70%. However, when taken with population density, their magnitude decreases substantially confirming the superiority of population density in 1500 as an instrument. Note, nevertheless that these other two instruments will be used for robustness purposes.

#### 2.4.2.2 2SLS Results

Column 3 of Table 2.3 reports the first stage results of our instrumental variable regression using population density in 1500 as an instrument for ES, whereas Table 2.4 reports the second stage results. Columns 1 to 3 report the instrumental variable results for total trade, exports of food and exports of manufactured products, respectively. Those results are very similar to the baseline regressions for most of the sectors and most of the variables. Namely, higher settlements in French

colonies (the reference group) increase both total trade and French exports of food and manufactured goods to those colonies, whereas the impact is smaller, and not significantly different from zero, for settlements in British colonies. For other colonies, settlements had a negative impact on total trade with France and on French exports to those colonies. Endogeneity appears to introduce a downward bias for the reference group (representing French colonies) since the coefficients of ES, when instrumented, are higher.

It is interesting to note that the coefficients for imports of raw agricultural material are opposite to the ones in the POLS as shown in column 4 of Table 2.4. The 2SLS results indicate that a one percentage point increase in French settlements increased the French imports of agricultural goods from French colonies by nearly 8%, whereas a one percentage point increase in the share of British settlements increased French imports of agricultural goods by nearly 2% (the difference between the reference group (8%) and the British coefficient (-6%). The overall impact of ES in British colonies is significantly positive, though of smaller magnitude than that of French colonies. Once we control for reverse causality, our results indicate that more French settlements increase imports of raw agricultural material from their French colonies, thereby facilitating extraction. This result is in line with what Marseilles (1984, p. 75) wrote: "The colonial empire was reserve tank of agricultural commodities" (translation by the author).

Column 5 shows a positive but statistically non-significant effect of British settlements on French imports of industrial raw materials from the British colonies. British colonies employed an "open door" policy (refer to footnote 16 for a definition of an open door policy) in which they did not have a preferential tariff with their metropolis, but rather they would pay the same tariff to any trading partner including France. This could explain why British settlements do not have a significant impact on trade with France. Overall, these results indicate that British settlements affect less French trade with the British colonies compared to that with French colonies. We hope to shed further light on this result once we capture the part of ES affected by common language, duration of colonization and formal institutions in section 4.

To provide some additional insights to the effects of ES on sectoral French trade, it is interesting to look at the export boom in French West Africa—namely, in Senegal and the Ivory Coast—between 1897 and 1913. Timber exports from the Ivory Coast increased by a factor of six in twenty years (Frieden, 2006), as colonial imports of European manufacturers grew. In Indochina



(which was under French colonial regime), the area of cultivated land dramatically increased, allowing it to become the third largest producer of rice in the world (Mitchener and Weidenmier, 2008). French settlements strengthened their ties between the empire and its colonial markets, achieving the ultimate goal of French colonization, as stated by Jules Ferry in his 1911 essay "Colonial policy is the daughter of industrial policy".<sup>19</sup> France used the colonial markets as both a buffer in times of crisis and a profitable alternative in times of expansion to dispense its products (Marseilles, 1984).

### 2.4.3 Robustness Checks

To check whether our results are sensitive to the specification of the econometric model, we conducted a series of robustness checks. The first column in Table 2.5 is the same as column 1 in Table 2.2 used here as a reference for comparison. The first test we conduct is by including the full sample of trade from 1880 to 1913 instead of 1890-1913.<sup>20</sup> The inclusion of 10 additional years (i.e., 1880–1890) does not change our results. As shown in column (2) of Table 2.5, French settlements still had a statistically significant effect on overall trade. The results are similar to the base sample POLS in column 1 for the remainder of the control variables (not reported here). Column 3 presents results of the same regression, but trade data is dis-aggregated from the original region to the country level using arable land area instead of population. The data were assembled using a variety of sources, including Mitchell (2007), Madisson (2006) and Nunn and Wantchekon (2011). The estimated coefficients of our main explanatory variables and the control variables are similar to the ones in the base regression in column (1), but with a smaller magnitude.

### Testing over-identification restrictions

In order to check for the validity of our initial instrument and the non-validity of the inclusion of the remaining two, we conduct a series of regressions with the alternative instruments, latitude and settler mortality. Columns (4) to (6) in Table 2.5 use respectively, latitude as an instrument to ES, settler mortality as an instrument to ES, population density in 1500 (our initial instrument) as an instrument to ES, while column (7) uses all instruments together to instrument ES. When

<sup>19</sup>La politique coloniale était fille de la politique industrielle

<sup>20</sup>Refer to section 3.2 above as for why we start our analysis on data starting on 1890

we include settler mortality and latitude as instrumental variables and when we include the three instruments together, results do change as compared to when we only use our initial instrumental variable. Actually, our results only seem to be robust to the various instrumental alternatives in the French colonies: French settlements did increase overall French trade in the French colonies for columns (4) to (7). European settlements in British and other empires either increase or reduce trade with France depending on the instrument used. This might be related to the none relevance or the non validity of the inclusion of settler mortality and latitude as additional instruments.

As an additional check for the validity of our instrument only, we conduct a Sargan test, a general test for over-identification restriction to check whether all our IV's are exogenous (hence valid). The test is conducted as follows: We regress the residual of the regression in column (7) that includes all the three instruments together on our explanatory variables and we retrieve the R-square  $R_1^2$ . Under the null hypothesis that all instruments are valid, our statistic follows a chi-square distribution  $nR_1^2 \sim \chi_q^2$  where  $q$  is the number of over-identifying restrictions, i.e. the number of instrumental variables minus the number of endogenous explanatory variables ( $q=3-1=2$ ). Actually, as predicted, the test statistic exceeds the critical value and we reject our hypothesis that the estimates are equal under the different instruments, hence that all instruments are valid.<sup>21</sup>

We repeat the same test for each alternative instrument alone. We regress the residual of the regression that includes latitude and population density in 1500 and retrieve its R-square, and regress the residual of the regression with settler mortality and our instrument and retrieve R-square.<sup>22</sup> (e.g. in column 4, the coefficient using latitude alone is compared to the estimate using latitude and population density in 1500 as instruments). The test statistic exceeds also the critical value and we reject our hypothesis that the estimates are equal under the different instruments. The other variables in the gravity model generally have the predicted signs and are statistically significant at conventional levels.<sup>23</sup>

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<sup>21</sup>Testing of over-identifying assumptions is less important in longitudinal applications because realizations of time varying explanatory variables in different time periods are potential instruments, i.e., over-identifying restrictions are automatically built into models estimated using longitudinal data.

<sup>22</sup>Not reported here.

<sup>23</sup>To ensure robustness, we also conducted the same analysis for each sector separately, (not reported here). Most variables and interaction terms showed similar results as previously reported (not reported here).

### **Comparing with cross section analysis**

One concern may be related to the fact that many of our control variables do not vary over time, while the dependent variable varies over time. Estimated standard errors may therefore be larger than their true values. To check whether our results are robust to such limitation, we conduct a cross section analysis by averaging the trade volumes over the considered period. The cross-section OLS and IV regressions, respectively in Tables 2.6 and 2.7, yield similar results to the POLS and to the IV regressions, in Tables 2.2 and 2.3. The magnitude of both coefficients and standard errors are now larger, preserving the statistical significance of our results. There are some differences for the regression on imports though. Some coefficients that were not significant in the Panel estimation, become significant in the cross-section estimation, whereas for other coefficients, the opposite is true. We argue that the values of our trade flows vary over the period of our sample. Reducing such flow to an average of one period might remove some information.

## **2.5 The Settlement Effect: transmission mechanisms**

Our empirical results indicate that European settlements in the late-nineteenth and early-twentieth centuries positively and significantly affected trade between France and its colonies, while it did not affect French trade with British and other colonies. These results suggest that settlements may affect trade through different underlying channels. In this section we explore two possible channels. One channel is through sharing a common language with the settlers and through the duration of colonization. Those variables can relate to different sorts of connections formed between the colony and the metropolis that facilitate trade, such as informal institutional and cultural traits that reinforce ties between them. For simplicity, we will name this channel 'networking'. The other channel is related to the establishment of formal institutions. With better institutions, for instance, colonies would be less captive of the metropolis, and hence freer to choose with whom and what to trade. In the next two subsections, we discuss these two channels in turn.

### **2.5.1 Language and duration of colonization**

The longer the colonization and the more people share a common language with the settlers, the more acquainted colonizers, settlers, and trading companies become with the cultural and institu-

tional traits of the colony, the more experience they acquire, and hence, the lower the operational and transaccational costs of trade; hence, facilitating commercialization and strengthening the networking ties between the trading partners. Recent studies have highlighted the importance of networks in monitoring trade in unorganized exchange markets as they facilitate matching sellers and buyers and fostering deals where laws of contract are weak (Rauch, 1999). Some evidence in the trade literature suggests that weak contracting institutions can be substituted by long-term relationships as well as kin- and ethnic-based networks to ensure efficient engagements (Nunn and Treffer, 2013). Moreover, Sandberg and Seale (2012) argue that former trade networks have a significant impact on current trade volumes attributed to regionalism (via the enactment of regional trade agreements) and history (via the modern effects of former imperial relationships). This is also true, and maybe even more important, in the colonies, where societies were less developed and legal apparatus was absent. Moreover, in a time when communication was more difficult, social networking had a greater role in creating some sort of informal contract enforcement that, even under extractive policies, would enhance trade between two countries.

European settlements contribute to the development some form of informal institutions, which should strengthen networking ties between the settlers and the indigenous population. When they settled, Europeans not only established formal institutions, but they also developed informal ones in the form of cultural traits, common language, human, physical and social capital (Easterly and Levine, 2012; Glaeser et al., 2004). Settlers promoted the use of their language in the colonies, thereby making communication with merchants easier. "Even in cases where the dominant language of the population differed from that of the imperial power, a lingua franca often developed around commercial centers" (Mitchener and Weidenmier, 2008, p. 1821). Alam (1994) also argues that colonizers had previously encouraged emigration into their dependencies to give a form of permanence to their occupation of these territories and strengthen their ties.

Networking established by immigration reduces costs associated with international transactions, and the networks are stronger the longer immigrants live in the host country. Colonial settlers can be seen as immigrants. Following this logic, we argue that, the longer the colonization, the more likely the immigrants created an inclusive form of social ties with the indigenous population, thereby helping to alleviate uncertainty, asymmetric information and opportunism associated with international trade. Walmsley et al. (2005) and Parsons (2005) show a positive relationship between immigration

and bilateral trade flows. Egger et al. (2011) also argue that migrants acquire economic, cultural and institutional knowledge about both the home and the host markets; they are able to mediate economic exchanges between those markets, thereby increasing trade above what it would be in the absence of such migration. While extraction was mainly exercised by concessionary companies in the French colonies and particularly in French Equatorial Africa, the presence of settlers would optimize such extraction by reducing information asymmetries that were even more severe during the age of high imperialism. Merchants had a financial incentive to learn the culture, habits and mostly the language of colonial masters in order to sell more goods and to protect themselves and mostly to become more familiar with the European settlers in order spare themselves the cost of coercive institutions.

A simple example makes the point about the role of networks in exchanges. During the period of colonial reign, colonizers were attracted by the cheap and abundant factor endowments in the colonies. In order to extract the full rent from this "wealth", colonizers had to impose some form of subjugation only possible through establishing strong ties within the colony on the field.

In order to capture the the basket of informal institutions, cultural traits, and transactional costs effects , we used two proxies that we believe are likely to best represent such impact as argued thus far. The first variable is the duration of colonization, measured as the length of time from the year of colonization until the year in our sample. We argue that the longer the Europeans stayed, the more familiar they became with local customs, language, beliefs and culture, the development of distribution and marketing channels, or the formation of social networks of the colony. This should decrease transaction costs associated with trade and hence increase international trade.

The second variable is common European language, an index ranging from 0 to 1 which is a proxy of the share European languages spoken in the country, namely French, English, Spanish, Dutch, Italian and Portuguese. The variable was constructed based on the CEPII data set. The CEPII data reports the main four languages spoken by at least 9% and at most 20% of the population and the main four languages spoken by more than 20% of the population. The data also contains information on whether two countries share a common ethnological language, including the creole language and a lingua franca. Based on these data and the historical background, we constructed

our index for language according the following formula:

$$EL = \frac{n_{EL}}{N_{TL}} + \frac{m_{EL}}{M_{TL}} \times 0.2$$

where  $EL$  is the European language index,  $n_{EL}$  is the number of European languages spoken by more than 20% of the population,  $N_{TL}$  is the total number of languages spoken by more than 20% of the population,  $m_{EL}$  is the number of European languages spoken by 9 to 20% of the population, and  $M_{TL}$  is the total number of languages spoken by 9 to 20% of the population. The second ratio is multiplied by 0.2 to take into account that this ratio concerns at most 20% of the population. The value of 1 is attributed to those countries whose second official language is a European one. This additional information is gathered from various historical backgrounds.<sup>24</sup>

### 2.5.2 Formal Institutions

The second channel linking European settlement and trade is the establishment of formal institutions. Nunn and Treffer (2013) find that institutions seem to exert a significantly and economically important impact on the comparative advantage of advanced manufacturing goods, even after controlling for factor endowments and for human capital variables (Acemoglu et al., 2014). This effect occurs through factor accumulation, technological innovation and commercial enterprise. In other studies on the impact of institutions on historical and current trade flows, Mitchener and Weidenmier (2008) and Estevadeordal et al. (2002) show that the main channels through which colonization has boosted trade were the explicit implementation of historical–institutional trade policies. DeGroot et al. (2004) find that institutional homogeneity increases overall current trade flows by 13% and that good governance increases it by 40% through imposing formal rules and securing and enforcing property rights in international transactions as well as Proudman and Redding (2000) found a positive correlation between the quality of institutions and the growth of international trade in 2000.

What shapes institutional legacy during the colonial reign? Different types of colonization policies create different sets of institutions—an interpretation consistent with Acemoglu et al. (2001,

<sup>24</sup>Notice that, theoretically, the index could take a value larger than one if, for example, there is only one language spoken by at least 20% of the population and only one language spoken by 9 to 20%, and these two languages are European. In this case, the number would be 1.2. First, such case does not occur in our data, second it would be evident to take the minimum value between the EL index and 1.

2014) and Crosby (1986), who argue that the colonization strategy was subjective to the viability of settlements. When European settlers faced favorable climate and soil conditions (resulting in low mortality rates and advantageous disease environment), they felt encouraged to stay and introduced good (productivity-enhancing) institutions which promote private property and checks against government power. This led to the creation of what Alfred Crosby called "Neo-Europe". Meanwhile, when a settlement was not viable due to unfavorable bio-geographic conditions (resulting in high mortality rates), they established extractive institutions favoring autocracy and weak accountability of the governors. Engerman and Sokoloff (1997) assert that, when Europeans faced natural resources with profitable international markets but did not find the lands, climate, and disease environment suitable for large-scale settlement, they had no or little incentive to invest in institutions or infrastructure in the colonies and instead created authoritarian political institutions to extract and exploit natural resources.

Let us consider a few examples. The Belgian colonizers in the Democratic Republic of Congo did not introduce any rule of law against government expropriation; extractivists only transferred many of the colony's resources to their homeland. Between 1905 and 1914, 50% of French Dahomey GDP was extracted by the French (Manning, 1982), and taxation rates in Tunisia were four times as high as those in metropolitan France (Young, 1994). Moreover, in French Africa, most of the agricultural production was based on small farmers with little political power and ability to oppose extractive institutions imposed by the colonizers (Tadei, 2013). Another example is the case of the Spanish and the Portuguese colonists during the seventeenth and eighteenth centuries, who set up complex mercantile systems of monopolies and trade regulations in order to obtain gold and other valuables. Finally, a last example is the British introduction of sound economic and political institutions who transferred common-law systems to their colonies, property rights, and developed financial markets (Cain and Hopkins, 1993; La Porta et al., 1998, 1999; Landes, 1998; North et al., 1998).

In order to capture formal institutions, we used two main variables widely used in the economic history literature. Our first variable is constraint on executive for the year 1900, which is a seven-point scale ranging from 1 to 7, with a higher score indicating more constraints. A score of 1 indicates unlimited authority for the governor, 3 indicates slight to moderate limitations by other institutional corps, 5 indicates substantial limitations, and 7 indicates executive parity or subordina-

tion. Scores of 2, 4, and 6 indicate intermediate values. A higher score refers to a better quality of institutions. Data are from Acemoglu et al. (2001), and the missing values were completed from the polity III data set.

During French colonization and in at least some of the French colonies, the constraint on administrators was very low, leading governors to be brutal towards the indigenous population. Cohen (1971, p. 62) stated that French colonial administration was, in actual practice, a decentralized system giving nearly full authority to the men in the colonies: "The administrators tended to ignore their superiors and ruled their circles according to their whims, they would levy severe fines on the natives without serious causes and without the governors' permission."

Our second variable is democracy in 1900, measured as an index ranging from 0 to 10 (also from Acemoglu et al., 2001, completed from Polity III data for missing values). A higher score indicates more democracy points from three dimensions: competitiveness of political participation (from 1 to 3 points); competitiveness of executive recruitment (from 1 to 2 points, with a bonus of 1 point if there is an election); and constraints on chief executive (from 1 to 4 points). The measurement was equal to 1 if the country was not independent on the date in question.

In their recent work, Nunn and Treffer (2013) showed that a tradition of local democracy is also associated with attitudes that favor democracy, better quality institutions, and a higher level of economic development. Their findings not only indicate persistence in democratic institutions over time, but are also consistent with national institutions affected by local institutions.

### 2.5.3 Empirical setup

In order to assess the effects of language and duration of colonization and of formal institutions through which European settlement might have impacted French trade, we start by estimating the part of European settlement associated with each of these two channels. Following Mitchener and Weidenmier (2008), we regress European settlements on common language and duration of colonization for the first channel capturing the informal institutions, cultural traits and networking effect, and constraint on executive and democracy in 1900 capturing formal institutions. We estimate the following equations:



$$\begin{cases} ES_i = \alpha_I + \iota_1 ExConstr_i + \iota_2 Dem_i + \mu_I \\ ES_i = \alpha_N + \eta_1 Lang_i + \eta_2 Dur_i + \mu_N \end{cases} \quad (2.3)$$

where  $ES$  represents European Settlements in 1900,  $ExConstr_i$  refers to constraint on executive in 1900 and  $Dem_i$  to democracy in 1900.  $Lang_i$  and  $Dur_i$  refer respectively to common European language and duration of colonization of the colonizer.  $\mu_I$  and  $\mu_N$  are the error terms.

Table 2.8 reports the ordinary least square regressions of equation (2.3). Column (1) of Table 2.8a shows the regression of European settlement on the formal institutions indicators (constraint on executive and democracy), whereas column (2) shows the same regression on European language and the duration of colonization. As for columns (3) and (4), they show the same regressions as in (1) and (2) however using the first stage values of ES from the 2SLS regression in Table 2.3 instrumented by population density in 1500.<sup>25</sup> The correlation coefficients are shown in Table 2.8b. Results of column (1) and column (3) indicate that both institutional indicators are strongly and positively correlated with European settlement with a quite high R-squared of 33% and 30%. Column (2) and (4) present results for common European language and years spent in the empire by the European colonizer (not only by the French colonizer). Both indicators are also positively and significantly correlated with ES for both specifications, that is, using the original initial values of ES and the IV values.

Note that, at this stage, we do not worry about reverse causality inherent in equation (2.3). Our goal is to capture the correlation between European Settlements and the variables representing the different channels, no matter in which direction causality goes. Therefore those variables do not need to be instrumented.

After regressing the set of equations (2.3) for both specifications of ES as represented in columns (1) to (4) in Table 2.8a, we use the estimated values of the parameters  $\hat{\iota}_1$ ,  $\hat{\iota}_2$ ,  $\hat{\eta}_1$  and  $\hat{\eta}_2$  presented the same table to compute the fitted values of the part of European settlements associated to common language and duration of colonization  $\widehat{ES}_{Ni}$  and the one associated to formal institutions  $\widehat{ES}_{Ii}$ , as represented in the equations:

<sup>25</sup>Using the values from the first stage regression to regress them separately in a different equation, as we do here, do generate accurate estimates; however the standard errors might not be exact. With such a large sample size, such imprecision should not affect the results.

$$\begin{cases} \widehat{ES}_{Ii} &= \widehat{\tau}_1 ExConstr_i + \widehat{\tau}_2 Dem_i, \text{ and} \\ \widehat{ES}_{Ni} &= \widehat{\eta}_1 Lang_i + \widehat{\eta}_2 Dur_i. \end{cases} \quad (2.4)$$

Note that we generate two sets of fitted values for European settlements,  $\widehat{ES}_{Ii}$  and  $\widehat{ES}_{Ni}$ : the first set using the parameters from columns (1) and (2) from Table 2.8a, estimated from the original values of European Settlements; and the second set using the parameters from columns (3) and (4), estimated from the instrumented values of ES from the 2SLS regression.

We now consider the extent to which these newly generated variables impacted trade between France and its colonies as compared to the other colonial groups. We re-estimate equation (2.1), now replacing the European settlement variable by the two fitted values from equation (2.4), which correspond to the institutional and to the networking channels of European settlement. The new gravity equation looks like:

$$LTrade_{ist} = \lambda_0 + \sum_{j \in J} \lambda_{1j} D_{ijt} \widehat{ES}_{Ii} + \lambda_2 \widehat{ES}_{Ii} + \sum_{j \in J} \lambda_{3j} D_{ijt} \widehat{ES}_{Ni} + \lambda_4 \widehat{ES}_{Ni} + \lambda X_{it} + \varepsilon \quad (2.5)$$

where  $X_{it}$  is a vector of explanatory variables detailed previously in equation (2.1).

Since we are using predicted values for settlements associated to the two channels we consider, as described in equation (2.4), we applied a re-sampling technique of 5000 samples based on bootstrapping technique in order to obtain stable standard errors (not reported here). Like in the previous regressions, all standard gravity variables behave well in terms of sign and significance. France traded less with countries that are more distant, trade decreased with war, and humid and cold climate reduced trade. Preferential trade agreements with France boosted trade with its colonies; however, countries that had trade agreements with their respective empires tended to trade less with France. Colonial status exerted a negative impact on trade once we controlled for settlement and other trade policy factors.

Table 2.9 reports the POLS results of equation (2.5), using the POLS fitted values from equation (4). In Table 2.10, we present analogous results, but using the instrumented values for European settlement. The results of both the pooled OLS and the IV regressions are similar for the overall

trade as well as for trade in the different sectors. For this reason we will focus on the discussion of the instrumental variables results in Table 2.10 only.<sup>26</sup> First, the coefficients capturing the impact of settlements through formal institutions in Table 2.10 indicate that the quality of formal institutions brought about by French settlements in their colonies is negatively correlated with the levels of those colonies' trade with France. This is true for overall trade, in column (1), as well as for exports and imports in each of the sectors in columns (2) through (5). On the one hand, an institutional system lacking democracy and giving full authority to the governor would allow France to secure favorable markets for its products within its colonies, exporting food and manufactured goods to its colonies. On the other hand, more authoritarian institutions (less constraints and less democracy) in French colonies allowed the exploitation of raw agricultural goods and raw material for industry.

Actually, those results confirm why the French had low incentive to establish good quality institutions. Their settlements helped traders and military troops to impose control in order to facilitate extractive policies. So, in sum, among French colonies, those with better institutions traded less with France. Louis Faidherbe<sup>27</sup> wrote: "In Algeria and Senegal the aim is the same, to dominate the country at as low cost as possible and through this get the highest advantages commerce." The function of the French officials was to maintain tranquility so that the natives could work and produce and so that they could recognize the advantages of our domination. The governors were entrusted with the safety and tranquility of the circles and instructed to make sure that the inhabitants of their territory demonstrated the fidelity and obedience that they owed France (Cohen, 1971). Our results also explain why post-independence trade between France and now its former colonies sharply shrank after independence (Head et al., 2010). This decrease can be attributed to the notion of "forced trade" developed through the system of authoritarian institutions that did not promote the welfare of the colony.

Among British colonies, when European settlements lead to the establishment of good quality institutions, trade with France is higher relative to the reference group. As indicated in the results presented in Table 2.10, the institutional impact of British settlements on both French exports to British colonies and French imports from British colonies of agricultural and industrial raw material

<sup>26</sup>Some of the instrumental variable results are higher in magnitude than the POLS results. Please, refer to section 3 for a discussion on this difference.

<sup>27</sup>French general and colonial administrator who created the Senegalese Tirailleurs when he was governor of Senegal.

is significantly higher than the institutional impact of French settlements. There are two possible, and maybe complementary, explanations. First, British colonies with higher democracy and better governance were less captive of trade with Great Britain and, therefore, freer to trade more with France. Second, the British favored free trade policies, and colonies with a democratic system and accountability can take more advantage of it since higher institutional quality can reduce trade costs (Anderson and Marcouiller, 2002; Hughes, 1987; Levchenko, 2007; Rauch, 1999). Overall, when the British induced representative formal institutions in their colonies, they delivered what the settlers wanted, and what they wanted was freedom and the ability to get rich by engaging in trade (Denoon, 1983).<sup>28</sup> The British were credited with allowing the native to have a hand in government and to have a "hand-off" policy (Betts, 1961). Chailley-Bert greatly admired the flexibility of the British colonial system, whose colonies were not rigidly categorized, were more timorous than the French ones, and were not insisting that their legal codes are applicable anywhere." (Chailley-Bert, 1894). Also in some of the British colonies (East-African), production was controlled by European settlers who had political influence before the colonial government. This suggests that the cost of enforcing extractive was higher in those British colonies which explains the difference in colonial extraction among regions. Moreover, it has been argued that Britain was convinced with the ineffectiveness of colonial exploitation (Brett, 1973). The French on the other hand made great use of their political power in order to establish extractive institutions and acquire non-competitive gains from trade.

With respect to the effect of settlements related to common language and number of years spent in the colony, Table 2.10 also suggests that trade with French colonies benefited most from French settlements through informal institutions, culture and networks, which we denote "network". The results in column 1 indicate that even among extractive policies, networking would boost overall trade. In particular, networking would increase extraction of agricultural raw material (column 4) and French exports of manufactured goods (column 3). Greater control induced by networking allowed the French to extract their colonies' raw materials and sell their manufactured products and food to those colonies. Marseilles (1984, p. 121) noted: "Colonial empire was a privileged market

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<sup>28</sup>The particular case of Australia and New Zealand is an intriguing example: settlers were mainly ex-convicts who fought for the establishment of European-like institutions in order to protect their rights against the arbitrary power of landowners, who themselves, were the ex-jailers. They demanded jury trials, freedom from arbitrary arrest, and electoral representation (Acemoglu et al., 2001).

for French capital exports, a compensating element and a stable outlet, an necessary outlet for raw material."<sup>29</sup>

The network impact of European settlement, as expected, was positively and significantly correlated with French trade with its own colonies while it was negatively correlated with French trade with other colonies. This is a reasonable result, since a greater number of years spent by British and other Europeans in their colonies tended to promote Great Britain, Portugal, Spain and Germany's trade with those colonies, but was less likely to promote France's trade with them. Actually we would infer from the negative sign of the network effect of British settlements on trade with France, that the common European language spoken by the British colonies was not French - the more British settled in their colonies, the more likely those colonies would learn English and less likely French- (Ginsburgh et al., 2014). This would make exchange more likely with the British empire, which substitutes for trade with France.<sup>30</sup>

Overall, our initial result that the presence of settlers increased trade in French colonies but had no significant impact on trade in non-French colonies is due to the fact that, in the French colonies, the networking effect of settlement is stronger than the institutional effect of settlement leading to a total positive net effect of settlements on trade within French colonies. However, the opposite is true for the non-French colonies: actually, in those colonies the two effects have opposite signs on trade, and the magnitude of one channel outweighs the magnitude of the other leading to net effect of settlements not significantly different from zero.

It is possible that European settlements affected trade through different channels than the ones tested by our model, however testing them empirically would be a daunting task. We limit ourselves to capturing the impacts of formal institutions and of ties generated from sharing a common language and the duration of colonization. As our results indicate, such impacts are significant and high in magnitude. Moreover, the error terms  $\mu_I$  and  $\mu_N$  from equation ((2.3)) are low in magnitude, indicating that the channels we have identified should account for a substantial share of the impact European settlement on French trade and help shed additional light on the settlement effect reported in this article.

<sup>29</sup>Translated from the original: "L'empire colonial, champs privilégié de l'exportation des capitaux français [...] un élément compensateur et un débouché stable, [...] un débouché essentiel de matières premières."

<sup>30</sup>However, we cannot disentangle trade deviation effect from direct networking effect

### 2.5.4 Robustness of the empirical model

Initially, the goal of identification from equations (2.3) and (2.4) is to separate the effects generated from formal institutions from those generated from both sharing a common language and the duration of colonization, which should capture ties arising from information institution, culture and networking. However, it is unlikely that these four variables are orthogonal. For instance, the adoption of certain formal institution may be related to the duration of colonization. Hence, the estimated parameters may contain some bias. We will attempt to correct for this by using Principle Component Analysis (PCA hereafter) for the four variables in question. The PCA approach is performed before a regression and it aims at reducing the number of variables by condensing some of the correlated variables together into one single representation (or an artificial variable) called a "principal component". Each factor or component is a linear combination of the initial variables, and it accounts for a part of the total variation in the original dataset. Moreover, the generated factors are un-correlated by construction.

Table 2.11 shows the percentage variance of the corresponding factors that were generated from the initial four variables, namely, constraint on executive in 1900, democracy in 1900, common European language, duration of colonization. Those percentages reflect how much of the initial variability of the original data each factor represents. In our analysis, the first two factors represent 85.4% of the initial variability of the original four variables. Table 2.12 presents the factor loadings (or estimates) of the linear combination between the generated factors and the initial variables. We find that the first principal component D1 is heavily "loaded" on the two variables relate to formal institutions, constraint on executive and democracy in 1900, while the second principal component D2 is "loaded" on the last two variables, common language and duration of colonization. Table 2.13 shows the factor score or the component score coefficient. Those coefficients are interpreted as the contribution of each variable to its factor. In Table 2.13 we notice that constraint on executive and democracy contribute to almost 93% (44% + 49%) of the first factor and that common language and duration of colonization contribute to also 93% of the second factor. Indeed, constraint on executive and democracy appear to describe a common variability related to formal institutions while common language and duration of colonization relate to some networking ties while ensuring orthogonality between the two.

This exercise allows us to predict observations for two factors D1 and D2, where D1 represents the formal institutions and D2 represents the common language and duration of colonization, while ensuring orthogonality between these two factors. We then estimate the part of European settlement associated with each of these two factors. More specifically, we regress European settlements on D1 (capturing constraint on executive and democracy in 1900) and on D2 (capturing common language and duration of colonization), as in the equation:

$$ES_i = \alpha_l + t_1 D1_i + t_2 D2_i + \varepsilon_i \quad (2.6)$$

Next, we use the estimated values of the parameters  $\hat{t}_1$  and  $\hat{t}_2$  from equation (2.6) to compute the fitted values of the part of European settlements associated to D1 (formal institutions) and the one associated to network ties (common language and duration of colonization), as represented in the equations:

$$\begin{cases} \widehat{ES}_{li} &= \hat{t}_1 D1_i, \text{ and} \\ \widehat{ES}_{Ni} &= \hat{t}_2 D2_i. \end{cases} \quad (2.7)$$

Finally, we estimate equation (2.8):

$$LTrade_{ist} = \lambda_0 + \sum_{j \in J} \lambda_{1j} D_{ijt} \widehat{ES}_{li} + \lambda_2 \widehat{ES}_{li} + \sum_{j \in J} \lambda_{3j} D_{ijt} \widehat{ES}_{Ni} + \lambda_4 \widehat{ES}_{Ni} + \sum_{j \in J} \lambda_{5j} D_{ijt} \varepsilon_i + \lambda_6 \varepsilon_i + \lambda X_{it} + \zeta, \quad (2.8)$$

which is a transformation of equation (2.5), where we included the error term  $\varepsilon$  as an additional control variable to account for the impact of ES on trade not associated with neither the institutional factor, nor with the factor related to common language and duration of colonization.

Table 2.14 reports the ordinary least squares regression for Equation (2.8). As the results of that table show, the aggregation of the variables constraint on executive, democracy, common language and duration of colonization into two factors D1, related to formal institutions, and D2, related to common language and duration of colonization, do not overturn our initial results. Similar to the results found in Tables 2.9 and 2.10, Table 2.14 show that the quality of formal institutions brought about by French settlements in their colonies is negatively correlated with the levels of those colonies' trade with France, and this is true for overall trade, as well as for exports and

imports in each of the sectors in columns (2) through (5). Among British colonies, those with better institutions brought by European settlements traded more with France relative to the reference group. Also, Table 2.14 shows that the impact of common language and duration of colonization associated to European settlement was positively and significantly correlated with French trade with its own colonies and negatively correlated with French trade and other colonies. An additional and interesting result is that the impact of the residual impact of settlements in French colonies  $\varepsilon$  (and British and other colonies which is not reported here) is very low in magnitude for the overall trade and have no impact on some sectors. This means that the channels D1 and D2 we have identified account for most of the impact of European settlement on French trade and help shed additional light on the settlement effect reported in this chapter.

## 2.6 Conclusion

How did the French, British, and other European settlements impact the French colonial trade patterns? Did the French use their political control and networks to transfer resources from the colony to themselves as well as secure favorable markets for their products? Did the British or other settlers introduce institutions in their colonies that favor mutually beneficial trade, enabling them to trade with France outside the circle of the empire? We provide some perspective on these questions by constructing a new database of more than 20,000 observations, relying on various primary historical sources containing information on the value of French sectoral imports and exports with each of its trading partners from 1880 to 1913. We find strong evidence that French exports and imports were higher to colonies with more French settlements. The positive impact of settlements was even higher for French exports of manufactured goods and imports of raw materials, suggesting that the French sought territories to both extract resources and procure markets for their products. British and other settlements, on average, led to a reduction of French overall trade with their respective colonies or had no significant impact. The settlement effect appears to be robust to a variety of econometric specifications, including instrumental variable regressions and alternative instruments and year fixed-effects.

We suggest two interrelated channels through which European settlements might have affected French trade patterns: formal institutions and informal ones accounting for cultural and network-



ing ties. Our empirical findings suggest that the low constraints on the French governors and the low democracy rates in the French colonies drove the colonizers to perpetuate extractive policies, increasing the levels of extraction through trade. We also find that British colonies with better institutions had stronger trade relations with France. Moreover, the different effects of "networks" on different colonies help explain why the effects of European settlers on trade differ. French language and customs were especially prevalent within the French colonies, thereby reducing the transaction costs of trade and creating an extractive environment that favors trade boosts. These special social network effects were not applicable when British or other Europeans settled, which explain our finding that the networking effect lessened French trade outside French colonies.

It would have been interesting to the study the mutual benefits or costs of such trade for the colonies. Unfortunately, proxies for measuring the cost of such trade are scarce. One alternative and interesting avenue for future research though would be to empirically analyze how the initial endowments of colonies affected their institutional quality and economic performance. This is seen in the literature in terms of the natural resources curse, which documents a negative relationship between specialization in natural resource production and institutional development (Ross, 1999). An earlier contributor to the literature, Barro (1999), showed that oil extraction hinders democracy. This historical evidence suggests that the institutional development depends on whether the elite or the merchants benefited from this trade (Acemoglu et al., 2005).

Table 2.1: French trade with colonies

<i>Colonies</i>	<i>Exports</i>			<i>Imports</i>			Total	
	Manufactured Goods	Food	Raw material for industry	Manufactured Goods	Raw agricultural goods	Raw material for industry		
<i>French</i>	11%	10%	1%	1%	69%	8%	14,993,317.56	92%
<i>British</i>	23%	8%	2%	0%	25%	42%	109,222.81	1%
<i>Other</i>	76%	4%	1%	1%	8%	9%	494,316.28	3%
<i>Former</i>	21%	9%	1%	1%	19%	48%	594,974.33	4%
<i>Total</i>	14%	9%	1%	1%	65%	10%	16,191,830.97	100%

Table 2.2: POLS: The Effect of Settlement on Trade

	(1)	(2)	(3)	(4)	(5)
	Exports			Imports	
	Total Trade	Food	Manufactured Goods	Raw agricultural goods	Raw material for industry
European Settlement 1900	0.09* (0.192)	0.03*** (0.007)	0.04*** (0.007)	-0.04** (0.017)	0.01 (0.009)
European Settlement in British Colonies	0.01 (0.210)	-0.03*** (0.008)	-0.04*** (0.009)	0.06*** (0.019)	0.01 (0.010)
European Settlement in other Colonies	-0.17 (0.207)	-0.05*** (0.008)	-0.06*** (0.008)	0.03 (0.018)	-0.01 (0.009)
European Settlement in Prev Colonies	0.05 (0.205)	-0.00 (0.008)	-0.02*** (0.008)	0.04** (0.018)	0.03*** (0.010)
French colonies	-8.48 (5.724)	-0.46** (0.214)	-1.64*** (0.241)	-4.49*** (0.369)	-0.45* (0.251)
British colonies	-12.66** (5.775)	-1.75*** (0.215)	-2.62*** (0.251)	-3.54*** (0.346)	-1.27*** (0.240)
Other Colonies	-23.77*** (8.703)	-3.38*** (0.297)	-4.42*** (0.339)	-5.13*** (0.481)	-2.49*** (0.285)
Log population density 1900	1.40*** (0.333)	0.18*** (0.011)	0.25*** (0.014)	0.15*** (0.017)	0.32*** (0.012)
Log distance sqm	-1.01 (2.319)	-0.28*** (0.090)	-0.38*** (0.096)	-0.34** (0.152)	0.31*** (0.101)
Landlocked	-10.48*** (2.533)	-1.71*** (0.116)	-1.84*** (0.139)	-1.63*** (0.185)	-2.08*** (0.117)
External War	-0.59 (4.404)	-0.38 (0.515)	-0.94** (0.376)	-0.06 (1.132)	-0.00 (0.223)
French War	-1.17 (1.057)	-0.26 (0.249)	-0.02 (0.262)	-0.46 (0.368)	-0.09 (0.239)
Temperature	-0.10 (0.281)	-0.01 (0.010)	-0.02** (0.011)	0.05*** (0.018)	0.03*** (0.012)
Average Humidity	-0.05 (0.061)	-0.01*** (0.002)	-0.01*** (0.003)	-0.01*** (0.004)	-0.00 (0.002)
Trade preference w/ Fr colonies	6.82** (3.392)	0.91*** (0.139)	1.26*** (0.125)	1.64*** (0.250)	0.57*** (0.205)
Trade preference w/ Br colonies	-0.12 (3.926)	-0.52*** (0.150)	-0.99*** (0.174)	1.30*** (0.214)	0.06 (0.145)
Trade preference w/ other colonies	19.96*** (6.948)	1.88*** (0.239)	2.88*** (0.252)	2.33*** (0.492)	1.84*** (0.240)
Custom union w/ Br colonies	-3.12 (3.861)	-0.17 (0.143)	-0.95*** (0.172)	0.65*** (0.208)	-0.73*** (0.133)
Custom union w/ other colonies	-1.32 (8.538)	-0.04 (0.286)	-0.08 (0.320)	-1.29*** (0.460)	-0.32 (0.233)
Currency union w/ Fr colonies	11.02*** (4.035)	1.63*** (0.167)	1.63*** (0.158)	4.05*** (0.281)	0.56*** (0.213)
Currency union w/ Br colonies	-1.43 (3.999)	-0.21 (0.154)	0.44** (0.184)	-2.05*** (0.202)	0.09 (0.149)
Currency union w/ other colonies	5.35 (6.489)	0.66*** (0.215)	0.38 (0.233)	1.23*** (0.349)	0.44** (0.189)
Constant	81.14*** (22.433)	14.70** (0.868)	17.28*** (0.941)	16.49*** (1.511)	8.16*** (1.014)
<b>Observations</b>	<b>1,981</b>	<b>2,130</b>	<b>2,124</b>	<b>2,086</b>	<b>2,124</b>
<b>R-squared</b>	<b>0.627</b>	<b>0.595</b>	<b>0.598</b>	<b>0.450</b>	<b>0.571</b>

Robust standard errors in parentheses

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1

Note: The estimates of our standard gravity variables are significant and report the correct sign. The larger the economy, the higher is the trade in all sectors and the further away is the country from France, the lower will its trade with France. Being landlocked and in times of war would reduce trade. Being part of a trade agreement, custom union or currency union with France would increase trade, but being part of trade agreement with British or other empire would reduce it. Favorable climate would also increase trade. Differences in the number of observations across columns comes from missing data across sectors. The difference is however minimal compared to the actual dataset. Note that we regressed the above 5 regressions using the same number of observations and results are very similar.

Table 2.3: Instrumental Variables

Dependent Variable: European Settlement				
	(1)	(2)	(3)	(4)
Latitude	0.46*** (0.044)			0.68*** (0.040)
Settler Mortality (in log)		-3.48*** (0.441)		-0.73* (0.406)
Popden1500 (in log)			-6.70*** (0.322)	-6.87*** (0.281)
Constant	-16.43* (8.862)	-28.61*** (9.175)	94.16*** (8.275)	-12.44 (8.596)
<b>Observations</b>	<b>2,134</b>	<b>1,474</b>	<b>2,046</b>	<b>1,474</b>
<b>R-squared</b>	<b>0.501</b>	<b>0.702</b>	<b>0.585</b>	<b>0.827</b>

Standard errors in parentheses

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1

Table 2.4: The Effect of Settlement on Trade: Instrumental Variable

	(1)	(2)	(3)	(4)	(5)
	Total Trade	Exports		Imports	
		Food	Manufactured Goods	Raw agricultural goods	Raw material for industry
European Settlement 1900	0.12* (0.066)	0.06*** (0.011)	0.05*** (0.013)	0.08*** (0.017)	-0.01 (0.012)
European Settlement in British Colonies	-0.17*** (0.064)	-0.04*** (0.011)	-0.04*** (0.013)	-0.06*** (0.018)	0.03** (0.011)
European Settlement in other Colonies	-0.73*** (0.082)	-0.14*** (0.014)	-0.15*** (0.016)	-0.17*** (0.022)	-0.01 (0.013)
European Settlement in Prev Colonies	-0.10 (0.067)	-0.03*** (0.011)	-0.05*** (0.013)	-0.07*** (0.018)	0.04*** (0.012)
French colonies	-16.56*** (1.649)	-1.75*** (0.248)	-3.19*** (0.300)	-6.55*** (0.402)	-1.32*** (0.305)
British colonies	-20.22*** (1.780)	-2.77*** (0.271)	-4.29*** (0.331)	-4.76*** (0.423)	-1.96*** (0.312)
Other Colonies	-15.48*** (1.845)	-1.76*** (0.262)	-3.15*** (0.332)	-2.33*** (0.454)	-1.46*** (0.307)
Log population density 1900	1.57*** (0.064)	0.21*** (0.010)	0.29*** (0.013)	0.19*** (0.015)	0.35*** (0.011)
Log distance sqmKm2	-2.02*** (0.518)	-0.73*** (0.088)	-0.79*** (0.100)	-0.68*** (0.126)	0.26*** (0.100)
Landlocked	-9.64*** (0.720)	-1.32*** (0.126)	-1.58*** (0.158)	-0.97*** (0.184)	-2.05*** (0.130)
External War	2.30 (2.469)	-0.31 (0.376)	-0.72*** (0.258)	-0.10 (1.163)	0.42** (0.208)
French War	-0.78 (1.498)	-0.22 (0.242)	0.02 (0.254)	-0.44 (0.360)	-0.10 (0.238)
Temperature	-0.05 (0.092)	0.04*** (0.014)	-0.01 (0.019)	0.14*** (0.022)	0.08*** (0.017)
Average Humidity	-0.11*** (0.015)	-0.02*** (0.002)	-0.02*** (0.003)	-0.03*** (0.004)	-0.01** (0.002)
Trade preference w/ Fr colonies	8.95*** (0.886)	1.34*** (0.148)	1.52*** (0.141)	2.63*** (0.240)	1.03*** (0.221)
Trade preference w/ Br colonies	5.20*** (0.998)	-0.17 (0.157)	-0.28 (0.189)	1.77*** (0.253)	0.63*** (0.171)
Trade preference w/ other colonies	19.18*** (1.515)	1.56*** (0.190)	2.79*** (0.257)	0.84** (0.374)	1.45*** (0.290)
Custom union w/ Br colonies	0.69 (1.019)	0.19 (0.156)	-0.30 (0.197)	1.30*** (0.220)	-0.48*** (0.157)
Custom union w/ other colonies	-7.92*** (1.395)	-1.24*** (0.212)	-1.17*** (0.260)	-3.45*** (0.390)	-1.48*** (0.197)
Currency union w/ Fr colonies	9.51*** (0.881)	1.63*** (0.161)	1.69*** (0.151)	3.37*** (0.269)	0.40* (0.210)
Currency union w/ Br colonies	-3.68*** (0.933)	-0.47*** (0.150)	0.02 (0.184)	-2.06*** (0.199)	-0.14 (0.156)
Currency union w/ other colonies	-4.19*** (1.175)	-0.76*** (0.189)	-1.27*** (0.215)	-0.72** (0.302)	-0.53*** (0.151)
Constant	96.84*** (6.195)	18.35*** (1.003)	21.95*** (1.249)	18.62*** (1.400)	7.94*** (1.122)
<b>Observations</b>	<b>1,899</b>	<b>2,063</b>	<b>2,056</b>	<b>2,014</b>	<b>2,058</b>
<b>R-squared</b>	<b>0.655</b>	<b>0.620</b>	<b>0.616</b>	<b>0.503</b>	<b>0.558</b>

Robust standard errors in parentheses

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;.1

Note: The instrument used for the above regressions is population density in 1500. ES refer to European Settlement in 1900. The first variable is the reference variable not interacted with any colonial dummy but actually representing ES in the French colonies.. Differences in the number of observations across columns comes from missing data across sectors, and between this table and the POLS comes from the introduction of instruments which contain missing information. The difference is however minimal compared to the actual dataset. Note that we regressed the above 5 regressions using the same number of observations and results are very similar.

Table 2.5: Robustness Checks of Effect of Settlement on Trade

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	<i>POLS</i>	<i>POLS full sample</i>	<i>POLS Land area</i>	<i>IV latitude</i>	<i>IV Settler mortality</i>	<i>IV Population density 1500</i>	<i>IV all instruments</i>
ES	0.09* (0.048)	0.07* (0.045)	0.006* (0.003)	0.90*** (0.068)	1.17*** (0.131)	0.12* (0.066)	0.42*** (0.052)
ES in British Colonies	0.01 (0.053)	0.05 (0.049)	-0.006 (0.27)	0.16** (0.069)	0.03 (0.076)	-0.17*** (0.064)	-0.21*** (0.054)
ES in Other colonies	-0.17*** (0.052)	-0.15*** (0.048)	-0.04*** (0.006)	-0.13 (0.097)	0.30* (0.164)	-0.73*** (0.082)	0.56*** (0.183)
ES in Former Colonies	0.05 (0.052)	0.06 (0.047)	0.03*** (0.004)	0.12** (0.060)	0.08 (0.081)	-0.10 (0.067)	-0.10* (0.056)
Constant	72.66*** (5.065)	82.21*** (4.790)	12.83*** (0.391)	58.62*** (4.480)	108.31*** (6.919)	80.28*** (5.709)	94.58*** (6.952)
All Controls	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES
<b>Observations</b>	<b>1,981</b>	<b>2,815</b>	<b>2544</b>	<b>1,986</b>	<b>1,362</b>	<b>1,899</b>	<b>1,362</b>
<b>R-squared</b>	<b>0.627</b>	<b>0.60</b>	<b>0.425</b>	<b>0.667</b>	<b>0.71</b>	<b>0.655</b>	<b>0.694</b>
P-value Chi squared test				(0.000)	(0.000)		(0.000)

Robust standard errors in parentheses

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1

Note: ES refer to European Settlement in 1900. The first variable is the reference variable not interacted with any colonial dummy but actually representing the French colonies. The first column is the base regression for POLS. Column 2 and 3 report results with different data specifications. The Column 2 includes the full sample from year 1880-1913. Column 3 reports results for different weights values of trade. Trade data was disaggregated from the region level to the country level using arable land area as a weight instead of our base one which is the population. Column 5 6 and 7 use different instrumental variables. The results for the standard gravity variable are also significant and exert the correct sign for the various specifications. The bigger the size, the higher is the trade of all sectors and the further is the country from France, the less likely they will trade with France. Being landlocked and in times of war would reduce trade. Being part of a trade agreement, custom union or currency union with France would increase trade, but being part of trade agreement with British or other empire would reduce it. Favorable climate would also increase trade. Colonial dummies seem to exert a negative impact on trade. Those results indicate that that colonial status per se does not necessarily present a positive impact on French trade if settlement and trade policies are not accounted for.

Table 2.6: Cross-section OLS: The Effect of Settlement on Trade

	(1)	(2)	(3)	(4)	(5)
	Exports		Imports		
	Total Trade	Food	Manufactured Goods	Raw agricultural goods	Raw material for industry
European Settlement 1900	0.62** (0.267)	0.13*** (0.045)	0.13*** (0.050)	0.07 (0.055)	0.08** (0.037)
European Settlement in Br Colonies	-0.59** (0.283)	-0.13*** (0.048)	-0.13** (0.053)	-0.06 (0.059)	-0.07* (0.040)
European Settlement in other Colonies	-0.85*** (0.286)	-0.17*** (0.049)	-0.18*** (0.054)	-0.11* (0.059)	-0.10** (0.040)
European Settlement in Prev Colonies	-0.27 (0.277)	-0.08 (0.047)	-0.07 (0.052)	-0.02 (0.057)	-0.02 (0.039)
Log population density 1900	0.97*** (0.266)	0.10** (0.045)	0.14*** (0.050)	0.09* (0.055)	0.26*** (0.037)
Log distance sqm	1.56 (2.502)	0.14 (0.426)	0.12 (0.471)	0.65 (0.519)	0.79** (0.351)
Landlock	-7.68** (3.484)	-1.08* (0.593)	-1.06 (0.655)	-1.88** (0.723)	-1.35*** (0.489)
Temperature	-0.13 (0.274)	-0.02 (0.047)	-0.05 (0.052)	0.02 (0.057)	0.02 (0.039)
Average Humidity	-0.03 (0.058)	-0.00 (0.010)	-0.00 (0.011)	-0.01 (0.012)	0.00 (0.008)
Trade preference w/ Fr colonies	13.61*** (3.664)	2.26*** (0.623)	2.47*** (0.689)	2.38*** (0.761)	1.40*** (0.514)
Trade preference w/ Br colonies	-4.75 (3.610)	-1.10* (0.614)	-1.26* (0.679)	-0.62 (0.750)	-0.53 (0.507)
Trade preference w/ other colonies	11.17* (5.930)	0.59 (1.009)	1.77 (1.115)	1.56 (1.231)	0.93 (0.832)
Constant	50.40** (22.955)	10.03** (3.904)	11.45*** (4.318)	5.76 (4.766)	3.49 (3.222)
Observations	98	98	98	98	98
R-squared	0.522	0.485	0.497	0.376	0.608

Robust standard errors in parentheses

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;.1

Note: The first variable is the reference variable not interacted with any colonial dummy but actually representing ES in the French colonies. The results show that they are significant and report the correct sign. The larger the economy, the higher is the trade in all sectors and the further away is the country from France, the lower will its trade with France. Being landlocked and in times of war would reduce trade.

Table 2.7: Cross-section IV: The Effect of Settlement on Trade

	(1)	(2)	(3)	(4)	(5)
	Exports		Imports		
	Total Trade	Food	Manufactured Goods	Raw agricultural goods	Raw material for industry
European Settlement 1900	0.58** (0.249)	0.15*** (0.042)	0.12** (0.049)	0.08 (0.052)	0.06 (0.036)
European Settlement in Br Colonies	-0.55** (0.26)	-0.12*** (0.04)	-0.12** (0.05)	-0.06 (0.05)	-0.05 (0.04)
European Settlement in other Colonies	-1.15*** (0.30)	-0.24*** (0.05)	-0.23*** (0.06)	-0.17*** (0.06)	-0.11** (0.04)
European Settlement in Prev Colonies	-0.15 (0.24)	-0.07* (0.04)	-0.05 (0.05)	0 (0.05)	0.01 (0.04)
Log population density 1900	1.14*** (0.25)	0.14*** (0.04)	0.17*** (0.05)	0.13** (0.05)	0.28*** (0.04)
Constant	60.78*** (22.97)	12.34*** (3.88)	13.90*** (4.48)	7.68 (4.78)	3.49 (3.35)
Observations	95	95	95	95	95
R-squared	0.58	0.565	0.534	0.45	0.612

Robust standard errors in parentheses

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;.1

Note: The first variable is the reference variable not interacted with any colonial dummy but actually representing ES in the French colonies. The results show that they are significant and report the correct sign. The larger the economy, the higher is the trade in all sectors and the further away is the country from France, the lower will its trade with France. Being landlocked and in times of war would reduce trade.

Table 2.8: The channels of European Settlement

(a) The channels of Settlement				
	European Settlement			
	(1)	(2)	(3)	(4)
	OLS	OLS	IV	IV
Constraint on Executive	0.92** (0.456)		1.70*** (0.366)	
Democracy	4.42*** (0.311)		2.63*** (0.249)	
Common Language		14.48*** (1.54)		18.34*** (1.174)
Duration of colonization		0.04*** (0.004)		0.03*** (0.003)
Observations	2,068	2,134	2,002	2,068
R-squared	0.333	0.176	0.299	0.265
(b) Correlation Matrix				
	Constraint on Executive	Democracy	Common Language	Duration of Colonization
<i>Constraint on Executive</i>	1			
<i>Democracy</i>	0.8673	1		
<i>Common language</i>	0.5045	0.3860	1	
<i>Duration of colonization</i>	0.3551	0.2026	0.5029	1
Robust standard errors in parentheses				
*** p<0.01, ** p<0.05, * p<0.1				

Note: The same regression was repeated at the cross section level. Estimates are similar in terms of magnitude and significance. The standard errors are smaller however. But none of this overturn our results. Hence, we chose to report this regression for consistency in the sample size



Table 2.9: POLS: The effects of channels of settlement on trade

	(1)	(2)	(3)	(4)	(5)
	Exports			Imports	
	Total Trade	Food	Manufactured goods	Raw agricultural goods	Raw material for industry
Institutional effect	-0.54*** (0.071)	-0.08*** (0.012)	-0.08*** (0.01)	-0.12*** (0.028)	-0.12*** (0.009)
Institutions effect in British colonies	0.71*** (0.077)	0.08*** (0.013)	0.11*** (0.012)	0.09*** (0.028)	0.14*** (0.01)
Institutions effect in Previous colonies	0.44*** (0.084)	0.06*** (0.014)	0.05*** (0.013)	0.08*** (0.029)	0.11*** (0.013)
Institutions effect in Other colonies	4.62*** (0.764)	0.76*** (0.121)	1.09*** (0.17)	1.04*** (0.136)	0.12 (0.121)
Network effect	1.25*** (0.081)	0.22*** (0.013)	0.20*** (0.014)	0.32*** (0.022)	0.16*** (0.016)
Network effect in British colonies	-1.03*** (0.091)	-0.19*** (0.015)	-0.24*** (0.016)	-0.14*** (0.025)	-0.11*** (0.017)
Network effect in Previous colonies	-0.87*** (0.164)	-0.12*** (0.026)	-0.06* (0.033)	-0.26*** (0.049)	0.01 (0.033)
Network effect in Other colonies	-0.74*** (0.114)	-0.17*** (0.019)	-0.17*** (0.021)	-0.17*** (0.031)	-0.11*** (0.02)
Control Variables	YES	YES	YES	YES	YES
Constant	86.64*** (5.078)	16.76*** (0.844)	17.69*** (1.054)	17.46*** (1.522)	6.91*** (1.102)
Year Fixed Effects	YES	YES	YES	YES	YES
<b>Observations</b>	<b>1916</b>	<b>2064</b>	<b>2058</b>	<b>2020</b>	<b>2058</b>
<b>R-Squared</b>	<b>0.71</b>	<b>0.675</b>	<b>0.683</b>	<b>0.562</b>	<b>0.61</b>

Robust standard errors in parentheses

\*\*\* p&lt; 0.01, \*\* p&lt; 0.05, \* p&lt; 0.1

Note: The institutions effects and network effects represent the fitted values of the European settlements explained by either as shown in equation 5. The first variable of each represent the reference variable not interacted with any colonial dummy but actually representing the French colonies. The residual is the unexplained part of the settlements. The standard gravity variables not reported in this table show that they are significant and exert the correct sign.

Table 2.10: IV: The Effects of channels of settlement on Trade

	(1)	(2)	(3)	(4)	(5)
	Exports			Imports	
	Total Trade	Food	Manufactured goods	Raw agricultural goods	Raw material for industry
Institutions effect	-0.84*** (0.139)	-0.14*** (0.024)	-0.18*** (0.024)	-0.23*** (0.044)	-0.10*** (0.033)
Institutions effect in British colonies	1.16*** (0.147)	0.16*** (0.025)	0.23*** (0.026)	0.21*** (0.045)	0.16*** (0.033)
Institutions effect in Previous colonies	0.77*** (0.148)	0.12*** (0.026)	0.14*** (0.026)	0.18*** (0.046)	0.12*** (0.035)
Institutions effect in Other colonies	-1.39*** (0.385)	-0.20*** (0.056)	-0.32*** (0.082)	-0.30*** (0.075)	0.07 (0.068)
Network effect	1.12*** (0.08)	0.18*** (0.014)	0.17*** (0.014)	0.26*** (0.022)	0.15*** (0.018)
Network effect in British colonies	-0.19 (0.166)	-0.13*** (0.028)	-0.23*** (0.032)	0.20*** (0.042)	0.04 (0.028)
Network effect in Previous colonies	-1.33*** (0.157)	-0.33*** (0.024)	-0.30*** (0.029)	-0.08* (0.048)	-0.18*** (0.035)
Network effect in Other colonies	-0.1 (0.138)	-0.07*** (0.023)	-0.07*** (0.023)	-0.02 (0.036)	-0.04* (0.024)
Residuals in French Colonies					
All Controls					
Constant	104.79*** (5.335)	21.89*** (0.868)	23.54*** (1.056)	17.46*** (1.439)	11.41*** (1.076)
Year FE	YES	YES	YES	YES	YES
Observations	1916	2064	2058	2020	2058
R-squared	0.709	0.663	0.671	0.565	0.606

Robust standard errors in parentheses

\*\*\* p&lt; 0.01, \*\* p&lt; 0.05, \* p&lt; 0.1

Note: The institutions effects and network effects represent the fitted values of the European settlements explained by either as shown in equation 5. The first variable of each represent the reference variable not interacted with any colonial dummy but actually representing the French colonies. The residual is the unexplained part of the settlements. The standard gravity variables not reported in this table show that they are significant and exert the correct sign.

Table 2.11: Percentage of variance

	D1	D2	F3	F4
Variability (%)	47.401	38.002	11.681	2.915
Cumulative %	47.401	85.403	97.085	100.000

Table 2.12: Factor loadings

	D1	D2
<i>constraint on executive</i>	0.913	0.307
<i>Democracy</i>	0.965	0.106
<i>Common language</i>	0.357	0.767
<i>Duration of colonization</i>	0.065	0.909

Table 2.13: Component score coefficients

	D1	D2	Dot product
<i>constraint on executive</i>	0.493	-0.030	-0.014
	44%	6%	
<i>Democracy</i>	0.586	-0.206	-0.12
	49%	1%	
<i>Common language</i>	-0.002	0.505	-0.001
	7%	39%	
<i>Duration of colonization</i>	-0.232	0.707	-0.16
	0.2%	54%	
			-0.30

Table 2.14: The Effects of channels of settlement on trade: PCA approach

	(1)	(2)	(3)	(4)	(5)
	Exports		Imports		
	Total Trade	Food	Manufactured Goods	Raw agricultural goods	Raw material for industry
Institutional effect of Settlement	-0.47*** (0.081)	-0.04** (0.016)	-0.03** (0.013)	-0.18*** (0.029)	-0.10*** (0.014)
Institutional effect in Br colonies	0.75*** (0.086)	0.06*** (0.017)	0.07*** (0.015)	0.19*** (0.029)	0.15*** (0.014)
Institutional effect in Prev colonies	0.53*** (0.091)	0.05*** (0.017)	0.05*** (0.016)	0.18*** (0.031)	0.14*** (0.016)
Institutional effect in Other colonies	0.67*** (0.225)	0.09** (0.035)	0.15*** (0.045)	0.25*** (0.05)	0.04 (0.035)
Network effect of Settlement	1.68*** (0.121)	0.32*** (0.019)	0.32*** (0.02)	0.33*** (0.034)	0.23*** (0.022)
Network effect in Br col	-1.25*** (0.122)	-0.27*** (0.02)	-0.35*** (0.021)	-0.07* (0.038)	-0.15*** (0.023)
Network effect in Prev colonies	-1.16*** (0.233)	-0.18*** (0.038)	-0.13*** (0.047)	-0.26*** (0.066)	-0.01 (0.045)
Network effect in Other colonies	0.19 (0.133)	-0.04** (0.021)	-0.03 (0.023)	0.13*** (0.038)	-0.04* (0.024)
Residuals of settlements	-0.05 (0.042)	0 (0.006)	0.02*** (0.006)	-0.10*** (0.016)	0 (0.008)
Residual in Br colonies	0.06 (0.053)	-0.01 (0.008)	-0.05*** (0.009)	0.13*** (0.017)	-0.01 (0.01)
Residual in Prev colonies	0.40*** (0.047)	0.06*** (0.007)	0.03*** (0.007)	0.14*** (0.017)	0.06*** (0.009)
Residual in Other colonies	-0.08 (0.047)	-0.03*** (0.007)	-0.04*** (0.007)	0.08*** (0.016)	-0.01 (0.009)
French colonies	-3.39 (2.299)	1.28*** (0.381)	1.11** (0.492)	-4.34*** (0.637)	1.35*** (0.47)
British colonies	-12.70*** (2.161)	-1.55*** (0.352)	-1.92*** (0.471)	-2.90*** (0.583)	-0.13 (0.449)
Other Colonies	-24.03*** (2.515)	-3.05*** (0.421)	-2.70*** (0.536)	-5.56*** (0.649)	-1.76*** (0.475)
Log population density 1900	2.12*** (0.112)	0.30*** (0.017)	0.34*** (0.021)	0.37*** (0.021)	0.41*** (0.017)
Log distance sqm	-3.06*** (0.537)	-0.63*** (0.09)	-0.50*** (0.095)	-1.39*** (0.144)	0.20* (0.114)
Landlocked	-9.27*** (0.614)	-1.46*** (0.101)	-1.40*** (0.123)	-1.79*** (0.178)	-1.83*** (0.113)
External War	1.92 (3.099)	-0.23 (0.435)	-0.77* (0.432)	0.26 (1.155)	0.25 (0.256)
Temperature	0.18*** (0.057)	0.03*** (0.009)	0.02** (0.01)	0.10*** (0.015)	0.05*** (0.011)
Average Humidity	0 (0.011)	0.00* (0.002)	0 (0.002)	-0.01*** (0.003)	0 (0.002)
Trade preference w/ Fr colonies	3.46*** (0.803)	0.28** (0.123)	0.69*** (0.12)	0.68*** (0.218)	0.12 (0.202)
Trade preference w/ Br colonies	2.37** (0.926)	-0.07 (0.14)	-0.25 (0.165)	1.29*** (0.188)	0.45*** (0.148)
Trade preference w/ other colonies	2.19 (1.37)	-0.51*** (0.181)	0.40* (0.241)	-2.24*** (0.42)	0.2 (0.237)
Custom union w/ Br colonies	-3.46*** (0.83)	-0.09 (0.139)	-0.62*** (0.156)	0.01 (0.224)	-0.76*** (0.122)
Custom union w/ other colonies	-5.61*** (1.071)	-0.49** (0.192)	-0.41* (0.227)	-2.21*** (0.272)	-0.90*** (0.171)
Currency union w/ Fr colonies	9.36*** (0.898)	1.32*** (0.151)	1.42*** (0.142)	3.60*** (0.278)	0.13 (0.211)
Currency union w/ Br colonies	-2.31** (0.907)	-0.36** (0.143)	0.03 (0.166)	-1.62*** (0.212)	0.07 (0.142)
Currency union w/ other colonies	11.00*** (1.168)	1.42*** (0.164)	1.07*** (0.191)	2.72*** (0.287)	0.94*** (0.18)
Constant	82.05*** (5.882)	14.79*** (0.929)	13.96*** (1.023)	22.60*** (1.53)	6.41*** (1.177)
<b>Observations</b>	<b>1,981</b>	<b>2,130</b>	<b>2,124</b>	<b>2,086</b>	<b>2,124</b>
<b>R-squared</b>	<b>0.74</b>	<b>0.71</b>	<b>0.706</b>	<b>0.597</b>	<b>0.64</b>

Robust standard errors in parentheses

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1

# Appendices

Table B.1: The European Settlement as constructed from Huillery

District	Precolonial Empire	Current Country Name	European Settlement	District	Precolonial Empire	Current Country Name	European Settlement
Porto-Novo	Adjatche	benin	39.8	Nara	Kaarta	mali	22.5
Borgou	Borgu	benin	39.8	Nioro	Kaarta	mali	22.5
Abomey	Dahomey	benin	39.8	Sikasso	Kenedugu	mali	22.5
Allada	Dahomey	benin	39.8	Bandiagara	Macina	mali	22.5
Ouidah	Dahomey	benin	39.8	Gourma	Macina	mali	22.5
Tenkodogo	Tenkodogo	burkina faso	10.1	Mopti	Macina	mali	22.5
Ouagadougou	Wagadugu	burkina faso	10.1	Macina	Segu	mali	22.5
Ouahigouya	Yatenga	burkina faso	10.1	Segou	Segu	mali	22.5
Koudougou	Wagadugu	burkina faso	10.1	Adrar	Emirate of Adrar	mauritania	9.4
Bobodioulasso	Gwiriko	burkina faso	10.1	Brakna	Emirate of Brakna	mauritania	9.4
Kaya	Wagadugu	burkina faso	10.1	Trarza	Emirate of Trarza	mauritania	9.4
Dori	Liptako	burkina faso	10.1	Tagant	Emirate of Tagant	mauritania	9.4
Fada	Liptako	burkina faso	10.1	Goure	Kanem-Bornu	niger	7.4
Kindia	Fuuta Jaalo	guinea	70	NGuigmi	Kanem-Bornu	niger	7.4
Koumbia	Fuuta Jaalo	guinea	70	Dosso	Sokoto	niger	7.4
Labe	Fuuta Jaalo	guinea	70	Konny	Sokoto	niger	7.4
Mamou	Fuuta Jaalo	guinea	70	Tessaoua	Sokoto	niger	7.4
Pita	Fuuta Jaalo	guinea	70	Zinder	Sokoto	niger	7.4
Matam	Fuuta Toro	guinea	70	Haute-gambie	Bundu	senegal	179
Podor	Fuuta Toro	guinea	70	Baol	Bawol	senegal	179
Kankan	Samori	guinea	70	Thies	Bawol	senegal	179
Kissidougou	Samori	guinea	70	Louga	Jolof	senegal	179
Kouroussa	Samori	guinea	70	Tivaouane	Kajoor	senegal	179
Bondoukou	Abron	ivory coast	11.7	Sinesaloum	Siin Salum	senegal	179
Assinie	Sanwi	ivory coast	11.7	Dagana	Waalo	senegal	179

Table B.2: The country dis-aggregation data

Regions as defined in the Tableau du Commerce general de la France		Countries Segregated	Colonizer	Year of Colonization	Year of independence
Europe	Possessions anglaises de la mediterranee	Gibraltar	GBR	1700	2012
		Cyprus	GBR	1878	1960
		Malta	GBR	1802	1964
Afrique	Egypte	Egypt	GBR	1882	1922
	Etats Barbaresques	Regence De Tripoli	Libya	ITA	1910
		Tunisie	Tunisia	FRA	1881
		Maroc	Morocco	FRA	1912
	Cote occidentale (Du maroc au cap de bonne esperance)	Western Sahara	ESP	1884	1965
		Mauritania	FRA	1895	1960
		Guinea Bissau	PRT	1800	1973
		Guinea	FRA	1890	1960
		Liberia	USA		1847
		Ivory Coast	FRA	1889	1960
		Togo	FRA	1918	1960
		Benin	FRA	1892	1960
		Cameroon	FRA	1918	1960
		Equatorial Guinea	ESP	1844	1968
		Gabon	FRA	1885	1960
		Congo	FRA	1903	1960
		Dr Of Congo	BEL	1885	1960
		Namibia	DEU	1884	1949
		Angola	PRT	1500	1975
		Sao Tome And Principe	PRT	1500	1975
		Botswana	GBR	1885	1966
Afrique	Possessions Anglaises	Sierra Leone	GBR	1808	1961
		Gambia	GBR	1888	1965
		Ghana	GBR	1874	1957
		South Africa	GBR	1806	1910
		Nigeria	GBR	1800	1914

			Partie Orientale (Y Compris L'île Maurice)	Malawi	GBR	1891	1964
				Tanzania	GBR	1918	1961
				Kenya	GBR	1888	1963
				Uganda	GBR	1894	1962
				Somalia	GBR	1884	1960
				Sudan	GBR	1899	1960
				Mauritius	GBR	1835	1968
				Zimbabwe	GBR	1888	1965
				Zambia	GBR	1899	1964
Afrique		Autres Pays (Y Compris L'île De Madagascar)		Mali	FRA	1892	1960
				Niger	FRA	1922	1960
				Chad	FRA	1900	1960
				Burkina Fasso	FRA	1897	1960
				Ethiopia			
				Mozambique	PRT	1500	1975
				Madagascar	FRA	1883	1960
				Central African Republic	FRA	1889	1960
Asie et Oceanie		Indes Comptoirs	Anglais	India	GBR	1857	1947
				Myanmar	GBR	1857	1948
				Pakistan	GBR	1857	1947
				Bangladesh	GBR	1857	1971
			Hollandais (Java Et Sumatra)	Indonesia	PRT	1600	1945
Asie et Oceanie		Philippines Chine Royaume De Siam Japon Australie		Philippines	ESP	1521	1898
				China			
				Thailand			
				Japan			
				Australia	GBR	1750	1901
		Autres Iles De L'oceanie		Fiji	GBR	1700	1970
				Solomon Islands	GBR	1893	1978
				New Zealand	GBR	1840	1907
Amerique	Septentrionale	Etats Unis	Ocean Atlantique Ocean Pacifique	United States	GBR	1600	1776
		Mexique		Mexico	ESP	1650	1810
Amerique	Centrale	Guatemala-CostaRica- Honduras		Guatemala	ESP	1519	1821

			Costa Rica	ESP	1522	1821			
			Honduras	ESP	1520	1821			
		Nouvelle Grenade	Colombia	ESP	1525	1808			
Amerique	Meridionale	Cote est	Venezuela	Venezuela	ESP	1490	1821		
			Brezil	Brazil	PRT	1500	1822		
			Uruguay	Uruguay	ESP	1500	1821		
			(MonteVideo)						
			Republique Argentine	Argentina	ESP	1500	1816		
		cote ouest	Equateur	Ecuador	ESP	1500	1822		
			Perou	Peru	ESP	1500	1821		
			Bolivie	Bolivia	ESP	1500	1825		
			Chili	Chile	ESP	1500	1810		
			colonies anglaises	Canada	Canada	GBR	1763	1867	
		Amerique	Antilles et possessions Europeennes	Autres Y Compris Les Antilles		Barbados	GBR	1650	1966
						Bahamas	GBR	1650	1973
	Jamaica				GBR	1650	1962		
	Guyana				GBR	1700	1966		
	British Virgin Islands				GBR	1672	1967		
	Dominica				GBR	1805	1978		
	Grenada				GBR	1763	1974		
	Saint Lucia				GBR	1750	1979		
	Trinidad And Tobago				GBR	1750	1962		
	Antigua Et Barbuda				GBR	1632	1981		
	Haiti Et Republique Dominicaine				Haiti	FRA	1697	1804	
				Dominican Republic	ESP	1500	1865		
Colonies espagnoles	Cuba-Porto Ricco			Cuba	ESP	1492	1898		
				Puerto Rico	ESP	1493	1898		
	Saint Thomas			Virgin Islands (Us)	DNK	1600	1917		
Colonies Hollandaises				Aruba	PRT	1600	1986		
				Suriname	PRT	1683	1975		
				Algerie	Algeria	FRA	1830	1962	

Colonies Francaises



		Tunisie	Tunisia	FRA	1881	1956
		Maroc	Morocco	FRA	1912	1956
		Congo	Congo	FRA	1903	1960
		Senegal	Senegal	FRA	1850	1960
		Etablissement Francais De La Cote Occidentale D'afrique	Guinea	FRA	1890	1960
Colonies Francaises			Central African Republic	FRA	1889	1960
			Gabon	FRA	1885	1960
			Ivory Coast	FRA	1889	1960
			Benin	FRA	1892	1960
			Mali	FRA	1892	1960
			Mauritania	FRA	1895	1960
			Burkina Fasso	FRA	1897	1960
			Chad	FRA	1900	1960
			Togo	FRA	1918	1960
			Cameroon	FRA	1918	1960
Colonies Francaises		Madagascar Et Dependences	Madagascar	FRA	1883	1960
		Mayotte	Madagascar	FRA	1883	1960
		Noisy-Be	Madagascar	FRA	1883	1960
		Ile De La Reunion	Reunion	FRA	1642	2012
		Cote Des Somalis	Djibouti	FRA	1896	1977
		Etablissement	Laos	FRA	1880	1949
		Francaise De L'inde	Cambodia	FRA	1863	1953
		Indo-chine Francaise	Vietnam	FRA	1859	1945
	Etablissements Francais de l' oceanie	Nouvelle Caledonie	New Caledonia	FRA	1853	2012
		Autres Etablissements	French Polynesia	FRA	1842	2012
			New Hebrides (Vanuatu)	FRA	1880	1980
		Guyane Francaise	French Guiana	FRA	1814	2012
		Martinique	Martinique	FRA	1685	2012
		Guadeloupe	Guadeloupe	FRA	1635	2012

	Saint Pierre Et Miquelon Et Grande Peche	Saint Pierre Et Miquelon	FRA	1814	2012
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Table B.3: The Correlation matrix between population variables

	<i>Lpopulation density 1500</i>	<i>European settlement 1900</i>	<i>Lpopulation density 1900</i>	<i>Population</i>
<i>Lpopulation density 1500</i>	1			
<i>European settlement 1900</i>	0.096	1		
<i>Lpopulation density 1900</i>	-0.003	0.027	1	
<i>Population</i>	0.019	-0.097	0.255	1

## **Chapter 3**

# **The French colonial patterns of imports, Institutions, current Economic performance**

### **Abstract**

In this paper, we investigate the relation between the type of goods colonies exported to France and those economies' later development. A common explanation for the export-growth nexus is the quality of institutions established in those colonies during the colonial period. The issue we explore is whether colonial trade patterns have directly affected development in the former colonies today, or have operated indirectly through institutions. In order to investigate the impact of colonial trade on current growth through the mediation of institutions, we use the Partial Least Squares Structural Equation Modeling. This method allows us to simultaneously predict the relative importance of French imports and of institutions on growth, while taking into account multicollinearity between the variables, their measurements errors and small sample size issues. The results are suggestive of an important joint role for both trade and institutions in determining economic development in the long run. In particular French colonies who exported raw material developed extractive institutions, which negatively affected development today, while those who exported manufactured goods experience better economic performance today. Among British and other colonies, however, higher exports of both raw materials and of manufactured goods to France are associated with better institutions. These differences had a long-run impact on economic development.

### 3.1 Introduction

A number of studies have highlighted a positive relation between export growth and economic growth (Leamer, 1984; Helpman and Krugman, 1985; Frankel and Romer, 1999; Acemoglu et al., 2005). However, a puzzling phenomenon is that some export dependent countries are often also underdeveloped, especially former colonies (Rungi, 2010). Some countries and regions that specialize in exporting their abundant natural resources and agricultural commodities become trapped in their resource comparative advantages, so that such trade does not translate into higher growth rates for the country. This phenomenon is related to the "resource curse" (Arroyo Abad and van Zanden, 2014). For example, we have, on the one hand, resource-rich Nigeria and Russia with low levels of economic growth (Aragona et al., 2015), and, on the other hand, resource-poor Republic of Korea, Japan and Switzerland who experienced high growth in the 19th and 20th centuries. Abundant natural resources is not necessarily a curse, however: Norway's income per capita, for instance, increased drastically a decade after the discovery of oil (Larsen, 2006).

We explore the idea that the impact of exports and the exploitation of natural resources on growth may be mediated by the quality of domestic institutions. According to Auty (2001), Mikesell (1997) and Gelb (1988), a negative relation between growth and international specialization may be the result of the quality of institutions. In particular, a weak governance could imply a wasting of benefits derived from trade; such benefits could be in the form of knowledge creation, innovation or also in the formation of human and physical capital (Sachs and Warner, 1995), whereas countries that export goods whose production is associated with better governance and higher productivity levels grow more rapidly (Hausmann et al., 2007). Moreover, Van der Ploeg (2011) attributes the positive growth experiences of resource rich countries to the high level of industrial diversification, of growth of manufacturing, of expenditures on education and of the development of institutions and market friendly policies. The disappointing levels of economic growth in similar countries, on their turn, is related to appreciation of the real exchange rate, deindustrialization, and to the inability of a country to transform its resources into other productive assets. Such adverse effects are more severe in countries with bad institutions, higher corruption levels, lack of democracy.<sup>1</sup>

The role of institutions has been identified in previous research to be a fundamental cause for

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<sup>1</sup> For a detailed discussion on the role of institutions on the relation between resources abundance and growth, see Van Der Ploeg (2011).

the differences in income per capita across regions. Countries facing better institutions, higher accountability, less corruption, more rule of law will perform more efficiently and hence achieve greater incomes (Acemoglu et al., 2001; Alam, 1994; Bretocchi and Canova 2002; Kwon, 2011; Lange et al., 2006; Nunn, 2008; North and Thomas, 1973). Following this literature, we focus on the importance of considering the quality of institutions as a mediator the impact of colonial exports on current level of development in former colonies. In particular, using data on colonial exports to France, we investigate the role of the colony's institutional quality on the relation between its exports to France and current growth, taking into account the potential interaction between trade pattern and institutions.

The idea is the following: On the one hand, in colonies with good institutions, trade with France should be mutually beneficial, whereas for a colony with bad institutions, trade with France could take the form of extractive trade for the benefit of the greater power. On the other hand, the source of differences in those institutions may be the potential benefit for the colonizer from exploiting the resources of the colony. Resource abundant colonies with potential exports of primary products tended to attract extractive colonial institutions, built for the purpose of transferring resources from the colony to the colonizer. Finally, we argue that those institutions persisted until present and affected current economic growth.

More precisely, our empirical investigation rests on three premises: First, according to Sachs and Warner (1995) and to Mehlum et al. (2006), resource abundance is usually measured as the relative size of primary exports. Empirical evidence provided by Leamer (1984) and Trefler (1995) confirms that the relative abundance of oil leads to net exports of crude oil and that of coal and mineral leads to net exports of raw materials. In our empirical analysis, we will study the colonial exports of primary goods to France, which we argue to be an indicator of the abundance of natural resources in the colony. Second, there were various types of colonial institutions. At one extreme, there were the extractive states, which "main purpose was to transfer as much resources from the colony to the colonizer" (Acemoglu et al., 2001, p. 2). There were also colonies with institutions that replicated the European style ones, with constraints and checks over government power. In particular, the mix of products that the colonizer imports from the colony is informative about the type of institutions set by the colonizer. Whenever the colony is rich in raw material, such as sugar or gold, with potential extraction opportunities, institutions tend to be coercive in order to facilitate

such extraction (Acemoglu et al., 2001). On the contrary, if the country specializes in the production of manufactures, trade empowers merchants that supported pro-business institutions and constraints on the executive.<sup>2</sup> Finally, the colonial institutions set during the colonial reign persisted and had a long-term impact on today's economic growth (Acemoglu et al., 2001).

In sum, our empirical model tests three main hypotheses: i) There is a correlation between the mix of French imports from colonies and the type of institutions introduced by the colonizer as depicted under H1 in Figure 3.1. ii) Those colonial institutions are positively correlated with current ones meaning that they persisted over time as H2 in the same figure shows. iii) Finally, current institutions affect economic performance today as indicated by H3 in Figure 3.1.

The relation between French imports from colonies and colonial institutions depends in part on whether those institutions were necessary to increase the rent extracted from the colonizer through colonial trade. A negative relation establishes that colonies exporting relatively more to France developed worse institutions. This result would suggest that the colonizer favors more extractive institutions to increase the rent from trade. A positive relation, on its turn, would imply that trade is beneficial to both parties and that good institutions are necessary to increase such trade. For instance, if domestic merchants and not only the colonizer were gaining from trade with France, they would push for better institutions.<sup>3</sup>

To address this issue, we constructed an original data set from various primary sources on French imports of both raw material<sup>4</sup> and of manufactured goods from 1880 to 1912, as described in chapter one of this thesis. Our empirical analysis is based on Partial Least Square Structural Equation Modeling (PLS-SEM),<sup>5</sup> initially proposed by Wold (1966), which is a particular form of Structural Equation Modeling (SEM). This method, which combines both factor analysis and traditional multivariate regression models, has a number of attractive statistical features not present in the

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A seminal example is the one of the industrial revolution in Great Britain that led to the increase of English production and exports of manufactures. Those exports benefited English merchants who encouraged the establishment of pro-business institutions (Nunn and Trefler, 2013).

<sup>3</sup>A noteworthy example is the trade between Western Europe and the countries across the Atlantic. The gains from such trade was beneficial to European merchants who pushed for better institutions, which in turn affected the economic performance of Europe (Acemoglu et al., 2005).

<sup>4</sup>French imports of raw materials consisted of sugar, fruits and other agricultural products, as well as of tobacco, phosphate, iron, ore, copper, zinc, tin, coal, oil, wood, rubber, silk, cotton.

<sup>5</sup>This method is also known as Partial Least Squares Path Modeling (PLS-PM).

traditional econometric models. In particular, it makes the best predictions about the unobserved dependent variables, based first, on the observed values of the independent variables and on the linear combination that we apriori have defined among those variables. The unobserved variables are constructed under features of factor analysis techniques specific to PLS-SEM (Wold, 1966; Chin, 1998). Once the constructed values are predicted, the model allows the conduction of several regressions simultaneously under one model. Note that SEM has been used in social sciences since the 1970s (Bollen, 1990; Joreskog, 1973), and more recently it has become a quasi-standard method in marketing and management research when it comes to analyzing the cause–effect relations between latent constructs (Hair et al., 2011).

One of the difficulties we face in our empirical investigation is that we use some concepts which cannot be captured by a single observable variable, such as the abundance in natural resources, the quality of institutions, the level of human capital, etc. PLS-SEM solves this problem by empirically validating the indicators used to measure our concepts, making sure not to mix the measure of each concept with another measure. Structural Equation Modeling allows predicting the unobserved conceptual variables using the observable data while verifying the validity of those constructed variables (Wold, 1966, 1985; Bollen and Jackman 1985, 1989). More specifically, PLS-SEM measures the reliability of the construct by measuring the correlation between comparable parts within the same construct (internal consistency approach, Chin, 2010). Actually mis-measuring any of those conceptual variables may generate misleading results in the structural relation between two constructs (Wold, 1966, 1985).<sup>6</sup> Here is an example of how the different prediction of a concept may affect consequent results. Arezki and Van Der Ploeg (2007) confirmed the resource curse hypothesis for countries with poor institutions, showing that they have low level of investment. However, their OLS result does not survive the use of Instrumental Variables techniques and when institutions are measured using the *de jure* method (that is, colonial settler mortality, legal origin and the fraction of the population speaking English language to account for institutions). Hence, the measure of institutions seems to matter in the resource curse-growth debate.

Another problem our empirical study faces is that of multicollinearity. Actually countries with

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<sup>6</sup>The impact of political democracy on income inequality in Bollen and Jackman (1985) and in Muller (1988) differs depending on the indicators used to measure either variables. Such conflicting impacts could arise from either invalid indicators used to measure political democracy, or from the failure to accurately validate their reliability (Bollen, 1990; Wold, 1966).



better institutions and countries that trade more grow faster. Also, countries with better institutions tend to trade more (Dollar and Kraay, 2003). Regressions of measures of trade and of institutional quality on GDP are uninformative about the relative importance of each of the two predictors on growth because of the very high collinearity between them and of eventual measurement errors in measuring each of those conceptual variables. PLS-SEM is designed to deal with this problem, especially when the sample size is small and collinearity is high between the variables.<sup>7</sup> Its added value relies in conducting simultaneous regressions of the impact of colonial exports of raw material to France on the quality of institutions, and that of the quality of institutions on GDP. Also, it generates the partial effect of French imports on GDP which is mediated by the channel of institutions. Unlike any other model, PLS-SEM allows us to reveal the mediator effect of institutions of the impact of trade on GDP (Hair et al, 2011; Henseler et al., 2009).

Furthermore, this model allows comparing the results across different groups of colonies. It produces a multi-group analysis to check whether there are any significant differences among the coefficients of each colonial group. The multi-group analysis ensures the comparability among the groups by standardizing the variances across the groups in order to guarantee the validity of outcomes and conclusions (Hair et al., 2015; Lohmöller, 1989; Wold, 1982).

We will then be able to compare the effects of French imports on institutions and on GDP and that of institutions on GDP across different colonial groups. Our hypothesis becomes clear: if French imports of primary products from their colonies are associated with more extractive institutions, it would suggest that worse institutions in French colonies are correlated with trade extraction.<sup>8</sup> Indeed, according to Grier (1999), Bretocchi and Canova (2002), French colonies rich in primary products were to become less fortunate in the future because they attracted more extractive institutions and were subject to greater exploitation. As for the other colonial groups, a positive relation between French imports and colonial institutions could suggest that, trade with France was generating gains to either local merchants or to the domestic colonizer encouraging them to establish better institutions in order to facilitate such trade, or that non-French colonies with better

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<sup>7</sup>Note that, since we are not concerned about the individual coefficients in generating our constructs, multicollinearity is not a problem in constructing our concepts. On the contrary, even if two variables are highly correlated, it is worth including both of them if each one contributes significantly to the predictive power of the model.

<sup>8</sup>It could be that either French colonizers set institutions in favor of extraction or that French colonies with worse institutions allowed for trade extraction.

institutions were freer to trade with France.

This paper contributes to the literature in various ways. First, we study the impact on the economic development of former colonies that simultaneously integrates institutional differences with differences in the natural resource endowments. To explain this phenomenon, we need to collect information about the natural resources, and about colonial institutions during the colonial period, and to understand the link between the two. Second, we constructed variables such as the quality of institutions, the level of human capital, the fertility of soil, the wealth in mineral resources that are not observed. More importantly, using the values of colonial exports of primary products and of manufactured goods to France, we were able to infer a measure of respectively the levels of French colonial extraction and of colonial specialization in production. This was achievable thanks to our original data set which includes information on the imports of France from all colonies, disaggregated into three sectors: agricultural raw material, raw material necessary for industry, and manufactured goods. Thirdly, we were able to generate the direct and indirect impacts of French imports of raw material and of manufactured goods on the level of economic performance simultaneously. The method explicitly divides both impacts and attributes the indirect effect to a mediator effect, namely, the quality of colonial and current institutions. Fourthly, the method allows us to conduct a comparative analysis among each colonial group of the differential impact of French imports on GDP through institutions. The model we use has the capacity to provide robust results even if the sample size of each colonial group is statistically small (the size of French colonial group is only twenty seven colonies).

There is some previous literature on the relation between the quality of institutions and the type of goods exported. Meon and Sekkat (2008) found that the quality of institutions has a positive impact on exports of manufactured goods, while it does not affect, or may even correlate negatively, with exports of non manufactured goods. Barro (1999) shows that oil extraction lowers democracy and Tsui (2011) unveils a positive relation between oil discoveries and autocracy. According to theory, the underlying problems of resource exploitation, trade and production activities are directly linked with the type of institutions embedded in the country and have to be considered altogether when studying the economic development of a country, since the extractive profit-seeking behavior could lead to an inefficient allocation of resources through time (Rungi, 2010). Nun and Treffer (2013), argue that the comparative advantage in manufactured goods in the 19th century in England

is highly related to institutions that promoted innovation and commercial enterprise.

Actually, the growth of trade may impact the domestic distribution of wealth and power. Those in hold of power, and benefiting from trade, drive institutional changes to either coercive or production biases. In the case of French colonies, French colonizers expropriated their land, exploited their labor at low wages, and charged high prices for their exports (Tadei, 2013). As noted by Ndulu and Oconnell (2007), a larger portion of Africa's economies are based on the extraction of natural resources than is the case of other regions in the world; one outcome is income inequality. European powers exploited the colonies' resources through trade and induced institutions to favor this type of extraction. Differences in agricultural policies in sub Saharan Africa are attributed to both changes in institutions and natural endowments (Bates and Block, 2010). They do so by influencing the politics of redistribution and revenue extraction particularly toward cash crops for exports. This assertion is not new to the literature and can be traced back to Hobson, Lenin and on down to Marxist thinkers, who regarded trade as the prime cause of imperialist expansion (Kleiman, 1976).

We have discussed the impacts of trade pattern and of natural resources abundance on institutions. There is a prominent literature, on its turn, relating institutions to economic growth (Acemoglu et al., 2001, 2002, 2005, 2011, 2014, and North, 1990). Besides this indirect effect on growth through institutions, trade patterns and natural resources abundance may be directly related to development. With respect to the aforementioned relation, a long strand of research identifies correlations between growth and exports patterns within an economy dating back to Chenery (1960) and Leamer (1984). Sachs and Warner (1995, 2001) and Easterly and Levine (2003) were among the first to formally explore the relation between resource abundance (as previously identified as exports in a particular sector) and economic growth. Using a cross-section of countries, they found that the relative size of primary exports, which they infer to be a measure of resource abundance, is negatively correlated to gross domestic product (GDP) growth.

We find, at the pooled sample level, that more colonial exports to France, of either primary or manufactured products, are correlated with better colonial institutions. Moreover, we find that colonial institutions are positively correlated to current institutions, and that better current institutions are correlated with better economic outcomes. French imports did not have a direct significant impact on economic performance. However, its impact through institutions was positive and signif-

icant.

Within the multi-group analysis, we find that, among French colonies, higher colonial exports of raw material to France is associated with worse colonial institutions, while higher colonial exports to France of manufactured goods does not affect the type of colonial institutions. Also in line with the findings of the second chapter, these results confirm our hypothesis that France set up extractive institutions to be able to extract more. Such impacts are significantly different from the impacts of trade on institutions in British and in other colonies. Among British colonies, there is no significant correlation between French imports and the British colonial institutions, whereas we find that higher French imports from former/other colonies are associated with better colonial institutions in those colonies. In all cases, the channel of institutions through which French imports affect current economic performance is significant.

Finally, among the pooled and the colonial group sample, both the indirect effect of colonial institutions and the direct effect of current institutions on GDP per capita are positive and significant, meaning that institutions persisted over time and have a positive impact on economic growth. Moreover we quantified the indirect effect of colonial institutions on economic performance through the channel of current institutions. While using an econometric technique different from the traditional OLS, our results are still in line with results found in the literature regarding the relation between institutions and growth (Acemoglu et al., 2001).

This paper is organized as follows: Section 2 presents an overview of the literature and the main hypotheses. Section 3 proposes a new model and the measurement of the variables, section 4 the empirical setup, the core results, and the multi-group results. Section 5 provides a discussion of the findings and the last section concludes.

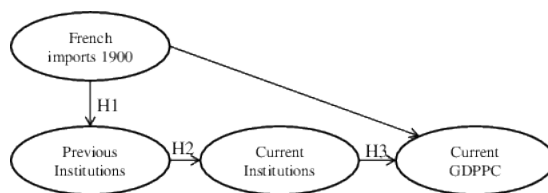


Figure 3.1: Motivation Scheme

## 3.2 Literature and research hypothesis

Both the economics and the history literatures suggest that there is an association between international trade and domestic institutions. The specialization of country in international trade, plays a key role in whether its domestic institutions are growth enhancing or growth retarding (Acemoglu et al., 2005; Meon and Sekkat, 2008; Nunn and Trefler, 2013). In particular, our first hypothesis H1 in Figure 3.2 checks whether the types of goods the colonies exported to France are associated with the type of colonial institutions set in these settlements. For instance, among the west African French colonies, French colonizers were attracted by an environment favorable for the cultivation of some crops with potential profits generated through trade of such cultivation. They implemented coercive institutions and monopsonies reducing the prices of colonial exports of raw material to African producers by about 25%, and hence the African gains from trade by over one-half (Tadei, 2013). A notable example of coercive labor institutions is the cotton price paid to Ubangi-Shari farmers which was 15% of the price of cotton in New York, and the cotton quotas established by Felix Eboué in Ubangi-Shari and Chad between 1924 and 1927 in which "every village had to produce amounts of cotton in proportion to its population and sell it to one of four trading companies with monopsony power" (DeDampierre, 1960). Also, within colonies suited for sugar cane, trade movements induced coercive institutions in favour of French low-cost imports, especially in agricultural goods (Lavallée Lochard, 2012; Dippel et al., 2015). For instance, European trading companies bought African crops that African laborers were forced to collect - in order to sell them at higher prices in Europe (Tadei, 2013).

As such, given the variety of environments, commodities and abundance of resources, economic activity, trade and institutions were structured in different ways (Busse and Groning, 2010). In other terms, the quality of land and the appropriability conditions of natural resources determine the relevant type of institutions that maximize the rent extraction from those resources (Bertoni and Willebald, 2015). British possessions for instance which specialized less in primary production and more in industrial production faced higher per capita income levels than other colonies who focused more on primary production. Moreover, Great Britain who exported manufactured goods to the rest of the world, enriched her middle class merchants who contributed to growth enhancing improvements and better-performing institutions. Also, during the commercial revolution in Venice,

trade enriched a broad range of merchants who later pushed for the constraints on the executive and establishment of parliament in 1172. However, a small elite of those merchants later emerged and became extremely rich in 1300's. They rebuilt coercive states in order to suppress opposition (Puga and Trefler, 2012). The Americas on the other hand, specialized in the production of raw commodities (sugar, cotton, tobacco), and silver mining, which enriched the elite who used their power to exert even more coercive institutions on workers, depriving them from any public good (Inikori, 2003). Within Africa, for instance, the trade of slaves deteriorated domestic institutions. Those patterns are in large part explained by the initial patterns of exports of the country in question. Institutional responses to trade thus depend on initial comparative advantage (Nunn and Trefler, 2013).

More generally, Acemoglu et al. (2011) assert that the inelastic demand for resources have created an incentive for resource-scarce countries to invade the resource rich country in order to appropriate the resource. The distinguishing feature of such practice was to concentrate the power in the hands of the elite who used it to oppress the population and induce forced labor (Acemoglu et al, 2002, 2011). Examples of Europeans' extraction are the transfer of gold and silver from Latin America in the 17th and 18th centuries and of natural resources from Africa in the 19th and 20th centuries, the Atlantic slave trade, the plantation agriculture in the Caribbean, Brazil and French Indochina, and the rule of the Dutch East India Company in Indonesia. In a related work, Dippel et al. (2015) find that a higher price of sugar is associated with stronger elite and hence higher levels of coercion in British colonies with sugar plantations.

Moreover, Caselli et al. (2013) state that war between pairs of countries is more likely when at least one country has natural resources. Engerman and Sokoloff (1997) attribute the inequality in colonial regions to those European elites that "shielded" themselves from competition by setting growth retarding institutions such as abusive labor rights, under-provision of education and of any other public good. Westing (1998) argues that all colonial conquests by European powers were driven by the necessity to find new supply channels for production and trade. By the mid-1800s, during the industrialization boom, colonial powers were relying on their natural resources from their overseas possessions as the increased production of manufacturing goods relied upon a consistent endowment of raw material necessary for industry, such as coal and iron. The disposal of such materials employed in the mass production of manufacturing goods was strategic for the industri-

alization of European continental countries and, since they were not available at home, colonial territories supplied useful stocks to be exploited. Europe imported commodities from colonies to specialize in manufacturing products (Rungi, 2010).

On a somewhat different perspective, North (1990), Barro (1999) and Rodrik (1999) relate the evolution and enforcement of property rights to trade whatever the characteristics of the traded goods are. In particular, trade of raw agricultural material of non-French colonies with France is not necessarily an extractive type of trade. A colony's tendency to export to a different empire might be driven by comparative advantages favoring such trade. It means that, for instance French imports from British colonies may not reflect extraction from those colonies but exploiting their comparative advantage instead. Also, even within an extractive environment, growth can still be achieved. As Arroyo Abad, and van Zanden (2014) claim, the heavy reliance of Spanish colonial enterprise on the mining sector attracted new settlements to the mining centers. This was considered an engine of growth. However such growth was not sustainable due to the presence of extractive institutions. Hence, one aspect distinguishing various types of dependencies is whether colonies trading outside their colonial empire are associated with better colonial institutions in those colonies. Such distinction can be made through our empirical model. For example, if exports of British colonies to France are associated with better institutions in those colonies, this would indicate that such trade was beneficial to those colonies or to the British colonizer, from which the incentive for the latter to develop business driven institutions to enhance such trade.

Our second hypothesis, H2 in Figure 3.2, stands that early institutions are slow-moving in time and hence are correlated to current ones. Finally, the third hypothesis states that the quality of those current institutions affect the former colonies' current economic performance. In fact, H2 and H3 are not new to the literature and focus on the role of political, economic, and social institutions, their persistence over time, and their influence on economic outcomes. Most prominent work is the one by Engerman and Sokoloff (1997), Acemoglu et al. (2001, 2002), Nunn (2008), Dell (2012), Arroyo Abad and Van Zanden (2014), Glaeser et al. (2004). Those authors emphasize the negative impact conveyed by extractive colonial institutions on colonies' relative economic performance. Differences in development can be attributed to the institutional matrix that produces a set of organizations, rights and privileges; the stability of the structure of exchange relationships in political and economic markets; and to a State that provides (or does not provide) a set of political rules

and promotes the enforcement of rights (Bertoni and Willebald, 2015). This is denoted as the “path dependence” where the origin of the development is traced back to the colonial period.

There is, however, not much literature about differences across colonies’ economic development linking differences in colonial exports to differences in institutional quality. Actually, the relation between exports and growth is not homogeneous across countries due to the fact that several channels mediate in the impact of exports on growth. Such channels could be the rentier effect, the dutch disease, expenditure effect, among others (Oyinlola et al., 2015). A prominent channel is the one of institutions. That is precisely what we do in this paper: we investigate the effect of exports of natural and agricultural resources and of manufactured products on growth, mediated by institutions as part of the debate about the “curse” (or the “blessing”) of abundant natural resources. Actually, while exporting primary products does not necessarily lead to low growth rates in the colonies, exporting manufactured products does not mean either that their level of economic performance will be high. Some economies have exploited their comparative advantage in primary production without increasing their industrial production and they still achieved high levels of economic performance. Nevertheless, Hausmann and Rigobon (2003) point out that economies with diversified exports are less likely to suffer negative effects of natural resource wealth.

Carmignani and Chowdhury (2007) argue that, although resource dependence is not necessarily a curse, it may still be detrimental to growth due to poor existing institutional quality. As the argument goes, the degree of specialization in primary products could retard growth, but, as institutions improve, resources turn from curse into a blessing. Sala-i-Martin and Subramanian (2003), while limiting their scope to Nigeria, considered both the direct and indirect effects (through institutions) of resource abundance on growth. The direct effect refutes the resource curse hypothesis, while, through the indirect effect, resource abundance retards growth through institutional quality. Arezki and Van der Ploeg (2007) confirm the resource curse hypothesis for countries that have poor institutions. Hence, the “curse” is conditional upon the existence of weak institutional arrangements in terms of the definition of property rights, contract enforcement, the rule of law and the perpetuation of a reduced elite in government.

Brunnschweiler (2008) empirically tested the hypothesis and found that, individually, resources (particularly mineral resources) matter for growth, and this result is confirmed when they consider the role of institutional quality. As Terra and Vasconcelos (2010) highlight, trade openness may



have opposing impacts on growth rates, depending on the country's institutional environment. Dell (2010) also examined the long-term impact of Spanish forced labor system in silver mining in Bolivia. She contends that this system is negatively correlated with today's consumption, education and public good provision. Gylfason (2001) empirically find that resource-abundance and international specialization in extractive sectors tends to crowd out national capital (whether financial or human), thereby impeding economic growth.

Hence, countries that depend heavily on the exports of their natural resources tend to have more corruption, less equality, less political liberty, less education, less domestic investment and less financial depth than other nations that are less well endowed with natural resources. Whereas economies that specialize in manufacturing production tend to develop more research and development as well as processes of learning by doing which have a positive spillover of human capital (Van der Ploeg, 2011). Mehlum, Moene and Torvik (2006) argue that, even if the abundance of natural resources deteriorates institutions due to rent-seeking activity, it is also true that it is thanks to the quality of institutions that the equilibrium between a pure rent-seeking (grabbing) activity and an entrepreneurial (efficient) activity is set. If, on the one hand some citizens may take rents out from natural resources and abandon more productive activities, on the other hand rent appropriation and production can become complementary to each other, so that producers continue to operate efficiently even if they can partially enjoy some rents deriving from natural resources. Natural resource abundance does therefore hinder economic growth in countries with grabber friendly institutions, but does not in countries with producer friendly institutions. Such institutions offer more scope for resource rent extraction.

Hypotheses one, two and three emphasize the indirect impact on growth of colonial exports to France. As an additional control, we also account for the direct impact of colonial exports to France on GDP. in order to check whether those exports have a significant effect on growth in those countries not captured by institutions. Actually, Sachs and Warner (1995) found evidence for a negative relationship between economic growth and resource abundance over the period 1970–1990 without any prominent role to the quality of institutions in explaining the resource curse hypothesis. Also, according to Acemoglu et al. (2005), growth in Western Europe from 16th till 18th century is attributed to the Atlantic trade. Also Naritomi, Soares and Assuncao (2012), registered a high correlation between colonial plantation of sugar in Brazil and higher inequality today.

Finally, we believe that European settlements might have also impacted the different sets of colonial institutions—as interpreted by Acemoglu et al. (2001) and Crosby (1986). They state that the colonization strategy was subject to the viability of settlements. When European settlers faced favorable climate and soil, they felt encouraged to stay and introduced productivity-enhancing institutions which promoted private property, and checks against government power. Meanwhile, when a settlement was not viable due to unfavorable bio-geographic conditions, they established extractive institutions. Engerman and Sokoloff (1997) assert that, when Europeans faced natural resources with potential profits but did not find the environment suitable for settlement, they wouldn't settle but create instead authoritarian political institutions to extract and exploit natural resources. Hence in a separate model, we test our initial hypothesis H1 while controlling for European settlements' impact on colonial institutions. Our model and hypotheses can be illustrated in Figure 3.2 below:

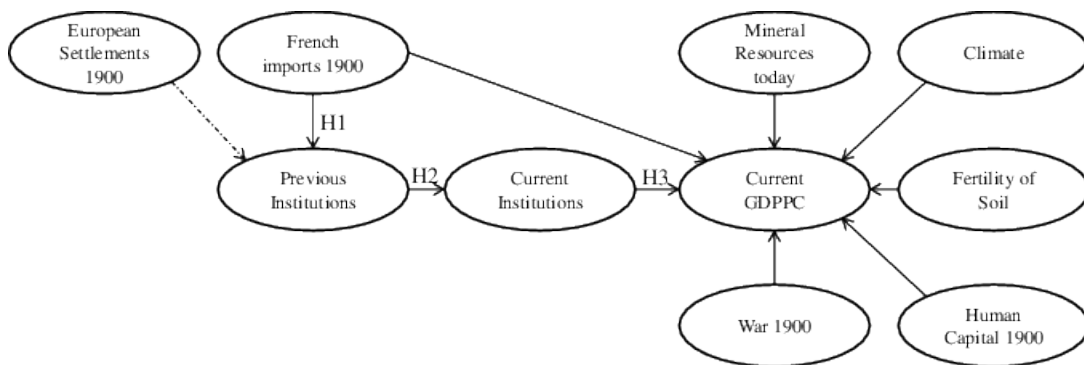


Figure 3.2: Model and Hypotheses

### 3.3 Proposed Model and Variables

To test our hypotheses, we employ the Partial least square structural equation modeling (hereafter PLS-SEM). PLS-SEM is a particular form of structural equation modeling SEM, originally developed by the econometrician Herman Wold (1966). The initial SEM includes a number of statistical methodologies aiming at estimating a simultaneous network of relations defined according to an apriori theoretical model linking latent concepts, each measured through a number of observable indicators (Vinzi et al., 2010a). Its advantage over previous models, such as PCA, factor analysis or multiple regression, is its ability to combine them together: predicting the latent variables through multiple linear combinations of their indicators while taking into account errors due to mul-

ticollinearity among the predictors, and empirically testing the theoretical assumptions between the latent constructs. Actually, prior to SEM, simultaneous causal relations were difficult to incorporate into a single economic model. A second advantage is its flexibility in the interplay between data and theory. When the theory is strong, one can rely more on it while analyzing the data. Alternatively, when the data is rich but the theory is under testing, the data, since its construction, measurement, and results are empirically validated under PLS-SEM, can have a stronger say (Chin, 1998). The Partial least squares approach to SEM (PLS-SEM) has been proposed with a slightly different algorithm than the initial co-variance based SEM. Its main advantage is that it separately generates the estimated observations for each latent construct and then, in a next step, estimates the coefficients of the structural model between those generated blocks of variables (Wold, 1975; Lohmoller, 1989; Tenenhaus, 2008). Such approach of SEM has many advantages over the initial one which are particularly relevant to our paper.

Firstly, let us briefly define the uses of SEM and its relevance to our model. In its initial form, the structural equation modeling is a set of data where a certain number of variables form a block that can be summarized by a single unobserved concept, and that linear relations exist between those concepts. Whenever researchers deal with relations between constructs such as satisfaction, role ambiguity, or attitude, SEM is likely to be the methodology of choice (Rigdon, 1998). Similarly such method perfectly fits in our model since we are dealing with concepts such as quality of institutions, level of human capital, fertility of soil, availability of mineral resources. In particular, we can generate a measure for the quality of institutions through a number of observed indicators such as rule of law, control for corruption, voice and accountability. There are two ways to connect the observable variables in a block to their latent variable: either formative or reflective way. In the reflective model, the indicators are highly correlated among each other, and together, they reflect the feature of the concept. In the formative model, each manifest variable represents a different dimension of the underlying concept. Therefore, unlike the reflective model, the formative model does not assume homogeneity nor unidimensionality of the block. These indicators need not to co-vary: changes in one indicator do not imply changes in the others and internal consistency is no more an issue (Vinzi et al., 2010a).

Moreover, since our model requires a method that is designed to test multiple simultaneous equations in which latent variables may influence one another reciprocally, SEM is the right fit.

Firstly, it allows for a great flexibility on how the equations are specified, due to its graphical language (McArdle 1980; McArdle and McDonald 1984). In particular, the method simultaneously depicts how one dependent construct, while being caused by an independent set of other constructs, can simultaneously predict another dependent construct as is the case of our variables colonial institutions and current institutions in Figure 3.2. In this case, SEM is a powerful method for tracing the direct effect of French imports on colonial institutions, and its indirect effects on both current institutions and GDP per capita while dealing with multicollinearity (Reisigner and Tuner, 1999).

The Variance-based SEM such as the PLS-SEM is another option for co-variance based SEM, with mostly similar features (Lohmoller 1989; Wold 1982). However, when CB-SEM assumptions cannot be met, or the research objective is prediction rather than confirmation of structural relationships, then variance-based PLS-SEM is the preferred method (Hair et al., 2011). Given the greater popularity of CB-SEM, the use of PLS-SEM often requires additional discussion to explain the rationale behind the decision (Chin, 2010).<sup>9</sup> Its primary objective is to maximize explained variance in the dependent constructs but additionally to evaluate the data quality on the basis of measurement model characteristics. Given PLS-SEM's ability to work efficiently with a much wider range of sample sizes and increased model complexity, and its less restrictive assumptions about the data, it can address a broader range of problems than CB-SEM. Moreover, because the construction of the latent variables requires less restrictive properties under PLS-SEM, a construct with only one indicator (i.e. our dependent variable per capita income is constructed using the observed variable GDP per capita) (Hair et al., 2011).

Indeed, such option is particularly relevant to our model because unlike SEM, PLS-SEM does not require multivariate normality of data or minimum sample size ( $n > 200$ ) (Diamantopoulos and Siguaw, 2000) to provide consistent estimation results. Actually, our cross section pooled sample contains only 98 observations (colonies) which are collected from primary sources not necessarily normally distributed. Moreover, since PLS-SEM's estimation procedure solves one block (or construct) at a time, it is capable of dealing with formative as well as reflective indicators within one

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<sup>9</sup>Note that the popularity as well as the frequent application across different disciplines of PLS-SEM has also grown, given the the plethora of recent developments and discussions (e.g., Henseler et al. 2014; Hwang et al. 2010; Lu et al. 2011; Rigdon 2014; Tenenhaus and Tenenhaus 2011; Hair et al. 2011; Lee et al. 2011; Peng and Lai 2012; Ringle et al. 2012). PLS-SEM has been increasingly applied in marketing and other business disciplines (e.g., Henseler, Ringle, and Sinkovics 2009), with more than 100 published studies featuring PLS-SEM in the top 20 marketing journals (for the marketing journal ranking, see Hult, Reimann, and Schilke 2009).

structural equation model, a property not fulfilled in the CB-SEM (Gots et al., 2010). Such feature is important to testing our model since one of our constructs is formative. Finally, being a mixture of apriori knowledge, intuition, and of data analysis, the model allows the author to freely specify his constructs or latent variables (hereafter LV), compile a number of indicators for each LV, and to design the structural relations among them (Wold, 1985). The model then, takes care of statistically validating those links without any ex-ante theoretical framework (Chin, 1998). Another important advantage of PLS-SEM modeling technique is the ability to test the same model across different groups or sub-samples (for instance, testing the structural relations within each colonial group) and to check for significant similarities or differences in estimates among groups. Such technique is known as as multi-group analysis (Vinzi et al., 2010b).

PLS-SEM is accomplished using a two-step process that starts with an iterative estimation of the latent variable scores. After the weights converge and latent variable scores are estimated, the second step is to obtain the parameters of the structural model by using ordinary least square between the generated latent variables (Assaker et al., 2012). Refer to Vinzi et al (2010b) for a detailed description of how the weights of latent variables are constructed.

### **3.3.1 Measures of latent variables**

The basic approach behind PLS-PM modeling is to first construct a measure for the latent or un-observed variables using one or several observed variables. Those measures are related to their observed predictors in the forms of linear compounds, "by means of a sequence of alternating least squares algorithms, each time solving a local, linear problem, with the aim to extract the predictive information" in those observed variables capable of defining the new latent variable (Vinzi et al, 2010). Once the latent variables are constructed in a first step, under what we call the measurement model, we estimate, in a second step, the OLS coefficients of the simultaneous equations relating the latent variables under what we call the structural model.

Firstly, how are those latent variables constructed? Previous studies developed various sets of criteria in determining how a latent variable should be constructed [Nunnally, 1978; Jarvis et al., 2003] from (Assaker et al., 2012). The most common practice in specifying our constructs is based on the classical theory of SEM. Such method assumes that the observed or the manifest variables (hereafter MV) are highly correlated among each other, and that each manifest variable is related

to its corresponding LV by a simple regression. We say that each MV reflects their corresponding LV - such approach is called the reflective measure. Each block of manifest variables should be unidimensional in the meaning of factor analysis, that is each block of MV's should constitute one component and not more. Cronbach's alpha is one indicator that is intended to evaluate how well a block of indicators measures well the corresponding construct. It does so by estimating the reliability of the measure through internal consistency (Guinot et al., 2001), as we will further develop in the next section. On the other hand, we have the formative measure, where each manifest variable represents a different dimension of the underlying concept. All our constructs, except for one, are measured through the reflective way, as summarized below.

*French Imports of primary production/ or of manufactured production*

In order to test hypothesis one from Figure 3.2, we constructed two measures for French imports to be used in two separate models: The French imports of primary production and the French imports of manufactured goods. These variables were constructed from French sectoral trade from "Tableau Général du commerce de la France" and the "Tableau décennal du commerce de la France". Our data extends from 1880 to 1913 and contains the following sectors: agricultural raw material; raw material necessary for industry; and manufactured products for a total of 98 colonies, including 27 French colonies, 37 British colonies, 36 other colonies and former colonies.<sup>10</sup> Figure 3.3 shows the world map containing all the countries included in our sample and how they were divided across the colonial powers. The data were then averaged for cross section analysis.

French imports of manufactured goods, which correspond to the colonial exports of manufactured goods to France, is directly observed through our data set. Hence, it does not need to be constructed from a set of other indicators.

As for French imports of primary production, we construct it using our observed data of French imports of raw agricultural material (constituted of, among others, wheat, sugar, fruits), and of French imports of raw material necessary for industry (constituted of, among others gold, cobalt,

<sup>10</sup>French colonies: Algeria, Benin, Burkina Fasso, Cambodia, Central African Republic, Chad, Congo, French Guiana, French Polynesia, Gabon, Guadeloupe, Guinea, Ivory Coast, Laos, Madagascar, Mali, Martinique, Mauritania, New Caledonia, Vanuatu, Niger, Reunion, St Pierre and Miquelon, Senegal, Vietnam, Morocco, and Tunisia. British colonies: Antigua and Barbuda, Australia, Bahamas, Bangladesh, Barbados, Botswana, Virgin Islands, Cyprus, Dominica, Fiji, Gambia, Ghana, Gibraltar, Grenada, Guyana, Jamaica, Kenya, Malawi, Malta, Mauritius, Myanmar, New Zealand, Nigeria, Pakistan, Saint Lucia, Sierra Leone, Solomon Islands, Somalia, South Africa, Sudan, Tanzania, Trinidad and Tobago, Uganda, Zambia, Zimbabwe, Egypt, and India. Other colonies: Angola, Aruba, Cameroon, Cuba, DR Congo, Equatorial Guinea, Guinea Bissau, Indonesia, Mozambique, Namibia, Philippines, Puerto Rico, Sao Tome and Principe, Suriname, Togo, Virgin Islands (US), and Western Sahara. Former colonies: Argentina, Bolivia, Brazil, Canada, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, Guatemala, Haiti, Honduras, Mexico, Peru, USA, Uruguay, and Venezuela

phosphate, iron, wood, and wool). In particular, these measures partially reflect colonies' abundance in their main natural resources.<sup>11</sup> Actually, according to Greiner and Semmler (2008) natural resources can take the form of energy or other materials (raw materials, minerals) that are essential for production processes and exporting those products shows that a country is abundant in them.

Tables 3.1 validates the composite reliability of the constructed block at the sample level. Actually, the two variables used to measure French imports of primary production reflect well on their latent variable. The factor analysis reveals that they both represent one single factor, with sample factor loadings exceeding 0.85 and with an eigenvalue or the amount of variance explained by this factor equal to 1.5 (out of two indicators).

As emphasized earlier, hypothesis one states that the type of goods the colonies export is associated with the type of institutions the colonizer set in those colonies. Specialization in manufactures are likely to lead to the creation of business enhancing institutions, whereas the specialization in raw material is more prone to the creation of coercive institutions. The main advantage of our data is its dis-aggregation into sectors, which allows us to compare, on the one hand, how colonial exports of primary production affected colonial institutions, the "resource curse nexus", to, on the other hand, how colonial exports of manufactured products affected those same institutions.

#### *Colonial institutions*

The variable is constructed from two main institutional indicators widely used in the economic history literature and for which information is available in 1900: Constraint on Executive and Democracy. Constraint on executive is a seven-point scale ranging from 1 to 7, with a higher score indicating more constraints. A score of 1 indicates unlimited authority to the governor, 3 indicates slight to moderate limitations by other institutional corps, 5 indicates substantial limitations, and 7 indicates executive parity or subordination. Scores of 2, 4, and 6 indicate intermediate values. A higher score refers to a better quality of institutions. Data are gathered from Acemoglu et al. (2001), and was completed from the polity III data set for the missing values. Democracy is measured as an index ranging from 0 to 10, gathered also from Acemoglu et al. (2001). A higher score indicates more democracy points from three dimensions: competitiveness of political participation (from 1 to 3 points); competitiveness of executive recruitment (from 1 to 2 points, with a bonus of 1 point if

<sup>11</sup>In the case of French colonies, such measure not only partially but fully reflects those colonies' abundance in natural resources since French colonies' share of exports of raw material to France account for more than 80% of their total exports of raw material.

there is an election); and constraints on chief executive (from 1 to 4 points). Both indicators reflect the quality of colonial institutions. In particular, we recall that during French colonization, in at least some of the French colonies, the constraint on administrators was very low, leading governors to be brutal towards the indigenous population and implementing even more coercive institutions (Cohen, 1971). Table 3.1 shows that both constraint on executive and democracy loaded onto one single factor with loadings exceeding 0.9. The eigenvalue of the first factor equals 1.75 providing evidence of the unidimensionality of the scale.

#### *Institutions in 2005*

A number of indices have been proposed to measure the quality of institutions. The most common baseline measures, however, rely on six indicators from Kaufmann, Kraay and Mastruzzi (2011). gathered from 31 various sources and surveys reporting the perception of governance. We picked the three mostly used indicators to construct our variable: 1) Rule of law which reflects the extent to which agents have confidence and abide by rules of society, such as property rights, contract enforcement, 2) control for corruption, which reflects the extent to which public authority is used for private interest, and, finally, 3) voice and accountability, which represents the effectiveness of democratic system. The three indicators are measures on a scale from -2.5 (weak institutions) to 2.5 (strong). We developed a measurement scale for the quality of institutions in 2005 that combines the three indicators all together. Results from Table 3.1 show unidimensionality (1st eigenvalue equals to 2.9 out of 3 indicators), and factor loadings exceed 0.9 for each item. .

#### *Human capital in 1900*

As an additional variable affecting GDP, we control for human capital in 1900. As Acemoglu et al. (2014) and Rocha et al. (2015) argue, initial education of colonizers in the colonies persisted through time and led, in the long-run, to higher income per capita. We collected two sources of potential exogenous variation in human capital in 1900. The first variable is the estimated percent of the population evangelized by Christian missions by the year 1900 from Woodberry (2004, 2012). It is known that Christian missionaries played an important role in the development of educational system in the former colonies. Our second indicator is primary enrollment rates in 1900 relative to the population aged between 6 and 14. Our data come from Acemoglu, Gallego and Robinson (2014) and is complemented from Benavot and Riddle (1988) and Gallego (2010). The factor analysis shows that both indicators load in a single factor with loadings in excess of 0.87 each. The



eigenvalue of the first factor is equal to 1.45.

#### *Mineral resources today*

The variable we construct measures the reserves of mineral resources in a country today. It contains four indicators: the percentage of world gold, iron, zinc and silver reserves today. The data is retrieved from Acemoglu et al.(2001, 2002) and complemented from Parker (1997) for missing data. We additionally controlled for reserves of mineral resources today because of its well-known effect on a country levels of income. Alexeev and Conrad (2009) show that an abundance of oil and mineral resources is associated with higher income per capita. Results from Table 3.1 show unidimensionality of our block.

#### *Temperature and Humidity*

It is known from Sachs et al. (2001), that climate variables explain differences in income per capita. We control for temperature and humidity as best reflecting climate. For each construct, we assigned a set of indicators to reflect the variation in it. Regarding temperature, we assigned average temperature, minimum monthly high, maximum monthly high, minimum monthly low, and maximum monthly low, all in centigrade. As for humidity, three indicators represent average, morning and afternoon temperature in percent. This data was also collected from Acemoglu et al. (2001, 2002) and complemented from Parker (1997) for missing data. The indicators load into one single factor and are uni-dimensional as the value of eigenvalues show.

#### *Fertility of soil*

The fertility of soil reflects upon measures of soil quality/climate. Also fertility of soil may influence the performance of a country. Three indicators were used to form our construct, steppe (semi arid climate with low latitude), desert (desertic climate) , dry steppe (semi arid climate with dry weather). Since each indicator reflect a different feature of our construct and the correlation among them is low, they tend to form the construct instead of reflecting on it, hence we use the formative way in order to construct the fertility of soil. Recall that the formative model does not assume unidimensionality of the block. A change in one indicator does not imply changes in the others.

The remainder of the variables in the model are observed from the data set, hence they do not need to be constructed. Our main dependent variable, GDP per capita in 2005, is collected from Maddison (2006) and World Bank indicators. Two other variables used in our model are European

settlement in 1900 (the percentage of the population that was European or of European descent in the year 1900) and war during colonial period (an index from 0 to 1 averaging the number of years country  $i$  was at war during our sample period). Both variables were gathered from El Kallab and Terra (2014).

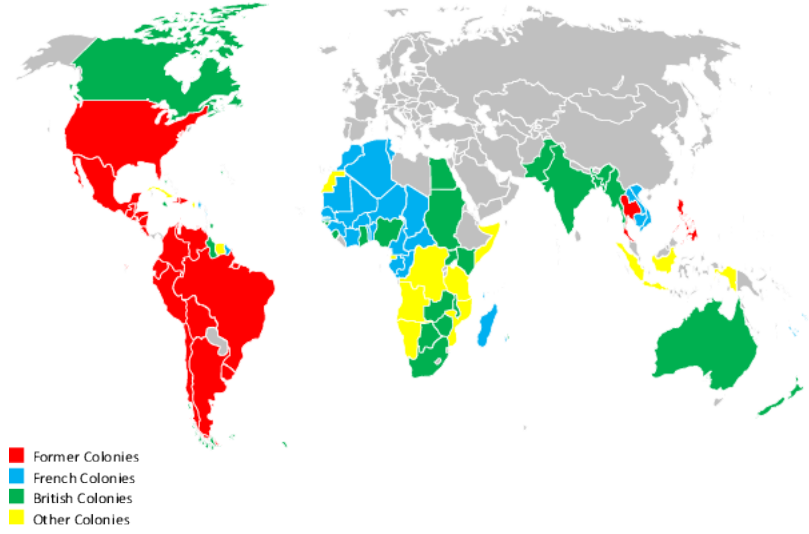


Figure 3.3: The trading partners of France per colonial groups

### 3.4 Empirical Setup

After defining our latent variables, we now turn to assess the structural path model estimates between those latent variables. Mathematically, our hypotheses can be expressed under the following system of simultaneous equations:

$$PInst_i = \beta_0 + \beta_1 FrImp_i + \beta_2 ES_i + \zeta_{Pinst} \quad (3.1)$$

$$CInst_i = \alpha_0 + \alpha_1 PInst_i + \mu_{Cinst} \quad (3.2)$$

$$GDPPC_i = \lambda_0 + \lambda_1 CInst_i + \lambda_2 FrImp_{is} + \lambda X_i + \varepsilon \quad (3.3)$$

Equation (3.1), which reflects upon hypothesis one, describes the relation between colonial French imports of primary production and of manufactured goods  $FrImp_i$ , and colonial institutions  $PInst_i$  in 1900, where  $i$  is the country. Equation (3.1) is run separately for each of the two sectors above.  $\zeta_{Pinst}$  is the error term. Since we believe, as argued earlier, that settlements are also likely to affect the type of institutions introduced by the colonizers (Acemoglu et al., 2001), we run this equation twice: once controlling for European settlements  $ES_i$  in 1900, and once without this additional control.

Equation (3.2), on its turn, describes the relation between colonial,  $PInst_i$ , and current institutions,  $CInst_i$  (in 2005). A positive correlation confirms the persistence of institutions over time.  $\mu_R$  is the error term. Our structural equation model allows us to generate the indirect effect exerted by French imports and by European settlements on current institutions through colonial institutions  $PInst_i$ , i.e.  $\beta_1\alpha_1$  and  $\beta_2\alpha_1$ .

Our last equation 3.3 captures the ordinary Least squares regression on per capita income  $GDPPC_i$ , of current institutions  $CInst_i$ , colonial French Imports  $FrImp_{is}$ , and of a vector of covariates  $X_i$ .  $\varepsilon$  is the error term. The main three coefficients of interest which test our three hypotheses are  $\beta_1$ ,  $\alpha_1$ , and  $\lambda_1$ . With those coefficients we can also obtain  $\beta_1\alpha_1$ , reflecting the indirect effect of colonial French imports on current institutions through the channel of colonial institutions, as well as  $\beta_1\alpha_1\lambda_1$ , reflecting the indirect effect of colonial French imports on income per capita today through both colonial and current institutions.

As additional control, we add human capital in 1900, since this variable might have influenced the long run development. Glaesser et al. (2004) (GLLS) argue that the rate of human capital accumulation developed during colonial periods disseminated slowly over generations, which impacts comparative economic development today. Actually, 19th-century school enrollment rates appear to have persisted to the present. Moreover, human capital that developed through missionaries activities may also have a direct impact on long run development by influencing the current religious composition of the population (Acemoglu, Gallego and Robinson, 2014). Jeffrey Sachs along with many other scientists dating back to Montesquieu have argued for a direct effect of geography and climate on economic performance. Geography is important because it is directly correlated to the availability of key natural resources, the fertility of soil, and to advantageous conditions for agriculture and technology. To the extent that geographic factors do not vary over time, countries that

were relatively rich in endowments and enjoy viable land should be relatively rich today. Climate is important because populations in temperate areas are associated with rapid advances in technologies compared to the development in the tropics (Sachs, 2001).

To control for those, we constructed a variety of geography-related variables, including fertility of soil, availability of mineral resources today, temperature and humidity. We also control for war factor, an index from 0 to 1 averaging the number of years country  $i$  was at war during our sample period. We control for this variable since we believe that war hinders or to a lesser extent slows down growth. Since our variables are measured at different scales, the latent variables scores were standardized.

### **3.4.1 The Measurement Model**

In a first step, the assessment of the measurement model is relevant in order to validate the estimates of the coefficients in the second step. In fact, if the construct is misspecified, its variance will be altered as well as its estimation, and the results will be either over-estimated or under-estimated, changing the structural path as well as their interpretation (Chin, 1998). We first analyze the quality of the reflective measurement model using both convergent and discriminant validity as well as the reliability of the latent variables. Convergent validity means that the measures of each construct that theoretically should be related to each other are, in fact, observed to be related to each other, whereas discriminant validity means that measures of a construct that theoretically should not be related to another construct are, in fact, observed to not be related to it.

Table 3.2 confirms the convergent validity of our reflective constructs (French imports of primary production, previous (colonial) institutions, current institutions, human capital, mineral resources, climate and temperature), given factor loadings (co-variance between manifest and latent variable) were around or above the 0.7 threshold for most of the indicators. As such, more than 50% of the variance in the observed variable could be explained by its underlying construct (Hulland, 1999). Furthermore, the bootstrap test shows high significance levels for all loadings (the bootstrap-based empirical 95% confidence interval does not include zero for all the reflective measures; see Table 3.2). This suggests that essentially all indicators significantly reflect on their underlying constructs.

In addition, the average variance explained (AVE) achieved values of 68%, 87%, 96%, 82%,

58%, 73% and 66% for the reflective constructs as shown in the last column from Table 3.2. AVE, originally proposed by Fornell and Larcker (1981), attempts to measure the amount of variance that a latent variable component captures from its own indicators relative to the amount due to measurement error. Since AVE exceeded the required 0.5 threshold, the constructs captured more than 50% of the indicators' variance. With respect to the reliability of the construct, Table 3.2 presents two indicators of the degree to which a set of items measure a single uni-dimensional latent construct, the Cronbach's alpha and the Dillon-Goldstein's rho.<sup>12</sup> Both measures were both robust and well above the 0.7 threshold (Nunnally and Bernstein, 1994), indicating high-scale reliability and further supporting the unidimensionality and reflective scheme of these factors.

The second and more detailed set of information we need to examine is how each item relates to each construct. Not only should each indicator be strongly related to the construct it attempts to reflect, but it should not have a stronger connection with another construct. Differently stated, the reflective indicator should load higher on its corresponding construct than on other constructs, otherwise, such a situation would imply that the indicator in question is unable to discriminate as to whether it belongs to the construct it was intended to measure or to another (i.e., a discriminant validity problem). Table 3.3 compares the loadings of each observed variable to its intended construct (i.e., loadings) and compares it to all other constructs (i.e., cross loadings). As Chin (1998) notes, going down a particular construct column, you should expect to see item loadings to be higher than the cross loadings. Specifically, we can say that each item loads higher on their own construct than on other constructs, and that all constructs share more variance with their measures than with other constructs.

With respect to discriminant validity the construct should be more strongly correlated with its own measures than with any other construct. Essentially, the argument is that if a specific construct is more correlated with another construct than with its own measures, there is the possibility that the two constructs share the same types of measures and are not conceptually distinct (Chin 1998b). To test for this, we compare the square root of the (AVE) with the correlations among constructs. This

<sup>12</sup> According to Chin (1998), Dillon-Goldstein's rho is considered to be a better indicator than Cronbach's alpha. Indeed, the latter assumes the so-called tau equivalence (or parallelity) of the manifest variables, i.e. each manifest variable is assumed to be equally important in defining the latent variable. Dillon-Goldstein's rho does not make this assumption as it is based on the results from the model (i.e. the loadings) rather than the correlations observed between the manifest variables in the data set. Cronbach's alpha actually provides a lower bound estimate of reliability.

square root should surpass the correlation coefficient of the construct with every other construct in the model. Indeed, this is the case in our outlined model as shown in Table 3.4.

Note that discriminant validity assessment has become a generally accepted prerequisite for analyzing relationships between latent variables (Henseler et al., 2015). The estimated strength of the relationships between the latent variables, can only be meaningfully interpreted if construct validity was established (Peter and Churchill 1986). Thereby, researchers ensure that the measurement models in their studies capture what they intend to measure (Campbell and Fiske 1959). We have focused on the reliability and validity of the measures used to represent our constructs. Ideally, the above provided an evaluation on how accurate and reliable the measures are and also their convergent and discriminant validity (Chin, 2010).

### 3.4.2 The structural equation model: Analysis of results

Table 3.5 reports the regressions for the simultaneous Equations (3.1), (3.2) and (3.3). The independent variable in Equation (3.1) is the French imports of primary production whereas table 3.6 reports the regressions for the same equations but with regards to French imports of manufactured goods. Both tables include the full sample of all colonies and present similar results in terms of significance, magnitude, and sign for most of the parameters.

The coefficients of Equation (3.1), as reported in column 1 of Tables 3.5 and 3.6, are 0.335 and 0.345, respectively. Both coefficients are statistically significant and high in magnitude. Higher colonial exports to France of either primary production or of manufactured goods are correlated with better colonial institutions in the colonies. Indeed, colonies with good institutions are also countries that tended to trade more with France. Results of Equation (1) support our first hypothesis that states that French imports from colonies have an impact on the type of institutions set by the colonizers in those colonies.

Results of Equation (2) in column 1 of Tables 3.5 and 3.6 suggest that the institutional structures set up in the colonies during the colonial era persisted, forming the basis of current institutions in those countries. Actually, the coefficient indicates that the increase of the quality of colonial institutions by one unit explains sixty percent of the increase in the quality of current institutions. A variety of historical evidence is in line our results. As Acemoglu and Verdier (1998) suggest, setting up good institutions, such as investing in human and physical capital and setting up rules and

property rights, is costly, so that it may not be profitable for the local elites to switch to extractive institutions after independence. They would rather invest in enforcing property rights. In contrast, whenever the local elites inherit extractive institutions, they may not want to bear the cost of introducing good institutions, but may instead benefit from the situation and keep on exploiting their population.

Additionally, the results of the second equation as presented in column 1 of Tables 3.5 and 3.6 show that such impact is partially attributed to colonial exports to France. In fact, colonial exports to France positively affected the quality of colonial institutions as identified in the first equation. This effect was partially transmitted to current day institutions. We find that a one unit increase in colonial exports to France of either primary production or of manufactured goods lead to an increase in the quality of current institutions by 0.2 units. Such impact is mediated by colonial institutions. The last regression in column 1 of Tables 3.5 and 3.6 reports results of Equation (3.3) which presents the impact of the quality of current institutions and of colonial French imports (of primary production and of manufactured goods) on per capita income, along with a variety of control variables. Results show that colonies with better institutions perform better in terms of income per capita (Kraay and Dollar, 2003). An increase of the quality of current institutions by one unit is associated with an increase in income per capita by almost 0.4. Results of PLS-PM provide evidence that almost 24% of such impact is attributed to colonial institutions in 1900's out of which 8% are attributed to colonial exports to France in 1900's. The coefficients of the indirect effects of both colonial institutions and of French imports on GDP are statistically significant. These results are suggestive of the long run joint role for both colonial French imports and colonial institutions on GDP, leaving a smaller independent role for improvements in institutional quality today.

Our findings are in line with some results from previous literature. De Medeiros and Dos Santos (2013) found that institutions can directly affect growth, or they can impact trade, which in turn affects growth. Once the authors separately quantify the link from institutions to trade, and that from trade to growth, the independent effect of institutions on growth is small. This suggests that part of what is often understood as trade's effect on growth can be attributed to institutional change (Keller and Shiue, 2013). In addition, Arezki and Van Der Ploeg (2007) confirmed the resource curse hypothesis for countries that are deficient in quality institutions, have low level of investment and are encumbered with restrictions. Komarulzaman and Alisjahbana (2006) revealed the existence

of resource curse at the national level in Indonesia mediated by institutions. The interaction of resource abundance confirms the hypothesis when institution is captured by investment ratio of GDP, resource abundance by oil and gas rent.

Moreover, Frankel and Romer (1999) highlight the importance of trade for growth in the long run. We test for the direct independent effect of colonial exports to France in 1900's on GDP in order to isolate the direct effect of trade on growth, from the previously deduced indirect effect. Results of Equation (3) in Table 3.5 do not suggest any significant impact of French imports of primary production in 1900's on income per capita today. However, the impact of French imports of manufactured goods on GDP is positive and significant (Table 3.6). Those results suggest that the French exploitation of the colonies' raw material only affects current standards of living through the institutional channel, whereas colonial exports of manufactured goods positively affect current economic performance. Such result is embedded in a larger body of literature that links increases in growth rates to exports, specialization in production, and endogenous technological progress (Frankel and Romer, 1999).

Income per capita seems to be insensitive to our geographic variables, but it is positively affected by the wealth of mineral resources today and the accumulation of human capital 100 years ago. The R-squared of the last regression in column 1 of Tables 3.5 and 3.6 are respectively 0.7 and 0.72.

The type of colonial institutions set by the colonizers is not only affected by the type of goods those colonizers could potentially import from the colonies, but it is also correlated to settlement decisions, as discussed by Acemoglu et al. (2001). We then control for European settlements in 1900 in Equation (3.1). While results of when controlling for European settlements, in column 2 of Tables 3.5 and 3.6 are similar to those without controlling for it, in column 1, there is a noteworthy difference between trade of primary and of manufactured goods. The coefficient of French imports of primary goods becomes insignificant once European settlements is controlled for, in Table 3.5. This result suggests that the positive impact of French imports of primary goods was actually capturing the impact of European settlements on institutions. For colonial exports of manufactured goods, however, its impact on institutions remains positive and significant, even after controlling for European settlements in 1900, as shown in Table 3.6. Specialization in manufactured goods still contributed to better colonial institutions.

Finally, the indirect effect of French imports on current institutions and on GDP per capita



becomes insignificant after accounting for the effect of European Settlements. Overall, the results of column 2 indicate that there is a high correlation between European settlements in 1900 and French imports in 1900. Such high multicollinearity is disturbing the individual effect of each on colonial institutions.

Indeed, evidence shows high correlation between settlement decisions in the colonies and potential trade (Betts, 1961; Dippel et al, 2015; Dollar and Kraay, 2003; Engerman and Sokoloff, 1997; and Lewis, 1983). Colonizers needed to actually settle in order to optimize the extraction of natural resources (El Kallab and Terra, 2015). We argue that initial European settlements were themselves not random, but based on the the bio-geographic conditions of the colony, in particular on the availability of natural resources that can be exploited. In fact, the extension of French possessions was reflected in the heterogeneity of their natural environment, including, from the coast towards the interior, tropical forests, savannahs, and arid-desert regions. For instance, the coastal forestry regions were suitable to produce bananas, coffee, cocoa, and rubber, while the drier interior areas were suitable for peanuts and cotton (Hopkins, 1973). Mitchener and Weidenmier (2008) further argue that, prior to the Industrial Revolution, colonial acquisitions were continuously sought by imperial powers to complement their growing economies, which ultimately affected colonial trade. This would generate different outcomes in terms of institutional quality, and later on economic performance.

For the above reasons, we regress Equation (3.1) using Partial least squares regression in order to solve the multicollinearity problem. Column 3 of Tables 3.5 and 3.6 reports the results of the Partial least squares regressions. Once we isolate the impact of European settlements from that of French imports, the effect of French imports of both raw material and of manufactured goods on colonial institutions becomes positive, significant and high in magnitude. Moreover, 13% of the impact of colonial institutions on current ones seems to be attributed to colonial exports to France of primary production while 26% of that impact is attributed to European settlements in 1900 in line with our findings in the previous chapter. Finally, 3% of institutional impact on GDP is due to colonial exports of raw material to France, with no contribution of European settlements on GDP in the long-run. The remaining regressions and variables, present similar results as in column 1 for both Tables.<sup>13</sup>

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<sup>13</sup>Bootstrap techniques of 5000 samples were conducted to ensure consistent standard errors.

### 3.4.3 Identification strategy

Although we tried to control for most factors affecting GDP, there are potentially many other omitted determinants of income differences across countries that are also correlated with institutions. Moreover the relationship between institutions and economic growth is not necessarily unidirectional. In particular, richer countries tend to develop better institutions (North, 1990; Acemoglu et al., 2001, 2014; Glaeser et al., 2004; Jones, 2013). To substantiate this endogeneity problem, we will employ a two-stage least square (2SLS) estimation method a la AJR (2001) for Equation (3.3), where we instrument for current institutions using log settler mortality in 1900 from AJR (2001). This instrument accounts for the institutional variation that we observe, but have no direct effect on performance. We adopt AJR argumentation in order to validate this exclusion restriction.

Our identification can be expressed as follows:

$$CInst_i = \delta_0 + \delta_1 LogMort_i + \delta X_i + \vartheta_R \quad (3.4)$$

where  $X$  is the vector of our explanatory variables as described previously in equation 3.3.

Panel A of table 7 reports the first stage results of our instrumental variable regression whereas panel B reports the 2SLS estimates of  $\lambda_1$  of equation 3.3. Panel C reports the corresponding ordinary least squared results where equation 3.3 is run alone. The first panel displays a strong negative relation between log settler mortality and current institutions. The 2SLS estimate of current institutions on income per capita is 1.51. Similarly to the results found in AJR (2001), this estimate is highly significant and it is in fact larger than the OLS estimates reported in Panel C. The authors argue that "measurement error in the institutions variables that creates attenuation bias is likely to be more important than reverse causality and omitted variables biases". Since we have similar sources of variables, their explanation is also valid in our case.

We note that our only reverse causality issue is for Equation between institutions and income per capita in Equation (3.3). It is true that extractive colonial institutions might have created extractive trade. However, such reverse causality between French imports and the type of colonial institutions does not affect our results. Our aim in Equation (3.1) is to investigate the correlation<sup>14</sup>

<sup>14</sup> A negative one within French colonies and a positive one within the other colonial groups.

between French imports and colonial institutions. Moreover, Equation (3.2) does not present any reverse causality issues as we have a time lag of 100 years between colonial and current institutions. Regarding the third equation, countries' bio-geographic, characteristics which are time invariant, are not affected by their income. Furthermore, French imports, human capital, and war variables are measured in 1900, hence we are sure that the relation with income in 2005 is unidirectional.

### 3.4.4 The multi-group analysis

After testing our hypotheses on the whole sample, we now investigate whether there are differences in the results across groups of colonies. We then test Equations (3.1), (3.2) and (3.3) across each group of colonies (group 1 = French colonies, group 2 = British Colonies, group 3 = Former and other colonies). Indeed, group comparisons or multigroup analysis, which is a statistical method incorporated into PLS-SEM, allows to test if pre-defined data groups have significant differences in their group-specific parameter estimates (e.g., outer weights, outer loadings and path coefficients) (Chin, 1998; Hair et al., 2011; Henseler et al., 2015). PLS-SEM is a better fit for group comparisons because, unlike the traditional CB-SEM that uses a global fit criterion (Chi-square difference test) to assess differences across the groups, PLS-SEM can compare the path coefficients among groups on a path by path basis, using multi-group t-test and permutation tests. This approach allows for the interpretation of the differences in the relationships among the constructs (i.e., estimates for equations 1, 2, and 3) across the three colonies/samples. The model applies specific tests to see if there is a difference for each parameter at a time, across the groups. Such technique is incorporated into XL-STAT versions 2011-2015 (Vinzi and Russolillo, 2013).

Both multi-group test and permutation test check for significant differences among group parameters. The multi-group test assumes normality of the data<sup>15</sup> and presumes that the standard errors of the path estimators in the groups are equal (Eberl, 2010). Permutation tests, on the other hand, use bootstrap sampling techniques to generate confidence intervals and p-values. It is argued that the latter often provides more accurate results than multi-group t-tests, especially in the case of normality violations and when the standard errors of the path estimators in the groups are dissimilar (Henseler and Fassott, 2010). Note that, if normality of data is slightly violated and if standard

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<sup>15</sup> After running normality test, we found that our data is normal.

errors of the path estimators are comparable<sup>16</sup>, both tests provide similar results and are considered to be complementary tests. Finally, in both tests, group comparisons were based on standardized estimations (standardized data).

As Tables 3.8 and 3.9 show, results from both tests revealed significant differences in the estimates of French imports of primary production and of manufactured goods in Equation (3.1) and in Equation (3.3) among the three groups of colonies—while the estimates of colonial institutions in Equation (2) and that of current institutions in Equation (3) show similar results among the three groups. In particular, French imports have different effects on colonial institutions and on per capita income depending on the colonial group, while previous institutions and current institutions had similar effects on respectively current institutions and on GDP across the three colonial groups.

Note that Equation (3) was reduced to smaller number of covariates due to lack of variation among some of the variables within each group (namely, geographic and climate variables were removed). This does not overturn our results because the estimates of those constructs were insignificant under the pooled sample. Moreover, after conducting several regressions, we found that, at the colonial group level, the regressions estimates were similar whether we controlled or not for European settlement, hence we decided to report the results including European settlements.

Table 3.8 reports the ordinary least squares regressions of Equations (1), (2) and (3) for the pooled sample as well as for French, British, and other colonies. Within the French colonies, more French imports of primary production are associated with worse quality of colonial institutions (column 2). This result is significantly different from the effect of French imports of primary production on the quality of colonial institutions among British and other colonies (Columns 3 and 4). Indeed, while French extraction of resources brought about by imports of primary products from French colonies is negatively correlated with the quality of colonial institutions, such impact is not significant among the British colonies while it is positively correlated with the quality of institutions in the other and former colonies. With regards to French imports of manufactured goods, only among other and former colonies such trade contributed to better colonial institutions, as reported in column 4 of Table 3.9.

Hypothesis 2 is true for all colonial groups: Better quality of colonial institutions is associated

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<sup>16</sup>In the current paper, running the PLS-SEM model across each group separately yielded similar standard errors for path coefficients.

with better quality of current institutions. This result is true for all groups in both Tables 3.8 and 3.9. However, within the French colonies, even though 22% of the variation in the quality of current institutions is traced back to colonial institutions, French imports of primary products in 1900 caused a reduction in institutional quality by 31%, as reported in column 2 of Table 3.8. Actually, since French imports of raw material had a negative impact on colonial institutions, this negative result was partially transmitted to current institutions.

Panel C of Tables 3.8 and 3.9 presents the results of Equation (3). The direct effect of colonial exports to France of both primary and industrial goods on GDP per capita today is only statistically significant among other and former colonies. Krugman (1987), argues that productivity of manufacturing is an increasing function of production itself. Moreover, for all the colonial groups, better quality of current institutions is associated with higher economic performance today across all colonial groups with no significant differences among the groups. Our main result of interest is the indirect effect of French imports of primary production on economic performance among French colonies. Actually, 15% of the decline in economic performance today due to institutional quality is attributed to the effect of French imports of primary production in 1900 on those institutions. Such negative result is statistically significant, suggesting that low levels of economic performance in the French colonies today can be partially attributed to the extraction of resources and implementation of coercive institutions by the French colonizers 100 years ago. This finding is in line with the resource curse hypothesis: extraction of resources as defined by French imports of primary production have the tendency to slow down the economic growth.

### 3.5 Findings and discussion

Our empirical results shed some light on the relative importance of colonial French imports and institutions in driving patterns of divergence in per capita income over more than 100 years. Globally, among all colonies, French imports of raw material and of manufactured goods in the late-nineteenth and early-twentieth centuries are positively and significantly associated with the quality of colonial institutions. As Nunn and Trefler (2013) suggest, institutions seem to exert a significantly and economically important impact on a country's comparative advantage as illustrated by its exports, even after controlling for factor endowments. Those institutions persisted over time and impacted the per

capita income.

These results convey that colonial French imports can contain different underlying channels through which they affected economic performance today. Actually, the institutional conditions and the prevailing types and quality of natural resource endowments within the various groups of colonies probably had different effects on the economic development of countries and regions (Badia-Miro et al. 2015). On the one hand, we argue that some regions were exposed to good institutions during colonization and took advantage of their abundant natural resource endowments and received the “blessing” of their natural capital. These economies grew from the closing decades of the nineteenth century until recent days, encouraged by business-enhancing institutional system which, in time, promoted innovation, industrialization, property rights, and developed financial markets, as is the case of British colonies (La Porta et al., 1999; Landes, 1998; North et al., 1998). On the other hand, in some colonies, extractive institutions encouraged the transfer of the colony’s resources to the colonizer’s homeland, namely in the form of imports, where revenues would be totally taken away from the colony. That was the case, for instance, of the Spanish and the Portuguese colonists during the seventeenth and eighteenth centuries, who set up complex mercantile systems of monopolies and trade regulations in order to obtain gold and other valuables.

Let us consider the specific example of French colonies. During the period of colonial reign, colonizers were attracted by both soil and crop, and by the cheap and abundant factor endowment in the colonies. In order to extract the full rent from this “wealth”, colonizers had to impose some form of coercive institutional system in order to facilitate trade and increase gains. Actually, an institutional system lacking democracy and giving full authority to the governor would allow France to exploit the raw material of their colonies (Alvarez et al., 2011, p. 165).

The results found in panel A of Table 8 confirm why the French had low incentive to establish institutions. Their main role was to impose control in order to facilitate extractive policies. This is attributed to the notion of “forced trade” developed through the system of authoritarian institutions that neither promoted the welfare of the colony nor exploited its comparative advantage. So, in sum, among French colonies, those with worse institutions exported more of raw material to France. Louis Faidherbe <sup>17</sup> wrote: “In Algeria and Senegal the aim is the same, to dominate the country at

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<sup>17</sup> French general and colonial administrator who created the Senegalese Tirailleurs when he was governor of Senegal.

as low cost as possible and through this get the highest advantages commerce.” The function of the French officials was to maintain tranquility so that the natives could work and produce [...].

To provide some additional insights on the negative relation between colonial institutions and French extraction of resources, it is interesting to look at the export boom in French West Africa (where the institutional conditions were deplorable)— in Senegal and the Ivory Coast—between 1897 and 1913. Timber exports from the Ivory Coast increased by a factor of six in twenty years [Frieden, 2006]. In Indochina (which was under French colonial regime), the area of cultivated land dramatically increased, allowing it to become the third largest producer of rice in the world (Mitchener and Weidenmier, 2008). Moreover, between 1905 and 1914, 50% of French Dahomey GDP was extracted by the French [Manning, 1982], and taxation rates in Tunisia were four times as high as those in metropolitan France [Young, 1994].

Since it was costly for the local elite to switch from extractive institutions to growth-enhancing ones after independence, the latter preferred to exploit the existing extractive institutions for their own benefits. This explains the resources curse phenomenon that engender low levels of standard of living in some of the former colonies today.

Van der Ploeg (2011) presents an interesting argumentation that explains the resource curse of natural resources. "First, an abundance of natural resources leads to real appreciation of the country's currency, the decline of tradeable sectors, the expansion of non-tradeable activities (deindustrialization) and production contracts after the initial boom (the Dutch disease). Second, if manufacturing rather than agriculture or primary activities is the economic sector that generates processes of learning by doing and the spillover of human capital, the sudden windfalls derived from natural resources put pressure on the “primarization” of the economy and can hinder economic growth. Third, the “curse” is conditional upon the existence of weak institutional arrangements in terms of the definition of property rights, contract enforcement, the rule of law and the perpetuation of a reduced elite in government, and these complicate economic development. Fourth, the empirically observed resource curse seems to be mostly driven by presidential and non-democratic regimes because these systems are less accountable and less representative and thus offer more scope for resource rent extraction. Fifth, resource dependence usually fuels corruption and rent seeking via protection measures and exclusive licenses so political elites, oligarchs and their cronies can exploit and export resources and capture wealth and political power. It also crowds out social capital, erodes the legal

system and can lead to armed conflict or civil war. Sixth, the fact that commodity prices are highly volatile can lead to sudden booms and busts that harm investment, exports and output. Seventh, the political economy of massive resource rents combined with badly-defined property rights, imperfect markets and poorly functioning legal systems, provide ideal opportunities for producers to engage in rent seeking, and thus divert resources away from more productive activities. Eighth, in general, a sudden resource bonanza tends to erode politicians' critical faculties and induces a false sense of security."

In contrast, among the remaining two groups of colonies, British and other/former colonies, those with better institutions either exported more to France or the level of their institutional quality was not related to the trade with France (Table 8, panel A, columns 3-4). Actually, one argues that those colonies were already experiencing business-enhancing social and political institutions, designed to develop the economy through production structure, free labor, and integration in international markets, rather than being subject to rent extraction in favor of some domestic or foreign elite (Bertoni and Willebald, 2015). Hence, trade with France will only marginally affect their quality of institutions. Moreover, whether these economies specialized in exporting primary or manufacturing goods, they would achieve levels of development close to the "core" because of the strong institutional system they have developed. In terms of the curse/blessing of natural resources, the former British colonies were more blessed and less damned by their abundance of resources than the other former colonies (Bertoni, and Willebald, 2015). In particular, colonies with better institutions were freer to trade more with France and generate the gains from such trade.

It might be impossible to test empirically all of the ways in which French imports affected levels of income today. However, we note that we were able to account for a significant share of it through both the direct impact and the one through both colonial and current institutions while controlling for main variables affecting GDP. The channels we identified account for a significant amount of the impact of French imports on economic performance in the colonies today.

### **3.6 Conclusion**

In this paper, we provide some perspective in determining the linkages between resource abundance in the colonies -as represented by French imports of raw material-, and institutional quality on



one hand, and their effect on growth on the other. We used Partial Least Square Structural Equation Modeling, which is a combination of both factor analysis and traditional multivariate regression models. The data set of French imports is newly constructed and contains about 100 colonies for an averaged sample period of 1880–1912.

Thanks to this method, we were able, first, to create measures of abstract variables (such as colonial extraction, quality of institutions), and, second, to investigate the direct effect of French imports of raw material on long run development conveyed from external factors from the one through colonial and current institutions.

At the pooled sample level, we found strong evidence that better colonial institutions are associated with higher French imports, emphasizing that colonies exporting relatively more tended to develop better institutions. Moreover, we found a strong positive correlation between colonial and current institutions, thus confirming their persistence over time. Finally we found that richer countries establish better institutions, with no significant direct impact of French imports on per capita income today. Our bootstrap results suggest that the indirect effect of French imports of both raw material and of manufactured goods on current institutions through the channel of colonial institutions is positive and significant effect. This impact through institutions is also transmitted to per capita income today. Our results appear to be robust to a variety of econometric specifications, including instrumental variable regressions and additional correlation effects...

We also perform a multigroup analysis to test the differential impacts of our main variables of interest across three different groups of colonies. We find that worse quality of colonial institutions in the French colonies is associated with increasing levels of extraction through trade with a significant difference from the estimate of the other groups. This result emphasizes that the French colonizers perpetuated extractive policies to extract more resources. The negative result is also transmitted indirectly to current institutions and to today GDP per capita. Within British colonies, no significant effect was noted between colonial institutions and French imports suggesting that exports to France do not affect colonial institutions set by the British colonizers. As for the other/former colonies, better institutions are associated with more French imports. While French imports of manufactured goods do not affect the quality of colonies institutions in the French colonies they positively affect that of former/ other colonies.

The results also demonstrate that among the three colonial groups, colonial institutions are pos-

itively correlated to current ones. Moreover, a higher amount of colonial French imports of raw material in the French colonies is associated with lower levels of per capita income today.

Our empirical findings shed some light on the relative importance of colonial French imports and institutions in driving patterns of divergence in per capita income over 100 years. This is embedded in a larger literature of how the natural resources of colonies affected their institutional quality and economic performance under the phenomenon of resource curse or blessing (Ross, 1999; Barro, 1999).

In trying to determine the simultaneous relationship between French extraction through trade, institutions and economic performance, we are constrained with various limitations. First, colonial extraction and its precise mechanisms are hard to quantify. Second, the gains colonizers extracted from colonies are not exactly known. In this paper, we tried to investigate those issues by exploiting a particular structure of trade and colonial institutions. While using a new data set for French sectoral imports, we were able to shed some new light this complicated process.



Table 3.1: Factor Matrix, Composite reliability and Eigenvalues with component analysis Extraction Method

Constructs	Variables	Factor 1	Cronbach's $\alpha$	D.G. rho (CR)	Critical value	Eigenvalues of first two factors
French Imports of primary production	Fr imports of agricultural goods	0.853	0.627	0.843	1	1.457
	Fr imports of raw material for industry	0.853				0.543
Institutions in 1900	Constraint on executive 1900	0.935	0.856	0.933	1	1.744
	Democracy 1900	0.935				0.256
Institutions in 2005	Rule of Law	0.969	0.984	0.990	1	2.906
	Control for corruption	0.993				0.094
	Voice and accountability	0.993				0.000
Temperature	Temperature 1	0.993				4.141
	Temperature 2	0.966				0.671
	Temperature 3	0.744	0.945	0.960	1	0.110
	Temperature 4	0.870				0.071
	Temperature 5	0.954				0.007
Humidity	Humidity 1	0.844				2.138
	Humidity 3	0.956	0.797	0.881	1	0.529
	Humidity 4	0.860				0.333
Human Capital 1900	percent of pop evangelized by					
	Christian missions	0.879	0.706	0.872	1	1.545
	Primary school enrollment	0.879				0.455
Fertility of soil	Steppe low	0.641				
	Desert low	0.713				
	Dry steppe	0.558	-	-	-	-
Mineral Resources today	Gold reserves	0.500	0.799	0.876	1	2.630
	Iron	0.889				0.928
	Silver	0.864				0.372
	Zinc	0.966				0.070

Table 3.2: Results of the measurement model: Latent variables with reflective Indicators

Latent variable	Manifest variables	Standardized loadings	Standardized loadings (Bootstrap)	Critical ratio (CR)a	Lower bound (95%)	Upper bound (95%)	Cronbach's $\alpha$ population	D.G. rho (CR)	(AVE)
French Imports of primary production	Fr imports of agricultural goods	0.661	0.656	2.468	0.176	0.969	0.821	0.843	0.663
	Fr imports of raw material for industry	0.969	0.958	27.535	0.897	0.999			
Institutions in 1900	Constraint on executive 1900	0.924	0.928	34.638	0.879	0.964	0.932	0.932	0.873
	Democracy 1900	0.943	0.937	37.445	0.887	0.966			
Institutions in 2005	Rule of Law	0.967	0.968	117.760	0.952	0.980	0.980	0.989	0.970
	Control for corruption	0.993	0.993	604.020	0.989	0.995			
	Voice and accountability	0.993	0.993	604.020	0.989	0.995			
Temperature	Temperature 1	0.992	0.950	11.178	0.748	0.994			
	Temperature 2	0.967	0.924	10.859	0.669	0.977			
	Temperature 3	0.705	0.650	4.105	0.376	0.958	0.869	0.960	0.826
	Temperature 4	0.897	0.875	5.459	0.539	0.981			
	Temperature 5	0.953	0.913	8.732	0.715	0.969			
Humidity	Humidity 1	0.667	0.668	3.006	0.306	0.965			
	Humidity 3	1.000	0.843	3.768	0.067	0.998	0.706	0.881	0.548
	Humidity 4	0.532	0.585	2.085	0.066	0.931			
Human Capital 1900	percent of pop evangelized by Christian missions	0.729	0.705	5.528	0.492	0.895	0.845	0.869	0.772
	Primary school enrollment	0.969	0.965	35.947	0.910	0.995			
Fertility of soil	Steppe low	0.846	0.625	2.614	0.004	0.956			
	Desert low	0.284	0.208	0.644	-0.589	0.879			
	Dry steppe	-0.334	-0.322	-1.296	-0.782	0.024	-	-	-
Mineral Resources today	Gold reserves	0.370	0.569	1.326	0.222	0.957	0.746	0.877	0.657
	Iron	0.886	0.889	11.109	0.827	0.964			
	Silver	0.872	0.867	10.323	0.694	0.983			
	Zinc	0.973	0.975	82.716	0.954	0.991			

Note: a Critical ratio is obtained by dividing the co-variance estimate (the loading) by its standard error. A value exceeding 1.96 represents a level of significance.

Table 3.3: Results of Cross loadings: Latent variable with reflective indicators

	Previous institutions	Current institutions	French imports primary	temperature	Human Capital in 1900	Mineral resources today	Humidity
Constraint on executive 1900	<b>0.928</b>	0.576	0.247	-0.378	0.543	0.418	0.122
Democracy 1900	<b>0.941</b>	0.518	0.321	-0.179	0.579	0.571	0.047
Rule of Law	0.555	<b>0.968</b>	0.208	-0.392	0.592	0.352	0.080
Control for corruption	0.584	<b>0.993</b>	0.189	-0.458	0.640	0.377	0.149
Voice and accountability	0.584	<b>0.993</b>	0.189	-0.458	0.640	0.377	0.149
Fr imports of agricultural goods	0.066	0.068	<b>0.647</b>	-0.015	0.061	0.184	-0.008
Fr imports of raw material for industry	0.337	0.211	<b>0.974</b>	0.055	0.278	0.513	-0.106
Temperature 1	-0.285	-0.420	0.063	<b>0.992</b>	-0.335	-0.118	-0.313
Temperature 2	-0.298	-0.432	0.041	<b>0.965</b>	-0.344	-0.122	-0.390
Temperature 3	-0.200	-0.196	0.162	<b>0.706</b>	-0.327	0.098	-0.611
Temperature 4	-0.266	-0.474	-0.013	<b>0.895</b>	-0.270	-0.255	-0.012
Temperature 5	-0.265	-0.418	0.006	<b>0.956</b>	-0.301	-0.103	-0.236
percent of pop evangelized by Christian missions	0.395	0.385	0.148	-0.225	<b>0.707</b>	0.135	0.227
Primary school enrollment	0.586	0.632	0.255	-0.332	<b>0.954</b>	0.471	0.218
Gold reserves	0.186	0.159	0.155	-0.026	0.094	<b>0.350</b>	-0.024
Iron	0.497	0.359	0.419	-0.118	0.356	<b>0.888</b>	-0.146
Silver	0.442	0.299	0.367	-0.139	0.403	<b>0.875</b>	-0.108
Zinc	0.519	0.359	0.540	-0.117	0.410	<b>0.973</b>	-0.128
Humidity 1	0.094	0.046	-0.101	-0.081	0.207	-0.072	<b>0.816</b>
Humidity 3	0.102	0.146	-0.056	-0.311	0.259	-0.142	<b>0.977</b>
Humidity 4	0.024	0.116	-0.130	-0.360	0.183	-0.132	<b>0.854</b>

Table 3.4: Results of Discriminant validity: Latent variable with Reflective indicators (correlations for any pair of Latent variables &lt; square root of AVE)

	French imports primary	Previous institutions	Current institutions	Temperature	Human Capital	Mineral resources today	Humidity
French imports primary	<b>0.814*</b>						
Previous institutions	0.101	<b>0.934*</b>					
Current institutions	0.042	0.338	<b>0.985*</b>				
temperature	0.002	0.085	0.198	<b>0.909*</b>			
Human Capital	0.225	0.381	0.346	0.063	<b>0.879*</b>		
Mineral resources today	0.248	0.282	0.140	0.018	0.246	<b>0.539*</b>	
humidity	0.051	0.004	0.005	0.001	0.004	0.006	<b>0.810*</b>
Mean Communalities (AVE)	<b>0.663</b>	<b>0.873</b>	<b>0.970</b>	<b>0.826</b>	<b>0.772</b>	<b>0.657</b>	<b>0.548</b>

Table 3.5: French Imports of primary production - Structural equation model standardized results:  
Pooled sample

	(1)		(2)		(3)	
	OLS		OLS		PLS	
<i>Equation 1: Dependent variable: Previous Institutions</i>						
	<i>Direct</i>	<i>Indirect</i>	<i>Direct</i>	<i>Indirect</i>	<i>Direct</i>	<i>Indirect</i>
French Imports raw material	0.335***		0.082		0.222**	
	(0.095)		(0.089)		(0.104)	
European Settlements			0.577***		0.456***	
			(0.089)		(0.116)	
Observations	100		100		100	
R square	0.112		0.381		0.346	
<i>Equation 2: Dependent variable: Current Institutions</i>						
	<i>Direct</i>	<i>Indirect</i>	<i>Direct</i>	<i>Indirect</i>	<i>Direct</i>	<i>Indirect</i>
French Imports raw material		0.206**		0.05		0.129**
		(0.107)		(0.079)		(0.065)
European Settlements				0.354**		0.266**
				(0.114)		(0.084)
Previous Institutions	0.615***		0.614***		0.582***	
	(0.08)		(0.08)		(0.082)	
Observations	100		100		100	
R square	0.379		0.377		0.339	
<i>Equation 3: Dependent variable: GDPPC</i>						
	<i>Direct</i>	<i>Indirect</i>	<i>Direct</i>	<i>Indirect</i>	<i>Direct</i>	<i>Indirect</i>
French Imports raw material	0.102	0.08**	0.102	0.019	0.288*	0.026*
	(0.069)	(0.04)	(0.069)	(0.031)	(0.13)	(0.014)
European Settlements 1900				0.138**		0.054



		(0.059)	(0.036)
Previous Institutions 1900	0.239***	0.239***	0.118**
	(0.067)	(0.061)	(0.061)
Current Institutions 2005	0.389***	0.389***	0.203**
	(0.086)	(0.086)	(0.103)
Mineral Resources today	0.373***	0.373***	0.328**
	(0.073)	(0.073)	(0.153)
Human Capital in 1900	0.229**	0.229**	0.320*
	(0.096)	(0.096)	(0.119)
Temperature	0.04	0.04	0.074
	(0.071)	(0.071)	(0.076)
Humidity	0.075	0.075	-0.082
	(0.066)	(0.066)	(0.062)
War in 1900's	-0.065	-0.065	-0.02
	(0.059)	(0.059)	(0.05)
Fertility of soil	-0.036	-0.036	-0.046
	(0.065)	(0.065)	(0.047)
<b>Observations</b>	<b>100</b>	<b>100</b>	<b>100</b>
<b>R square</b>	<b>0.703</b>	<b>0.703</b>	<b>0.769</b>

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Robust standard errors in parentheses

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\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

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Table 3.6: French Imports of manufactured goods - Structural equation model standardized results: Pooled sample

	(1)		(2)		(3)	
	OLS		OLS		PLS	
Equation 1	Dependent variable: Colonial Institutions					
	Direct	Indirect	Direct	Indirect	Direct	Indirect
French Imports manufactured	0.345***		0.146*		0.265**	
	(0.095)		(0.085)		(0.109)	
European Settlements			0.561***		0.471***	
			(0.085)		(0.119)	
Observations	100		100		100	
R square	0.119		0.395		0.382	
Equation 2:	Dependent variable: Current Institutions					
	Direct	Indirect	Direct	Indirect	Direct	Indirect
French Imports manufactured		0.211**		0.085		0.162**
		(0.109)		(0.071)		(0.07)
European Settlements				0.327**		0.288**
				(0.117)		(0.092)
Previous Institutions	0.612***		0.583***		0.611***	
	(0.08)		(0.082)		(0.073)	
Observations	100		100		100	
R square	0.375		0.34		0.375	
Equation 3:	Dependent variable: GDPPC					
	Direct	Indirect	Direct	Indirect	Direct	Indirect
French Imports manufactured	0.199**	0.079**	0.194**	0.036	0.18	0.045**
	(0.068)	(0.039)	(0.069)	(0.028)	(0.08)	(0.017)

European Settlements 1900		0.137**	0.079**
		(0.058)	(0.027)
Previous Institutions 1900	0.229***	0.245***	0.168***
	(0.064)	(0.071)	(0.026)
Current Institutions 2005	0.374***	0.419***	0.275***
	(0.083)	(0.078)	(0.024)
Mineral Resources today	0.328***	0.358***	0.246***
	(0.071)	(0.073)	(0.05)
Human Capital in 1900	0.238**	0.153*	0.268***
	(0.091)	(0.083)	(0.021)
Temperature	0.008	0.017	-0.131
	(0.069)	(0.068)	(0.044)
Humidity	0.059	0.067	0.060**
	(0.064)	(0.063)	(0.028)
War in 1900's	-0.101*	-0.061	0.017
	(0.059)	(0.059)	(0.04)
Fertility of soil	-0.051	-0.031	-0.074
	(0.065)	(0.063)	(0.02)
<b>Observations</b>	<b>100</b>	<b>100</b>	<b>100</b>
<b>R square</b>	<b>0.723</b>	<b>0.716</b>	<b>0.678</b>

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Robust standard errors in parentheses

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\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

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Table 3.7: IV regressions

<i>Panel A: First Stage for current Institutions</i>	
Log Settler Mortality	-0.149** (0.047)
<b>Observations</b>	<b>100</b>
<b>R-squared</b>	<b>0.27</b>
<i>Panel B: Second Stage least squares</i>	
Current institutions	1.51*** (0.159)
<b>Observations</b>	<b>100</b>
<b>R-squared</b>	<b>0.585</b>
<i>Panel C: ordinary least squares</i>	
Current institutions	0.663*** (0.137)
<b>Observations</b>	<b>100</b>
<b>R-squared</b>	<b>0.664</b>
Standard errors in parentheses	
*** p<0.01, ** p<0.05, * p<0.1	

Note: Panel B reports the two stage least squares estimates with log GDP per capita as the dependent variable and instrumenting for current institutions scores using log settler mortality; Panel A reports the corresponding first stage. Panel C reports the OLS coefficient from regressing log GDP per capita on current institutions, with the other control variables (not reported to save space). The corresponding 2SLS estimate of the impact of institutions on income per capita is in fact larger than the OLS estimates as found in AJR (2001). This suggests that measurement error in the institutions variables that creates attenuation bias is likely to be more important than reverse causality and omitted variables biases.

Table 3.8: French Imports of primary production - Structural equation model standardized results: multigroup

	(1)		(2)		(3)		(4)	
	Pooled		French Colonies		British Colonies		Other and Former Colonies	
	Panel A: Dependent variable - Colonial Institutions							
	Direct	Indirect	Direct	Indirect	Direct	Indirect	Direct	Indirect
French imports raw => Previous Institutions	0.082		-0.691** a, c		-0.037a,b		0.27*b,c	
	(0.089)		(0.25)		(0.132)		(0.151)	
European Settlement=> Previous Institutions	0.577***		0.646**		0.660***		0.486**	
	(0.089)		(0.25)		(0.132)		(0.151)	
Observations	100		27		37		36	
R square	0.381		0.259		0.43		0.44	
	Panel B: Dependent variable - Current Institutions							
	(1)		(2)		(3)		(4)	
	Direct	Indirect	Direct	Indirect	Direct	Indirect	Direct	Indirect
French imports raw=> Current Institutions		0.05		-0.314**		-0.025		0.167*
		(0.079)		(0.089)		(0.031)		(0.096)
European Settlement=> Current Institutions		0.354**		0.294***		0.451***		0.30**

		(0.114)		(0.072)		(0.093)		(0.144)
Previous Institutions=> Current Institutions	0.614***		0.455**a	0.220**	0.682***a		0.618***	
	(0.08)		(0.178)	(0.075)	(0.124)		(0.135)	
<b>Observations</b>	<b>100</b>		<b>27</b>		<b>37</b>		<b>36</b>	
<b>R square</b>	<b>0.377</b>		<b>0.21</b>		<b>0.47</b>		<b>0.38</b>	

*Panel C: Dependent variable - GDPPC*

	(1)		(2)		(3)		(4)	
	Direct	Indirect	Direct	Indirect	Direct	Indirect	Direct	Indirect
French imports raw=> GDPPC	0.102	0.019	-0.055a	<b>-0.152*</b>	0.052	-0.012	0.293***a	0.054
	(0.069)	(0.031)	(0.17)	(0.056)	(0.105)	(0.014)	(0.147)	(0.036)
European Settlement=> GDPPC		0.138**		0.142**		0.209***		0.097*
		(0.059)		(0.047)		(0.06)		(0.05)
Previous Institutions=> GDPPC		0.239***		0.220**		0.316***		0.201**
		(0.061)		(0.075)		(0.062)		(0.08)
Current Institutions=> GDPPC	0.389***		0.483**		0.463**		0.325*	
	(0.086)		(0.244)		(0.162)		(0.172)	
<b>Observations</b>	<b>100</b>		<b>27</b>		<b>37</b>		<b>36</b>	
<b>R square</b>	<b>0.703</b>		<b>0.463</b>		<b>0.722</b>		<b>0.624</b>	

Robust standard errors in parentheses

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

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Letter superscripts represent significant differences in path coefficients compared to other two groups

Table 3.9: French Imports of manufactured good - standardized results: multigroup

	(1)		(2)		(3)		(4)	
	Pooled		French Colonies		British Colonies		Other and Former Colonies	
	Panel A: Dependent variable - Previous Institutions							
	Direct	Indirect	Direct	Indirect	Direct	Indirect	Direct	Indirect
French imports man=>								
Previous Institutions	0.146*		-0.341a,c		-0.042a,b		0.361** b ,c	
	(0.085)		(0.243)		(0.129)		(0.136)	
European Settlement=>								
Previous Institutions	0.561***		0.362		0.653***		0.473***	
	(0.085)		(0.243)		(0.129)		(0.136)	
Observations	100		27		37		36	
R square	0.395		0.1		0.43		0.44	
Panel B: Dependent variable - Current Institutions								
	(1)		(2)		(3)		(4)	
	Direct	Indirect	Direct	Indirect	Direct	Indirect	Direct	Indirect



French imports man=>					
Current Institutions	0.085		-0.146		-0.029
	(0.071)		(0.063)		(0.03)
European Settlement=>					
Current Institutions	0.327**		0.154**		0.447***
	(0.117)		(0.063)		(0.091)
Previous Institutions=>					
Current Institutions	0.583***	0.427**a	0.220**	0.683***a	0.618***
	(0.082)	(0.181)	(0.075)	(0.123)	(0.135)
<b>Observations</b>	<b>100</b>	<b>27</b>		<b>37</b>	<b>36</b>
<b>R square</b>	<b>0.34</b>	<b>0.18</b>		<b>0.47</b>	<b>0.38</b>

Panel C: Dependent variable - GDPPC

	(1)		(2)		(3)		(4)	
	Direct	Indirect	Direct	Indirect	Direct	Indirect	Direct	Indirect
French imports man=>								
GDPPC	0.194**	0.036	0.096a,c	-0.089	0.053a,b	-0.014	0.47**b,c	0.067**
	(0.069)	(0.028)	(0.16)	(0.043)	(0.102)	(0.014)	(0.143)	(0.031)

European Settlement=>					
GDPPC		0.137**	0.094**	0.219***	0.088*
		(0.058)	(0.046)	(0.061)	(0.046)
Previous Institutions=>					
GDPPC		0.245***	0.261**	0.335***	0.186**
		(0.071)	(0.085)	(0.058)	(0.073)
Current Institutions=>					
GDPPC		0.419***	0.611**a	0.490**	0.302*a
		(0.078)	(0.251)	(0.161)	(0.157)
Covariates	YES		YES	YES	YES
Observations	100	27	37	36	
R square	0.716	0.497	0.722	0.686	
Robust standard errors in parentheses					
*** p<0.01, ** p<0.05, * p<0.1					

Letter superscripts represent significant differences in path coefficients compared to other two groups

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