THREE ESSAYS ON THE ECONOMY OF THE LATE OTTOMAN EMPIRE

AVNI ONDER HANEDAR

A THESIS SUBMITTED FOR THE DEGREE OF

DOCTOR OF PHILOSOPHY

DEPARTMENT OF ECONOMICS

UNIVERSITY OF ESSEX

SEPTEMBER, 2013

Abstract

This thesis consists of three empirical papers on the Ottoman economy. In the first chapter, I examine whether wars and boycotts were negatively associated with how the Ottoman Empire traded with 21 trading partners from 1879 to 1913. The results of my study provide no evidence that how the Ottoman Empire traded with its trading partners was affected by boycotts. The findings also provide weak evidence that a war year resulted in a decrease in Ottoman foreign trade. I interpret this finding to mean that wars damaged trade routes and markets, which led to lower profitability on trade through increasing transaction costs and risks for merchants, and as a result, the Ottoman foreign trade decreased.

In the second chapter, I estimate the effect of railroads on economic growth in the Ottoman Empire. I examine whether access to railroads in a judicial district changed the size of the population in that judicial district for the years 1893 and 1914. The empirical results indicate some evidence for a positive effect of access to railroads on population in the respective judicial districts. I conclude that access to railroads induced economic growth in the Ottoman Empire, which led to expansion in the affected areas.

In the third chapter, I study how the profits of Imperial Ottoman Bank branches were affected by the number of foreign bank branches operating in the Ottoman Empire from 1895 to 1914. There is no empirical evidence that foreign bank branches in a market led to lower profits for Imperial Ottoman Bank branches in these areas. This result is valid even when large numbers of foreign bank branches were present. My interpretation is that the positive effect of foreign banks on efficiency cancelled out the negative effect of foreign banks on profits.

Acknowledgements

First of all, I wish to express my deepest gratitude to all the members of my family and friends for the support from the beginning of PhD programme. I especially wish to acknowledge my wife, brother, mother, father: Elmas Yaldiz, Anil Hanedar, Kadriye Hanedar, and Muhittin Sabri Hanedar. Particularly, I would never have been able to finish this thesis without my wife. I would like to thank my friends: Derya Altun Erdem, Ozgur Genc, Salih Gumus, Mustafa Gunes, Vu Minh Hien, Ugur Hocoglu, Ismail Doga Karatepe, Bilal Onver, Guner Polat, and Erdost Torun for all their encouragement and unending support.

Along my PhD many people encouraged and helped me. I am highly indebted to my supervisors: Prof. Timothy Hatton and Dr. Patrick J. Nolen for their invaluable advice, guidance, patience, and prompt feedback. I must also express great thanks to Dr. Rowena Gray, Dr. Katharine Rockett, and Prof. Joao M. C. Santos Silva for their detailed feedback, support, and helpful comments. Special thanks must go to Prof. Sevket Pamuk and Dr. Ali Coskun Tuncer who offered invaluable advice and helpful suggestions as well as for their guidance and encouragement throughout the entire duration of my thesis. I would like to extend special thanks to Dr. Holger Breinlich and Prof. Marco Francesconi for their practical suggestions and many helpful comments during my board meetings and Research Strategy Seminar (RSS).

I am also grateful for help, feedback, comments, and advice provided by Prof. Sedef Akgungor, Prof. Yener Altunbas, Roy E. Bailey, Prof. Stefano Battilossi, Dr. Scott Bennett, Ozgul Bilici, Mustafa Caliskan, Prof. Shanti Chakravarty, Nazim Can Cicektakan, Prof. Michael Clemens, Prof. Muhammed-Shahid Ebrahim, Prof. Edhem Eldem, Prof. Sabri Erdem, Prof. Mehmet Yavuz Erler, Prof. Kristian Gleditsch,

Mehmet Gokhan Goktan, Nurullah Gur, Prof. Jude C. Hays, Prof. Antonio Tena Junguito, Dr. David S. Jacks, Prof. Adnan Kasman, Prof. Donald Quataert, Dr. Robert Walker, Dr. Nikolaus Wolf, and Prof. Enrico Zaninotto. Furthermore, I would like to thank participants at the Research Strategy Seminar (RSS) at the University of Essex, the 2011 European Historical Economics Society Conference, and the 2011 CAGE Summer School: Historical Patterns of Growth and Development at the University of Warwick for their feedback.

My great thanks go to Prof. Sevket Pamuk, the external examiner, and Prof. George Symeonidis, the internal examiner, for their valuable comments and advice.

My PhD thesis has taken me to the British Library, LSE Library, and the National Archives at Kew. In this setting I also benefited greatly from training at the Institute of Historical Research at the University of London on how to find and use archival sources. I am very grateful to the staff of all these institutions for their assistance. Thanks are also extended to the staff of the Albert Solomon Library at the University of Essex. It would not have been possible to write this thesis without sources at these institutions. Last but not least, I would like to acknowledge the financial support from the Dokuz Eylul University.

Dedication

This thesis is dedicated to my grandfather who passed away in 2010: Avni Hanedar.

A Guide on Place Names and Pronunciation of Turkish Words

I call countries and places according to the general international usage. For instance, I use Greece not Yunanistan and Baghdad not Bagdad or Bagdat. Because the Ottoman Turkish name of Samos appears in the data sources, only the Ottoman Turkish name of Samos is given in parenthesis (i.e. Sisam) in the first chapter. In the second and third chapters, all judicial district, county, province, and railroad names are given in the form in which they appear in the sources from which the information come. For instance, I use Salonika branch, Halep province, and Dedeagac-Edirne railroad line not Thessaloniki branch, Aleppo province, and Alexandroupoli-Edirne railroad line.

Each chapter includes appendices in which I present maps and tables. In the sources from which maps and tables are taken, the Ottoman Turkish names for places are sometimes preferred. In the tables, place names appear in their original format, i.e. as found in the sources. Each map has notes that provide supplementary information. In these notes, the English spelling of a place name is also given in parenthesis such as Bagdad (i.e. Baghdad).

Finally, throughout this thesis I do not use several letters in Turkish alphabet (e.g. ç, ş, ı, ğ). For instance, Akçe, Kuruş, Ereğli, Aydın, and İzmir are the Ottoman Turkish names for Akce, Kurus, Eregli, Aydin, and Izmir, respectively.

Table of Contents

Introduction.....xiv

References.....xxvi

Chapter 1: The Impacts of Wars and Boycotts on Ottoman Foreign Trade, 1879-1913.....33

1.1 Introduction.....33

1.2 The Effects of Conflicts and Sanctions on Trade Flows: Literature Review 39

1.2.1 The Impact of Conflicts on Trade Flows.....39

1.2.2 The Impact of Sanctions on Trade Flows 42

1.3 Hypotheses.....44

1.4 Data.....46

1.5 Empirical Approach 54

1.6 Results.....59

1.6.1 Robustness Checks 63

1.7 Conclusion 70

1.8 Appendix A: Figures and Tables 74

1.8.1 Figures 74

1.8.2 Tables.....75

1.9 Appendix B: Tables 78

1.10 Appendix C: Figure and Table 87

1.10.1 Figure.....87

1.10.2 Table 87

1.11 References.....88

Chapter 2: The Impact of Access to Railroads on Economic Growth in the Ottoman Empire, 1893-1914.....98

2.1 Introduction....98
2.2 The Economic Effect of Railroads: Literature Review....104
2.3 Historical Background: Railroads in the Ottoman Empire....111
2.3.1 Transportation in the Ottoman Empire and Railroad Line Placement Decisions....112
2.3.2 The Development of Railways in the Ottoman Empire....115
2.4 Hypotheses....120
2.5 Data....122
2.6 Empirical Approach....133
2.6.1 Alternative Estimation Methods....137
2.6.1.1 Instrumental Variable Methodology....139
2.6.1.2 Placebo Regression....142
2.7 Results....145
2.7.1 Robustness Checks....152
2.8 Conclusion....157
2.9 Appendix A: Figures and Tables....163
2.9.1 Figures....163
2.9.2 Tables....171
2.10 Appendix B: Tables....178
2.11 References....183
Chapter 3: Banking Competition in the Ottoman Empire and the Imperial Ottoman Bank between 1895 and 1914....193
3.1 Introduction....193
3.2 The Effect of Foreign Banks on Domestic Bank Performance: Theory and Evidence....198

3.2.1 Theoretical Framework.....198
3.2.2 Empirical Evidence.....202
3.3 Historical Background: an Overview of the Ottoman Financial System 207
3.4 Hypotheses.....212
3.5 Data…….....216
3.6 Empirical Approach 223
3.7 Results…….....230
3.7.1 Robustness Check.....242
3.8 Conclusion 243
3.9 Appendix A: Figures and Tables 246
3.9.1 Figures 246
3.9.2 Tables.....249
3.10 Appendix B: Tables 258
3.11 References.....262

List of Figures

Figure 1.1 The Borders of the Ottoman Empire (1817-1913) 74

Figure 1.2 Ottoman Exports and Imports (1878-1913) 74

Figure 1.3 Ottoman Trade with Austria-Hungary and Bulgaria (1879-1913) 87

Figure 2.1 The Borders of the Ottoman Empire (1817-1914) 163

Figure 2.2 Railroad Lines in the Asian Part of the Ottoman Empire in 1918 163

Figure 2.3 Railroad Lines in Rumelia in 1914 164

Figure 2.4 Railroad Line Connecting Damascus with Muzeirib 165

Figure 2.5 The Anatolian and Baghdad Railways in 1914 166

Figure 2.6 The Hejaz Railway in 1914 166

Figure 2.7 The Railroad Line Connecting Deraa with Haifa 167

Figure 2.8 The Relationship between Population Density and Railroad Density in the Ottoman Empire (1890-1913) 167

Figure 2.9 The Relationship between Foreign Trade per capita and Railroad Density in the Ottoman Empire (1890-1913) 168

Figure 2.10 Total Rail Passengers in the Ottoman Empire (1891-1913) 169

Figure 2.11 Provinces of the Ottoman Empire in 1900 169

Figure 2.12 A Map of Railroad Lines in The Ottoman Empire (1893 and 1914) 170

Figure 2.13 The Middle Eastern Caravan and Trade Routes 170

Figure 3.1 The Number of Foreign Bank Branches (1895-1914) 246

Figure 3.2 The Number of the Imperial Ottoman Bank Branches (1895-1914) 246

Figure 3.3 The Borders of the Ottoman Empire (1817-1914) 247

Figure 3.4 A Map of Railroad Lines in the Ottoman Empire (1895 and 1914) 247

Figure 3.5 Railroad Lines in the Ottoman Empire (1856-1914) 248

Figure 3.6 The Middle Eastern Caravan and Trade Routes 248

List of Tables

Table 1.1 Gravity Regressions (1879-1913) 75

Table 1.2 Robustnes Check: Gravity Regressions with Different Dependent Variables (1879-1913) 76

Table 1.3 Gravity Regressions: Other Robustness Checks (1830-1913) 77

Table 1.4 Distribution of Ottoman Exports and Imports by Trading Partners, 1830-1913 (percent) 78

Table 1.5 Gravity Regressions: Boycotts that were Imposed by the Ottoman Empire against Germany, Italy, and Greece (1879-1913) 79

Table 1.6 Gravity Regressions: Wars and an Alternative Sub-sample (1879-1913) 80

Table 1.7 Gravity Regressions: Alternative Estimation Methods and Fixed Effects (1879-1913) 81

Table 1.8 Gravity Regressions: an Alternative Sub-sample and Method (1879-1913) 82

Table 1.9 Gravity Regressions with an Alternative Dataset: Boycotts, Wars, Alternative Estimation Methods, Fixed Effects, and Additional Control Variables (1830-1913).....83

Table 1.10 Gravity Regressions: an Alternative Sample, Prices, and Different Dependent Variables (1830-1913).....85

Table 1.11 Descriptive Statistics on Wars and Boycotts 87

Table 2.1 Descriptive Statistics.....171

Table 2.2 The Impact of Railroads on Populations of Judicial Districts (1893 and 1914).....172

Table 2.3 First Stage Regressions (1893 and 1914).....172

Table 2.4 Instrumental Variable Estimates for the Impact of Railroads on Populations of Judicial Districts (1893 and 1914) 173

Table 2.5 Placebo Regressions: The Impact of Lines in the Proposals of Colonel Chesney and Levant Herald on Populations of Judicial Districts (1893 and 1914).....174

Table 2.6 Robustness Check: Circassian Immigrants (1893 and 1914) 175

Table 2.7 First Stage Regression: Circassian Immigrants (1893 and 1914).....176

Table 2.8 Robustness Check: First Differences (1893 and 1914).....176

Table 2.9 First Stage Regression: First Differences (1893 and 1914).....177

Table 2.10 The Railroad Lines in the Ottoman Empire (1856 and 1914) 178

Table 2.11 The Completion Year of the 1881/82-93 Census 179

Table 2.12 Female Population in Musul and Basra provinces, Ipek and Prizren Counties (1893 and 1914).....180

Table 2.13 Exclusion of Islands in the Sample (1893 and 1914) 181

Table 2.14 Inclusion of Central Judicial Districts (1893 and 1914) 182

Table 3.1 The Opening Dates of Imperial Ottoman Bank Branches (1863-1914) 249

Table 3.2 The Number of Foreign Bank Branches in the Ottoman Empire by County, Province, and Year (1895-1914) 251

Table 3.3 Descriptive Statistics.....252

Table 3.4 The Impact of Foreign Bank Branch Presence on Profits of Imperial Ottoman Bank Branches (1895-1914).....253

Table 3.5 The Impact of Foreign Bank Branch Presence on Probability of Loss in an Imperial Ottoman Bank Branch (1895-1914) 254

Table 3.6 The Impact of Foreign Bank Branch Presence and Foreign Bank Branch Presence-Year Interaction on Profits of Imperial Ottoman Bank Branches (1895-1914) 255

Table 3.7 The Impact of the Number of Foreign Bank Branches on Profits of Imperial Ottoman Bank Branches (1895-1914) 256

Table 3.8 Robustness Check: an Alternative Sub-sample (1895-1914) 257

Table 3.9 Summary Statistics for Profits of Imperial Ottoman Bank Branches (1895-1914).....258

Table 3.10 Robustness Checks: an Alternative Dependent Variable and the Short-term Impact of Foreign Bank Branch Presence on Profits of Imperial Ottoman Bank Branches (1895-1914) 260

Table 3.11 Robustness Check: Prices (1895-1914) 261

Introduction

The Ottoman Empire was a traditional economy based on agriculture and land-intensive production (Quataert, 2005; pp. 126-30). The foreign trade policy of the Ottoman Empire was different from those of European countries. That is, in order to prevent food shortages and famines imports were encouraged as the Ottoman state restricted exports of several goods (Issawi, 1980; p. 74; Issawi, 1998; pp. 90-3; Genc, 2009; pp. 61-9). In the early nineteenth century, international trade was not important both in volume and value (Inalcik and Quataert, 1996; p. 829).

Additionally, the existing road networks of the Ottoman Empire were not well developed and no railroad line was built in the Ottoman Empire by 1856. This is mainly attributed to financial difficulties and lack of technological knowledge in construction of roads. On the other hand, the railroad networks of Europe and US were expanding rapidly (Schoenberg, 1977; Kasaba, 1993; pp. 40-1; Inalcik and Quataert, 1996; p. 804; Gulsoy, 2010; p. 27). During the same period, there were few institutions that provided financial services such as formal money lending via a bank. Money lenders (e.g. Galata bankers in Istanbul) and several foreign banks (e.g. the Ottoman Bank and Bank of Smyrna) were the main providers of financial services (Clay, 1994; Frangakis-Syrett, 1997; pp. 264-6; Cottrell, 2008; pp. 65-73; Toprak, 2008; p. 145).

However, this situation changed until 1914, because there were many fundamental changes occurring, which would have a substantial effect on foreign trade, economic growth, and banking competition in the Ottoman Empire. Ottoman exports and imports increased due to economic expansion in Europe which led to higher demand for the raw materials of the Ottoman Empire (Pamuk, 1984; pp. 25-

34; Quataert, 2005; pp. 131-2). Also, because of the free trade agreements that the Ottoman Empire signed with several European countries, trade restrictions for foreign merchants were reduced which led to an increase in Ottoman imports (Great Britain, Parliamentary Papers, 1839; pp, 38-40; Issawi, 1980; pp. 74-5; Pamuk, 1984; pp. 19-20; Kasaba, 1993; p. 50; Quataert, 2005; p. 127; Geyikdagi; 2011; p. 17). Moreover, in 1856 construction of railroad lines in the Ottoman Empire began and after the 1860s there was an improvement in transport technology, which could lead to higher international trade flows and the Ottoman foreign trade because of lower transportation costs (Pamuk, 1984; pp. 32-4; Quataert, 2005; p. 126).

In the late nineteenth and early twentieth century there were two main determinants for the low trading level between the Ottoman Empire and its partners: wars and boycotts. The Ottoman Empire was involved in wars with several of its trading partners such as Italy, Serbia, Montenegro, and Bulgaria. The wars could have led to a decrease in trade between the Ottoman Empire and its partners because of trade route and market disruptions (Inalcik and Quataert, 1996; pp. 767-8; Quataert, 2005; p. 126). Between 1908 and 1909 boycotts were imposed by the Ottoman Empire against Austria-Hungary and Bulgaria for political reasons (e.g. the annexation of Bosnia-Herzegovina by Austria-Hungary in 1908) (Geyikdagi, 2011; p. 151). Quataert (1987; p. 119) and Geyikdagi (2011; p. 152) argue that the boycotts lowered Ottoman trade with its trading partners. To help shed light on this issue, in the first chapter I examine the effects of wars and boycotts by the Ottoman Empire on Ottoman foreign trade from 1879 to 1913.

During this period, there was another major transition in the Ottoman Empire regarding its transportation networks, which could have caused economic growth.

This was the construction of railroad lines between 1856 and 1914. The building of railroads began in 1856 and railroad networks grew rapidly until 1914. Railroad lines connected Rumelia[1] with other parts of the Ottoman Empire such as Hejaz, Syria, Iraq, and Anatolia. The railroad networks were not as dense as one might expect because of financial difficulties, wars, and political obstacles limiting construction even up until 1914 (von Pressel, 1966; p. 91; Schoenberg, 1977; Ortayli, 2010; pp. 163-5; Geyikdagi, 2011; pp. 90-8).

In the Ottoman Empire, there were only few railroad lines that were built by the state itself. Many railroad lines were constructed and operated by the foreign railroad companies of major European powers[2]. This could be due to the fact that the Ottoman state did not have the funds to finance construction of railroads. Its financial situation became worse during the 1850s and it went bankrupt in the 1870s because of its debts. The Ottoman Empire was also behind the contemporary technological knowledge for building railways (Schoenberg, 1977; Gulsoy, 2010; p. 27; Geyikdagi, 2011; pp. 119-126).

The Ottoman state primarily wanted the railroads to be built so it could exercise political control over its territories. However, the major European powers constructed several railroads —such as line connecting Izmir with Aydin— to extend their economic control and import raw materials from the Ottoman Empire. The decreasing transportation costs made it easy to obtain import from the Ottoman Empire. To sum, only few railroad lines were allocated to places of economic importance (Kolars and Malin, 1970; Karkar, 1972; p. 65; Schoenberg, 1977;

[1] Land of the Ottoman Empire in Europe.
[2] They were the UK, France, Germany, and Austria-Hungary.

Quataert, 1977; Inalcik and Quataert, 1996; p. 806; Illich, 2007; pp. 91-2; Gulsoy, 2010, pp. 27-8; Hulagu, 2010, pp. 23-25).

Although the construction of railroad lines was primarily motivated by political and military considerations, the historical literature indicates that there was an increase in international and interregional trade because of lower transportation costs, which led to higher agricultural production in places that had gained access to railroads. Higher trade and agricultural production resulted in increasing employment opportunities that attracted an inflow of people looking for employment and jobs (Schoenberg, 1977; Eldem, 1994; p. 94; Gulsoy, 1994; pp. 245-8; Inalcik and Quataert, 1996; pp. 810-4; Gulsoy, 2010, pp. 181-5, p. 270; Hulagu, 2010; pp. 14-45). Based on the historical literature about the impact of railroads, I test whether railroads induced economic growth in the Ottoman Empire for the years 1893 and 1914 in the second chapter.

Finally, there was an important change in the banking sector in the Ottoman Empire during the late nineteenth and early twentieth century as British, French, German, Austrian, Italian, Russian, and Greek banks gradually established a presence in the Ottoman Empire due to the economic recovery and increasing international trade (Thobie, 1991; p. 421; Cottrell, 2008; pp. 71-3). Before 1900, there were not many foreign banks operating in the Ottoman Empire. The most important one was the Imperial Ottoman Bank, which was founded with French and British capital in 1863. The Ottoman state had significantly benefited from its operations through the provision of loans, issuing notes, and transmission of tax revenues that were collected in territories of the Ottoman Empire to its capital (Istanbul). On the other hand, the bank also financed railroad construction and provided all financial services that

people needed such as collecting deposits and giving credit to borrowers. Thus, the Imperial Ottoman Bank operated like a domestic and state bank and it had a strong market power for a long period of time (Thobie, 1991; p. 407; Clay, 1990; p. 142, p. 146; Clay, 1994; Eldem, 1997; p. 115-8; Frangakis-Syrett, 1997; pp. 268-9; Autheman, 2002; p. 74; p. 82; Autheman, 2008; pp. 101-6; Clay, 2008; p. 109; Geyikdagi, 2011; p. 101).

However, the historical literature argues that the growing number of foreign banks present in the Ottoman Empire after 1900 undermined the strong position of the Imperial Ottoman Bank because they increased competition, which led to lower profits in the Imperial Ottoman Bank branches (Clay, 1994). To examine these arguments, in the last chapter, I investigate whether the strong position of the Imperial Ottoman Bank was negatively affected by foreign banks over the period 1895-1913.

Having provided a brief summary of the historical literature and purpose of the chapters in my thesis, I will now proceed to discuss three main factors that motivated the thesis as well as the empirical results and policy implications of my research. The first factor is that it is less difficult to obtain data for the late nineteenth and early twentieth century as compared to earlier periods, because most economic and financial data from before the nineteenth century were either not available or not collected. Besides, historical data that were collected in earlier periods were not likely to be measured precisely.

The second factor is the lack of consensus in the historical literature regarding the effects of wars, boycotts, railroads, and foreign banks. For instance, one strand of the historical literature argues that the wars that the Ottoman Empire was involved in

between 1879 and 1913 disrupted trade routes and markets (Inalcik and Quataert, 1996; pp. 767-8; Quataert, 2005; p. 126). However, Pamuk (1984; p. 32) argues that the Ottoman trade with its trading partners had increased by 1914 despite destructive wars. Similarly, the effect of railroads on economic growth in the Ottoman Empire is controversial. There is one strand of the historical literature, which argues that railroads induced economic growth in the Ottoman Empire[3]. On the other hand, railroads could have had a negative impact on production as Inalcik and Quataert (1996; p. 814) indicate that there was an increase in imports due to lower transportation costs which hampered domestic industry in connected places.

Finally, the literature about the Ottoman Empire does not provide econometric evidence on the effects of wars, boycotts, railroads, and foreign banks. This thesis uses unique historical datasets which are extracted from various sources. For instance, the data for foreign bank branches in the Ottoman Empire that I use in the third chapter come from *the Banking Almanac*[4]. Also, the historical data for railroads come from multiple sources that have not been used before, to best of my knowledge. On the basis of historical data on boycotts, railroads, and foreign banks my thesis represents the first empirical study in the literature about the impact of these factors on the Ottoman economy.

In the first chapter, I focus on the impacts of wars and boycotts on how the Ottoman Empire traded with 21 of its partners over the period 1879-1913. I use the gravity equation to model the trade flows. A segment of the previous literature on the effect of military interstate conflicts suggests that wars damage transportation and

[3] See British Parliamentary Paper (1896; pp. 5-8), Karkar (1972; p. 65, p. 82), Quataert (1977) Eldem (1994; p. 94), Gulsoy (1994; pp. 245-6), Inalcik and Quataert (1996; pp. 810-3), Gulsoy (2010, pp. 181-2, p. 270), and Hulagu (2010; pp. 14-45).

[4] It was a journal, which provided detailed information on British and foreign banks—such as German, French, Italian, Russian banks—that opened branches outside the UK. It was published by Waterlow and Sons since 1844.

communication networks. Additionally, they lead to market disruptions. So, transportation network and market disruptions due to wars could lead to lower profitability of trade through increasing transaction costs and risks for traders, and as a result, could reduce bilateral trade flows (Anderton and Carter, 2001; Li and Sacko, 2002; Long, 2003; Oneal et al., 2003). Previous studies on sanctions find negative impact of sanctions (e.g. boycotts) on the trade of countries that impose sanctions with target countries (Hufbauer et al., 1997; Evenett, 2002; Hufbauer and Oegg, 2003; Yang et al., 2004; Lamotte, 2012).

The findings in the first chapter indicate little evidence for a negative effect of wars on Ottoman foreign trade, which is in line with the historical literature on the impact of military interstate conflicts. The point estimate suggests that there was a 39.4 percent decrease in trade between the Ottoman Empire and its trading partners in a war year. In contrast to the previous literature on the impact of sanctions, there is no empirical evidence that finds a decrease in trade between the Ottoman Empire and boycotted trading partners. This is consistent with Quataert (1987; p. 117) and Ortayli (2010; p. 61), who argue that boycotts were not effective enough to cut off trade between the Ottoman Empire and boycotted trading partners, because they were not long-lived and people in many ports did not participate in boycotts.

In the second chapter, I examine whether access to railroads induced economic growth in the Ottoman Empire, using data for 455 judicial districts (known as kazas) from 32 provinces (known as vilayets)[5] in the Ottoman Empire for the years 1893 and 1914. Hornung (2012) uses population growth as a proxy for economic growth in Prussia. He finds a positive impact of railroads on population in connected

[5] Population data are taken from 1881/82-93 and 1914 censuses. In the 1881/82-93 and 1914 censuses, the largest administrative unit in the Ottoman Empire was generally province as the smallest one was judicial district (Karpat, 1985; p. 151, p. 189).

cities in Prusia for the period 1840-1871 and argues that railroad access induced economic growth and increased employment opportunities in connected cities. Higher employment opportunities attracted people to find jobs in the respective cities.

There is no data source with information about economic outcomes, trade, transportation costs, and internal migration at the judicial district level. I conduct a similar analysis to Hornung (2012) by focusing on the relationship between railroads and population in a judicial district. The findings in the second chapter indicate some evidence for a positive impact of access to railroads on population at the judicial district level. My point estimates reveal that one percent decrease in the distance from a judicial district to the nearest railroad line led to an increase in population of the respective judicial district by 0.03 percent, on average. In line with arguments of the historical literature and the findings of Hornung (2012), my empirical results imply that access to railroads had induced economic growth, which led to higher population in the respective judicial district.

I also address the possibility that placement of railroad lines could be endogenous to population (i.e. reverse causality) which leads to bias in the OLS (Ordinary Least Squares) estimates for the impact of railroads. This is because historical literature indicates that one of the railroad lines was allocated to places that were commercially important (i.e. Izmir and Aydin) (Kolars and Malin, 1970; Karkar, 1972; p. 65, p. 79). The Ottoman state wanted several railroad lines to be built in unpopulated places —such as Bandirma and Balikesir— due to famines. The railroad lines would decrease food shortages and prevent future famines in the respective places (Inalcik and Quataert, 1996; p. 789; Erler, 2010; pp. 304-12). To mitigate concerns of reverse causality, I use an instrumental variable for railroads based on

trade and caravan routes that were used before railroads were constructed[6]. Furthermore, I examine the effect of lines that were planned but which were not constructed. I find that reverse causality is not an important concern. This could be due to the fact that railroads in the Ottoman Empire were primarily built for political, religious or military rather than economic reasons. This is also in line with Jedwab and Moradi (2012) who examine the impact of railroads on cocoa production and population growth in Ghana.

In the last chapter, I examine whether profits of the Imperial Ottoman Bank branches were negatively affected by foreign banks, using data for profits of the Imperial Ottoman Bank branches and on foreign bank branches operating in the Ottoman Empire between 1895 and 1914. My results indicate a negative effect of foreign bank branches only for the Imperial Ottoman Bank branches in places that were affected by more than two foreign bank branches. The coefficient estimate for the effect of three and more than three foreign bank branches is -0.269. However, the results in the last chapter provide no evidence that there was a statistically significant effect of foreign bank branch presence and the number of foreign bank branches on profits of the Imperial Ottoman Bank branches in the respective market for both short and long-term. Additionally, I do not find that the effect of foreign bank branches on profits of Imperial Ottoman Bank branches was related to the amount of time the foreign bank branches were present in the respective market.

Previous studies on banking suggest that foreign banks are negatively associated with profits of domestic banks through increasing competition in domestic banking markets (Clarke et al., 1999; Denizer, 2000; Claessens e al., 2001; Hermes and Lensink, 2001; Unite and Sullivan, 2003; Schafer and Talavera, 2007; Pohl,

[6] It means that regression is estimated by 2SLS (Two-stage Least Squares).

2011; Xu, 2011). The findings in the last chapter do not necessarily mean that foreign bank branches did not create competition in the respective market. In fact Clay (1994) argues that foreign banks did lead to higher competition.

Data constraints do not allow me to directly examine whether there was a negative impact of foreign bank branches on costs of the Imperial Ottoman Bank branches through an efficiency improvement channel. On the other hand, increasing competition due to foreign bank branches could lead to lower costs of the Imperial Ottoman Bank branches through forcing them to work more efficiently (Clay, 1994). So, the non-effect could be due to the fact that the negative impact of foreign banks on profits of the Imperial Ottoman Bank branches was cancelled out by the positive effect of foreign banks on efficiency. This is parallel to empirical findings in Lensink and Hermes (2004) who investigate the effect of foreign banks on domestic bank performance, using data for 990 banks in 48 countries for the period 1990-1996.

This thesis contributes to the existing literature in three ways. First, it uses unique datasets: which allows me to undertake a comprehensive empirical test of the hypotheses on the impacts of wars, boycotts, railroads, and foreign banks. No other study undertakes an econometric methodology for the effects of these factors on the Ottoman economy, to best of my knowledge. These unique data also allow me to shed further light on debate about the impacts of these factors which are not a settled topic among historians.

Second, to my knowledge, only few studies in the existing literature provide empirical evidence from history. My thesis extends the existing literature by presenting empirical evidence from the Ottoman Empire which was one of the longest lasting empires in history. Also, its borders contained many of today`s countries (i.e.

Turkey, Bulgaria, Croatia, Serbia, Albania, Bosnia, Greece, Saudi Arabia, Syria, Iraq, Lebanon, Israel, Palestine, Jordan, and Yemen).

Finally, the first chapter provides evidence of different outcomes than what is usually in the literature. It does not indicate a decrease in trade between the Ottoman Empire and boycotted trading partners, which is inconsistent with previous findings on the impact of sanctions. However, the second and third chapters do fit into the existing literature. Apart from this, in the third chapter, different from the existing literature on banking I test whether the impact of foreign banks on domestic bank performance is positively related to the amount of time the foreign banks are present in a market.

What are the policy implications of the findings in this thesis? First, the results from the first chapter suggest that unilateral sanctions did not work to decrease trade between countries that impose sanctions and sanctioned countries. In the context of the Ottoman Empire, this could be due to the fact that sanctions were not long-lived and only few people participated in boycotts. Additionally, the findings in the first chapter show a negative effect of wars in a year on Ottoman foreign trade, as found in several previous studies on trade (Li and Sacko, 2002; Oneal et al., 2003). The results imply that peace could promote trade between countries as wars lead to lower trade between countries.

Second, the findings in the second chapter suggest that railroads are an effective stimulant for economic growth in connected places, as found by Hornung (2012). The road networks of the Ottoman Empire were not in a good condition before the construction of railroads, which was an important reason for low levels of production and trade. Railroads provided a cheaper way to transport agricultural

goods to ports than before. This is in line with arguments of Inalcik and Quataert (1996; p. 814). Thus the results imply that even if the construction of railroad lines is not motivated by economic purpose, railroads nevertheless facilitate interregional and international trade through decreasing transportation costs.

Finally, the findings in the third chapter do not show a statistically significant effect of foreign bank branches on the profits of the Imperial Ottoman Bank branches. At the first glance, it seems that this does not support the view that foreign bank presence leads to lower profitability of domestic banks through increasing competition. However, the non-effect does not necessarily mean that there was not a positive relationship between foreign banks and competition in the Ottoman Empire which could lead to lower profits of the Imperial Ottoman Bank branches in the respective markets. This is because higher competition due to foreign banks could also decrease costs of the Imperial Ottoman Bank branches through an efficiency improvement channel, which is in line with the arguments of Clay (1994). So, the findings suggest that foreign bank entry could bring important benefits to the domestic economy even in the short-run through forcing banks to work more efficiently, which cancels out the negative impact of foreign banks on profitability of domestic banks. Such is the finding of Lensink and Hermes (2004).

The rest of this thesis is organized as follows: each chapter starts with an introduction and review of the related literature. In the introduction part of the first chapter, I provide a very brief review of the Ottoman foreign trade. The second and third chapters discuss the historical background of railroad constructions and domestic banking sector in the Ottoman Empire after a summary of the previous literature on the impact of railroads and foreign banks. Then hypotheses are

developed to address the research questions. The chapters follow discussions of the data and empirical strategy to be used to test the hypotheses. Finally, I present empirical results which are followed by concluding remarks. Each chapter includes its own appendices and list of references.

References

Anderton, H. and J. R. Carter (2001). "The Impact of War on Trade: An Interrupted Times Series Study". *Journal of Peace Research*. 38(4). pp. 445-57.

Autheman, A. (2002). *The Imperial Ottoman Bank*. Istanbul: Ottoman Bank Archives and Research Centre.

Autheman, A. (2008). "A General Survey of the History of the Imperial Ottoman Bank". in Fraser, I. L., M. Pohle and P. L. Cottrell (eds). *East Meets West Banking, Commerce and Investment in the Ottoman Empire.* UK: Ashgate Publishing Limited. pp. 97-109.

British Parliamentary Paper (1896). *Report by Major Law on Railways in Asiatic Turkey*. 19th Century House of Commons Sessional Papers No. C. 8019. pp.1-21.

Claessens, S., A. Demirgüç-Kunt and H. Huizinga (2001). "How does Foreign Entry Affect the Domestic Banking Markets?". *Journal of Banking and Finance*. 25. pp. 891-911.

Clarke, G., R. Cull, L. D`Amato, and A. Molinari (1999). "The Impact of Foreign Entry on Domestic Banks in Argentina". *The World Bank Development Research Group Policy Research Working Papers No. 2158*.

Clay, C. (1990). “The Imperial Ottoman Bank in the Later Nineteenth Century: A Multinational “National” Bank”. in G. Jones (ed). *Banks as Multinationals*. London. pp. 149-157.

Clay, C. (1994). “The Origin of Modern Banking in the Levant: The Branch Network of the Imperial Ottoman Bank, 1890-1914”. *International Journal of Middle East Studies*. 26. pp. 589-614.

Clay, C. (2008). “State Borrowing and the Imperial Ottoman Bank in the Bankruptcy Era (1863-1877)”. in Fraser, I. L., M. Pohle and P. L. Cottrell (eds). *East Meets West Banking, Commerce and Investment in the Ottoman Empire*. UK: Ashgate Publishing Limited. pp.109-23.

Cottrell, P. L. (2008). “A Survey of European Investment in Turkey, 1854-1914: Banks and the Finance of the State and Railway Construction”. in Cottrell, P. L., M. Pohle and I. L. Fraser (eds). *East Meets West: Banking, Commerce and Investment in the Ottoman Empire*. UK: Ashgate Publishing Limited. pp. 54-97.

Denizer, C. (2000). “Foreign Entry in Turkey's Banking Sector, 1980-97”. *The World Bank Policy Research Working Papers No. 2462*.

Eldem, E. (1997). *135 Yillik bir Hazine Osmanli Bankasi Arsivinde Tarihsel Izler*. Istanbul: Osmanli Bankasi A.S..

Eldem, V. (1994). *Osmanli Imparatorlugu’nun Iktisadi Sartlari Hakkinda Bir Tetkik*. Istanbul: Turk Tarih Kurumu Yayınları.

Erler, M. Y. (2010). *Osmanli Devleti`nde Kuraklik ve Kitlik Olaylari (1800-1880)*. Istanbul: Libra Yayinevi.

Evenett, S. J. (2002). “The Impact of Economic Sanctions on South African Exports”. *Scottish Journal of Political Economy*. 49(5). pp. 557-73.

Frangakis-Syrett, E. (1997). “The Role of European Banks in the Ottoman Empire in the Second Half of the Nineteenth and in the Early Twentieth Centuries”. in Teichova, A., Kurgan-Van Henteruk, G and D. Ziegler (eds). *Banking, Trade and Industry in Europe*. Cambridge: Cambridge University Press. pp. 263-67.

Genc, M. (2009). *Osmanli Imparatorlugu`nda Devlet ve Ekonomi*. Istanbul: Otuken Yayinlari.

Geyikdagi, V.N. (2011). *Foreign Investment in the Ottoman Empire: International Trade and Relations 1854-1914*. London: Tauris Academic Studies.

Great Britain, Parliamentary Papers (1839). “Anglo-Turkish Commercial Convention of 1838”. in Issawi, C. (ed). *The Economic History of the Middle East 1800-1914.* Chicago: University of Chicago Press. pp. 38-41.

Gulsoy, U. (1994). Hicaz Demiryolu. Istanbul: ErenYayinlari.

Gulsoy, U. (2010). *Kutsal Proje – Ortadogu` da Osmanli Demiryollari*. Istanbul: Timas Yayinlari.

Hermes, N. and R. Lensink (2001). “The Impact of Foreign Bank Entry on Domestic Banking Markets: a Note”. *University of Groningen Research Reports No. 01E62.*

Hornung, E. (2012). “Railroads and Micro-regional Growth in Prussia”. *Competitive Advantage in the Global Economy (CAGE) Working Paper Series No. 79.*

Hufbauer, G. C. and B. Oegg (2003). “The Impact of Economic Sanctions on U.S. Trade: Andrew Rose’s Gravity Model”. *Peterson Institute for International Economics Working Papers No. 03-4*.

Hufbauer, G. C., K. A. Elliott, and E. Winston (1997). “Economic Sanctions: Their Impact on Trade, Jobs, and Wages”. *Peterson Institute for International Economics Working Papers*.

Hulagu, M. M. (2010). *The Hejaz Railway: the Construction of a New Hope*. New York: Bluedome Press.

Illich, N. S. (2007). “German Imperialism in the Ottoman Empire: a Comparative Study”. *Unpublished PhD Thesis.* Texas: Texas A&M University.

Inalcik, H. and D. Quatert (1996). *An Economic and Social History of the Ottoman Empire 1300-1914*. Cambridge: Cambridge University Press.

Issawi, C. (1980). *The Economic History of Turkey, 1800–1914*. London: University of Chicago Press.

Issawi, C. (1998). *Cross-cultural Encounters and Conflicts*. New York: Oxford University Press.

Jedwab, R. and A. Moradi (2012). “Revolutionizing Transport: Modern Infrastructure, Agriculture and Development in Ghana”. *LSE Open Access Publications*.

Karkar, Y. N. (1972). *Railway Development in the Ottoman Empire, 1856-1914*. New York: Vantage Press.

Karpat, K. H. (1985). *Ottoman Population 1830-1914: Demographic and Social Characteristics*. Wisconsin: The University of Wisconsin Press.

Kasaba, R. (1993). *Osmanli Imparatorlugu ve Dunya Ekonomisi Ondokuzuncu Yuzyil*. Istanbul: Belge Yayinlari.

Kolars, J. and H. J. Malin (1970). "Population and Accessibility: An Analysis of Turkish Railroads". *The Geographical Review*. 60(2). pp. 229-46.

Lamotte, O. (2012). "Disentangling the Impact of Wars and Sanctions on International Trade: Evidence from Former Yugoslavia". *Comparative Economic Studies*. pp. 1–27.

Lensink, R. and N. Hermes (2004). "The Short-term Effects of Foreign Bank Entry on Domestic Bank Behaviour: Does Economic Development Matter?". *Journal of Banking & Finance.* 28(3). pp. 553-68.

Li, Q. and D. Sacko (2002). "The (Ir)Relevance of Militarized Interstate Disputes for International Trade". *International Studies Quarterly.* 46(1). pp. 11-43.

Long, A. G. (2003). "Defense Pacts and International Trade". *Journal of Peace Research*. 40(5). pp. 537–552.

Oneal, J., B. Russett and M.L. Berbaum (2003). "Causes of Peace: Democracy, Interdependence, and International Organizations, 1885-1992". *International Studies Quarterly*, 47(3). pp. 371-93

Ortayli, I. (2010). *Osmanli Imparatorlugu'nda Alman Nufuzu*. Istanbul: Timas Yayinlari.

Pamuk, S. (1984). *Osmanli Ekonomisi ve Dunya Kapitalizmi, (1820-1913): Ticaret, Sermaye ve Uretim Iliskileri*. Ankara: Yurt Yayinevi.

Pohl, B. (2011). "Spillover and Competition Effects: Evidence from the Sub-Saharan African Banking Sector". *GIGA Working Papers No. 165*.

Quataert, D. (1977). "Limited Revolution: The Impact of the Anatolian Railway on Turkish Transportation and the Provisioning of Istanbul, 1890-1908". *The Business History Review*. 51(2). pp. 139-60.

Quataert, D. (1987). *Avrupa Iktisadi Yayilimi ve Sosyal Direnis 1881-1908*. Ankara: Yurt Yayinlari.

Quataert, D. (2005). *The Ottoman Empire, 1700-1922.* Cambridge: Cambridge University Press.

Schafer, D and O. Talavera (2007). "The Impact of Foreign Banks Entry on Domestic Banks' Profitability in a Transition Economy". *1st Annual Meeting of the Portuguese Economic Journal*. Acores, Portugal: Universidade Dos Acores.

Schoenberg, P. E. (1977). "The Evolution of Transport in Turkey (Eastern Thrace and Asia Minor) under Ottoman Rule, 1856-1918". *Middle Eastern Studies*. 13(3). pp. 359-72.

The Banking Almanac (1895-1914). *The Colonial and Foreign Bank Branches and Bankers.* London: Waterlow and Sons.

Thobie, J. (1991). "European Banks in the Middle East". in Cameron, R. and V. I. Bovykin (eds). *International Banking 1870-1914*. New York: Oxford University Press.

Toprak, Z. (2008). “The Financial Structure of the Stock Exchange in the Late Ottoman Empire”. in Cottrell, P. L., M. Pohle and I. L. Fraser (eds). *East Meets West: Banking, Commerce and Investment in the Ottoman Empire*. UK: Ashgate Publishing Limited. pp. 143-61.

Unite, A. A. and M. J. Sullivan (2003). “The Effect of Foreign Entry and Ownership Structure on the Philippine Domestic Banking Market”. *Journal of Banking & Finance*. 27(12). pp. 23-45.

Von Pressel, W. (1966). “Railway Projects in Turkey, 1872-1900”. in Issawi, C. (ed). *The Economic History of the Middle East 1800-1914.* Chicago: University of Chicago Press. pp. 90-4.

Xu, Y. (2011). “Towards a More Accurate Measure of Foreign Bank Entry and its Impact on Domestic Banking Performance: The Case of China”. *Journal of Banking & Finance*. 35(4). pp. 886-901.

Yang, J, H. Askari, J. Forrer, and H. Teenegen (2004). “US Economic Sanctions: an Empirical Study”. *The International Trade Journal*. 18(1). pp. 23-62.

Chapter 1: The Impacts of Wars and Boycotts on Ottoman Foreign Trade, 1879-1913

1.1 Introduction

Since the Ottoman state primarily aimed to prevent food shortages in the Ottoman Empire, exports were discouraged and imports were not seen as a threat to the economy. The Ottoman state imposed high tariffs on exports and prohibited export of certain goods but it did not restrict imports (Issawi, 1980; p. 74; Issawi, 1998; pp. 90-3; Genc, 2009; pp. 61-9). However, after the 1830s there was a significant change in this situation as the Ottoman Empire started to integrate with the world economy. Accordingly, Ottoman exports increased in nominal terms from 3.7 million pounds in 1830 to 28.4 million pounds in 1913. At the same time, Ottoman imports increased in

nominal terms from 5.3 million pounds in 1830 to 39.4 million pounds in 1913 (Pamuk, 1984; p. 25, p. 140; Pamuk, 1990; p. 199; Quataert, 2005; p. 128).

The main factor that facilitated the integration of the Ottoman Empire to world economy was the economic growth and expansion in Europe, which created huge demand for cheap raw materials from the Ottoman Empire after the 1830s. Furthermore, repeal of the Corn Laws in England led to higher imports to the UK from the Ottoman Empire. Higher demand for raw materials from the Ottoman Empire was positively associated with their prices. Accordingly, productive capacity of the Ottoman Empire improved, and as a result, Ottoman exports increased (Pamuk, 1984; pp. 25-34, p. 48, p. 79; Owen, 2002; p. 111; Quataert, 2005; pp. 131-2). Moreover, the Ottoman Empire signed free trade agreements during the 1830s and 1840s with many European countries, including the UK in 1838. With these free trade agreements, all forms of monopoly in the Ottoman Empire were removed and there was a substantial decrease in trade barriers for foreign merchants. So, cheap products from European countries gradually entered the Ottoman Empire which led to higher imports in real terms (Great Britain, Parliamentary Papers, 1839; pp, 38-40; Issawi, 1980; pp. 74-5; Pamuk, 1984; pp. 19-20; Kasaba, 1993; p. 50; Quataert, 2005; p. 127; Geyikdagi; 2011; pp. 25-8).

Apart from these factors, there were important improvements in merchant shipping in the 1870s which stimulated global and Ottoman trade through decreasing transportation costs. The major European powers[7] built railroads in the Ottoman Empire after 1855 to extend their economic control. Several railroad lines were allocated to places of economic importance. Ports were connected with places that were rich in agricultural resources, with lower transportation costs. Thus, there was

[7] The UK, Austria-Hungary, France, and Germany.

an increase in interregional and international trade in the Ottoman Empire (Karkar, 1972; p. 65, p. 82; Schoenberg, 1977; Quataert, 1977; Pamuk, 1984; pp. 34-9; Inalcik and Quataert, 1996; pp. 810-4; Owen, 2002; p. 113; Quataert, 2005; p. 126; Hanioglu, 2008; p. 137).

There were several key features of trade between the Ottoman Empire and its trading partners. First, the industrial revolution in Europe changed the pattern of trade. The Ottoman Empire had gradually shifted from an exporter of manufactured goods to become an exporter of raw materials and agricultural products by 1913. It began to buy manufactured goods from European countries that were cheap due to industrial revolution[8] —such as steel, metal products, woollen cloths, and glass— as well as colonial goods such as sugar and coffee (Karpat, 1972; Issawi, 1980; 77; Inalcik and Quataert, 1996; p. 833). The main trading partners of the Ottoman Empire were the UK, France, Germany, Austria-Hungary, and Russia. The importance of the UK, France, Russia, and Austria-Hungary for Ottoman foreign trade mainly decreased over time as the share of trade with Germany increased due to political ties between Germany and the Empire and the superior efficiency of German industry[9] (Issawi, 1980; p. 78; Inalcik and Quataert, 1996; p. 833; Ortayli, 2010; pp. 51-63). Finally, exports lagged imports in almost every period although integration of the Ottoman Empire into the world market improved production capacity[10] (Eldem, 1994; pp. 120-4).

[8] Furthermore, higher imports of manufactured goods hampered traditional handicraft industry in the Ottoman Empire (Pamuk, 1984; p. 115; Inalcik and Quataert, 1996; p. 814; Pamuk and Williamson, 2009).
[9] See Table 1.4 in Appendix B.
[10] See Figure 1.2 in Appendix A.

Recent research shows that conflicts are expected to decrease bilateral trade flows[11]. This literature is based on the idea that military interstate conflicts disrupt transportation and communication networks as well as the functioning of markets. This can lead to lower profits and increasing transaction costs for traders. Goods are damaged and lives of traders will be under threat due to military interstate conflicts. So, military interstate conflicts are associated with increasing risks and costs to firms which could likely reduce bilateral trade flows (Anderton and Carter, 2001; Li and Sacko, 2002; Long, 2003; Oneal et al., 2003).

Sanctions have many forms such as trade embargoes or boycotts[12]. Previous studies on the effect of sanctions indicate a negative relationship between sanctions and trade between countries that impose sanctions and the sanctioned countries (Hufbauer et al., 1997; Evenett, 2002; Hufbauer and Oegg, 2003; Yang et al., 2004; Lamotte, 2012). However, another group of studies argues that there may not be a strong relationship, if sanctions are imposed by only one country (i.e. unilateral sanctions). This is because only sanctions that are organized by more than one country (i.e. multilateral sanctions) could induce cooperative behaviour as there are many alternative markets (Elliot, 1998; Caruso, 2003; Peksen, 2006).

Up to 1913 the Ottoman Empire had been involved in several wars. Inalcik and Quataert (1996; pp. 767-8) and Quataert (2005; p. 126) argue that these wars disrupted trade routes and markets which led to lower trade between the Ottoman Empire and its trading partners. Furthermore, in 1908 and 1909 the Ottoman Empire enacted boycotts against several of its trading partners[13] —such as Austria-Hungary

[11] See Li and Sacko (2002), Long (2003), Oneal et al. (2003), and Parlow (2011).
[12] Following trade literature, sanction term refers to financial sanctions, embargoes, and boycotts in my study.
[13] These boycotts were only imposed by the Ottoman Empire, which means that they were unilateral.

due to the annexation of Bosnia-Herzegovina[14]. Quataert (1987; p. 119) and Geyikdagi (2011; pp. 151-2) argue that the boycotts could have led to a decrease in the Ottoman trade with the respective trading partners. However, the impact of boycotts in the Ottoman Empire is not a settled issue. Ortayli (2010; p. 61) argues that boycotts did not have a negative impact on the Ottoman trade with boycotted trading partners. Also, the literature on the effect of wars and boycotts in the Ottoman Empire does not provide econometric evidence on the effect of wars and boycotts. This chapter aims to examine whether wars and boycotts affected the Ottoman foreign trade from 1879 to 1913 from an econometric perspective.

The results in this chapter provide some support for that Ottoman trade with its trading partners was lower in war years, as compared to years without wars. Although it is not possible to test directly the effect of wars on trade routes and markets due to data constraints, the negative impact of wars is consistent with the arguments of Inalcik and Quataert (1996; pp. 767-8) and Quataert (2005; p. 126). This is also parallel to findings by Li and Sacko (2002) and Oneal et al. (2003). Thus, I interpret this finding to mean that wars had a negative effect by damaging trade routes and markets which led to lower profits through increasing transaction costs and risks for merchants[15].

Additionally, different from previous studies on the effect of sanctions, my findings provide no evidence of a negative effect of boycotts. This is not consistent with arguments of Quataert (1987; p. 119) and Geyikdagi (2011; pp. 151-2). However, there is another strand of the historical literature which argues that the

[14] The boycott was organized by the Ottoman state, the Committee of Union and Progress, merchants, and port workers together (Quataert, 1987; p. 104).
[15] From Geyikdagi (2011; p. 154), "*The Commercial Company of Salonica claimed to have incurred heavy losses when the invading Bulgarian army pillaged and burnt its stores and warehouses in Serres and Djoumaya Bala during the First Balkan War*."

boycotts were not successful enough to limit trade between the Ottoman Empire and boycotted trading partners. The boycotts did not have their desired effects, because there were no mass boycotts against the respective trading partners within the Ottoman Empire, particularly in many ports such as Aleppo and Izmir. And the boycotts were not strictly enforced and participation declined after a short time[16] (Quataert, 1987; p. 117; Ortayli, 2010; p. 61). My results suggest that there was no strong effect of boycotts on the Ottoman trade with trading partners that were subjected to boycotts.

This chapter makes three contributions to the previous literature: First, it uses a unique historical dataset which I compiled from various sources. Second, it represents the first empirical attempt to analyse the effects of wars and boycotts on Ottoman trade with its trading partners. And it provides empirical evidence which can shed further light on the debate about the impacts of wars and boycotts in the historical literature. Third, it extends the empirical literature on the effects of conflicts and sanctions by providing empirical evidence from history. Moreover, my results are different from previous research on the impact of sanctions as no empirical studies find an insignificant coefficient estimates for the effect of sanctions for different countries.

The rest of this chapter is structured as follows: the next section reviews the previous literature on the effects of conflicts and sanctions. Section 1.3 presents hypotheses to be tested in this study and corresponding predictions. Section 1.4 outlines the data to be employed in the empirical analysis. Section 1.5 describes the gravity model of trade used to examine the impacts of wars and boycotts. And section

[16] From Quataert (1987; p. 117), "*…people gave up supporting boycott against Austria-Hungary immediately after a short while.*"

1.6 presents the empirical results and introduces a wide range of robustness tests. Section 1.7 concludes.

1.2 The Effects of Conflicts and Sanctions on Trade Flows: Literature Review

In this section, I present the arguments and empirical results of previous studies on the impacts of conflicts and sanctions. A comprehensive review of the previous literature helps to formulate hypotheses on how wars and boycotts affected trade flows between the Ottoman Empire and its trading partners. Additionally, the empirical trade literature gives a conceptual framework in order to specify the model that I use to test the impacts of wars and boycotts.

1.2.1 The Impact of Conflicts on Trade Flows

There are a number of papers in which the gravity model of bilateral trade is used to examine the relationship between interstate conflicts (i.e. diplomatic conflicts and wars)[17] and bilateral trade flows. They find conflicting results for the impact of interstate conflicts on bilateral trade flows. Several studies show a negative relationship between interstate conflicts and bilateral trade flows because of trade restrictions and disruptions in transportation networks and markets (Pollins, 1989a, 1989b; Li and Sacko, 2002; Oneal et al., 2003; Parlow, 2011). However, there is another set of studies that does not find a statistically significant effect of interstate conflicts on bilateral trade flows (Gowa and Mansfield, 1993; Morrow et al., 1999; Long, 2003). Furthermore, there are some recent papers showing that interstate conflicts could be endogenous to bilateral trade flows, which would lead to biased

[17] As a measure of military interstate conflicts, previous studies use a dummy variable for presence of military interstate conflicts between countries in a given year. As a measure of diplomatic conflicts, previous literature uses an index based on the number of diplomatic hostilities between countries in a given year.

OLS estimates. To deal with reverse causality different approaches are used, including instrumental variables (Keshk et al., 2004; Parlow, 2011).

In his early work Pollins (1989a) examines whether diplomatic cooperation between countries is associated with higher bilateral trade flows. He uses data from six countries for the period 1955-78. Also, Pollins (1989b) analyses the impact of diplomatic cooperation on bilateral trade flows, using data from 25 countries for the period 1960-75. He finds a positive relationship between diplomatic cooperation and bilateral trade flows. Pollins (1989a, 1989b) concludes that countries which have friendly diplomatic relations trade more, because diplomatic conflicts between countries always results in the imposition of trade restrictions such as embargoes, which limit bilateral trade flows.

Gowa and Mansfield (1993) focus on the impact of military interstate conflicts (i.e. wars) on bilateral trade flows. Gowa and Mansfield (1993) use data from 7 countries for the period 1905-1985. They provide no evidence that military interstate conflicts leads to lower bilateral trade flows. Morrow et al. (1998) also examine this relationship, using data on 7 countries for the period 1907-1990. They find no statistically significant effect of military interstate conflicts on bilateral trade flows. Additionally, Long (2003) analyses the effect of military interstate conflicts on bilateral trade flows, using data for the period 1885-1990. He argues that military interstate conflicts could damage production and transportation infrastructures which lead to lower bilateral trade flows. However, Long (2003) does not find a statistically significant effect of military interstate conflicts on bilateral trade flows.

In contrast to the results found by Gowa and Mansfield (1993), Morrow et al. (1998), and Long (2003), Li and Sacko (2002) find that military interstate conflicts

have a strong negative effect on bilateral trade flows. They use data from 120 countries for the period 1949-1992 and on 56 countries for the period 1870-1992, respectively. Li and Sacko (2002) conclude that military interstate conflicts disrupt transportation networks and markets. They also lead to higher risks for firms. So, military interstate conflicts increase transaction costs for traders which lead to lower profits and trade between countries. Moreover, there is a positive relationship between military interstate conflicts and trade restrictions, which decreases bilateral trade flows. Free trade between countries increases income, which leads to higher welfare and military expenditures. So, countries that are involved in wars impose trade restrictions on international trade to prevent their adversaries from obtaining gains from free trade, which leads to lower bilateral trade flows. Li and Sacko (2002) also examine the impact of duration and severity of military interstate conflicts on bilateral trade flows: They find negative effects. Li and Sacko (2002) interpret this effect as working through trade restrictions, disruptions in transportation networks and markets, and risks to firms.

Similarly, Oneal et al. (2003) find a strong negative effect of military interstate conflicts on bilateral trade flows, using data over the period 1885-1992. Different from studies cited above Oneal et al. (2003) also address the possibility that bilateral trade flows could have a negative effect on military interstate conflicts. Oneal et al. (2003) show a negative impact of bilateral trade flows on military interstate conflicts. Their interpretation is that free trade results in increased income and welfare in trading partners. These gains lead to higher interdependence among trading partners and as a result, military interstate conflicts decrease. Furthermore, military interstate conflicts are endogenous to bilateral trade flows. To address the reverse causality issue Keshk et al. (2004) use simultaneous equation estimation

approach. They do not provide robust evidence that military interstate conflicts have a negative impact on bilateral trade flows.

Recently, Parlow (2011) also argues that military interstate conflicts could be endogenous to bilateral trade flows. He uses data from 160 countries for the period 1988-2001. In order to address reverse causality issue, Parlow (2011) uses military expenditures of countries in his sample as an instrumental variable for military interstate conflicts. Additionally, Parlow (2011) instruments for military interstate conflicts with its lagged values to mitigate concerns of reverse causality. He finds a strong negative effect of military interstate conflicts on bilateral trade flows. Furthermore, Parlow (2011) shows that military interstate conflicts are endogenous to bilateral trade flows, which could lead to bias in the OLS estimates.

1.2.2 The Impact of Sanctions on Trade Flows

Previous studies of the economic impact of sanctions such as trade embargoes or boycotts[18] have been few in number. Empirical studies use gravity equations to analyse the effect of sanctions on foreign trade. The literature on sanctions also focuses on the effectiveness of different types of sanctions such as unilateral or multilateral sanctions. Previous studies empirically show that economic sanctions lead to lower trade between countries that are subjected to sanctions (i.e. target countries) and countries that impose sanctions (i.e. sender countries).

One of the pioneering studies on the impact of sanctions on trade between target and sender countries is provided by Hufbauer et al. (1997). They examine the impact on US exports of unilateral sanctions —such as embargos— that were

[18] As a measure of sanctions, previous studies use a dummy variable for whether a country imposes a sanction against another country in a given year.

imposed by the US to counter terrorism and drug trafficking. They use data from 88 trading partners of the US for the years 1985, 1990, and 1995. Hufbauer et al. (1997) provide evidence that there is a negative impact of sanctions on US exports to 26 target countries. Similarly, Hufbauer and Oegg (2003) find a negative impact of unilateral sanctions by the US on the US exports to and imports from target countries, using data for the years 1995 and 1999. They also show that there is a negative effect of sanctions on bilateral trade flows. Furthermore, Yang et al. (2004) provide evidence that unilateral sanctions by the US lead to lower trade between the US and target countries.

Caruso (2003) provides a comprehensive study on the impact of sanctions on bilateral trade flows. He argues that sanctions could be more effective if many countries cooperate in imposing them. To this end, Caruso (2003) analyses the effect of unilateral and multilateral sanctions on bilateral trade flows, using data over the period 1960-2000. He finds that both unilateral and multilateral sanctions have a large negative effect on the bilateral trade flows.

Evenett (2002) also examines the impact of multilateral sanctions. He focuses on effect of multilateral sanctions that were placed by the US and EU against South Africa, using data on South African exports for the period 1978-1999. Evenett (2002) finds that multilateral sanctions are associated with lower South African exports to sender countries. Furthermore, he shows that this effect continued even after they were removed.

More recently, Lamotte (2012) carries out a similar analysis focusing on the impact on Yugoslavian trade of sanctions imposed by UN and the UK against Yugoslavia due to war in Bosnia-Herzegovina. Lamotte (2012) uses data on the

former Yugoslavia for the period 1979-1992, which shows a strong negative impact of sanctions on trade between Yugoslavia and countries that place sanctions against it. Additionally, Lamotte (2012) finds that sanctions lead to lower Yugoslavian trade to third countries.

1.3 Hypotheses

In the light of the previous literature on the impacts of conflicts and sanctions, I construct hypotheses based on arguments derived from the historical literature about the effects of wars and boycotts on Ottoman trade.

As argued by Anderton and Carter (2001), Li and Sacko (2002) and Long (2003), wars can disrupt transportation networks and markets, which lead to lower trade between countries due to increasing transaction costs and risks for traders. Similarly, the historical literature argues that wars damaged trade routes that were in use for carrying goods between the Ottoman Empire and its trading partners. For instance, due to wars between 1879 and 1913 the trade route connecting Kayseri and Tokat with Rumelia[19] and Europe declined in importance for the Ottoman economy (Inalcik and Quataert, 1996; pp. 767-8). Quataert (2005; p. 126) also argues that Ottoman foreign trade was low even after wars had finished due to disruption of markets by wars. These historical facts lead to me following hypothesis.

Hypothesis l: *In the years that the Ottoman Empire was involved in a war foreign trade was lower.*

In hypothesis 1, I argue that if wars were taking place, then there would be a decrease in the Ottoman trade. This is possible because wars may damage trade routes

[19] The land of the Ottoman Empire in the Europe was named as Rumelia.

and markets leading to delays in the delivery of goods or unexpected damage which could lead to lower profits due to increasing transactions costs and risks for merchants.

Previous literature on the impact of conflicts argues that wars could lead to imposition of trade restrictions such as boycotts. The historical literature does not provide any information on such boycotts, to the best of my knowledge[20]. Instead, historical facts reveal that there were several boycotts that were organized by the Ottoman Empire, which were not the results of wars.

Between 1908 and 1909, the Ottoman state organized several boycotts against its trading partners, i.e. Austria-Hungary and Bulgaria. It commonly used boycotts as a political weapon to try and hurt the economic interest of a country. For instance, the driving force behind the boycott of Austro-Hungarian trade was the annexation of Bosnia-Herzegovina by Austria-Hungary in 1908 (Quataert, 1987; pp. 103-117; Kent, 1996, p. 12; Cetinkaya, 2010; Ortayli, 2010; p. 61; Geyikdagi, 2011; pp. 151-2; Sohrabi, 2011; p. 182). Quataert (1987; p. 119) and Geyikdagi (2011; p. 152) argue that the boycott led to a decrease in Ottoman imports from Austria-Hungary. Furthermore, Ottoman exports to Austria-Hungary could be negatively affected by the boycott, because Austro-Hungarian ships were forced to leave ports in the Ottoman Empire[21]. Based on this example, I test following hypothesis.

[20] Shaw and Shaw (1977; p. 290) argue that there was a boycott against Italy due to the war between 1911 and 1912. However, the other sources do not provide information for such a boycott. Even though I do not report it here, findings in my research do not change after taking into account the presence of a boycott against Italy in 1911.

[21] See Figure 1.3 in Appendix C, which shows a significant decrease in Ottoman imports from Austria-Hungary in 1908 as Ottoman exports to Austria-Hungary decreased slightly. On the other hand, there was an increase in Ottoman exports and imports with Bulgaria in 1908 and 1909.

Hypothesis 2: *The boycotts that were imposed by the Ottoman state against several of its trading partners had a negative impact on trade between the Ottoman Empire and its trading partners.*

As shown in previous studies on the impact of sanctions, Hypothesis 2 suggests that if a boycott that was placed by the Ottoman state against a trading partner was effective, then there should be a decrease in trade between the Ottoman Empire and boycotted trading partner.

1.4 Data

To investigate the impacts of wars and boycotts on the Ottoman trade with its trading partners, following Summary (1989), Jacks and Pendakur (2008), and Kavallari et al. (2008)[22], I use a gravity model which predicts trade based on distances, incomes, and other characteristics. As in Li and Sacko (2002), the dependent variable is the sum of Ottoman exports and imports of goods[23] for the period 1879-1913[24] (*T*). My data come from Pamuk (1995; pp. 68-77). The sample is an unbalanced panel on 21

[22] Based on data for the US and UK, Summary (1989) and Jacks and Pendakur (2008) use standard gravity equation to examine the impact of political factors and transport improvements on the US and UK trade with their trading partners, respectively. Based on data for imports of Germany from its 14 trading partners, Kavallari et al. (2008) also use standard gravity equation to investigate the determinants of German imports of olive oil.

[23] Between 1879 and 1913, the Ottoman Empire bought and sold several goods such as live animals, wheat, vegetables, sugar, olive oil, glass, woollen cloths, cars, and machines. One concern with the Ottoman export and import data is that the data do not contain information on imports of farm machines and vehicles in addition to weapons before 1898, and on exports and imports of tobacco before 1907 (Pamuk, 1995; pp. 3-4). Furthermore, there is no detailed information available for whether the Ottoman exports and imports of goods were valued on an f.o.b. or c.i.f basis (Pamuk, 1995; pp. 5-6). Another concern with the Ottoman export and import data is that there could be measurement errors in the data, which could arise from reporting issues and technical errors (Pamuk, 1995; p. 1).

[24] Although export and import data are available for the period 1878-1913, the final sample contains data over the period 1879-1913. This is because several independent variables in my model are lagged one year to mitigate concerns of bias due to reverse causality as one of trading partners of the Ottoman Empire (i.e. Bulgaria) was part of the Ottoman Empire in 1877, as shown in Figure 1.1. I also estimate regressions using current values of the variables in question. This does not make a difference in the results.

countries[25] (the Ottoman Empire trading partners) over the period 1879-1913[26]. All values are expressed in British pounds in my study[27].

There are some missing observations in export and import data for several years —such as the years between 1901 and 1904. Following Kalemli-Ozcan and Nikolsko-Rzhevskyy (2009), I extrapolate missing values under the assumption of constant growth using the average annual growth rate of the years for which export and import data are available[28]. Furthermore, all values in Pamuk (1995; pp. 68-77) are expressed in gold liras. Since exchange rates between trading partners` currencies and the Ottoman gold lira remained stable over the sample period because of the gold standard, prices were relatively stable[29] (Pamuk, 2004; Kalemli-Ozcan and Nikolsko-

[25] The trading partners of the Ottoman Empire were Germany, Austria-Hungary, Bulgaria, France, Netherlands, UK, Italy, Romania, Russia, Serbia, Montenegro, US, Belgium, Sweden, Switzerland, Japan, Iran, Spain, Denmark, Tunisia, Egypt, and Greece. In Pamuk (1995), the Ottoman export and import data are also available for Samos (i.e. Sisam) over the sample period. Samos was an island and an autonomous principality from 1835. Samos joined Greece in 1912. So, Samos is considered as a part of Greece in this study. Also, Serbia and Montenegro is considered as one country due to unavailability of GDP and GDP per capita data for Montenegro which was an independent country from the Ottoman Empire after 1877. Finally, following Pamuk (1978), Bulgaria, Tunisia, and Egypt are considered as independent from the Ottoman Empire over the sample period.

[26] As Morea gained independence from the Ottoman Empire in 1826, northern Greece was part of the Ottoman Empire before 1913, as shown in Figure 1.1. So, in this study Greece is considered as a separate country from the Ottoman Empire only after 1912, as its size changed. I estimate regressions using a balanced sub-sample of my data, which leads to a decrease in the number of observations from 701 to 700. This exercise does not change the results in column (3) of Table 1.1. Also, in column (1) of Table 1.10 of Appendix B, I run regressions after considering Greece as an independent country from the Ottoman Empire over the sample period. This leads to an increase in sample size to 735. The results do not change in terms of statistical significance and direction of relationship (See also column (1) of Table 1.3 and column (2) of Table 1.10 of Appendix B).

[27] All values in Pamuk (1995) are expressed in gold liras. The Ottoman lira was the currency of the Ottoman Empire between 1844 and 1923. After 1844, the Ottoman lira was tied to gold, i.e. gold lira (Inalcik and Quataert, 1996; p. 971). Over the period 1850-1914, 1 British pound equals 1.10 Ottoman gold liras (Inalcik and Quataert, 1996; p. 972). So, using Ottoman exports and imports expressed in gold liras does not matter. I convert them to British pounds using the exchange rate, because this is a similar methodology applied by Kalemli-Ozcan and Nikolsko-Rzhevskyy (2009). They use data from the Ottoman Empire for the period 1859-1913 to examine the relationship between the Ottoman trade and financial flows of Germany, UK, and France into the Ottoman Empire.

[28] Missing values arise from reporting or collecting issues (Pamuk, 1995; p. 1). I estimate regressions after dropping missing observations, which leads to a decrease in sample size to 610. This does not change the results. So, missing values may not lead to bias in the OLS estimates. Furthermore, this could suggest that extrapolation is appropriate for my study.

[29] Additionally, the metal content of Ottoman lira was constant between 1844 and 1923, as the Ottoman state abandoned debasement (Inalcik and Quataert, 1996; p. 971).

Rzhevskyy, 2009; Tuncer, 2012). So, the data on Ottoman exports and imports in my study are treated as constant prices[30].

To investigate the impact of wars on Ottoman foreign trade, I use a dummy variable to indicate if the Ottoman Empire was involved in a war during any given year (W)[31]. The historical data on wars come from the dataset of militarized interstate disputes (MID) created by Correlates of War Project. Correlates of War Project contains detailed information on a number of interstate wars and duration of interstate wars for the period 1816-2007. Between 1879 and 1913, the Ottoman Empire was involved in wars with its trading partners (i.e. Greece, Romania, Italy, Serbia-Montenegro, and Bulgaria) in different years[32]. These wars led to high mortality rates. Furthermore, the Ottoman Empire lost almost all its territories in Rumelia after the Ottoman Empire had been defeated by Bulgaria, Serbia, and Montenegro between 1911 and 1913[33] (Inalcik and Quataert, 1996; pp. 767-8).

[30] It seems that I could control for the effect of price changes and inflation through year fixed effects (γ_t) in equation (1.1) that capture shocks common to its trading partners, as prices remained stable between 1879 and 1913 (Pamuk, 2004). Also, the statistical significance of the coefficient estimates for the effects of wars and boycotts in column (3) of Tables 1.1 and 1.3 does not change when I re-estimate regressions after Ottoman exports and imports are deflated by the Istanbul consumer price index (See columns (3)-(4) of Table 1.10 in Appendix B). This implies that figures in Pamuk (1995) could be reflective of real values. The data for consumer price index of Istanbul are taken from Pamuk (2000; p. 18). In the previous literature on trade, both real and nominal trade flows are used. Several studies (Eichengreen and Irwin, 1995; Mansfield and Bronson, 1997; Morrow et al., 1999; Li and Sacko, 2002; Gowa and Mansfield, 2004; Keshk et al., 2004) use real trade data to examine the determinants of bilateral trade flows. Furthermore, as argued by Morrow et al. (1999) and Keshk et al. (2004), use of the Ottoman exports and imports in constant prices could minimize the effects of price changes and inflation over time due to wars.

[31] Previous studies on the impact of conflicts commonly use dummy variable for presence of interstate conflicts in a year. Several studies also use a dummy variable which equals 1 for each year after the wars and number of wars in a year. On the other hand, I do not construct this dummy, because there were wars that the Ottoman Empire was involved in different years such as 1897, 1911, 1912, and 1913. Also, there was only one war that the Ottoman Empire was involved in a year.

[32] See Table 1.11 in Appendix C which indicates that 11 percent of 701 trading partner-year observations represent war years, on average.

[33] Wars lasted about 7 months, on average. So, there could be a weak impact of wars on Ottoman foreign trade on the contrary to that of WWI which lasted 4 years and led to a substantial decrease in Ottoman foreign trade between 1914 and 1918 through damaging domestic industry. Additionally, the negative effect of WWI was positively associated with trade restrictions that were placed by the UK, Russia, and France against the Ottoman Empire (Pamuk, 2009; pp. 118-20). Over the sample period, most of the wars were in Rumelia as there was a war that was located in land of the Ottoman Empire

To examine the impact of boycotts on Ottoman foreign trade, I use a dummy variable to indicate if there was a boycott imposed by the Ottoman state against one of its trading partners in a given year (*B*). The necessary information to construct this dummy variable is obtained from Quataert (1987; pp. 103-117), Kent (1996, p. 12), Cetinkaya (2010), Ortayli (2010; p. 61), Geyikdagi (2011; pp. 151-2), and Sohrabi (2011; p. 182). These sources provide detailed information on when boycotts were placed by the Ottoman state, countries that the Ottoman state imposed boycotts against, and reasons for the boycotts. Between October 1908 and February 1909, the Ottoman state organized boycotts against Austria-Hungary and Bulgaria[34] due to political reasons[35] (Quataert, 1987; pp. 103-117; Geyikdagi, 2011; p. 151).

Additionally, the model includes standard gravity variables: GDP (Gross Domestic Product) and GDP per capita of the Ottoman Empire and its trading partners (*G* and *GP*)[36], distance between capital city of the Ottoman Empire (i.e.

---

within border of today`s Libya. This could suggest that wars mainly damaged trade routes, ports, and markets in Rumelia such as the port in Salonika. Furthermore, only trade between Ottoman Empire and several of its trading partners such as Germany, Russia, and Austria-Hungary was disrupted by wars severely as trade with these partners was primarily conducted through the Rumelia (Pamuk, 1984; p. 28). However, Issawi (1980; pp. 103-8) shows that trade through Izmir port decreased due to wars although Izmir was not directly affected during the wars. Also, there was a decrease in trade with the UK and France in war years. Finally, Inalcik and Quataert (1996; p. 768) argue that wars disrupted trade routes connecting Anatolia with Europe and the Caucasus which could lead to lower trade with its trading partners in Europe –such as Bulgaria, Greece, Romania— and Russia. (See also footnote 50).

[34] See Table 1.11 in Appendix C which shows that 1 percent of 701 trading partner-year observations represent boycotts, on average.

[35] Ortayli (2010; p. 61) and Sohrabi (2011; p. 182) argue that the Ottoman Empire also organized boycotts against Germany and Italy between 1908 and 1909. However, none of the other sources (Quataert, 1987; pp. 103-117; Kent, 1996, p. 12; Cetinkaya, 2010; Geyikdagi, 2011; p. 151) provide information for such boycotts. I also estimate regressions taking into account the presence of boycotts against Germany and Italy. As shown in column (1) of Table 1.5, this exercise does not change the statistical significance of boycotts. Finally, Gocek (2002; p. 25) and Cetinkaya (2010; pp. 7-8) argue that there was a boycott of Greek trade between 1909 and 1911 due to fact that Crete joined Greece in 1909. In my study, Greece is considered as an independent country from the Ottoman Empire after 1912. On the other hand, I run regressions after considering Greece as a separate country from the Ottoman Empire over the sample period and taking into account presence of boycott against Greece. The findings are presented in column (2) of Table 1.5. The findings do not change in terms of statistical significance and direction of relationship (See also column 1 of Table 1.10).

[36] Several studies in the previous literature on trade use population instead of GDP per capita. I also re-estimate regressions using population of the Ottoman Empire and its trading partners as independent

Istanbul) and capital city of a trading partner (*D*), and finally dummy variables for colonial relationship, contiguity, common religion, landlocked trading partners, and free trade agreements (*C*, *CB*, *CR*, *L,* and *F*).

GDP and population data for the Ottoman Empire are available in Eldem (1994; p.14, pp. 230-31) and Behar (1996; pp. 51-6). In Eldem (1994), GDP data are expressed in constant prices (base year 1913) and in kuruses[37]. As the export and import data I use are in British pounds, I convert them to British pound using exchange rate[38]. The data on exchange rate come from Inalcik and Quataert (1996; pp. 972-3). There are missing values in the GDP and population data. Missing observations are extrapolated under the assumption that GDP and population grew at a constant rate equal to the rate of growth in the years for which GDP and population data are available, following Kalemli-Ozcan and Rzhevskyy (2009). Based on the extrapolated data, I construct GDP per capita of the Ottoman Empire.

GDP and GDP per capita data for trading partners of the Ottoman Empire come from Maddison (2003; pp. 5-200)[39]. Some countries —such as Bulgaria, Russia, and Romania— have missing values for several years. Missing values in Maddison (2003; pp. 5-200) are extrapolated by using the average annual growth rate of the years for which GDP and GDP per capita data are available, as in Gowa and Mansfield (2004). All values in Maddison (2003) are expressed in 1990 US dollars as the rest of the data I use is in 1913 British pounds. Following Kalemli-Ozcan and Rzhevskyy (2009), I first convert them to 1913 US dollars by using consumer price

variables, which does not make difference to the results. The model in this study includes GDP per capita of the Ottoman Empire and its trading partners, as in Santos Silva and Tenreyro (2005).

[37] Kurus was an Ottoman currency subunit. 1 Ottoman gold lira equals 100 kuruses (Inalcik and Quataert, 1996; p. 971).

[38] Between 1850 and 1914, the exchange rate between Ottoman gold lira and British pound was constant. 1 British pound equalled 1.10 Ottoman gold liras (Inalcik and Quataert, 1996; p. 972).

[39] GDP and GDP per capita data of Yugoslavia in Maddison (2003) are used as a proxy for GDP and GDP per capita of Serbia-Montenegro in my sample.

index deflator, and then convert them into 1913 British pounds using exchange rate[40]. The data for the consumer price index deflator and exchange rate come from Kalemli-Ozcan and Rzhevskyy (2009).

Additionally, as a proxy for transportation costs the model includes the shortest distance between the capital city of the Ottoman Empire and capital city of a trading partner due to current data availability[41], following previous studies on trade. I construct the variable in question using ArcGIS software measured as kilometres. Data on colonial relationship, landlocked trading partners and whether the Ottoman Empire and trading partners had a common religion[42] or border come from Pamuk (1987; p. 22), Mayer, T. and S. Zignago (2011), Stinnett et al. (2002), and Gleditsch and Ward (2001). For instance, as shown in Figure 1.1 Bulgaria was a part of the Ottoman Empire before 1878 as the Ottoman Empire and Bulgaria had a common border in 1878. Majority of population in the Ottoman Empire, Egypt, Tunisia, and Iran was Muslim. Finally, Switzerland was a landlocked country.

Following Santos Silva and Tenreyro (2005) I also use a dummy variable for whether Ottoman Empire signed free trade agreements with its trading partners

[40] Although scaling of prices does not matter as I take logarithm of these variables, this is similar methodology applied by Kalemli-Ozcan and Rzhevskyy (2009) who use logarithm of the GDP for several of its trading partners. Between 1830 and 1914, the exchange rate between US dollar and British pound was constant. 1 US dollar equals 0.205 British pounds.

[41] Previous trade literature also uses freight rates instead of distance, because distance may not be a good proxy for transportation costs. Isserlis (1938), North (1958), and Mohammed and Williamson (2004) contain detailed information on freight rates on UK and US trade with rest of the world between 1750 and 1950. Furthermore, Pamuk (1978; pp. 188-91) and Pamuk (1984; pp. 147-8) provide detailed information on an index that freight rates on the Ottoman foreign trade with its several trading partners could be calculated over the period 1830-1913. However, this information is not available for all routes from the Ottoman Empire to its trading partners, particularly for most of its trading partners that the Ottoman Empire was involved in wars.

[42] Previous studies on trade use dummy variables for whether countries have a common language or religion to control for language and cultural similarity between countries. There were many languages that were used within the Ottoman Empire as most of people were Muslim. So, I only use a dummy variable for whether the Ottoman Empire and its trading partners had a common religion.

between 1838 and 1913 (F)[43]. The data for free trade agreements come from Kasaba (1993; p. 50) and Ortayli (2010; p. 57). During this period, the Ottoman state signed free trade agreements with UK, France, Germany, USA, Sweden, Norway, Netherland, Belgium, and Denmark. After the free trade agreements were signed, there was an increase in the Ottoman exports and imports in constant terms (Geyikdagi, 2011; p. 25).

To test the robustness of the baseline results, I use an alternative data set on the Ottoman exports and imports that is of superior quality. These data come from Pamuk (1978; pp. 213-34) who provides detailed information on the Ottoman foreign trade with 18 of its trading partners over the period 1830-1913[44]. All values in Pamuk (1978) are expressed in current British pounds. The Ottoman export and import data are deflated by the consumer price index of Istanbul (base year 1913). The data for the price index of Istanbul are taken from Pamuk (2000; pp. 14-8)[45]. There are only few available observations on GDP, GDP per capita, and population for the Ottoman Empire and some of its trading partners —such as Serbia, Russia, Bulgaria, and

[43] I use a dummy variable that does not vary by time, because most of the free trade agreements were signed by the Ottoman State between 1838 and the 1840s. In 1838, the first trade agreement was signed between the Ottoman Empire and the UK (Kasaba, 1993; p. 50).

[44] In Pamuk (1978), the Ottoman exports and imports of goods are given in f.o.b. and c.i.f prices, respectively. The trading partners of the Ottoman Empire were Austria-Hungary, Belgium, Bulgaria, Egypt, France, Germany, Greece, Iran, Italy, Netherlands, Romania, Russia, Serbia, UK, and US as other countries are summed as "other countries". Other countries include Switzerland, Spain, and Sweden. The sample comprises of an unbalanced panel with 1051 trading partner-year level observations for several reasons. There are a couple of missing observations. Ottoman export and import data are only available for several of its trading partners (e.g. Germany) after 1877. Several countries (e.g. Greece and Bulgaria) gained their independence from the Ottoman Empire in different years.

[45] All values in Pamuk (2000) are expressed in akces. Akce was silver coin. I convert the Istanbul consumer price index to British pounds using exchange rates in Pamuk (1978; p. 200) and Inalcik and Quataert (1996; pp. 971-3). The base year is changed to 1913. Also, there are couple of missing observations in data for consumer price index of Istanbul. Missing values are extrapolated under the assumption that price level grew at a constant rate equal to the rate of growth in the years for which consumer price index of Istanbul data are available. Finally, I re-estimate regressions after the Ottoman export and import data in Pamuk (1978) are deflated by consumer price index of the UK (base year 1913). Additionally, I run regressions without deflating the Ottoman export and import data. These do not make a difference in the results in column (1) of Table 1.3 (See columns (5) and (6) of Table 1.10 in Appendix B).

Romania between 1830 and 1913. Missing values are extrapolated under the same assumption as before. Based on the Ottoman export and import data in Pamuk (1978), extrapolation of missing values may not be reliable. This is why I estimate regressions using the data in Pamuk (1978) to check robustness of the baseline findings.

As another robustness test of the baseline results, I run regressions using some additional control variables that may affect the Ottoman trade with its trading partners. Following Jacks and Pendakur (2010), I use the logarithm of the average tariff rates in the Ottoman Empire and its trading partners in a given year. The data for average tariff rates come from Clemens and Williamson (2004). Average tariff rates are calculated as the total revenue from import duties divided by the value of total imports in a country in a given year. This means that average tariff rates show the general level of protection in the Ottoman Empire and its trading partners. There is no available information for country-pair-specific tariff rates. Lastly, the data on average tariff rates are only available for 14 trading partners of the Ottoman Empire over the sample period[46]. This is why I exclude these variables from the main regression.

Following Gowa and Mansfield (2004) who find a positive impact of political-military alliances on trade between allies, I use a dummy variable which equals 1 if the Ottoman Empire and its trading partner were political-military allies in a given year, and zero otherwise. They argue that governments are likely to liberalize trade with allies, because free trade between countries leads to an increase in income, welfare, and resources for their military expenditures. The data on alliances come

[46] These trading partners of the Ottoman Empire were Austria-Hungary, Denmark, Egypt, France, Germany, Greece, Italy, Japan, Russia, Serbia-Montenegro, Spain, Sweden, UK, and US.

from the dataset of alliances in Correlates of War Project. Between 1878 and 1880, there was a political-military alliance between the Ottoman Empire and UK. Apart from this variable, I use a dummy variable which takes the value 1 if a trading partner of the Ottoman Empire was involved in wars with other countries in a given year, and zero otherwise. The data for wars are taken from the dataset of militarized interstate disputes (MID) in Correlates of War Project.

Finally, I use a dummy variable which equals 1 if there were railroad lines in the Ottoman Empire that were operated by firms of a trading partner in a given year, and zero otherwise[47]. Historical literature shows that the firms of the major European powers built and operated railroads in the Ottoman Empire to import raw materials and products easily. Thus, there could be an increase in trade between the Ottoman Empire and trading partners whose firms constructed and operated railroad lines after the railroad lines had been in operation (Karkar, 1972; p. 65). The data on railroads come from Geyikdagi (2011; pp. 89-90) who provides detailed information on foreign firms that constructed and operated railroad lines, and when construction of railroad lines began and finished[48].

1.5 Empirical Approach

In this section, I present a gravity model to analyse the impacts of wars and boycotts on the Ottoman trade with its 21 trading partners. In the first hypothesis, wars in a year are expected to decrease the Ottoman trade with its trading partners. In the

[47] This dummy variable also captures the effect of foreign direct investments on Ottoman foreign trade. The share of railroad construction in total foreign direct investments was 33.4 percent in 1888 as it was 63.1 percent in 1914 (Pamuk, 1984; pp. 64-5). Pamuk (1978; p. 117) and Pamuk (1984; pp. 167-170) contain information on composition of foreign direct investments between 1859 and 1914. I do not use this data due to missing observations. Additionally, there is only available information for French, British, and German foreign direct investments while other countries are summed as "other countries".
[48] The first railroad line in the Ottoman Empire began to be built by a British firm in 1856. Between 1856 and 1914, British, French, German, and Austro-Hungarian firms constructed and operated several railroad lines (Geyikdagi, 2011; pp. 89-90).

second hypothesis I argue that boycotts by the Ottoman state against its trading partners would lead to lower trade between Ottoman Empire and boycotted trading partners. To test these hypotheses, I run the following standard gravity regression of trade[49]:

$$\log(T_{OEjt}) = \beta_0 + \beta_1 W_{OEt-1} + \beta_2 B_{OEjt-1} + \beta_3 \log(D_{OEjt}) + \beta_4 \log(D_{OEjt}) \times Trend_t + \beta_5 \log(G_{OEt-1}) + \beta_6 \log(GP_{OEt-1}) + \beta_7 \log(G_{jt-1}) + \beta_8 \log(GP_{jt-1}) + \beta_9 C_{OEj} + \beta_{10} CB_{OEj} + \beta_{11} CR_{OEj} + \beta_{12} L_{OEj} + \beta_{13} F_{OEj} + \gamma_t + \rho_j + u_{OEjt} \quad (1.1)$$

where *OE*, *j*, and *t* index the Ottoman Empire, its trading partner, and year, respectively. $\log(T_{OEjt})$ is logarithm of trade between the Ottoman Empire and trading partner *j*, in year *t,* expressed in constant British pounds. It is calculated as $\log(T_{OEjt})=\log(Exports_{OEjt}+Imports_{OEjt})$, where $Exports_{OEjt}$ is exports of the Ottoman Empire to trading partner *j*, in year *t,* expressed in constant British pounds as $Imports_{OEjt}$ is imports of the Ottoman Empire from trading partner *j*, in year *t,* expressed in constant British pounds. W_{OEt-1} is a dummy variable which equals 1 if there was a war that the Ottoman Empire was involved in year *t-1*, and zero otherwise[50]. B_{OEjt-1} takes 1, if there was a boycott that was organized by the Ottoman Empire against trading partner *j*, in year *t-1,* and zero otherwise[51].

[49] Following the previous studies on trade, I estimate a standard log-linear specification of the gravity equation for trade. So, I take logarithms of T_{OEjt}, D_{OEjt}, GO_{t-1}, G_{jt-1}, GPO_{OEt-1}, and GP_{jt-1}. Also, taking logarithm of them make the estimates less sensitive to extreme observations (Wooldridge, 2009; p. 184).

[50] W_{OEt-1} only varies by time, because wars between the Ottoman Empire and its trading partners in a year disrupted trade routes and markets, which could lead to a decrease in the Ottoman trade with both its trading partners that were involved in wars and its other trading partners. For instance, after wars between the Ottoman Empire and its former colonies such as Bulgaria in 1878, there was a decrease in Ottoman trade with Russia and Austria-Hungary (Pamuk, 1984; p. 28). After 1878, the shares of Russia and Austria-Hungary in Ottoman foreign trade mainly decreased, as shown in Table 1.4. On the other hand, I re-estimate the regression using a dummy variable that varies by both time and its trading partners instead of W_{OEt-1}. The results are presented in column (1) of Table 1.6. Additionally, wars could have a larger effect on Ottoman trade with countries in the West in comparison to Ottoman trade with countries in the East as western part of the Ottoman Empire was affected by wars more severely.

Furthermore, the model includes standard gravity variables and fixed effects. $\log(D_{OEjt})$ is logarithm of the shortest distance between capital city of the Ottoman Empire and capital city of trading partner *j,* as a proxy of transportation costs. Following Head et al. (2009), I also use the interaction of $\log(D_{OEjt})$ with time trend ($Trend_t$) to examine how transportation costs had changed over time. $\log(G_{OEt-1})$ and $\log(G_{jt-1})$ are logarithms of the GDP of the Ottoman Empire and trading partner *j,* in year *t-1*. $\log(GP_{OEt-1})$ and $\log(GP_{jt-1})$ are logarithms of the GDP per capita of the Ottoman Empire and trading partner *j,* in year *t-1*[52].

C_{OEj} is a dummy variable which equals 1 if trading partner *j* was a part of the Ottoman Empire before 1913, and zero otherwise. CB_{OEj} takes the value 1 if the Ottoman Empire and trading partner *j* shared a common border, and zero otherwise. CR_{OEj} is a dummy variable which equals 1 if the Ottoman Empire and trading partner

---

In column (2) of Table 1.6, I run my regression after dropping its trading partners in the East. These do not change the results very much. Finally, there were wars that the Ottoman Empire was involved in with its trading partners before the sample period. These wars could affect the Ottoman foreign trade. It seems that I could control for the effect of these wars through trading partner fixed effects (p_i) that capture time-invariant cross-trading partner differences in history.

[51] Previous literature on the impacts of conflicts and sanctions argue that wars and sanctions could be endogenous to trade. So, in order to mitigate concerns of bias due to reverse causality, I take one lag of wars and boycotts variables (W_{OEjt-1} and B_{OEjt-1}), as in Gowa and Mansfield (1993), and Li and Sacko (2002). Given the lack of available historical data on the Ottoman Empire and its several trading partners, it is not possible to construct instrumental variables for wars and boycotts in this study. The variables are only lagged one year as Bulgaria was part of the Ottoman Empire in 1877. Also, I re-estimate regressions after exclusion of Bulgaria and the variables in question are lagged more than one year, which does not make difference to the results. Moreover, I use lagged values of the variables in question as instruments for wars and boycotts following Parlow (2011), which does not change the results. So, it seems that reverse causality is not an important concern in this study.

[52] Bergstrand (1985, 1989) and Rahman (2009) argue that GDP and GDP per capita could not be endogenous to trade in the gravity model, because a gravity model is a reduced form equation of a general equilibrium of demand and supply systems. On the other hand, Li and Sacko (2002) address the possibility that GDP and GDP per capita could be endogenous to trade. So, in order to deal with reverse causality, GDP and GDP per capita of the Ottoman Empire and its trading partners are entered in the regression with their one-year lagged values (G_{OEt-1}, G_{jt-1}, GP_{OEt-1}, and GP_{jt-1}), following Li and Sacko (2002). The variables in question are only lagged one year, because Bulgaria was part of the Ottoman Empire before 1878. The results are not sensitive to re-estimating model with more than one lags of the variables in question after exclusion of Bulgaria from the analysis. Furthermore, I use lagged values of the variables in question as instruments for GDP and GDP per capita of the Ottoman Empire and its trading partners following Anderson (1979), which does not make difference to the results. In sum, endogeneity of GDP and GDP per capita is not an important problem in this study. The data on GDP and GDP per capita of the Ottoman Empire and its trading partners before 1878 come from Maddison (2003).

j shared a common religion, and zero otherwise. L_{OEj} takes the value 1 if trading partner j was landlocked, and zero otherwise. F_{OEj} is a dummy variable which equals 1 if the Ottoman Empire signed a free trade agreement with trading partner j between 1838 and 1913, and zero otherwise. p_j are trading partner fixed effects to control for unobservable time-invariant trading partner characteristics (e.g. average trade barrier facing all trading partners). y_t are year fixed effects that capture shocks (e.g. global price depression and financial crises) common to all trading partners of the Ottoman Empire. Finally, u_{OEjt} is the error term[53], coefficients of interest are β_1 and β_2.

A negative coefficient estimate of β_1 would provide evidence for hypothesis 1, as it implies that when the Ottoman Empire was involved in wars, its trade decreased. If boycotts by the Ottoman Empire against its trading partners were effective, then there is evidence supporting hypothesis 2. That is $\beta_2<0$.

$\log(D_{OEjt})$ is an indicator for transportations costs. An increase in the distance between the Ottoman Empire and its trading partners led to higher transportation costs (Mansfield and Bronson, 1997; Egger, 2002; de Groot et al., 2004), and resultantly, the Ottoman foreign trade would decrease, which would imply a negative β_3. In addition to $\log(D_{OEjt})$, the model includes the interaction of $\log(D_{OEjt})$ with time trend ($Trend_t$). Jacks and Pendakur (2010) argue that there was an improvement in transport technology in the late nineteenth century, which led to lower transportation costs over time. This is seen as an important driving force for increasing international trade flows[54]. A positive β_4 suggests that geographic distance had become a less

[53] Standard errors are clustered at the country level. Since there are 21 trading partners of the Ottoman Empire in the sample, number of clusters is few, which could cause a downward bias in the standard errors. However, the results are not sensitive to using bootstrap-t procedure, which is suggested by Cameron et al. (2008) to reduce any bias in the standard errors when number of clusters is not large.

[54] Furthermore, there were several railroad lines that were built in different parts of the Ottoman Empire between 1856 and 1913, which facilitated the Ottoman exports and imports through decreasing transportation costs (Karkar, 1972; p. 65, p. 75; Pamuk, 1984; p. 33).

important factor in the Ottoman foreign trade over time due to this changing technology.

Economic sizes of the Ottoman Empire and its trading partners are measured by $\log(G_{OEt-1})$ and $\log(G_{jt-1})$, respectively (Rahman, 2009). Higher $\log(G_{OEt-1})$ and $\log(G_{jt-1})$ would be positively related to production capacity and sizes of markets in the Ottoman Empire and its trading partners, which led to both higher exports of the Ottoman Empire to its trading partners and imports of the Ottoman Empire from its trading partners[55]. That is $\beta_5>0$ and $\beta_7>0$.

$\log(GP_{OEt-1})$ and $\log(GP_{jt-1})$ are used in order to control for level of economic development in the Ottoman Empire and its trading partners, respectively (Li and Sacko, 2002). Higher $\log(GP_{OEt-1})$ and $\log(GP_{jt-1})$ would be positively associated with purchasing ability of the Ottoman Empire and its trading partners, which would imply $\beta_6>0$ and $\beta_8>0$.

As argued by previous studies on trade, if the Ottoman Empire and a trading partner had shared a colonial relationship, a common border, and a common religion, then the Ottoman Empire would trade more with the respective trading partner due to strong social, cultural, historical, and economic ties as compared to the other trading partners (Li and Sacko, 2002; Rose, 2002; de Groot et al., 2004; Liu, 2009), i.e. $\beta_9>0$, $\beta_{10}>0$, and $\beta_{11}>0$.

If a trading partner of the Ottoman Empire had been a landlocked country, this would lead to lower the Ottoman trade with the respective trading partner, due to high transportation costs (Felipe and Kumar, 2010). That is $\beta_{12}<0$.

[55] For instance, income expansion in Europe after the 1890s had created an explosion in the demand for cheap agricultural products and mineral resources of the Ottoman Empire, which led to an increase in the Ottoman exports (Pamuk, 1984; p. 32; Inalcik and Quataert, 1996; p. 852).

As argued by Issawi (1980; p. 76), Pamuk (1984; pp. 20-6) and Kasaba (1993; pp. 50-1), if free trade agreements had made the Ottoman foreign trade more open, then the Ottoman Empire would trade more with trading partners that free trade agreements were signed as compared to the other trading partners, which implies $\beta_{13}>0$.

Finally, γ_t are year fixed effects to control for shocks common to all trading partners that affected the Ottoman foreign trade, as in Gauto (2012). An example for these shocks could be global price depression of 1873-96 (Pamuk, 1984; p. 29). Another example for these shocks is international financial crisis in 1907 (Thobie, 1991; p. 425). Pamuk (1984; p. 29) argues that the global price depression led to lower growth rates for the Ottoman foreign trade. p_j are trading partner fixed effects. As in Jacks and Pendakur (2010), trading partner fixed effects account for time-invariant multilateral barriers or price effects, which capture the average trade barriers that were faced by all trading partners of the Ottoman Empire (Anderson and van Wincoop, 2003).

1.6 Results

The gravity model represented by the equation (1.1) is estimated by OLS. The logarithm of trade between the Ottoman Empire and a trading partner ($\log(T_{OEjt})$) is regressed on regressors of interest, i.e. W_{OEt-1} and B_{OEjt-1}[56] and standard gravity variables.

Table 1.1 shows OLS estimates of the equation (1.1) that I analyse the effects of wars and boycotts on the Ottoman foreign trade. Column (1) does not include year

[56] Hereafter, "*wars*" refers to presence of wars that the Ottoman Empire was involved in year *t-1* (W_{OEt-1}) and "*boycotts*" refers to presence of boycotts that were imposed by the Ottoman Empire against a trading partner in year *t-1* (B_{OEjt-1}).

and trading partner fixed effects. In column (2), I control for year fixed effects. Column (3) includes year and trading partner fixed effects. The coefficient estimates for the impact of wars are between -0.227 and 0.239 as standard errors go up. This means that the OLS estimates for the impact of wars are sensitive to inclusion of year and trading partner fixed effects. Furthermore, the point estimates are not precisely estimated[57]. The coefficient estimates for the impact of boycotts range from -0.569 to 2.763 as standard errors go down. This implies that the coefficient estimates for the impact of boycotts are not robust to adding year and trading partner fixed effects and are precisely estimated.

Columns (1)-(2) show that coefficient estimates for the effect of wars are positive, which implies that wars in a year lead to an increase in the Ottoman trade with its trading partners, contrary to my expectation. Column (3) reports that the coefficient estimate for the effect of wars is negative. This suggests that there could be a negative impact of wars in a year on the Ottoman trade with its trading partners. However, the coefficient estimates for the impact of wars in columns (1)-(3) are not statistically significant even at 10 percent. This means that there is no statistically significant effect of wars on the Ottoman trade with its trading partners. There is no evidence in Table 1.1 to confirm the hypothesis 1 which argues that wars in a year were related to less the Ottoman foreign trade through their negative impact on trade routes and markets.

Columns (1)-(2) show that the coefficient estimates for the effect of boycotts are positive and statistically different from zero at 5 percent, contrary to my

[57] As argued by Kimura and Lee (2006) and Parlow (2011), inclusion of year fixed effects could create a multicollinearity problem as wars only vary by time in my model. So, the coefficient estimates for the impact of wars could not be robust to inclusion of fixed effects. The coefficient estimate for the impact of wars in column (3) is similar in statistical significance to those in columns (1)-(2), which shows that multicollinearity can be tolerable in my model.

expectation. This means that boycotts which are placed by the Ottoman Empire against a trading partner are positively associated with the Ottoman trade with the respective trading partner. On the other hand, columns (1)-(2) do not add trading partner fixed effects, which leads to biased OLS estimates. Column (3) reports that there is a negative impact of boycotts on trade between the Ottoman Empire and boycotted trading partners, as expected. However, column (3) shows that the coefficient estimate for the effect of boycotts is not statistically significant. This implies that there is no statistically significant decrease in trade between the Ottoman Empire and boycotted trading partners. To sum up, there is no robust evidence in Table 1.1 to support hypothesis 2, arguing that boycotts that were imposed by the Ottoman Empire against a trading partner led to a decrease in the Ottoman trade with that trading partner.

These results are in line with Gowa and Mansfield (1993), Morrow et al. (1998), and Long (2003) who provide no evidence that military interstate conflicts lead to lower bilateral trade flows. One group of the historical literature argues that wars disrupted trade routes and markets (Inalcik and Quataert, 1996; p. 829; Quataert, 2005; p. 126). Although data constraints do not allow me to test if wars damaged trade routes and markets, the findings could imply that wars in a year could not damage trade routes and markets badly. This can be explained by another group of the historical literature which argues that there was an increase in the Ottoman exports and imports by 1913 despite wars (Pamuk, 1984; p. 32). In sum, I interpret the findings to mean that there is no statistically significant effect of wars in a year on the Ottoman trade with its trading partners.

Additionally, the findings in this study indicate the absence of statistically significant impact of boycotts on trade between the Ottoman Empire and trading partners subject to boycotts. These findings are not parallel to results of previous studies on the impact of sanctions. However, the historical literature argues that boycotts by the Ottoman Empire against several trading partners were not successful. This can be explained by the fact that they were relatively temporary or short-lived as less people participated in boycotts after a short while. Also, the Ottoman state did not convince many people to participate, particularly in important ports such as Aleppo and Izmir (Quataert, 1987; p. 117; Ortayli, 2010; p. 61).

With regard to the standard gravity variables in the model, all variables do not predict the Ottoman foreign trade as expected. Also, coefficient estimates for the impact of several variables are sensitive to controlling for year and trading partner fixed effects[58]. The results in Table 1.1 consistently provide no evidence that there is a statistically significant effect of distance, distance-trend interaction, Ottoman GDP[59], trading partner GDP per capita, colonial relationship, common border, and free trade agreements on the Ottoman foreign trade.

[58] This could be due to correlation between several variables and trading partner fixed effects as there are time-invariant variables in the model. Apart from this, the model is free from multicollinearity, because correlations between independent variables are generally small. To deal with this issue, in columns (2)-(3) of Table 1.7 I re-estimate equation (1.1) using random-effects and fixed-effects models without adding year fixed effects due to correlation between Ottoman GDP and year fixed effects in fixed-effects model. In column (1) of Table 1.7 I run my regression only after adding trading partner fixed effects. The coefficient estimates for the impacts of wars and boycotts in column (1) of Table 1.7 are robust to using random-effects and fixed-effects models. Sargan-Hansen statistic indicates that fixed-effects specification is preferred. Finally, in column (4) of Table 1.7 I estimate equation (1.1) after exclusion of time-invariant variables. The findings show that exclusion of time-invariant variables does not make a difference in the coefficient estimates for the impacts of wars and boycotts in column (3) of Table 1.1. To sum up, these mean that multicollinearity does not constitute a big problem.

[59] The coefficient estimates for the impact of Ottoman GDP in Table 1.1 are large in magnitude. This could arise from correlation between Ottoman GDP and distance-trend interaction as missing values in GDP data are filled in by extrapolation using the average annual growth rate of the years for which GDP data are available. I re-estimate regression after exclusion of distance-trend interaction. The results provide no evidence that there is a statistically significant effect of Ottoman GDP on the

Columns (2)-(3) of Table 1.1 report that the coefficient estimates for the impact of Ottoman GDP per capita is positive and statistically significant at the 10 percent level. The point estimates indicate that one percent increase in Ottoman GDP per capita leads to an increase in the Ottoman foreign trade by 14.484-13.864 percent, which implies that higher economic development in the Ottoman Empire increases the Ottoman foreign trade. Column (1) also shows that coefficient estimate for the impact of trading partner GDP is positive and statistically significant at 5 percent. The point estimate indicates that one percent increase in trading partner GDP leads to an increase in the Ottoman foreign trade by 1.351 percent. This means that higher economic size of a trading partner increases the Ottoman trade with the respective trading partner. Columns (1)-(2) report that coefficient estimates for the impact of having a common religion are positive and statistically significant at 10 percent. The point estimates suggest that the Ottoman trade with trading partners that share a common religion is 374.7-369.8 percent more than the Ottoman trade with the other trading partners, which could be due to cultural ties. Finally, columns (1)-(3) report that coefficient estimates for the effect of being a landlocked trading partner are negative and statistically significant at 1 percent. The point estimates imply that the Ottoman trade with trading partners that are landlocked is 2122-1460.3 percent less than the Ottoman trade with the other trading partners, which could arise from high transportation costs.

1.6.1 Robustness Checks

In this section, I examine the robustness of the results in Table 1.1 in five dimensions. First, following Lamotte (2012) I test the robustness of the baseline results to

---

Ottoman foreign trade after exclusion of distance-trend interaction as the coefficient estimate for the impact of Ottoman GDP decreases.

estimating of the gravity model for exports and imports separately as the impact of boycotts on Ottoman imports could be larger than their effects on Ottoman exports.

The findings are reported in Table 1.2. Columns (1)-(2) add both trading partner and year fixed effects. Estimation results show that wars and boycotts are negatively related to Ottoman exports and imports. Column (1) reports that coefficient estimate for the effect of wars is larger than that of column (3) of Table 1.1 in magnitude. Column (2) shows that coefficient estimate for the impact of wars decreases in magnitude. The point estimates remained statistically insignificant, as it was in column (3) of Table 1.1. The findings imply that the coefficient estimate for the effect of wars is robust to estimating regression for Ottoman exports and imports, separately. The coefficient estimates for the impact of boycotts in columns (1) and (2) increase in magnitude as compared to that in column (3) of Table 1.1. The point estimate in column (2) is not statistically significant. However, column (1) shows that the coefficient estimate for the effect of boycotts is statistically different from zero at 10 percent, which means that the Ottoman exports to boycotted trading partners are 82.5 percent less than Ottoman exports to the other trading partners[60]. The results suggest that the coefficient estimate for the impact of boycotts is sensitive to estimating regression for Ottoman exports and imports, separately.

[60] The finding does not necessarily mean that boycotts led to a decrease in Ottoman exports, as the historical literature argues that the Ottoman Empire was primarily boycotting imports from the respective trading partners (Quataert, 1987; p. 117; Geyikdagi, 2011; pp. 151-2). Also, the findings are not robust to using additional control variables. The negative effect is sensitive to using Ottoman exports and imports that are deflated by consumer price index of Istanbul. Moreover, the coefficient estimate for the effect of boycotts on Ottoman exports is not statistically different from zero after only considering the presence of boycott against Austria-Hungary. The negative effect could be due to the fact that Bulgaria declared complete independence from the Ottoman Empire in 1908 which damaged commercial and economic ties between the Ottoman Empire and Bulgaria, as export-oriented farms in the Ottoman Empire were located in Rumelia (Inalcik and Quataert, 1996; p. 768). This is in line with Geyikdagi (2011; p. 152) who argues that the complete independence of Bulgaria in 1908 led to large economic losses for the Ottoman Empire.

Second, I run the regressions using an alternative dataset that come from Pamuk (1978). The findings are presented in column (1) of Table 1.3. Column (1) includes both trading partner and year fixed effects. Column (1) shows that the coefficient estimates for the effects of wars and boycotts are negative. The coefficient estimate for the impact of wars and its standard error is larger than those of column (3) of Table 1.1 in magnitude. The coefficient estimate for the impact of boycotts and its standard error decrease in magnitude as compared to those in column (3) of Table 1.1. The point estimate is not statistically significant, again. These findings imply that the baseline results are robust to using an alternative dataset[61].

Third, inclusion of countries that had a large share in the Ottoman foreign trade, i.e. the UK, France, and Germany[62], could affect the results I find. Income growth and expansion in these countries during the late nineteenth and early twentieth century could mitigate the impact of wars on the Ottoman foreign trade. Expansion in these countries had created an explosion in the demand for the Ottoman products, which led to an increase in the Ottoman foreign trade (Pamuk, 1984; p. 32). To this end, I run the same regression for a sample without these countries, following Gowa and Mansfield (1993) and Anderson and Marcouiller (2002).

The results are presented in column (2) of Table 1.3. Column (2) includes both trading partner and year fixed effects. The coefficient estimate for the impact of wars decreases in magnitude as compared to the previous specifications using full sample (Column (3) of Table 1.1), on the contrary to my expectation. Furthermore, its standard error goes up. The point estimate is not statistically different from zero,

[61] In Table 1.9, I test the robustness of results from which I run regressions using the Ottoman export and import data in Pamuk (1978) (column (1) of Table 1.3) in several dimensions. These exercises consistently show that the coefficient estimates for the effects of wars and boycotts are not statistically different from zero, as in column (1) of Table 3.1.

[62] The sum of shares of the UK, Germany, and France in the total Ottoman exports and imports was 50 percent on average between 1911 and 1913, as shown in Table 1.4.

again. Column (2) reports that the coefficient estimate for the impact of boycotts decreases in magnitude as its standard error increases in comparison to that in column (3) of Table 1.1. The point estimate is not statistically significant, as it was in column (3) of Table 1.1. These results mean that the baseline results are not sensitive to inclusion of countries that had a large share in the Ottoman exports and imports.

Fourth, I include some additional control variables, namely logarithm of the average tariff rates in the Ottoman Empire and its trading partners in year *t-1*[63], dummy variables for presence of political-military alliances between the Ottoman Empire and a trading partner of the Ottoman Empire in year *t-1*[64], wars that a trading partner was involved in with other countries in year *t*[65], and railroads that were operated by firms of a trading partner in year *t*. There is no available data for average tariff rates of 7 trading partners of the Ottoman Empire. So, adding logarithm of the average tariff rates in the Ottoman Empire and its trading partners leads to a decrease in the number of observations from 701 to 456.

The findings are presented in column (3) of Table 1.3. Column (3) adds both trading partner and year fixed effects. Column (3) reports that coefficient estimates for the effects of Ottoman and trading partner average tariffs are negative. These point estimates are not statistically different from zero. The results show that coefficient estimates for the impacts of alliances and railroads are positive while

[63] Hereafter, "*Ottoman average tariffs*" refers to logarithm of the average tariff rates in the Ottoman Empire in year *t-1*, and "*trading partner average tariffs*" refers to logarithm of the average tariff rates in the trading partners of the Ottoman Empire in year *t-1*. Ottoman and trading partner average tariffs are lagged one year to mitigate concerns of reverse causality as previous studies on trade argue that average tariff rates could be endogenous to trade flows. I estimate regressions using current values of average tariff rates in the Ottoman Empire and its trading partners, which does not make difference to the results.

[64] Dummy variable for alliances are lagged one year to deal with reverse causality, as in Gowa and Mansfield (2004).

[65] Hereafter, "other wars" refers to dummy variable for wars that its trading partners were involved in year *t*.

coefficient estimate for the effect of other wars is negative. Column (3) reports that coefficient estimate for the effect of alliances is statistically different from zero at 5 percent. The coefficient estimates for the impacts of other wars and railroads are not statistically significant. This implies that political-military alliance between the Ottoman Empire and UK leads to an increase in Ottoman foreign trade.

Column (3) also shows that the coefficient estimate for the impact of boycotts is negative. This means that there is a decrease in trade between the Ottoman Empire and boycotted trading partners. However, the point estimate is not statistically significant, as it was in column (3) of Table 1.1. Furthermore, column (3) presents that the coefficient estimate for the effect of wars is negative. It is statistically different from zero at 10 percent, contrary to the results in column (3) of Table 1.1. The point estimate implies that Ottoman foreign trade in war years is 39.4 percent lower than it was in the other years. There is evidence in column (3) of Table 1.3 that supports the hypothesis 1, i.e. wars in a year were associated with lower the Ottoman foreign trade. Additionally, this exercise shows that the coefficient estimate for the impact of wars (column (3) of Table 1.1) is not robust to adding additional control variables or using an alternative sub-sample[66].

Finally, I estimate the equation (1.1) that I look at the effect of wars and boycotts using PPML (Poisson pseudo-maximum likelihood) method, following

[66] In column (1) of Table 1.8, I re-estimate the regression using same sample in column (3) of Table 1.3 without adding Ottoman and trading partner average tariffs, dummy variables for alliances, wars, and railroads. The result shows that the coefficient estimate for the impact of wars is similar to that in column (3) of Table 1.3 in magnitude. Its standard error is larger than that in column (3). Furthermore, the point estimate is statistically significant at 10 percent. This could imply that the coefficient estimate for the impact of wars is sensitive to using an alternative sub-sample. However, it seems that adding control variables gives more precise coefficient estimates for the effect of wars. Also, insignificant coefficient estimates for the effect of Ottoman and trading partner average tariffs do not necessarily mean that tariff rates do not have a statistically significant impact on the Ottoman foreign trade, because they are not bilateral tariff rates due to data unavailability. So, although the coefficient estimates for the impact of Ottoman and trading partner average tariffs in column (3) of Table 1.3 are not statistically significant, it could be better to include them.

Santos Silva and Tenreyro (2005). Santos Silva and Tenreyro (2005) show that the log-linear specification of the gravity equation for trade leads to inefficient and biased estimates of the regression coefficients in case of heteroskedasticity even after controlling for fixed effects. To this end, I examine whether there is a misspecification in the gravity equation of trade using OLS or PPML with the heteroskedasticity-robust RESET test, as in Santos Silva and Tenreyro (2005).

Column (4) of Table 1.3 presents the PPML estimates for the equation (1.1). In column (4), the dependent variable is sum of the Ottoman exports and imports, following Santos Silva and Tenreyro (2005). Column (4) adds year and trading partner fixed effects.

Column (4) shows that the coefficient estimate for the impact of boycotts is negative. However, it is not statistically different from zero, as previously. Column (4) reports that the coefficient estimate for the effect of wars is negative and not statistically significant, as that of column (3) of Table 1.1. The last row of Table 1.3 shows the *p*-values of the heteroskedasticity-robust RESET test. In column (4) *p*-value of the heteroskedasticity-robust RESET test is 0.000 as *p*-value of the heteroskedasticity-robust RESET test in column (3) of Table 1.3 is 0.384. This result suggests that the coefficient estimates for the impact of wars and boycotts in column (3) are efficient and not biased as the model in column (3) is correctly specified[67]. So, the specification in column (3) of Table 1.3 is preferable, which shows that there is a

[67] In column (4) of Table 1.3, the model does not include additional control variables. So, the model in column (4) could not be correctly specified due to omitted Ottoman and trading partner average tariff rates, dummy variables for alliances, wars, and railroads. I re-estimate the equation (1.1) using PPML after adding additional control variables in column (2) of Table 1.8. *P*-value of the heteroskedasticity-robust RESET test is still low. Also, column (4) of Table 1.3 does not include several variables (i.e. Ottoman GDP and GDP per capita, and dummy variable for colonial ties) due to multicollinearity. Even if I do not it report here, I re-estimate equation (1.1) using OLS after exclusion of these variables, which does not produce different results. To sum, these mean that heteroskedasticity is not an important problem or there is no misspecification in the log-linear specification of the gravity equation in column (3) of Table 1.3.

negative impact of wars in a year on the Ottoman foreign trade as boycotts are not statistically related to the Ottoman trade with the respective trading partners[68].

To sum up, based on the results in this section I can conclude that wars in a year led to lower the Ottoman trade with its trading partners. The point estimate for the impact of wars is consistent with findings of Li and Sacko (2002), Oneal et al. (2003), and Parlow (2011) which show a negative effect of wars on bilateral trade flows. The finding is also in line with Inalcik and Quataert (1996; pp. 767-8) and Quataert (2005; p. 126) who argue that there were trade route and market disruptions due to wars, which decreased the Ottoman foreign trade. However, the coefficient estimate for the impact of wars is sensitive to controlling for the impact of additional variables or using an alternative sub-sample[69]. Also, the coefficient estimate for the effect of boycotts is not robust to using alternative dependent variables[70]. The

[68] Insignificant coefficient estimates for the impact of boycotts may not be due to inefficient OLS estimates in case of small sample size (Wooldridge, 2009; p. 397), because the point estimates are consistently estimated in most of the regressions.

[69] As a further test of the robustness of the results in column (3) of Table 1.3, I again estimate regressions for Ottoman exports and imports, separately. The findings are presented in columns (7) and (8) of Table 1.10. Different from Table 1.2, in the columns (7) and (8) I also include some additional control variables, as in column (3) of Table 1.3. The findings show that the coefficient estimates for the effect of wars are not statistically significant contrary to the results in column (3) of Table 1.3. Additionally, in columns (9) and (10) of Table 1.10 I estimate regressions separately for Ottoman exports and imports using an alternative dataset that come from Pamuk (1978), as in column (1) of Table 1.3. I find that there is a statistically significant effect of wars on Ottoman exports. The results do not provide evidence that wars led to lower Ottoman imports from its trading partners. Even though I do not report them here, I also estimate the regressions in the columns (9) and (10) after including additional control variables, as in column (9) of Table 1.9. The finding does not indicate a negative impact of wars on both Ottoman exports and imports. To sum, these findings mean that the negative effect of wars is also sensitive to estimating regressions for Ottoman exports and imports, separately.

[70] In columns (7), (8), (9), and (10) of Table 1.10, as in Table 1.2 I use alternative dependent variables as a further test of the robustness of the results on the impact of boycotts. That is, I run regressions for Ottoman exports and imports, separately. This is because the Ottoman Empire was primarily boycotting imports from the respective trading partners. Different from Table 1.2, in columns (7) and (8) the regressions include some additional control variables, as in column (3) of Table 1.3. In columns (9) and (10), I run regressions separately for Ottoman exports and imports using an alternative dataset that are taken from Pamuk (1978). I also estimate regressions in columns (9) and (10) after inclusion of additional control variables whose results are not reported here. The findings consistently show that the coefficient estimates for the impact of boycotts are not statistically significant. Contrary to the results in column (1) of Table 1.2, the findings do not show a statistically significant effect of boycotts on Ottoman exports. These findings could suggest that boycotts did not lead to a decrease in Ottoman imports from the respective trading partners. Also, the coefficient estimate for the impact of boycotts is little sensitive to changes in the specification.

findings may not necessarily mean that wars in a year damaged trade routes and markets severely, as argued by Inalcik and Quataert (1996; pp. 767-8) and Quataert (2005; p. 126). This is because Ottoman exports and imports in constant prices (base year 1913) gradually increased after war years (i.e. 1897, 1911, and 1912), as shown in Figure 1.2. In these war years, there was a decrease in Ottoman exports and imports. This is also in line with Issawi (1980; p. 134), arguing that the negative impact of wars was only persistent for war years when carrying of goods across borders was dangerous as it slowly went away and the Ottoman foreign trade gradually increased after war years.

1.7 Conclusion

Previous literature shows that wars and sanctions might be negatively related to bilateral trade (Hufbauer et al., 1997; Anderton and Carter, 2001; Evenett, 2002; Li and Sacko, 2002; Caruso, 2003; Hufbauer and Oegg, 2003; Oneal et al., 2003; Parlow, 2011; Lamotte, 2012). The historical literature argues that wars had a negative impact on the Ottoman foreign trade because of disruptions in the trade routes and markets (Inalcik and Quataert, 1996; pp. 767-8; Quataert, 2005; p. 126). Furthermore, the Ottoman state organized boycotts against some of its trading partners which could lead to lower the Ottoman trade with trading partners that were subjected to boycotts (Quataert, 1987; pp. 103-117; Kent, 1996; p. 12; Ortayli, 2010; p. 61; Geyikdagi, 2011; pp. 151-2; Sohrabi, 2011; p. 182). Based on empirical findings of previous trade literature and arguments of historical literature, I investigate whether wars and boycotts had a negative impact on the Ottoman trade with its trading partners. To the best of my knowledge, my work is the first empirical

attempt to examine the effects of wars and boycotts on the Ottoman foreign trade on the basis of unique historical data on boycotts by the Ottoman state.

This chapter does not find a statistically significant effect of boycotts on trade between the Ottoman Empire and its trading partners that were subjected to boycotts. This non-effect is consistent with the historical literature, arguing that boycotts were not successful enough to cut off trade and business relationship between the Ottoman Empire and boycotted trading partners (Quataert, 1987; p. 117; Ortayli, 2010; p. 61). In this study I provide weak evidence for the negative relationship between wars and Ottoman foreign trade. Although I could not directly analyse whether wars damaged trade routes and markets in the Ottoman Empire due to current data availability, my results are consistent with the historical literature showing that wars had a negative effect on the Ottoman trade through trade route and market disruptions (Inalcik and Quataert, 1996; pp. 767-8; Quataert, 2005; p. 126). The negative impact of wars is also in line with the previous studies on the impact of conflicts, showing that wars lead to lower bilateral flows due to transportation network and market disruptions. So, my findings mean that wars in a year could have damaged trade routes and markets which could lead to lower profitability of trade due to increasing transaction costs and risks for merchants, and resultantly, the Ottoman foreign trade decreased.

In the context of the Ottoman Empire, it seems that unilateral sanctions were not very successful in cutting off business relationships between target and sender countries as trade was negatively affected by wars. Increasing transaction costs due to transportation network and market disruptions could have been an important driving force for decreasing trade between countries. So, the first policy implication of this chapter is that avoiding wars could be important in increasing trade between

countries. Sanctions against certain countries are commonly used for political aims that could have economic results. On the other hand, they are likely to discourage trade between target and sender countries when sender countries success to bring their members together against a sanctioned country. Thus, the second implication of this chapter is that sanctions could be effective if they are long-lived and the sanctioning country induces cooperative behaviour among its citizens.

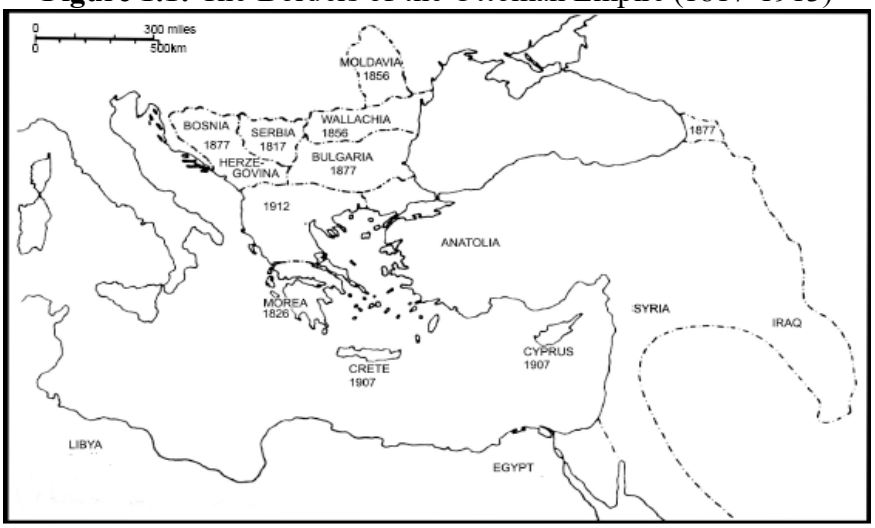
Finally, this study has several limitations because of current data availability. The first limitation is that dummy variables for presence of wars and boycotts may not be adequate to explain the persistent impact of wars on trade routes and markets, and the severity of boycotts, as argued by Quataert (1987; p. 118). There is no data source with information about severity of damages in trade routes and markets in the Ottoman Empire that were caused by wars. So, due to data constraints it is not possible to use other variables for the Ottoman Empire. The second limitation is that the relationship between wars and the Ottoman foreign trade is sensitive to inclusion of additional control variables or using an alternative sub-sample. It would be better if there is available data to use more relevant control variables —such as bilateral tariff rates— or to use an instrumental variable for wars. However, historical data on the Ottoman Empire and several of its trading partners such as Bulgaria, Egypt, Tunisia, and Iran are not plentiful in comparison to other trading partners of the Ottoman Empire such as the UK. The third limitation is that it is not possible to exclude imports of weapons. There was an increase in the share of war materials in the Ottoman imports by 1913 (Kent, 1996, pp. 171-2; Ortayli, 2010; pp. 56-66; Yorulmaz, 2010). Furthermore, Quataert (1987; p. 104) argues that there was not a decrease in imports of weapons from Austria-Hungary when a boycott of Austro-Hungarian goods was organized by the Ottoman Empire.

The fourth limitation is the extrapolation of missing values in GDP and GDP per capita data on the Ottoman Empire and several of its trading partners under assumption of constant growth rate. The GDP and GDP per capita may not increase constantly over the sample period. However, there are no other sources with GDP and GDP per capita data. The fifth limitation is that there is only few data available on which goods were traded between the Ottoman Empire and its trading partners to carry out an econometric analysis as Pamuk (1978; pp. 235-49) and Pamuk (1995; pp. 62-7) contain information on composition of Ottoman foreign trade for several years. Industrialization in the Europe changed the pattern of trade. By 1913 the Ottoman Empire became an exporter of raw materials and agricultural products as it could export manufactured goods before (Karpat, 1972). So, the use of aggregate data might mask the impact of standard gravity variables. The final limitation is that there is no available data for freight rates for the Ottoman Empire and all of its trading partners in my sample. The interaction of distance with time trend may not be a good proxy for improvements in the transport technology. This limitation leads to future research for freight rates on the Ottoman foreign trade with rest of the world, following framework in Pamuk (1978; pp. 188-91) and Pamuk (1984; pp. 147-8) who use an index to calculate freight rates on the Ottoman foreign trade with several of its trading partners.

1.8 Appendix A: Figures and Tables

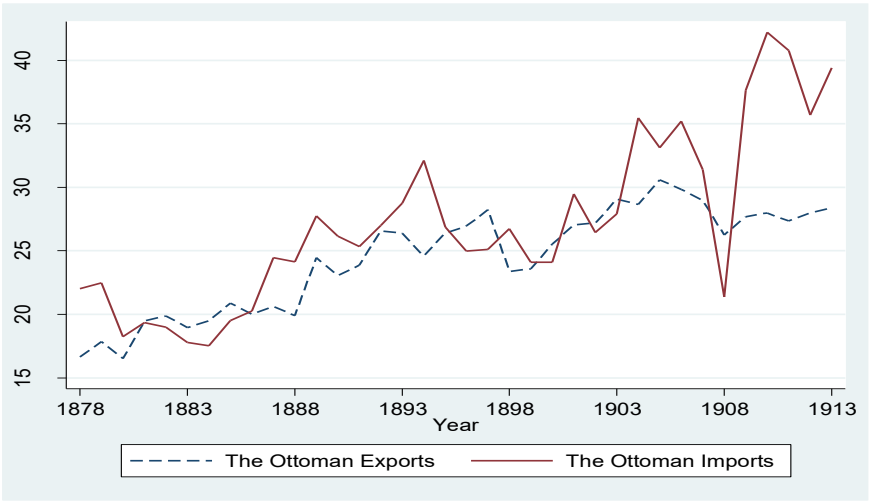
1.8.1 Figures

Figure 1.1: The Borders of the Ottoman Empire (1817-1913)



Notes: Figure 1.1 shows the borders of the Ottoman Empire between 1817 and 1913. The dates indicate the last year for which each territory was considered as part of the Ottoman Empire. Also, in this study Egypt are considered as a separate country from the Ottoman Empire over the sample period. Figure 1.1 is taken from Pamuk (1987; p. 22).

Figure 1.2: Ottoman Exports and Imports (1878-1913)



Notes: Figure 1.2 shows the Ottoman exports on f.o.b. basis and imports on c.i.f. basis in constant prices (base year 1913) over the period 1878-1913. The Ottoman exports and imports are expressed in million British pounds. The data on the Ottoman exports and imports come from Pamuk (1984; p. 140). All values in Pamuk (1984) are expressed in million British pounds. In the Figure 1.2, the Ottoman exports and imports are deflated using the Istanbul consumer price index (base year 1913). The data for price index of Istanbul come from Pamuk (2000; p. 18). All values in Pamuk (2000) are expressed in akces. Akce was silver coin. Before the Ottoman export and import data are deflated by the Istanbul consumer price index, I convert the Istanbul consumer price index to British pounds using exchange rate in Inalcik and Quataert (1996; pp. 971-3). 1 kurus equals 120 akces. 1 Ottoman gold lira equals 100 kuruses. Between 1878 and 1919, 1 British pound equals 1.10 Ottoman gold liras. Base year in Pamuk (2000) is 1469. The base year is changed to 1913.

1.8.2 Tables

Table 1.1: Gravity Regressions (1879-1913)

Dependent Variable: log(Sum of Ottoman Exports and Imports)			
	1	2	3
Wars	0.173	0.239	-0.227
	(0.107)	(0.431)	(0.186)
Boycotts	2.516**	2.763**	-0.569
	(1.077)	(1.078)	(0.414)
log(Distance)	-0.989	-0.991	-1.181
	(0.656)	(0.670)	(1.809)
log(Distance)×Trend$_t$	-0.003	-0.003	-0.026
	(0.022)	(0.023)	(0.023)
log(Ottoman GDP)	237.287	-323.023	696.710
	(771.759)	(783.560)	(895.353)
log(Ottoman GDP per capita)	0.480	13.864*	14.484*
	(0.612)	(7.517)	(8.145)
log(Trading Partner GDP)	1.351**	1.352	-1.994
	(0.612)	(1.625)	(3.328)
log(Trading Partner GDP per capita)	1.200	1.226	4.561
	(1.354)	(1.381)	(4.745)
Colonial Relationship	0.269	0.244	-46.275
	(2.357)	(2.407)	(30.830)
Common Border	0.574	0.577	6.511
	(1.108)	(1.134)	(13.365)
Common Religion	3.698*	3.747*	42.140
	(2.072)	(2.111)	(31.724)
Landlocked	-14.603***	-14.625***	-21.220***
	(2.113)	(2.259)	(0.698)
Free Trade Agreements	-1.015	-1.033	2.541
	(1.870)	(1.911)	(7.024)
Trading Partner Fixed Effects	NO	NO	YES
Year Fixed Effects	NO	YES	YES
Constant	-1323.690	1908.456	-3808.461
	(4360.237)	(4438.988)	(5058.890)
N. of obs.	701	701	701
R^2	0.74	0.74	0.90

Notes: Columns (1)-(3) report the OLS estimates for equation (1.1). Heteroskedasticity-robust standard errors corrected for clustering at the country level are reported in parentheses. ***, **, and * denote statistically significantly different from zero at 1%, 5%, and 10% levels, respectively. N. of obs. is number of observation. R^2 is the R-squared.

Table 1.2: Robustness Check: Gravity Regressions with Different Dependent Variables (1879-1913)

Dependent Variables: log(Ottoman Exports+1) and log(Ottoman Imports+1)		
	1	2
Wars	-0.440	-0.094
	(0.452)	(0.201)
Boycotts	-0.825*	-0.694
	(0.466)	(0.518)
log(Distance)	-2.449**	-1.588
	(1.122)	(1.517)
log(Distance)×$Trend_t$	-0.024	-0.027
	(0.021)	(0.021)
log(Ottoman GDP)	-312.449	1117.581
	(1134.219)	(803.479)
log(Ottoman GDP per capita)	34.298**	8.256
	(13.314)	(8.875)
log(Trading Partner GDP)	1.565	-3.001
	(2.126)	(3.046)
log(Trading Partner GDP per capita)	0.079	3.702
	(2.308)	(3.451)
Colonial Relationship	-3.338	-42.550
	(17.231)	(25.092)
Common Border	-6.903	7.117
	(7.620)	(11.138)
Common Religion	-2.809	33.533
	(16.439)	(24.158)
Landlocked	-13.891***	-15.812***
	(0.326)	(0.488)
Free Trade Agreements	-4.386	4.883
	(4.802)	(6.789)
Trading Partner Fixed Effects	YES	YES
Year Fixed Effects	YES	YES
Constant	1957.092	-6223.146
	(6463.538)	(4549.610)
N. of obs.	701	701
R^2	0.87	0.87

Notes: In columns (1)-(2), regressions are estimated by OLS. In column (1), I estimate equation (1.1) using logarithm of the Ottoman exports to 21 of its trading partners in year *t* as dependent variable. In column (2), I estimate equation (1.1) using logarithm of the Ottoman imports from 21 of its trading partners in year *t* as dependent variable. There are only couple of zero values in the Ottoman exports and imports. So, I add one to each observation before taking logarithm of the Ottoman exports and imports. Heteroskedasticity-robust standard errors corrected for clustering at the country level are reported in parentheses. ***, **, and * denote statistically significantly different from zero at 1%, 5%, and 10% levels, respectively. N. of obs. is number of observation. R^2 is the R-squared.

Table 1.3: Gravity Regressions: Other Robustness Checks (1830-1913)

Dependent Variables: log(Sum of Ottoman Exports and Imports) and Sum of Ottoman Exports and Imports

	1	2	3	4
Wars	-12.213	-0.155	-0.394*	-1.320
	(16.539)	(0.220)	(0.208)	(1.000)
Boycotts	-0.273	-0.488	-0.029	-0.013
	(0.275)	(0.506)	(0.282)	(0.125)
log(Distance)	-2.212***	12.003	-0.548	-3.821**
	(0.311)	(7.839)	(5.044)	(1.940)
log(Distance)×Trend$_t$	0.196	-0.027	-0.034*	-0.010
	(0.269)	(0.025)	(0.017)	(0.007)
log(Ottoman GDP)	-75.717	1134.824	916.037	--
	(94.130)	(1070.487)	(662.489)	
log(Ottoman GDP per capita)	106.145	10.366	14.218	--
	(128.878)	(9.343)	(12.455)	
log(Trading Partner GDP)	0.181	-5.540	1.313	2.879***
	(0.371)	(4.241)	(2.539)	(0.863)
log(Trading Partner GDP per capita)	1.212	8.083	-0.564	-2.392***
	(1.102)	(6.164)	(2.215)	(0.784)
Colonial Relationship	-3.568***	-28.161	-7.736	--
	(0.869)	(18.829)	(5.758)	
Common Border	-1.985	30.870	-2.743	-13.389***
	(1.575)	(22.925)	(17.255)	(4.455)
Common Religion	-0.505	34.021	10.819	7.339***
	(0.847)	(25.796)	(6.232)	(2.625)
Landlocked	-3.442***	-10.445**	--	-14.163***
	(0.727)	(4.530)		(1.425)
Free Trade Agreements	-1.684**	4.234	-2.774	-7.382***
	(0.755)	(5.773)	(8.498)	(1.324)
log(Ottoman Average Tariffs)	--	--	-2.147	--
			(2.418)	
log(Trading Partner Average Tariffs)	--	--	-0.012	--
			(0.285)	
Alliances	--	--	0.827**	--
			(0.349)	
Other Wars	--	--	-0.007	--
			(0.222)	
Railroads	--	--	2.490	--
			(4.789)	
Trading Partner Fixed Effects	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES
Constant	2.480	-6398.904	-5107.953	27.526***
	(6.592)	(6077.657)	(3776.748)	(9.383)
N. of obs.	1051	596	456	701
R^2	0.90	0.90	0.93	0.93
Reset Test *p*-values	--	--	0.384	0.000

Notes: Column (1) reports the OLS estimates for equation (1.1) by using an alternative dataset that come from Pamuk (1978) who provides detailed information on Ottoman exports and imports between 1830 and 1913. In column (1), distance between capital city of the Ottoman Empire and several of its trading partners (i.e. Sweden, Switzerland, and Spain), their GDP and GDP per capita are average values of distance, GDP, and GDP per capita as Pamuk (1978) provides information on sum of Ottoman exports to and imports from these countries. In column (1), GDP and GDP per capita data of the Ottoman Empire and its trading partners come from Maddison (2003) who provides detailed information on their GDP and GDP per capita even before the 1880s. In columns (2)-(4), regressions are estimated by using data in Pamuk (1995) who contains detailed information on Ottoman exports and imports between 1879 and 1913. Column (2) reports the OLS estimates for equation (1.1) when I run my regression by excluding trading partners that had a large share in the Ottoman foreign trade. These countries were the UK, France, and Germany. Column (3) shows the OLS estimates for equation (1.1) after adding logarithm of the average tariff rates in the Ottoman Empire and its trading partners in year *t-1* and other variables (i.e Alliances, Other Wars, and Railroads). *"Alliances"* refers to dummy variable to indicate if the Ottoman Empire and its trading partner were allies in year *t-1*. *"Other wars"* refers to dummy variable for wars that a trading partner of the Ottoman Empire was involved in with other countries in year *t*. "*Railroads*" refers to dummy variable for whether firms of a trading partner of the Ottoman Empire operated railroad lines in year *t*. Column (4) reports the PPML estimates for equation (1.1). In columns (1)-(3), the dependent variable is the logarithm of the sum of the Ottoman exports and imports. In column (4), the dependent variable is sum of the Ottoman exports and imports, as in Santos Silva and Tenreyro (2005). In columns (3) and (4), several variables (i.e. Ottoman GDP and GDP per capita, and dummy variable for landlocked trading partners) are omitted due to multi-collinearity. Heteroskedasticity-robust standard errors corrected for clustering at the country level are reported in parentheses. ***, **, and * denote statistically significantly different from zero at 1%, 5%, and 10% levels, respectively. N. of obs. is number of observation. R^2 is the R-squared. Reset test is a heteroskedasticity-robust Ramsey`s Reset test. The *p*-values of the heteroskedasticity-robust Reset test are reported at the bottom of Table 1.3.

1.9 Appendix B: Tables

Table 1.4: Distribution of Ottoman Exports and Imports by Trading Partners, 1830-1913 (percent)

Years	UK		France		Germany		Austria-Hungary		Russia		Other	
	Export	Import	Export	Import	Export	Import	Export	Import	Export	Import	Export	Import
1830-2	13.3	19.0	14.3	9.9	2.1[a]	3.3[a]	30.9	16.9	12.6	31.3	26.8	19.6
1840-2	19.8	29.3	16.6	8.6	1.9[a]	4.6[a]	29.1	22.1	10.4	16.5	22.2	18.9
1850-2	29.2	25.5	15.8	9.3	1.1[a]	9.7[a]	28.0	26.2	8.3	13.6	17.6	15.7
1860-2	23.5	26.5	29.9	12.2	0.5[a]	9.5[a]	16.8	17.2	10.2	11.5	19.1	23.1
1870-2	27.2	32.4	25.3	12.3	0.4	13.6	14.3	12.9	14.7	9.2	18.1	19.6
1880-2	23.5	45.2	28.0	11.8	0.5	2.4	6.1	11.8	13.6	9.7	28.3	19.1
1890-2	25.9	35.9	24.5	12.4	4.3	10.3	5.9	9.8	4.2	9.9	35.2	21.7
1900-2	25.7	29.5	19.6	10.2	6.8	9.2	7.8	14.2	4	11.1	35.8	25.5
1911-13	18.6	16.1	12.8	10.1	11.8	16.2	9.3	17.8	6.6	10	40.9	29.8

Notes: The values in Table 1.4 are averaged for every three years. For example, 1911-13 refers to averages values of 1911, 1912, and 1913. [a] 80 percent of Ottoman trade with Germany was done through Austria-Hungary. The information in Table 1.4 are gathered from Pamuk (1978; pp. 188-91), Pamuk (1984; pp. 31-2), and Pamuk (1995; pp. 68-77).

Table 1.5: Gravity Regressions: Boycotts that were Imposed by the Ottoman Empire against Germany, Italy, and Greece (1879-1913)

Dependent Variable: log(Sum of Ottoman Exports and Imports)		
	1	2
Wars	-0.226	-34.849
	(0.187)	(38.921)
Boycotts	-0.216	-0.768
	(0.664)	(0.507)
log(Distance)	-1.159	-2.511*
	(1.815)	(1.269)
log(Distance)×$Trend_t$	-0.026	-0.0004
	(0.023)	(0.013)
log(Ottoman GDP)	698.782	-102531.400
	(900.300)	(114415.200)
log(Ottoman GDP per capita)	14.480*	2541.348
	(8.152)	(2838.575)
log(Trading Partner GDP)	-2.040	-0.151
	(3.331)	(2.611)
log(Trading Partner GDP per capita)	4.609	2.650
	(4.767)	(3.969)
Colonial Relationship	-46.643	-29.387
	(30.919)	(23.317)
Common Border	6.697	-0.148
	(13.386)	(10.671)
Common Religion	42.506	26.233
	(31.840)	(24.640)
Landlocked	-21.206***	-20.981***
	(0.714)	(0.601)
Free Trade Agreements	2.663	-1.577
	(7.013)	(5.492)
Trading Partner Fixed Effects	YES	YES
Year Fixed Effects	YES	YES
Constant	-3831.318	591938.800
	(5087.103)	(660703.700)
N. of obs.	701	735
R^2	0.90	0.91

Notes: Columns (1)-(2) report the OLS estimates for equation (1.1). In column (1) of Table 1.5, I take into account the presence of boycotts against Germany and Italy in addition to boycotts that the Ottoman Empire imposed against Bulgaria and Austria-Hungary. In column (2) of Table 1.5, I consider the presence of boycott against Greece between 1909 and 1911 in addition to boycotts that the Ottoman Empire organized against Bulgaria and Austria-Hungary. Different from column (1) of Table 1.5 and previous tables, Greece is considered as a separate country from the Ottoman Empire over the sample period in column (2). In column (2), the coefficient estimates for the effects of several variables (e.g. wars and Ottoman GDP) increase in magnitude, which arises from inclusion of year fixed effects. Heteroskedasticity-robust standard errors corrected for clustering at the country level are reported in parentheses. *** and * denote statistically significantly different from zero at 1% and 10% levels, respectively. N. of obs. is number of observation. R^2 is the R-squared.

Table 1.6: Gravity Regressions: Wars and an Alternative Sub-sample (1879-1913)

Dependent Variable: log(Sum of Ottoman Exports and Imports)		
	1	2
Wars	-0.469	-0.231
	(0.671)	(0.236)
Boycotts	-0.577	-0.608
	(0.421)	(0.458)
log(Distance)	-1.150	-1.457
	(1.841)	(2.029)
log(Distance)×$Trend_t$	-0.026	-0.008
	(0.023)	(0.018)
log(Ottoman GDP)	1522.679	50.601
	(1068.263)	(706.885)
log(Ottoman GDP per capita)	-5.514	14.325
	(6.245)	(10.432)
log(Trading Partner GDP)	-2.060	-1.998
	(3.379)	(3.829)
log(Trading Partner GDP per capita)	4.672	5.241
	(4.841)	(6.335)
Colonial Relationship	-46.613	-47.101
	(31.142)	(37.325)
Common Border	6.802	7.313
	(13.604)	(16.251)
Common Religion	42.516	--
	(32.070)	
Landlocked	-21.247***	-21.338***
	(0.722)	(0.955)
Free Trade Agreements	2.675	2.254
	(7.124)	(7.896)
Trading Partner Fixed Effects	YES	YES
Year Fixed Effects	YES	YES
Constant	-8585.134	-163.186
	(6050.848)	(3999.140)
N. of obs.	701	561
R^2	0.90	0.91

Notes: Columns (1)-(2) report the OLS estimates for equation (1.1). In column (1) of Table 1.6, wars takes the value 1 if the Ottoman Empire was involved in a war with one of its trading partners in year *t-1*, and zero otherwise. Different from previous tables, wars varies by both time and its trading partners in column (1). Column (2) reports the OLS estimates for equation (1.1) after dropping its trading partners in the East (i.e. Iran, Egypt, Japan, Tunisia). Heteroskedasticity-robust standard errors corrected for clustering at the country level are reported in parentheses. *** denotes statistically significantly different from zero at 1% level, respectively. N. of obs. is number of observation. R^2 is the R-squared.

Table 1.7: Gravity Regressions: Alternative Estimation Methods and Fixed Effects (1879-1913)

Dependent Variable: log(Sum of Ottoman Exports and Imports)				
	1	2	3	4
Wars	0.058	0.058	0.075	-0.227
	(0.084)	(0.083)	(0.081)	(0.186)
Boycotts	-0.581	-0.581	-0.656	-0.569
	(0.354)	(0.349)	(0.420)	(0.414)
log(Distance)	-1.203	--	0.842	--
	(1.771)		(1.291)	
log(Distance)×$Trend_t$	-0.026	-0.026	-0.017	-0.026
	(0.022)	(0.022)	(0.020)	(0.023)
log(Ottoman GDP)	1246.508	1246.508	770.376	694.710
	(881.363)	(870.126)	(726.255)	(895.253)
log(Ottoman GDP per capita)	0.635	0.635	0.449	14.484*
	(0.497)	(0.490)	(0.484)	(8.145)
log(Trading Partner GDP)	-1.966	-1.966	1.461**	-1.994
	(3.252)	(3.205)	(0.567)	(3.328)
log(Trading Partner GDP per capita)	4.439	4.439	0.687	4.561
	(4.611)	(4.554)	(1.565)	(4.745)
Colonial Relationship	-45.794	--	2.288	--
	(30.180)		(2.073)	
Common Border	6.298	--	0.939	--
	(13.039)		(1.444)	
Common Religion	41.492	--	2.262	--
	(31.007)		(2.596)	
Landlocked	-21.201***	--	-13.176***	--
	(0.675)		(1.798)	
Free Trade Agreements	2.515	--	-0.298	--
	(6.872)		(1.780)	
Trading Partner Fixed Effects	YES	--	--	YES
Year Fixed Effects	NO	NO	NO	YES
Constant	-6995.010	-7006.948	-4355.241	-3818.496
	(4983.271)	(4898.765)	(4107.547)	(5047.778)
N. of obs.	701	701	701	701
R^2	0.90	0.07	0.70	0.90
χ^2	--	99.525***		--

Notes: Column (1) shows the OLS estimates for equation (1.1) after exclusion of year fixed effects. Columns (2)-(3) indicate fixed-effects and random-effects estimates for equation (1.1), respectively. Column (4) reports the OLS estimates for equation (1.1) after exclusion of time-invariant variables. Heteroskedasticity-robust standard errors corrected for clustering at the country level are reported in parentheses. ***, **, and * denote statistically significantly different from zero at 1%, 5%, and 10% levels, respectively. N. of obs. is number of observation. In columns (1) and (4), R^2 is the R-squared as R^2 is the overall R-squared in columns (2)-(3). χ^2 is Sargan-Hansen statistic which is an alternative to the Hausman test and is valid in the presence of heteroskedasticity and clustered errors.

Table 1.8: Gravity Regressions: an Alternative Sub-sample and Method (1879-1913)

Dependent Variables: log(Sum of Ottoman Exports and Imports) and Sum of Ottoman Exports and Imports		
	1	2
Wars	-0.394*	6.833*
	(0.211)	(3.623)
Boycotts	-0.023	0.102
	(0.276)	(0.078)
log(Distance)	-2.699**	-1.694
	(1.061)	(2.088)
log(Distance)×Trend$_t$	-0.034*	-0.029*
	(0.017)	(0.015)
log(Ottoman GDP)	872.478	--
	(686.921)	
log(Ottoman GDP per capita)	12.470	--
	(10.715)	
log(Trading Partner GDP)	1.353	3.444**
	(2.470)	(1.607)
log(Trading Partner GDP per capita)	-0.610	-2.291**
	(2.109)	(1.095)
Colonial Relationship	-15.075	8.694**
	(17.616)	(4.087)
Common Border	-7.578	-16.271
	(8.212)	(11.974)
Common Religion	17.519	--
	(11.421)	
Landlocked	--	--
Free Trade Agreements	-4.214	-11.317**
	(5.760)	(5.885)
log(Ottoman Average Tariffs)	--	--
log(Trading Partner Average Tariffs)	--	-0.107
		(0.197)
Alliances	--	0.453***
		(0.117)
Other Wars	--	0.034
		(0.045)
Railroads	--	-3.934
		(5.125)
Trading Partner Fixed Effects	YES	YES
Year Fixed Effects	YES	YES
Constant	-4843.964	7.889
	(3912.831)	(11.863)
N. of obs.	456	456
R^2	0.93	0.95
Reset Test *p*-values	--	0.001

Notes: Column (1) reports the OLS estimates for equation (1.1). In column (1), I estimate equation (1.1) with same sample in column (3) of Table 1.3 without adding additional control variables. Different from column (4) of Table 1.3, column (2) reports the PPML estimates for equation (1.1) after adding additional control variables. In column (1), the dependent variable is the logarithm of the sum of the Ottoman exports and imports. In column (2), the dependent variable is sum of the Ottoman exports and imports, as in Santos Silva and Tenreyro (2005). In columns (1) and (2), several variables (i.e. Ottoman GDP and GDP per capita, and dummy variable for landlocked trading partners) are omitted due to multi-collinearity. Heteroskedasticity-robust standard errors corrected for clustering at the country level are reported in parentheses. ***, **, and * denote statistically significantly different from zero at 1%, 5%, and 10% levels, respectively. N. of obs. is number of observation. R^2 is the R-squared. Reset test is a heteroskedasticity-robust Ramsey`s Reset test. The *p*-value of the heteroskedasticity-robust Reset test is reported at the bottom of column (2) in Table 1.8.

Table 1.9: Gravity Regressions with an Alternative Dataset: Boycotts, Wars, Alternative Estimation Methods, Fixed Effects, and Additional Control Variables (1830-1913)

Dependent Variables: log(Sum of Ottoman Exports and Imports) and Sum of Ottoman Exports and Imports										
	1	2	3	4	5	6	7	8	9	10
Wars	-12.194	-12.842	0.014	-2.197	0.094	0.092	-12.213	0.094	-0.446	-0.028
	(16.470)	(15.597)	(0.208)	(26.624)	(0.081)	(0.082)	(16.539)	(0.082)	(0.441)	(0.168)
Boycotts	0.209	-0.525	-0.272	-0.256	-0.174	-0.166	-0.273	-0.174	-0.138	0.025
	(0.312)	(0.246)	(0.274)	(0.288)	(0.263)	(0.292)	(0.275)	(0.265)	(0.145)	(0.081)
log(Distance)	-2.210***	-2.255***	-2.212***	-2.282***	--	-0.098	--	-2.041***	-3.372***	0.150
	(0.311)	(0.298)	(0.315)	(0.363)		(0.580)		(0.167)	(0.250)	(1.104)
log(Distance)×Trend$_t$	0.190	0.211	0.196	0.198	0.047	0.046	0.196	0.047	0.966***	1.291***
	(0.267)	(0.260)	(0.269)	(0.274)	(0.119)	(0.119)	(0.269)	(0.120)	(0.054)	(0.163)
log(Ottoman GDP)	-75.451	-77.793	-75.451	-20.117	6.939	6.690	-75.717	6.939	198.783	--
	(93.778)	(89.583)	(96.895)	(150.743)	(5.458)	(5.373)	(94.130)	(5.498)	(211.194)	
log(Ottoman GDP per capita)	105.793	109.100	105.782	30.284	-10.849	-10.519	106.145	-10.889	-326.385	--
	(128.392)	(122.683)	(132.653)	(206.467)	(7.540)	(7.498)	(128.508)	(7.686)	(342.151)	
log(Trading Partner GDP)	0.186	0.220	0.182	0.220	0.122	0.203	0.181	0.122	1.130	0.850
	(0.372)	(0.387)	(0.370)	(0.515)	(0.359)	(0.293)	(0.371)	(0.362)	(0.893)	(0.809)
log(Trading Partner GDP per capita)	1.192	1.030	1.208	0.770	1.353	1.228	1.212	1.353	-0.085	0.010
	(1.108)	(1.079)	(1.138)	(1.679)	(1.013)	(0.939)	(1.102)	(1.021)	(1.076)	(0.788)
Colonial Relationship	-3.565***	-3.556***	-3.566***	-3.697***	--	-0.395	--	-3.658***	-1.730	--
	(0.867)	(0.911)	(0.856)	(0.980)		(1.081)		(0.824)	(2.264)	
Common Border	-2.004	-2.244	-1.992	-2.481	--	-0.173	--	-1.730	-5.286**	1.666
	(1.584)	(1.578)	(1.617)	(2.453)		(1.261)		(1.506)	(2.418)	(2.699)
Common Religion	-0.496	-0.446	-0.501	--	--	0.931	--	-0.621	3.853***	0.304
	(0.846)	(0.891)	(0.836)			(0.926)		(0.820)	(0.337)	(1.137)
Landlocked	-3.457***	-3.461***	-3.444***	-3.673***	--	-2.055***	--	-3.699***	--	--
	(0.724)	(0.717)	(0.736)	(0.945)		(0.496)		(0.589)		
Free Trade Agreements	-1.680*	-1.726*	-1.686*	-1.637*	--	-1.218	--	-1.588*	-3.113	-4.294
	(0.756)	(0.794)	(0.745)	(0.908)		(0.859)		(0.727)	(2.357)	(2.775)
log(Ottoman Average Tariffs)	--	--	--	--	--	--	--	--	0.518	1.266
									(2.019)	(1.206)

Table 1.9 Continued

	1	2	3	4	5	6	7	8	9	10
log(Trading Partner Average Tariffs)	--	--	--	--	--	--	--	--	-0.047	-0.030
									(0.200)	(0.102)
Alliances	--	--	--	--	--	--	--	--	0.096	0.191
									(0.217)	(0.144)
Other Wars	--	--	--	--	--	--	--	--	-0.104	-0.054
									(0.148)	(0.077)
Railroads	--	--	--	--	--	--	--	--	-0.221	-0.117
									(0.256)	(0.191)
Trading Partner Fixed Effects	YES	YES	YES	YES	--	--	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	NO	NO	YES	NO	YES	YES
Constant	2.532	-1.674	-9.619	0.070	4.764	6.033	-16.304**	23.183**	384.369	-13.750
	(6.622)	(6.436)	(17.791)	(7.643)	(7.744)	(6.082)	(6.680)	(9.045)	(367.192)	(16.357)
N. of obs.	1051	1132	1051	883	1051	1051	1051	1051	415	415
R^2	0.90	0.90	0.90	0.90	0.17	0.43	0.90	0.89	0.92	0.92
Reset Test *p*-values	--	--	--	--	--	--	--	--	0.037	0.037
χ^2	--	--	--	--	158.011***		--	--	--	--

Notes: In table 1.9, I use the Ottoman export and import data in Pamuk (1978) to estimate equation (1.1). Pamuk (1978) contains detailed information on Ottoman exports and imports between 1830 and 1913. I examine the robustness of the results in column (1) of Table 1.3. Columns (1)-(4) and columns (7)-(9) report the OLS estimates for equation (1.1). Columns (5)–(6) report fixed-effects and random-effects estimates for equation (1.1) without adding year fixed effects. Column (10) shows the PPML estimates for equation (1.1). In column (1), I consider the presence of boycotts against Germany and Italy in addition to boycotts that the Ottoman Empire imposed against Bulgaria and Austria-Hungary. In column (2), I consider the presence of boycott against Greece between 1909 and 1911. Different from other columns, Greece is considered as a separate country from the Ottoman Empire after 1831. In columns (1)-(10), distance between capital city of the Ottoman Empire and several of its trading partners (i.e. Sweden, Switzerland, and Spain), their GDP and GDP per capita are average values of distance, GDP, and GDP per capita as Pamuk (1978) contains information on sum of Ottoman exports to and imports from these countries. GDP and GDP per capita data of the Ottoman Empire and its trading partners come from Maddison (2003) who contains detailed information on their GDP and GDP per capita even before the 1880s. In column (3), different from other columns in Table 1.9 wars equals 1 if the Ottoman Empire was involved in a war with one of its trading partners in year *t-1*, and zero otherwise. This means that wars varies both time and its trading partners. In column (4), I re-estimate regressions after exclusion of its trading partners in the East (i.e. Iran and Egypt). In column (7), I run regressions after exclusion of time-invariant variables. Column (8) includes trading partner fixed effects. Columns (9) and (10) add logarithm of the average tariff rates in the Ottoman Empire and its trading partners in year *t-1* and other variables (i.e Alliances, Other Wars, and Railroads). The data on the average tariff rates are not available for all trading partners of the Ottoman Empire. Also, this data provide information on the average tariff rates of the Ottoman Empire and its trading partners between 1865 and 1913. The sample in columns (9)-(10) includes 10 of its trading partners between 1866 and 1913: Austria-Hungary, Egypt, France, Germany, Greece, Italy, Russia, Serbia, UK, and US. *"Alliances"* is a dummy variable for whether the Ottoman Empire and its trading partner were allies in year *t-1*. *"Other wars"* is a dummy variable to indicate if there were wars that a trading partner of the Ottoman Empire was involved in with other countries in year *t*. "*Railroads*" is a dummy variable to indicate if there was a railroad line that was operated by firm of a trading partner of the Ottoman Empire in year *t*. In columns (1)-(9), the dependent variable is the logarithm of the sum of the Ottoman exports and imports. In column (10), the dependent variable is sum of the Ottoman exports and imports, as in Santos Silva and Tenreyro (2005). In columns (9) and (10), several variables (i.e. Ottoman GDP and GDP per capita, and dummy variable for landlocked trading partners) are omitted due to multi-collinearity. Heteroskedasticity-robust standard errors corrected for clustering at the country level are reported in parentheses. ***, **, and * denote statistically significantly different from zero at 1%, 5%, and 10% levels, respectively. N. of obs. is number of observation. In columns (5) and (6), R^2 is the overall R-squared as R^2 is the R-squared in other columns. χ^2 refers to Sargan-Hansen statistic which is an alternative to the Hausman test. In my study, it is preferred to the Hausman test as errors could be heteroskedastic and clustered. The Sargan-Hansen statistic shows that fixed-effects specification is preferred. Reset test is a heteroskedasticity-robust Ramsey`s Reset test. The *p*-values of the heteroskedasticity-robust Reset test are reported at the bottom of columns (9) and (10) in Table 1.9. The *p*-values in columns (9)-(10) show that there is no misspecification in the models in the columns (9)-(10) at 1 percent level.

Table 1.10: Gravity Regressions: an Alternative Sample, Prices, and Different Dependent Variables (1830-1913)

Dependent Variables: log(Sum of Ottoman Exports and Imports), log((Sum of Ottoman Exports and Imports)/Prices), log(Ottoman Exports) and log(Ottoman Imports)										
	1	2	3	4	5	6	7	8	9	10
Wars	-4.694	-13.059	-0.188	-0.368*	-12.426	-12.395	-0.533	-0.235	-36.618*	-31.119
	(22.460)	(15.686)	(0.176)	(0.209)	(16.539)	(16.539)	(0.423)	(0.279)	(19.739)	(18.205)
Boycotts	-0.554	-0.219	-0.130	-0.028	-0.273	-0.273	-0.094	-0.159	-0.517	-0.098
	(0.465)	(0.259)	(0.191)	(0.286)	(0.275)	(0.275)	(0.298)	(0.600)	(0.507)	(0.178)
log(Distance)	-2.562*	-2.261***	-2.679***	-0.462	-2.212***	-2.212***	0.854	3.837	-1.883***	-2.798***
	(1.284)	(0.300)	(0.872)	(5.065)	(0.311)	(0.311)	(5.308)	(7.551)	(0.507)	(0.288)
log(Distance)×Trend$_t$	0.0007	0.212	-0.014	-0.034*	0.196	0.196	-0.040	-0.042*	0.238	0.192
	(0.013)	(0.261)	(0.012)	(0.016)	(0.269)	(0.269)	(0.029)	(0.021)	(0.386)	(0.237)
log(Ottoman GDP)	-13591.700	-78.992	256.336	938.278	-75.717	-75.717	299.374	1784.442	-224.970*	178.256
	(65876.900)	(90.121)	(554.374)	(664.576)	(94.130)	(94.130)	(1042.124)	(821.501)	(110.984)	(104.890)
log(Ottoman GDP per capita)	341.405	110.763	10.700	12.560	106.145	106.145	33.494	6.234	314.473*	-245.931
	(1637.486)	(123.419)	(7.185)	(12.523)	(118.878)	(128.878)	(14.253)	(14.022)	(151.940)	(143.656)
log(Trading Partner GDP)	-0.085	0.229	0.462	1.257	0.181	0.181	2.929	-1.064	0.173	-0.815**
	(2.607)	(0.390)	(1.795)	(2.252)	(0.371)	(0.371)	(2.604)	(3.963)	(0.545)	(0.336)
log(Trading Partner GDP per capita)	2.577	1.001	-0.049	-0.548	1.212	1.212	-0.882	-0.243	2.129	1.696
	(3.944)	(1.088)	(1.813)	(2.228)	(1.102)	(1.102)	(2.260)	(3.765)	(1.876)	(1.268)
Colonial Relationship	-28.947	-3.549***	-10.097	1.569	-3.568***	-3.568***	18.557*	1.200	-2.919***	-6.506***
	(23.223)	(0.916)	(14.039)	(5.742)	(0.869)	(0.869)	(9.634)	(8.467)	(0.965)	(0.663)
Common Border	-0.378	-2.282	-4.826	-2.430	-1.985	-1.985	-3.315	11.531	-0.996	-0.146
	(10.629)	(1.593)	(6.336)	(17.337)	(1.575)	(1.575)	(17.759)	(26.631)	(2.718)	(1.743)
Common Religion	25.830	-0.431	3.261	1.322	-0.505	-0.505	-9.025	-5.358	-0.465	-0.505
	(24.525)	(0.897)	(13.033)	(6.165)	(0.847)	(0.847)	(11.765)	(5.030)	(1.095)	(0.847)
Landlocked	-20.959***	-3.465***	-6.076***	--	-3.442***	-3.442***	--	--	-3.035***	-2.709***
	(0.593)	(0.719)	(2.242)		(0.727)	(0.727)			(0.962)	(0.688)
Free Trade Agreements	-1.708	-1.731**	-2.116	-2.603	-1.684**	-1.684**	-5.368	5.430	-1.853*	0.122
	(5.502)	(0.800)	(4.068)	(8.532)	(0.755)	(0.755)	(9.103)	(12.762)	(0.917)	(0.589)
log(Ottoman Average Tariffs)	--	--	--	-1.354	--	--	-2.941	-1.299	--	--
				(2.408)			(4.522)	(2.109)		

Table 1.10 Continued

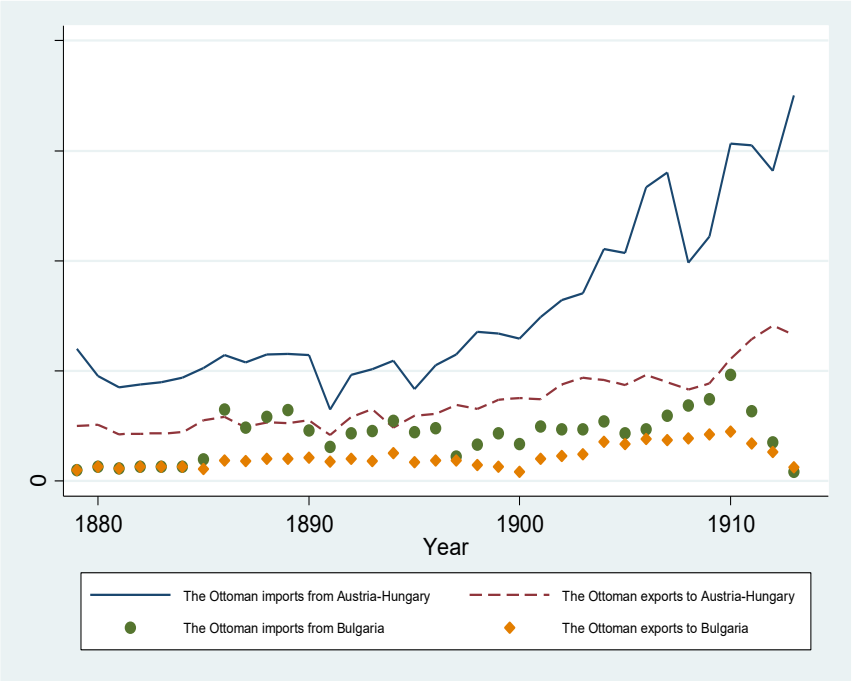
	1	2	3	4	5	6	7	8	9	10
log(Trading Partner Average Tariffs)	--	--	--	-0.013	--	--	-0.248	0.194	--	--
				(0.281)			(0.500)	(0.405)		
Alliances	--	--	--	0.824**	--	--	1.031**	0.884**	--	--
				(0.349)			(0.425)	(0.321)		
Other Wars	--	--	--	-0.010	--	--	0.161	0.028	--	--
				(0.227)			(0.218)	(0.541)		
Railroads	--	--	--	2.586	--	--	3.879	7.706	--	--
				(4.807)			(5.142)	(7.338)		
Trading Partner Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Constant	78528.710	-1.548	-1361.636	-5244.414	2.431	2.406	-1556.101	-10082.510*	-25.667*	24.105***
	(380265.800)	(6.438)	(3153.241)	(3789.196)	(6.592)	(6.692)	(5916.957)	(4684.130)	(12.073)	(6.907)
N. of obs.	735	1132	701	456	1051	1051	456	456	1051	1051
R^2	0.91	0.90	0.91	0.93	0.90	0.90	0.90	0.91	0.86	0.83

Notes: Table 1.10 reports the OLS estimates for equation (1.1). In columns (1), (3), (4), (7), and (8), I estimate equation (1.1) using Ottoman export and import data between 1879 and 1913 that come from Pamuk (1995), as in column (3) of Table 1.1. In columns (2), (5), (6),(9), and (10), I use an alternative dataset on Ottoman exports and imports between 1830 and 1913 that come from Pamuk (1978) to estimate equation (1.1), as in column (1) of Table 1.3. In columns (7) and (9), I estimate equation (1.1) using logarithm of the Ottoman exports to its trading partners in year *t* as dependent variable. In columns (8) and (10), I estimate equation (1.1) using logarithm of the Ottoman imports from its trading partners in year *t* as dependent variable. As in Table 1.2., there are only couple of zero values in the Ottoman export and import data that come from Pamuk (1995). So, in columns (7) and (8) I add one to each observation before taking logarithm of the Ottoman exports and imports. Different from column (3) of Table 1.1 and column (1) of Table 1.3, Greece is considered as an independent country from the Ottoman Empire after 1831 in columns (1) and (2). In columns (3)-(4), Ottoman export and import data in Pamuk (1995) are deflated using the Istanbul consumer price index (base year 1913). The data for consumer price index of Istanbul are taken from Pamuk (2000; p. 18). All values in Pamuk (2000) are expressed in akces. I convert them to gold lira using exchange rates in Inalcik and Quataert (1996; pp. 972-3). Base year in Pamuk (2000) is 1469. The base year is changed to 1913. Missing values are extrapolated by using the average annual growth rate of the years for which consumer price index of Istanbul data are available. Columns (4), (7), and (8) report the OLS estimates for equation (1.1) after adding additional control variables. These control variables are logarithm of the average tariff rates in the Ottoman Empire and its trading partners in year *t-1,* alliances, other wars, and railroads. The data on the average tariff rates are not available for all trading partners of the Ottoman Empire. *"Alliances"* is a dummy variable to indicate if the Ottoman Empire and its trading partner were allies in year *t-1. "Other wars"* is a dummy variable for whether there were wars that a trading partner of the Ottoman Empire was involved in with other countries in year *t*. "*Railroads*" is a dummy variable to indicate if there was a railroad line that was operated by firm of a trading partner of the Ottoman Empire in year *t*. In columns (5) and (6), I estimate equation (1.1) by using data in Pamuk (1978), as in column (1) of Table 1.3. On the other hand, in column (5) Ottoman export and import data in Pamuk (1978) are deflated by consumer price index of the UK (base year 1913). The data for price index of the UK are taken from Mitchell (2003; pp. 846-9). In column (6), I use Ottoman export and import data in current British pounds. Heteroskedasticity-robust standard errors corrected for clustering at the country level are reported in parentheses. ***, **, and * denote statistically significantly different from zero at 1%, 5%, and 10% levels, respectively. N. of obs. is number of observation. R^2 is the R-squared.

1.10 Appendix C: Figure and Table

1.10.1 Figure

Figure 1.3: Ottoman Trade with Austria-Hungary and Bulgaria (1879-1913)



Notes: Figure 1.3 shows Ottoman exports and imports with Austria-Hungary and Bulgaria over the period 1879-1913. The Ottoman exports and imports in constant prices (base year 1913) are expressed in thousand British pounds. The data on the Ottoman exports and imports come from Pamuk (1978; pp. 188-91). The Ottoman exports and imports are deflated using the Istanbul consumer price index (base year 1913). The data for price index of Istanbul are taken from Pamuk (2000; p. 18). All values in Pamuk (2000) are expressed in akces. I convert the Istanbul consumer price index to British pounds using exchange rate in Inalcik and Quataert (1996; pp. 971-3). The base year is changed to 1913.

1.10.2 Table

Table 1.11: Descriptive Statistics on Wars and Boycotts

Variable	N. of obs.	Mean	Std. Dev.
Wars	701	0.114	0.318
Boycotts	701	0.006	0.075

Notes: N. of obs. displays the total number of trading partner-year observations. Std. Dev. denotes standard deviations of wars and boycotts.

1.11 References

Anderson, J. E. (1979). "A Theoretical Foundation for the Gravity Equation". *American Economic Review*. 69. pp. 106-16.

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

Anderson, J.E. and D. Marcouiller (2002). "Insecurity and the Pattern of Trade: An Empirical Investigation". *Review of Economics and Statistics*". 84. pp. 342-52.

Anderton, H. and J. R. Carter (2001). "The Impact of War on Trade: An Interrupted Times Series Study". *Journal of Peace Research*. 38(4). pp. 445-57.

Behar, C. (1996). *Osmanli Imparatorlugu'nun ve Turkiye`nin Nufusu 1500-1927*. Ankara: Devlet Istatistik Enstitusu.

Bergstrand, J. H. (1985). "The Gravity Equation in International Trade: Some Microeconomic Foundations and Empirical Evidence". *The Review of Economics and Statistics*. 67. pp. 474-81.

Bergstrand, J. H. (1989). "The Generalised Gravity Equation, Monopolistic Competition, and the Factor Proportion Theory in International Trade". *Review of Economics and Statistics*. pp. 143-53.

Cameron, A.C., J.G. Gelbach, and D.L. Miller (2008). "Bootstrap-Based Improvements for Inference with Clustered Errors". *Review of Economics and Statistics*. 90. pp. 414-27.

Caruso, R. (2003). “The Impact of International Economic Sanctions on Trade: An Empirical Analysis”. *Peace Economics, Peace Science and Public Policy*. 9(2). pp. 1–29.

Cetinkaya, Y. D. (2010). “Muslim Merchants and Working-Class in Action: Nationalism, Social Mobilization and Boycott Movement in the Ottoman Empire 1908-1914”. *Unpublished PhD Thesis*. Leiden: Leiden University.

Clemens, M.A. and J. G. Williamson (2004). “Why did the tariff-growth correlation change after 1950? ”.*Journal of Economic Growth.* 9 (1). pp. 5-46

De Groot, H.L.F., G. Linders, P. Rievtveld, and U. Subramanian (2004). “The Institutional Determinants of Bilateral Trade Patterns”. *Kyklos* 57. pp.103–24.

Egger, P. (2002). “An Econometric View on the Estimation of Gravity Models and the Calculation of Trade Potentials”. *World Economy.* 25. pp. 297-312.

Eichengreen, B. and D. A. Irwin (1998). “The Role of History in Bilateral Trade Flows”. *NBER Working Papers No. 5565.*

Eldem, V. (1994). *Osmanli Imparatorlugu’nun Iktisadi Sartlari Hakkinda Bir Tetkik*. Istanbul: Turk Tarih Kurumu Yayınları.

Elliott, K. A. (1998). “The Sanctions Glass: Half Full or Completely Empty?”. *International Security*. 23(1). pp. 50-65.

Evenett, S. J. (2002). “The Impact of Economic Sanctions on South African Exports”. *Scottish Journal of Political Economy*. 49(5). pp. 557-73.

Felipe, J. and U. Kumar (2010). "The Role of Trade Facilitation in Central Asia: A Gravity Model". *Levy Economics Institute Working Papers No. 628.*

Gauto, V. (2012). "Paraguay and Mercosur: A Sensitivity Analysis of Gravity Model Estimation Techniques". *Forum for Research in Empirical International Trade (FREI) Working Papers No. 475.*

Genc, M. (2009). *Osmanli Imparatorlugu`nda Devlet ve Ekonomi*. Istanbul: Otuken Yayinlari.

Geyikdagi, V.N. (2011). *Foreign Investment in the Ottoman Empire: International Trade and Relations 1854-1914*. London: Tauris Academic Studies.

Ghosn, Faten, and S. Bennett (2003). *Codebook for the Dyadic Militarized Interstate Incident Data, Version 3.10*. Online: http://correlatesofwar.org.

Gleditsch, K.S. and M.D. Ward (2001). "Measuring Space: A Minimum-Distance Database and Applications to International Studies". *Journal of Peace Research*. 38(6). pp.739-758.

Gocek, F. M. (2002). "Decline of the Ottoman Empire and the Emergence of Greek, Armenian, Turkish, Arap Nationalisms". in Gocek, F. M. (ed). *Social Constructions of Nationalism in Middle East.* Albany: State University of New York. pp. 15-85.

Gowa, J. and E. D. Mansfield (1993). "Power Politics and International Trade". *American Political Science Review.* 87(4). pp. 408-20.

Gowa, J. and E. D. Mansfield (2004). "*Alliances, Imperfect Markets, and Major-Power Trade".* International Organization. 58. pp. 775-805.

Great Britain, Parliamentary Papers (1839). “Anglo-Turkish Commercial Convention of 1838”. in Issawi, C. (ed). *The Economic History of the Middle East 1800-1914.* Chicago: University of Chicago Press. pp. 38-41.

Hanioglu, M. S. (2008). *A Brief History of the Late Ottoman Empire*, Princeton: Princeton University Press.

Head, K., T. Mayer, and J. Ries (2009). “How Remote is the Offshoring Threat?”. *European Economic Review.* 53. pp. 429-44

Hufbauer, G. C. and B. Oegg (2003). “The Impact of Economic Sanctions on U.S. Trade: Andrew Rose’s Gravity Model”. *Peterson Institute for International Economics Working Papers No. 03-4*.

Hufbauer, G. C., K. A. Elliott, and E. Winston (1997). “Economic Sanctions: Their Impact on Trade, Jobs, and Wages”. *Peterson Institute for International Economics Working Papers*.

Inalcik, H. and D. Quatert (1996). *An Economic and Social History of the Ottoman Empire 1300-1914*. Cambridge: Cambridge University Press.

Issawi, C. (1980). *The Economic History of Turkey, 1800–1914*. London: University of Chicago Press.

Issawi, C. (1998). *Cross-cultural Encounters and Conflicts*. New York: Oxford University Press.

Isserlis, L. (1938). “Tramp Shipping Cargoes and Freights”. *Journal of the Royal Statistical Society.* 101 (1). pp. 53–146.

Jacks, D. S. and K. Pendakur (2010). “Global Trade and the Maritime Transport Revolution”. *The Review of Economics and Statistics.* 92(4). pp. 745–55.

Kalemli-Ozcan, S. and A. Nikolsko-Rzhevskyy (2009). “Trade, Finance, and Sovereign Debt: Historical Evidence”. *University of Memphis Working Papers.*

Karkar, Y. N. (1972). *Railway Development in the Ottoman Empire, 1856-1914*. New York: Vantage Press.

Karpat, K. (1972). “Transformation of the Ottoman State, 1789-1908”. *International Journal of Middle East Studies*. 3. p. 243-81.

Kasaba, R. (1993). *Osmanli Imparatorlugu ve Dunya Ekonomisi Ondokuzuncu Yuzyil*. Istanbul: Belge Yayinlari.

Kavallari, A. S., S. Maas, and P.M. Schmitz (2008). “Explaining German Imports of Olive Oil: Evidence from a Gravity Model”.*12th EAAE Congress on People, Food and Environments: Global Trends and European Strategies*. Gent. Belgium.

Kent, M. (1996). *Great powers and the End of the Ottoman Empire*, London: Frank Cass and Co. Ltd..

Keshk, O., B. Pollins, and R. Reuveny (2004). “Trade Still Follows the Flag: The Primacy of Politics in a Simultaneous Model of Interdependence and Armed Conflict”. *Journal of Politics*. 66(4). pp. 1155–79.

Kimura, F. and H. Lee (2006). “The Gravity Equation in International Trade in Services”. *Review of World Economics*. 42(1). p. 92-121.

Lamotte, O. (2012). “Disentangling the Impact of Wars and Sanctions on International Trade: Evidence from Former Yugoslavia”. *Comparative Economic Studies*. pp. 1–27.

Li, Q. and D. Sacko (2002). “The (Ir)Relevance of Militarized Interstate Disputes for International Trade”. *International Studies Quarterly.* 46(1). pp. 11-43.

Liu, X. (2009). “GATT/WTO Promotes Trade Strongly: Sample Selection and Model Specification”. *Review of International Economics.* 17(3). pp. 428-46.

Long, A. G. (2003). “Defense Pacts and International Trade”. *Journal of Peace Research*. 40(5). pp. 537–552.

Maddison, A. (2003). *The World Economy: Historical Statistics*, Paris: OECD Development Centre.

Mansfield, E. D. and R. Bronson (1997). “Alliances, Preferential Trading Arrangements, and International Trade”. *The American Political Science Review*. 91(1). pp. 94-107.

Mayer, T. and S. Zignago (2011). “Notes on CEPII’s distances measures (GeoDist)”. *CEPII Working Paper No. 2011-25*.

Mitchell, B.R. (2003). *International Historical* Statistics*: Europe, 1750-2000*. New York: Palgrave Macmillan.

Mohammed, S. S., and J. G. Williamson (2004). “Freight Rates and Productivity Gains in British Tramp Shipping 1869–1950”. *Explorations in Economic History.* 41(2). pp. 172–203.

Morrow, J. D., R. M. Siverson, and T. E. Tabaras (1998). "The Political Determinants of International Trade: The Major Powers, 1907–90". *American Political Science Review*. 92. pp. 649-61.

North, D. C. (1958). "Ocean Freight Rates and Economic Development, 1750–1913". Journal of Economic History. 18(4). pp. 537–55.

Oneal, J., B. Russett and M.L. Berbaum (2003). "Causes of Peace: Democracy, Interdependence, and International Organizations, 1885-1992". *International Studies Quarterly*, 47(3). pp. 371-93

Ortayli, I. (2010). *Osmanli Imparatorlugu'nda Alman Nufuzu*. Istanbul: Timas Yayinlari.

Owen, R. (2002). *The Middle East in the World Economy, 1800-1914*. London: Tauris and Co Ltd.

Pamuk, S. (1978). "Foreign Trade, Foreign Capital and the Peripheralization of the Ottoman Empire, 1830-1913". *Unpublished PhD Thesis*. Berkeley: University of California.

Pamuk, S. (1984). *Osmanli Ekonomisi ve Dunya Kapitalizmi, (1820-1913): Ticaret, Sermaye ve Uretim Iliskileri*. Ankara: Yurt Yayinevi.

Pamuk, S. (1987). *The Ottoman Empire and European Capitalism: 1820-1913*. Cambridge: Cambridge University Press.

Pamuk, S. (1990). "The Middle East in Nineteenth Century World Trade". in Esfandiari, H. and A.L. Udovitch (eds.). *The Economic Dimensions of Middle*

Eastern History, Essays in Honour of Charles Issawi. Princeton: Darwin Press. pp. 199-214.

Pamuk, S. (1995). *19. Yuzyilda Osmanli Dis Ticareti*. Ankara: Devlet Istatistik Enstitusu.

Pamuk, S. (2000). *Istanbul ve Diger Kentlerde 500 Yillik Fiyatlar ve Ucretler*, *1469-1998*. Ankara: Devlet Istatistik Enstitusu.

Pamuk, S. (2004). "Prices in the Ottoman Empire, 1469-1914". *International Journal Middle East Studies*. 36. pp. 451-468.

Pamuk, S. (2009). *The Ottoman Economy and Its Institutions*. UK: Ashgate Publishing Limited.

Pamuk, S. and J. G. Williamson (2009). "Ottoman De-Industrialization 1800-1913: Assessing the Shock, Its Impact and the Response". *NBER Working Papers No. 147463.*

Parlow, A. (2011). "Does Trade promote Peace? A panel Data Approach within a Gravity-Model Framework". *University of Wisconsin-Milwaukee Working Papers.*

Peksen, D. (2006). "Bilateral Trade and the Third Party Effect of US Sanctions". *Annual Meeting of International Studies Association-Midwest.* US, St Louis.

Pollins, B. M. (1989a). "Does Trade Still Follow the Flag?". *American Political Science Review*. 83(2). pp. 465-80.

Pollins, B. M. (1989b). “Conflict, Cooperation, and Commerce: The Effect of International Political Interactions on Bilateral Trade Flows”. *American Political Science Review*. 33(3). pp. 465-80.

Quataert, D. (1977). “Limited Revolution: The Impact of the Anatolian Railway on Turkish Transportation and the Provisioning of Istanbul, 1890-1908”. *The Business History Review*. 51(2). pp. 139-60.

Quataert, D. (1987). *Avrupa Iktisadi Yayilimi ve Sosyal Direnis 1881-1908*. Ankara: Yurt Yayinlari.

Quataert, D. (2005). *The Ottoman Empire, 1700-1922.* Cambridge: Cambridge University Press.

Rahman, M. M. (2009). “Australia’s Global Trade Potential: Evidence from the Gravity Model Analysis”. *Oxford Business and Economics Conference.* Oxford, UK: St. Hugh`s College, Oxford University.

Rose, A. (2002). “Do We Really Know That the WTO Increases Trade?”. *NBER Working Papers No. 9273.*

Santos Silva, J. M. C. and S. Tenreyro (2006). “The Log of Gravity”. *The Review of Economics and Statistics*. 88(4). pp 641-58.

Schoenberg, P. E. (1977). “The Evolution of Transport in Turkey (Eastern Thrace and Asia Minor) under Ottoman Rule, 1856-1918”. *Middle Eastern Studies*. 13(3). pp. 359-72.

Shaw, S. J. and E. K. Shaw (1977). *History of the Ottoman Empire and Modern Turkey*. Volume 2. Cambridge: Cambridge University Press.

Small, M. and J. D. Singer (1969). “Formal Alliances, 1815-1965: An Extension of the Basic Data”. *Journal of Peace Research*. 6. pp. 257-282.

Sohrabi, N. (2011). *Revolution and Constitutionalism in the Ottoman Empire and Iran*. Cambridge: Cambridge University Press.

Stinnett, Douglas M., J. Tir, P. Schafer, P. F. Diehl, and C. Gochman (2002). “The Correlates of War Project Direct Contiguity Data, Version 3”. *Conflict Management and Peace Science* 19(2). pp. 58-66.

Summary, R. (1989). “Political-Economic Model of U.S. Bilateral Trade”. *Review of Economics and Statistics*. 1. pp. 179-82.

Thobie, J. (1991). “European Banks in the Middle East”. in Cameron, R. and V. I. Bovykin (eds). *International Banking 1870-1914*. New York: Oxford University Press.

Tuncer, A. C. (2012). “Monetary Sovereignty during the Classical Gold Standard Era: the Ottoman Empire and Europe, 1880-1913”. *LSE Working Papers No. 165/12.*

Wooldridge, J. F. (2009). *Introductory Econometrics: a Modern Approach*. Mason: South-Western Pub.

Yang, J, H. Askari, J. Forrer, and H. Teenegen (2004). “US Economic Sanctions: an Empirical Study”. *The International Trade Journal*. 18(1). pp. 23-62.

Yorulmaz, N. (2010). “Ottoman Empire and Germany (1871-1908) Military-economic Relationship Trade Activities of German Armaments Industry in the Ottoman Market”. *European Science Foundation (ESF) Global Euronet Working Paper*.

Chapter 2: The Impact of Access to Railroads on Economic Growth in the Ottoman Empire, 1893-1914

2.1 Introduction

In the previous literature, decreasing transportation costs due to railroads is considered as a central factor for increasing trade, productivity, and production, which induces economic growth. Railroads result in higher trade, as they allow a more efficient allocation of goods: consumers can buy goods from the cheapest places as producers can sell goods in the most expensive ones (Donaldson, 2008; Huijg et al., 2010; Atack and Margo, 2011; Kotavaara et al., 2011). Additionally, the resulting decrease in transportation costs due to railroads puts downward pressure on input costs, and as a result, production increases. Moreover, thanks to railroads

transportation agricultural products to distant places or ports become easier. So, railroads can create new marketing opportunities for agricultural goods and higher agricultural production (Schwartz et al., 2011; Hornung, 2012; Jedwab and Moradi, 2012). Finally, railroads are positively related to the accessibility of new technologies as they facilitate circulation of newspapers and mail, which leads to higher productivity of firms, and resultantly, production increases in a place which gains access to railroads (Banerjee et al., 2009; Schwartz et al., 2011; Hornung, 2012). Furthermore, increasing accessibility of markets through lower transportation costs leads to a decrease in market power of firms, i.e. increased competition. Thanks to competition, firms achieve productivity and efficiency (Atack et al., 2009b; Banerjee et al., 2009).

In the early nineteenth century, the existing road networks in the Ottoman Empire were not in a good condition due to financial and geographical obstacles (Karkar, 1972; p. 59; Schoenberg, 1977; Engin, 1993; pp. 28-9). Lack of suitable roads resulted in difficulties that limited the Ottoman state`s political control over its territories. Accordingly, the Ottoman state primarily aimed to build railroads in order to bring remote areas under its political control (Kolars and Malin, 1970; Schoenberg, 1977; Quataert, 1977; Gulsoy, 2010, pp. 27-8; Hulagu, 2010, pp. 23-25). On the other hand, nearly all railroad lines were built and operated by foreign firms from the major European powers[71]. This is because the Ottoman state was suffering financial difficulties and lacked technological knowledge in how to construct railroads (Schoenberg, 1977; Gulsoy, 2010; p. 27).

In the historical literature, there are controversial arguments for the impact of railroads on economic growth in the Ottoman Empire. Several researches argue that

[71] They were the UK, France, Germany, and Austria-Hungary.

there had been a substantial increase in trade and agricultural production as places had gained access to railroads[72]. On the other hand, while railroads are generally viewed as having a positive effect on growth, there is a strand of literature arguing that railroads could lead to lower production in connected places, as there was an increase in imports due to railroads, which resulted in the domestic industry being hampered in places where railroad lines were located (Inalcik and Quataert, 1996; p. 814). There is another strand of the literature, arguing that railroads did not lead to economic growth in the Ottoman Empire. This strand is based on the argument that railroad lines were not adequately connected to one another[73] (Ortayli, 2010; p. 166), and resultantly the passenger and good traffic was not intense[74].

In order to provide further evidence on this debate, the aim of this chapter is to investigate the impact of railroads on economic growth in the Ottoman Empire in the years 1893 and 1914. Since there is no available data on GDP or economic activity[75], I examine whether access to railroads changed population of judicial districts (known

[72] See British Parliamentary Paper (1896; p. 10), Karkar (1972; p. 65, p. 82), Quataert (1977), Eldem (1994; p. 94), Gulsoy (1994; pp. 245-6), Inalcik and Quataert (1996; pp. 810-4), Quataert (2005; p. 126), Hanioglu (2008; p. 137), Gulsoy (2010, pp. 181-2, p. 270), and Hulagu (2010; pp. 14-45).

[73] This is because all major European powers wanted to build railroads to control places politically and economically (Illich, 2007; p. 91-3; Geyikdagi, 2011; pp. 54-5). Furthermore, the construction of the railroads by one power would create a threat to its rivals` economic and political dominance in the respective location. Competition among the major European powers to control the respective location via railroad investments would lead to conflicts (Ortayli, 2010; pp. 165-6). For instance, in 1836 Colonel Chesney, who was a British engineer, had proposed construction of several railroads in the Ottoman Empire to the UK government. The railroads would have connected the Syrian coast with Baghdad (von Pressel, 1966; p. 92). However, since railroads would create a threat to the economic dominance of France in these areas, France blocked the building of these railroads using a French diplomat, i.e. Ferdinand de Lesseps (Gulsoy, 2010; pp. 43-4).

[74] Another reason for this is that railroads were not connected with highways (Eldem, 1994; p. 105).

[75] Guran (1997) contains information on agricultural production in borders of today`s Turkey for the years 1909, 1913, and 1914. The agricultural production data are only available at city level. I use judicial districts as my unit of analysis and focus on the effect of railroads in the Ottoman Empire. The borders of the Ottoman Empire did not include only today`s Turkey, as shown in Figure 2.1. So, I am not available to use the city-level agricultural production data. Also, Eldem (1994; p. 93) uses fiscal revenues as a proxy for agricultural production in order to examine the effect of railroads in the connected areas. However, there is no available data for fiscal revenues at judicial district level. A concern with data on fiscal revenues is that railroads not only led to higher economic growth in the affected areas but also an increase in tax collection capacity of the Ottoman state.

as kazas)[76] following Hornung (2012) who relates population growth to economic growth to analyse the impact of railroads in Prussia. Railroads would change population in connected judicial districts if they were associated with production and trade in the respective judicial districts[77]. I use the historical data on population of judicial districts in the Ottoman Empire for the years 1893 and 1914 and information about location of railroad lines by year and by judicial district.

The estimation results reveal some evidence for a positive relationship between railroad access (as measured by the distance from a judicial district centre to the nearest railroad line) and population. Data constraints do not allow me to directly examine whether railroad access resulted in increasing of trade, agricultural production, and employment opportunities in the respective judicial districts as well as internal migration. The historical literature shows that railroads were positively related to trade and agricultural production in places where there was a lack of good roads. Increasing trade and agricultural production resulted in creating new jobs, which attracted an inflow of people seeking employment opportunities in the these areas where trade and production were increasing (Schoenberg, 1977; Eldem, 1994; p. 94; Gulsoy, 1994; pp. 245-8; Inalcik and Quataert, 1996; pp. 810-4; Gulsoy, 2010, pp. 181-5, p. 270; Hulagu, 2010; pp. 14-45). So, I interpret this result to mean that access to railroads was positively related to economic growth, which led to higher

[76] Over the sample period, the Ottoman Empire was divided into several administrative units. In the censuses that population data come from, the judicial district was the smallest unit. English translation of this term is taken from Karpat (1985; p. 151, p. 189). (See Section 2.5).

[77] This seems an appropriate choice, because the historical literature argues that there was an increase in population of places that had gained access to railroads due to internal migration, expanding of markets for agricultural goods, and increasing agricultural production, employment opportunities and safety in the respective places (British Parliamentary Paper, 1896; p. 10; Eldem, 1994; p. 94; Gulsoy, 1994; pp. 245-6; Inalcik and Quataert, 1996; pp. 810-4; Gulsoy, 2010, pp. 181-2, p. 270; Hulagu, 2010; pp. 14-45). Furthermore, it seems that judicial districts with higher agricultural production and trade could support large population, as argued by Acemoglu et al. (2002a).

population in the affected areas. This is also consistent with findings of Hornung (2012)[78].

A large number of papers in the previous literature on the impact of railroads address the possibility that placement of railroad lines is endogenous to economic and demographic outcomes in a region. Similarly, the historical literature argues that Izmir and Aydin were commercially important, populated, and rich, that is why a railroad line was built to connect Izmir with Aydin (Kolars and Malin, 1970; Karkar, 1972; p. 65, p. 79). Also, in order to prevent future famines, several railroad lines — such as the line connecting Bandirma with Balikesir— were located in places that had been affected by famines and were unpopulated (Inalcik and Quataert, 1996; p. 789; Erler, 2010; pp. 304-12). Accordingly, the OLS estimates for the impact of railroad access could be biased due to reverse causality. To address the reverse causality issue, I pursue two different strategies: (i) I construct an instrumental variable for railroads based on trade and caravan routes; and (ii) I examine the effect of un-built lines in proposals of Colonel Chesney and Levant Herald[79] on population.

The results from the second approach that I follow to mitigate concerns of bias are highly consistent with the hypothesis that reverse causality is not a serious problem in this study. This is in line with the strand of historical literature which argues that many railroad lines in the Ottoman Empire were assigned to places regardless their economic importance. Instead, the construction of railroads in the Ottoman Empire was motivated by non-economic reasons, such as political, military,

[78] Using data from Prussia over the period 1840-1871, Hornung (2012) finds that railroads increased population in connected cities. He concludes that railroad access was positively associated with productivity and economic growth, which led to higher employment opportunities in the respective cities. Furthermore, increasing employment opportunities attracted an inflow of migrants.

[79] Before 1870, Colonel Chesney and Levant Herald proposed construction of several lines which would have located in Syria, Iraq, and Anatolia. However, the lines never began to be built due to political and financial reasons. Also, there were no railroad lines that were constructed in places that Colonel Chesney and Levant Herald proposed between 1856 and 1914.

and religious concerns[80]. The results in this chapter are consistent with findings of Jedwab and Moradi (2012)[81].

This study contributes to previous literature in four aspects: (i) it is the first study that uses a unique historical dataset of railroads and judicial district population to analyse the impact of railroads in the Ottoman Empire; (ii) it provides empirical evidence to help inform the historical literature as to whether access to railroads induced economic growth in the Ottoman Empire; (iii) it is the first study that uses a unique historical dataset on trade and caravan routes in the Ottoman Empire as well as proposals of Colonel Chesney and Levant Herald in order to deal with endogeneity issue of where railroad lines in the Ottoman Empire were built, i.e. it represents the first attempt to study the decisions about placement of railroad lines empirically, and (iv) it extends the empirical literature on the impact of railroads by presenting empirical evidence from history. Using a unique historical dataset on the Ottoman Empire whose borders included many present-day countries[82], it contributes to the previous study based on historical data from Turkey.

The remainder of this chapter is organized as follows: section 2.2 reviews the previous literature, section 2.3 presents the historical background of railroad construction in the Ottoman Empire, section 2.4 outlines hypotheses and predictions, section 2.5 introduces the unique dataset that I collect to examine the effect of railroads on economic growth, the variables used in the regressions, and the

[80] See Karkar (1972; p. 75), Quataert (1977), Schoenberg (1977), Gulsoy (1994; pp. 41-50), Inalcik and Quataert (1996; p. 806), Illich (2007; pp. 91-2), Gulsoy (2010; pp. 27-8), and Hulagu (2010; pp. 23-5).

[81] Based on data from Ghana for the years 1901 and 1931, Jedwab and Moradi (2012) fail to validate a statistically significant effect of un-built lines on cocoa production and population growth. They argue that railroads in Ghana were primarily built for military and political reasons. So, they interpret the finding to mean that placement of lines in Ghana was not endogenous to cocoa production and population growth.

[82] These countries are Turkey, Greece, Syria, Iraq, Lebanon, Israel, Palestine, Jordan, Yemen, and some parts of Albania, Macedonia, Kosovo, and Saudi Arabia.

descriptive statistics, section 2.6 discusses the empirical strategy used in this chapter and the issue of reverse causality, section 2.7 presents the empirical results with a wide range of robustness checks regarding the effect of railroads on economic growth, and section 2.8 concludes.

2.2 The Economic Effect of Railroads: Literature Review

Recently, researchers have shown an increased interest in the effect of railroads on economic growth, development, and outcomes in the region. However, there is no empirical literature on the relationship between railroads and economic growth in the Ottoman Empire. Furthermore, the association between railroads and economic growth is hardly a settled topic on which historians agree. The arguments of the historical literature are discussed in sections 2.3 and 2.4. Previous studies on the impact of railroads provide a conceptual framework that I use to construct a model to test the impact of railroads on population. Moreover, the empirical literature on the impact of railroads contains a number of different methods that I use to tackle the endogeneity issue of placement of railroad lines in the Ottoman Empire.

A number of recent papers examine the effect of railroads and mostly find a positive effect of railroad access[83] on economic development, growth and outcomes in a region. There are many papers in the literature that use population density, urbanization, and population growth as indicators of economic development and growth in case of data constraints (Beeson et al., 2001; Atack et al., 2009a; Hornung, 2012). Furthermore, one strand of literature focuses on the impact of railroads on demographic outcomes in a region, which leads to conflicting findings (Banerjee et

[83] Previous studies on the impact of railroads use a large set of measures of railroad access such as dummy variable for railroad line presence in a given area or the shortest distance between a place and railroad lines.

al., 2009; Jedwab and Moradi, 2012). Several papers argue that the placement of railroad lines could be endogenous to economic and demographic outcomes in a region, which could lead to biased OLS estimates for the impact of railroads (Banerjee et al., 2009; Jedwab and Moradi, 2012). In order to deal with reverse causality, they construct instrumental variables for measures of railroad access and examine the effect of lines that are planned but which are not actually constructed. Finally, there is another strand of literature, which uses instrumental variables for measures of railroad access in order to address the issue of omitted variable bias (Donaldson, 2008; Atack et al., 2009a; Hornung, 2012).

In an earlier study, Beeson et al. (2001) find that population and population growth increase as a county gains access to railroads, using data from the US for the years 1840 and 1990. They conclude that railroad access promotes economic development in a county.

Atack et al. (2009a) provide a comprehensive study on the effect of railroads on economic development. Using data for 287 counties from the US for the years 1850 and 1860, Atack et al. (2009a) examine the effect of railroad presence in a county on urbanization and population density in the respective county. They use urbanization and population density as related indicators of economic development in the respective county. While they primarily use a difference-in-difference approach, they also pursue an instrumental variable strategy. This is because a relevant omitted variable leads to bias in difference in difference estimates for the impact of railroads.

In order to address omitted variable bias, Atack et al. (2009a) construct an instrumental variable based on a straight line between start and end points of routes which come from several government surveys that were done from 1824 to 1838 in

the US. The government surveys looked for suitable routes for construction of roads and canals for military purposes. So, counties along the straight line are expected to be geographically suitable locations for railroad construction as well. Atack et al. (2009a) show that railroad access is positively related to urbanization as there is no statistically significant effect of railroad access on population density. Furthermore, Atack et al. (2009a) find that the IV (Instrumental Variable) estimates for the impact of railroads are larger than the difference in difference coefficients in magnitude. Atack et al. (2009a) conclude that the difference in difference estimates for the impact of railroads are biased downward due to omitted variables.

Different from Beeson et al. (2001) and Atack et al. (2009a), Donaldson (2008) focuses on the impact of railroad presence in a district on an economic outcome (i.e. real agricultural income) in the respective district. Donaldson (2008) uses data for 239 districts from India for the period 1870-1930. Donaldson (2008) also examines the impact of railroads on transportation costs, and interregional and international trade. He argues that railroad line placement decisions in India may be correlated with time-varying determinants of agricultural income that are omitted due to data constraints. This suggests that railroad lines could not be placed randomly, which leads to bias in the OLS estimates for the impact of railroads.

Donaldson (2008) uses three strategies to mitigate concerns of bias due to non-random railroad placement. First, he examines the effect of lines which were planned, but that were never built. Donaldson (2008) argues that un-built lines will be spuriously correlated with agricultural production, if line placement decisions are related to time-varying determinants of agricultural production. Second, Donaldson (2008) constructs an instrumental variable for railroad presence in a district based on

rainfall shortages in the respective district, because railroads in India were built to alleviate future famines which arose from inadequate rainfall. Donaldson (2008) argues that if the OLS estimates are not different from the IV coefficients in magnitude, then this means that omitted variable bias is unlikely to be serious problem. Last, Donaldson (2008) places railroad lines in three different categories to their intended purposes and compares the effect of them on agricultural production. If there is a large difference among the effect of railroad lines that are placed in different categories, this suggests that bias in the OLS estimates due to non-random railroad placement is likely to be a concern.

Donaldson (2008) provides evidence that railroad access is positively related to real agricultural income and trade among districts as there is a negative effect of railroad access on transportation costs. Donaldson (2008) concludes that railroads increase trade through decreasing transportation costs, which leads to higher agricultural production in the respective district. Additionally, Donaldson (2008) finds that railroads in India are not assigned to a district on the basis of unobservable determinants of real agricultural income.

Banerjee et al. (2009) also investigate the effect of railroads on economic outcomes (i.e. per capita GDP and GDP growth) and demographic outcomes (i.e. population and population growth). They use data for 353 counties in China for the period 1986-2003. Banerjee et al. (2009) argue that placement of railroad lines are endogenous to economic and demographic outcomes in China, which leads to bias in the OLS estimates for the effect of railroads. To mitigate concerns about reverse causality, they use an instrumental variable for railroad access. Railroads in China were generally built by non-Chinese powers who aimed to extend their political

control over historically important cities through mobilizing their troops easily, which were located in the Treaty ports. So, their instrumental variable is the distance from each county in their sample to the straight lines connecting historically important cities with Treaty ports in China.

Banerjee et al. (2009) provide supportive evidence that the railroad access is only associated with increasing of GDP per capita growth. They conclude that railroads lead to an increase in income through not only increasing trade, but also improving access to financial and other services such as education and health care, which arise from decreasing transportation costs. Additionally, restrictions on migration in China lead to an insignificant coefficient estimates for the impact of railroads on population and population growth. Lastly, Banerjee et al. (2009) find that the IV estimates for the impact of railroads are much larger than OLS coefficients in magnitude as they are imprecisely estimated. They conclude that the IV estimates are not precise enough to be informative about railroad line placement decisions in China.

More recently, Jedwab and Moradi (2012) examine the effect of railroads on economic and demographic outcomes (i.e. cocoa production and population growth). They use data from Ghana for the years 1901 and 1931. As in Banerjee et al. (2009) and Hornung (2012), Jedwab and Moradi (2012) address the possibility that railroads are assigned to a city on the basis of its economic and demographic importance. This means that railroad line placement decisions are endogenous to cocoa production and population growth, which leads to bias in the OLS estimates for the effect of railroads on population growth and cocoa production. In order to address the issue of reverse causality, they use the distance from each city in their sample to the straight lines

joining main ports and large cities in Ghana as an instrumental variable for railroads, following Banerjee et al. (2009). Furthermore, following Donaldson (2008), Jedwab and Moradi (2012) examine the effect of lines which were planned but that were never built.

Jedwab and Moradi (2012) find a positive relationship between railroad access and cocoa production. They conclude that railroads are positively associated with cocoa production through decreasing transportation costs, and resultantly input costs. They also show that railroad access is positively related to population growth. Their interpretation is that increasing cocoa production due to decreasing transportation and input costs attracts a large number of people which seek employment opportunities in places that gain access to railroads. Finally, Jedwab and Moradi (2012) provide evidence that the OLS coefficients are not different from the IV estimates in magnitude. Furthermore, there is no statistically significant effect of un-built lines on agricultural production and population growth. They interpret the findings to mean that placement of lines in Ghana are not endogenous to cocoa production and population growth, because construction of railroad lines in Ghana was primarily motivated by military and political purposes.

A related paper to my study is Hornung (2012) who focuses on the impact of railroads on economic growth, based on data for 978 cities in Prussia for the period 1840-1871. Due to data constraints, Hornung (2012) examines whether there was an increase in the population of a city that had gained access to railroads. Furthermore, Hornung (2012) focuses on the impact of railroads on firm size and number of firms in order to examine whether railroads were positively associated with industrial jobs in connected cities. In line with Donaldson (2008), Atack et al. (2009a) and Banerjee

et al. (2009), Hornung (2012) pursues an instrumental variable strategy to mitigate concerns about omitted variables. Hornung (2012) uses an instrumental variable for railroads based on straight line joining important cities in Prussia, because railroads were primarily built to connect important cities. Hornung (2012) finds a positive impact of railroad access on firm size and population growth. Hornung (2012) concludes that railroads are positively associated with production and economic growth through increasing productivity, which attracts a greater number of people that want to find jobs in the respective cities. Additionally, Hornung (2012) shows that the OLS estimates are smaller than IV coefficients in magnitude. He interprets this finding to mean that the OLS estimates for the impact of railroads are biased downward due to omitted variables.

To best of my knowledge, Beyzatlar (2010) is the only study that investigates the effect of railroads on the development of cities in one of the successor states to the Ottoman Empire, i.e. Turkey, in an econometric context[84]. He uses kilometres of railroads within a city as a measure of railroad access, based on data for cities from Turkey over the period 1856-2007. Beyzatlar (2010) finds that there is a positive impact of railroad access on agricultural production as railroad access does not have a statistically significant effect on population density[85].

My study is different from Beyzatlar (2010) in several aspects. Firstly, I use judicial districts as my unit of analysis. Secondly, I examine the effect of railroads on population in judicial districts within the borders of the Ottoman Empire in a given

[84] There are also some descriptive studies—such as Kolars and Malin (1970), Bayraktaroglu (1995), and Akgungor et al. (2011)—that examine the effect of railroads in Ottoman Empire and Turkey, using historical data for railroads.

[85] To calculate population density at the city level, Beyzatlar (2010) uses data for the area of cities in square kilometres in 2000 to maintain consistency of city borders over the period 1856-2007. There were many changes in borders of cities in Turkey between 1856 and 2007 due to administrative reasons and wars. Due to lack of enough data and information on the area of all judicial districts in my sample, population is preferred as dependent variable in my study.

year. As shown in Figure 2.1, these borders included not only today`s Turkey, but also many other countries. Thirdly, railroad networks of the Ottoman Empire and Turkey even by 2007 were not dense. This implies that kilometres of railroads in a judicial district or a city may not be appropriate to analyse the effect of railroads on economic and demographic outcomes in the Ottoman Empire or Turkey, as suggested by Banerjee et al. (2012) and Sanchis-Guarner (2012). For this reason, I use the shortest distance between judicial district centre and railroad lines as a measure of railroad access. Finally, my study is the first to address the possibility that railroad lines placement decisions in the Ottoman Empire could be related to economic conditions or population.

2.3 Historical Background: Railroads in the Ottoman Empire

Having provided an outline of previous literature on the impact of railroads, I proceed with a discussion for essential background features of railroad construction in the Ottoman Empire. In section 2.3.1, I describe the transportation system in the Ottoman Empire before construction of railroads and look at the reasons why the Ottoman state wanted to build railroads. I also briefly discuss how railroad line placement decisions were made. In section 2.3.2, I provide detailed information on when and where railroads were built as well as about who built and operated these railroad lines. The factors that determined where lines were placed are discussed in detail. The impact of railroads is briefly examined along with relevant historical facts. Finally, methods that were used to finance railroad construction are discussed.

2.3.1 Transportation in the Ottoman Empire and Railroad Line Placement Decisions

Since the early nineteenth century, railroads emerged as a new form of transportation in Europe and US and replaced former ones (e.g. camels and horses), which were used for a long time. Railroads led to a sharp decrease in transportation costs and travel time. Thanks to railroads, goods and people were carried more safely as railroads were less likely to be affected from the weather conditions in comparison to other forms of transportation (Issawi, 1982; pp. 44-52).

In the 1850s, the length of railroads was 620 km in Italy and Spain had less than 100 km of railroad lines. Also, Austria-Hungary, the UK, and the US had 1,357, 9,800, and 14,480 km of railroad lines, respectively (Kasaba, 1993; pp. 40-1; Inalcik and Quataert, 1996; p. 804). As railroad networks of the Europe and US grew rapidly, there was no railroad line in the Ottoman Empire by the 1860s. Furthermore, the existing road networks of the Ottoman Empire were in a poor condition[86]. There were many problems due to poor road networks of the Ottoman Empire. The most paramount issue for the government was that the poor roads hindered mobilization of troops to fight against rebellions and wars in remote locations. The construction of railroads in the Ottoman Empire was primarily motivated to mitigate these military and political concerns (Kolars and Malin, 1970; Schoenberg, 1977; Quataert, 1977; Gulsoy, 2010; pp. 27-8; Hulagu, 2010; pp. 23-25).

[86] Even in 1914, there was 20,000 kilometres of highways. However, the highways were only partially finished and not built well. Additionally, it was not possible to repair them and construct new roads due to financial difficulties and physical geography (Schoenberg, 1977; Engin, 1993; pp. 28-9; Inalcik and Quataert, 1996; p. 818).

Since railroad construction was a matter of technology and finance, it was not easy for the Ottoman state to build the railroads alone[87]. So, almost all railroad lines were built by foreign companies[88] of the major European powers. Undoubtedly, the foreign railroad companies primarily built the railroads in order to make profits. On the other hand, political motives also attracted railroad investments of the major European powers in the Ottoman Empire. That is, the major European powers would extend their controls over the Ottoman Empire via their railroad investments[89] (Earle, 1966, pp. 120-31; Schoenberg, 1977; Illich, 2007; pp. 90-1; Ortayli, 2010; pp. 165-6; Geyikdagi, 2011; pp. 54-5). Accordingly, railroad networks of the Ottoman Empire were not designed and built by the Ottoman state alone.

The Ottoman state commonly gave the right to the foreign railroad companies to build and operate railroads in places that the state wanted the railroads to be built. Foreign railroad companies hired engineers to survey routes and develop plans for the railroads which the Ministry of Public Works (known as Nafia Nezareti) had to grant approval. Only after the Ministry of Public Works had approved plans, the construction of the railroads started[90] (Engin, 1993; p. 65). The Ottoman state could

---

[87] Financial situation of the Ottoman state became worse after Crimean War of 1853 and 1856. Moreover, the Ottoman state went bankrupt due to its debts in the 1870s (Schoenberg, 1977; Geyikdagi, 2011; pp. 119-126).

[88] Some of the foreign railroad companies were the Smyrna-Aydin Railroad Company and the Smyrna-Cassaba Company of the UK, Chemin de Fer Moudania Brousse, Compagnie Generale d`Exploitation des Chemins de Fer de la Turquie d`Europe of France, the Deutsche Bank and Anatolian Railway Company of Germany, Societe Ottomane du Chemin de Fer Damas and Societe du Chemin de Fer Ottoman de Jaffa a Jerusalem et Prolongements of France (Kolars and Malin, 1970; Karkar, 1972; pp. 70-5; Schoenberg, 1977; Engin, 1993; p. 61; Eldem, 1994; p. 103; Hulagu, 2010, pp. 23-25).

[89] From Geyikdagi (2011; pp. 54-5), "*foreign powers believed that the Ottoman state fall apart and cease to exist. As they did not pass up their shares of the spoils, they brought in capital that would prove their presence and prepare the grounds for the territorial or economic claims on the estate of the defunct*." For instance, Russia got the right to build railroads in provinces of the Ottoman Empire in Black Sea in 1900. Germany also wanted to build the railroads in the provinces in the Black Sea. Since the provinces in the Black Sea was too close to Russia`s border, the railroads would create a threat Russia`s dominance in this region if Germany would build the railroads. Russia got the right to build the railroads in this region to prevent Germany from controlling of this region via railroad investments of German firms (Karkar, 1972; p. 74).

[90] Additionally, if the Ottoman state had wanted to build railroads itself, it hired engineers to develop plans for railroads. For instance, in the 1870s, Wilhelm von Pressel was hired by the Ottoman state to

sometimes ask foreign railroad companies to change locations of tracks due to political and strategic reasons (Schoenberg, 1977). For instance, the line running from Ankara to Aleppo did not pass through rich places even if foreign railroad company had planned to build it in places that were rich in agricultural resources (i.e. the Mediterranean coast). This is because the Ottoman state wanted the lines to be built in places that were located further away from the coast since the coast would likely came under attack if a war broke out (Schoenberg, 1977; Inalcik and Quataert, 1996; p. 806).

On the other hand, Schoenberg (1977) argues that foreign railroad companies of the major European powers could construct railroad lines in places that the Ottoman state did not want the railroads to be built. One example for this was the railroad line linking Izmir with Aydin. It was built by a British firm and opened in 1866. The line was located in places where the UK wanted to extend its economic control. The Ottoman state was opposed to build lines connecting Izmir with Aydin, because Izmir and Aydin had no political and military importance. The only thing that the Ottoman state did to hamper the construction of the line did not provide any financial aid to the foreign firm.

Moreover, foreign railroad companies sometimes built unnecessary[91] railroad lines to get more money, because the Ottoman state made payments to foreign railroad companies per kilometre of railroad line that was put into operation, the so-called kilometric guarantee system[92]. So, railroad lines did not exactly pass through

develop plans for railroads, which would link Istanbul with Baghdad (von Pressel, 1966; pp. 91-3; McMurray, 2001; p. 18; Illich, 2007; p. 97).

[91] From Issawi (1982; p. 60), "*...the railways had grave defects. Some, particularly in European Turkey and Syria, were unnecessarily circuits, in order to draw greater revenues from kilometric guarantees, and payments by the governments were correspondingly high*."

[92] In the later nineteenth century, the Ottoman state used kilometric guarantee system to encourage railroad construction and paid a certain minimum revenue per kilometre of lines in operation to foreign

places that were in the plan that was approved by Ministry of Public Works before construction started (Schoenberg, 1977; Issawi, 1982; p. 60).

2.3.2 The Development of Railways in the Ottoman Empire

Although there were many geographical, political and financial obstacles in construction of railroads, railroad construction in the Ottoman Empire started after 1855. Railroad networks of the Ottoman Empire grew to 8,334 km by 1914 (Schoenberg, 1977; Eldem, 1994; p. 103) such that the Rumelia[93] was connected with Hejaz, Syria, Iraq, and Anatolia. On the other hand, as shown in Figures 2.2 and 2.3, the railroad networks of the Ottoman Empire were not that dense even in 1914. This was due to financial difficulties, wars, political obstacles, economic interests of the major European powers[94], and physical geography (von Pressel, 1966; p. 91; Schoenberg, 1977; Ortayli, 2010; pp. 163-5; Geyikdagi, 2011; pp. 90-8).

Construction of the first railroad line in the Ottoman Empire began in 1856. The line would connect Izmir with Aydin, as shown in Figure 2.2[95]. The line was constructed by the Smyrna-Aydin Railroad Company that was a British company and

---

railroad companies. During this period, the Ottoman state had paid nearly 170 million French francs as part of the kilometric guarantee (Schoenberg, 1977; Issawi, 1980; p. 188; Inalcik and Quataert, 1996; p. 806-7; Owen, 2002; p. 121; Tuncer, 2009; pp. 54-89). Due to political and military reasons, the Ottoman state had an urgent need for the construction of the railroads, which resulted in easy and prolific abuse of the kilometric guarantee system (Irtem, 1999; p. 42).

[93] Part of the Ottoman Empire in the Europe.

[94] Several railroad lines were never built, although the Ottoman state gave the right to foreign firms to build and operate railroads. For instance, in 1891, a Belgian firm got the right to build a line that was supposed to be located in Samsun, Sivas, and Kayseri. The firm sold the right to the Russian government. The railroad line was not constructed by the Russia. This is because railroads would facilitate agricultural production in this region and imports of the Ottoman Empire from the Europe through decreasing transportation costs, which would result in decreasing of exports of Russia to the Ottoman Empire (Karkar, 1972; p. 74; Issawi, 1980; p. 195).

[95] As shown in Figure 2.3 and Table 2.10 of Appendix B, there were some other railroad lines that were built and operated in similar years with that of Izmir-Aydin railroad line. These were Chernovoda-Constantza and Varna-Rustchuk railroad lines. They were built by British companies in Rumelia. These lines were in operation in 1860 and 1866, respectively. These railroad lines were not within the border of the Ottoman Empire between 1893 and 1914 as the Ottoman Empire lost several of its territories in Rumelia after 1870 (Eldem, 1994; pp. 96-104; Geyikdagi, 2011; p. 78).

began to operate in 1866[96] (British Parliamentary Paper, 1896; p. 10; Issawi, 1980; p. 183; Eldem, 1994; p. 104). Izmir was the most populated city in the Ottoman Empire in the 1850s after Istanbul[97] (Issawi, 1982; p. 101; Hourcade, 2008, p. 163). Additionally, figs and sultana raisins, which were produced in Aydin, exported to the UK through Izmir port. These were the reasons of building a line to link Izmir with Aydin (Karkar, 1972; p. 65; Issawi, 1982; p. 159). The railroad line facilitated the transportation of agricultural products by shortening the travel time to only three hours. So, the UK could import raw materials and products, which was produced in Aydin, easier and cheaper than before (Karkar, 1972; p. 65). Gulsoy (1994; p. 22) argues that construction of the line was of importance to the Ottoman state for another reason as there were many bandits in the Aegean region, where Izmir and Aydin were located, during the nineteenth century. After the line was in operation, the Ottoman state mobilized troops easily in order to suppress the bandits in the Aegean region.

Railroads in Rumelia that are shown in Figure 2.3 were generally built by French firms[98]. The Rumelia was gradually falling under the dominance of Russia during the nineteenth century. So, the Ottoman state wanted to build railroads to bring Rumelia under its political control by preventing dominance of Russia in this region. To achieve this, in 1869, the Ottoman state gave the right to build railroads[99] in Rumelia to Baron Maurice de Hirsch, who was a German born financier. In order to build the railroads, he founded Compagnie Generale d`Exploitation des Chemins de Fer de la Turquie d`Europe whose headquarter was in Paris. In 1872, Dedeagac-Edirne railroad line was opened. Also, a railroad line connecting Istanbul with Edirne

[96] Geyikdagi (2011; p. 89) argues that the line began to operate in 1867 on the contrary to British Parliamentary Paper (1896; p. 10) and Issawi (1980; 183).
[97] As population in Istanbul was around 500,000 in the 1850s, population of Izmir was about 150,000 (Issawi, 1982; p. 101; Hourcade, 2008, p. 163)
[98] Karkar (1972; p. 68) argues that they were Austro-Hungarian and French firms. Apart from this, several railroad lines were built by British firms (Eldem, 1994; pp. 96-104; Geyikdagi, 2011; p. 78).
[99] The railroad lines were named as the Rumelia railway.

was opened in 1873. After the railroad lines had been in operation, the Ottoman state`s political control in the Rumelia increased (Karkar, 1972; p. 67; Engin, 1993; pp. 44-5, pp. 49-61, pp. 108-110).

French firms also built railroads in other parts of the Ottoman Empire. Through railroad investments of French firms, France aimed to extend its economic control in places —such as Syria, Jaffa, and Jerusalem— that had been the focus of French economic interests since eighteenth century[100] (Gulsoy, 2010; pp. 43-4). In 1888, Societe du Chemin de Fer Ottoman de Jaffa a Jerusalem et Prolongements constructed the line linking Jaffa with Jerusalem, which was opened in 1892. In 1890, construction of the line between Damascus and Muzeirib began, as shown in Figure 2.4. The line was built by Damas, Hama et Prolongoments and opened in 1894. Additionally, Societe Ottomane du Chemin de Fer Damas built another railroad line connecting Damascus with Beirut. The line was in operation in 1895 (Karkar, 1972; p. 69; Eldem, 1994; p. 98; Inalcik and Quataert, 1996; p. 808; Nicholson, 2005; p. 18; Gulsoy, 2010; pp. 45-50).

In addition to British and French firms, German companies built several railroad lines[101] in the Ottoman Empire. As shown in Figure 2.5, the railroad lines were supposed to link the capital city of the Ottoman Empire (i.e. Istanbul) with Anatolia and Baghdad, which was not completely under political control of the Ottoman state (Quataert, 1987; p. 68; McMurray, 2001; p. 42). On the other hand, there were other reasons for building the railroad lines. Industrialization in Germany had created an explosion in the demand for the cheap agricultural products and mineral resources of the Ottoman Empire after the 1880s. Germany would import

[100] For instance, silk that was produced in these places commonly exported to France (Gulsoy, 2010; pp. 43-4).
[101] The railroad lines were named as the Anatolian and Baghdad railways.

them easily through railroads which led to lower transportation costs[102] (Dominian, 1916; McMurray, 2001; p. 40; McMeekin, 2010; pp. 36-7; Ortayli, 2010; p. 58). Moreover, through railroad investments of German firms, Germany would create a threat to the British and French economic and political dominance in the Asia and the Ottoman Empire[103] (McMurray, 2001; p. 41; Illich, 2007; p. 89; Gulsoy, 2010; pp. 43-4; Ortayli, 2010; pp. 161-5).

In 1888, the right to build railroad lines linking Istanbul with Baghdad through Izmit, Eskisehir, Ankara, and Konya was given to the Deutsche Bank and Anatolian Railway Company of Germany by the Ottoman state. Between 1888 and 1892, construction of railroad lines connecting Izmit with Ankara was finished. Similarly, the railroad line running from Eskisehir to Konya was opened in 1896. Building of railroad lines connecting Konya with Baghdad began after 1904 and could finish after 1914 due to political obstacles and wars[104] (Earle, 1966; p. 199; Karkar, 1972; pp. 71-5; Eldem, 1994; p. 99; Inalcik and Quataert, 1996; p. 808; Geyikdagi, 2011; pp. 90-8). After the railroad lines had been in operation, there was an increase in population of places that had gained access to railroads due to increasing trade and production (Clay, 1994).

---

[102] Additionally, since railroad companies of Germany had rights to exploit any mineral resources—such as oil—found within 20 km of tracks, German industry would gain access to mineral resources of the Ottoman Empire via railroad investments. The rights were given by the Ottoman state to encourage the railroad construction (Karkar, 1972; p. 87, Engin, 1993; pp. 28-9; Owen, 2002; pp. 196-7).

[103] For instance, McMurray (2001; p. 41) states that "*Linking Berlin to Persian Gulf, the railway would create the most direct route between Europe and the Indian subcontinent, challenging England`s dominance of the seas by providing an alternative route than the Suez Canal."*

[104] As shown in Figure 2.5, the construction of the railroad lines between Konya and Baghdad was not completed before 1914. Railroad line constructions by German firms created a threat to British economic dominance in the Ottoman Empire and Asia. Additionally, the construction of railroad lines was expected to extend Germany`s economic influence towards the Russian border and regions that were the focus of French economic interest. As a result, Russia, France, and the UK created political obstacles to prevent completion of the railroad lines. So, the building of the railroad lines became a source of international disputes and was accepted as one of the important reasons for WWI (Earle, 1966; pp. 2-3, pp. 147-208; von Pressel, 1966; p. 91; Gulsoy, 2010; pp. 43-4; Ortayli, 2010; pp. 163-7). This is the reason why Earle (1967; p. 6) named the area along the railroad lines as "*Danger zone*".

Apart from these lines, there were several railroad lines that were built by the Ottoman state. The railroad line connecting Istanbul with Izmit was opened in 1873 after construction of the line had started in 1871 (Karkar, 1972; p. 71). Additionally, the railroad lines linking Damascus with Medina[105], which is shown in Figure 2.6, was constructed by the Ottoman state with support of Germany between 1900 and 1908[106]. There were several reasons for building the railroad lines between Damascus and Medina. First, the railroad lines would bring the Arab provinces under the political control of the Ottoman state. Second, it was built to connect the holy cities of the Islam with Istanbul, which would make transport of pilgrims to the holy cities easy. After the railroad lines had been opened, the Ottoman states become successful in suppressing the rebellions in Kerak and Jabal al-Duruz in 1910. Furthermore, there was an increase in trade, economic growth, and population in places along the railroad lines, which arose from decreasing transportation costs and connecting the agricultural areas with the ports (Karkar, 1972; p. 75; Al-Hameed, 1989; pp. 1-14; Gulsoy, 1994; pp. 45-6, Gulsoy, 2010; p. 270; Hulagu, 2010; pp. 61-2, p. 148, pp. 180-1).

The last thing worth mentioning is how the construction of railroads was financed. Since the Ottoman Empire experienced financial difficulties, it did not have enough funds to build the railroad lines itself. So, the construction of the Hejaz railway was possible thanks to donations that were collected all over the Muslim world (Gulsoy, 1994; pp. 59-86, Inalcik and Quataert, 1996; p. 806, Gulsoy, 2010; pp. 82-102). The foreign railroad companies could commonly issue stocks and bonds

[105] The railroad lines were named as the Hejaz railway.
[106] Apart from main line connecting Damascus with Medina, there was another line running Haifa from Deraa, as shown in Figure 2.7. A British firm primarily began to construct the line in 1895. However, the Ottoman state bought the line from this firm and completed construction of the line in 1905 (Gulsoy, 1994; pp. 130-1; Nicholson, 2005; p. 50; Gulsoy, 2010; pp. 51-2).

in order to raise the capital for construction and operation of railroad lines. Also, in construction of several railroad lines, the Ottoman state guaranteed to pay a certain rate of return on the capital invested or the cost of construction to the foreign companies. For instance, for the construction of the railroads in Rumelia, the Ottoman state guaranteed to pay for 11 percent of capital invested to Baron Maurice de Hirsch (Schoenberg, 1977; Inalcik and Quataert, 1996; p. 806-7).

2.4 Hypotheses

In this section, based on the literature review on the impact of railroads and the above survey on railroad construction in the Ottoman Empire, I proceed to develop hypotheses that incorporate key historical facts about the association between railroad access and economic growth in the Ottoman Empire.

In the previous literature on the impact of railroads, decreasing costs due to railroads is seen as an important factor for increasing trade, productivity, production, and employment opportunities, that lead to economic growth (Donaldson, 2008; Banerjee et al., 2009; Huijg et al., 2010; Atack and Margo, 2011; Schwartz et al., 2011; Kotavaara et al., 2011; Hornung, 2012; Jedwab and Moradi, 2012). Similarly, the historical literature argues that railroads led to a decrease in transportation costs and facilitated more effective transportation (Inalcik and Quataert, 1996; p. 814). Accordingly, trade gradually increased in places that had gained access to railroads (Quataert, 2005; p. 126). For instance, since goods were easily carried from Anatolia to ports by the Anatolian railway, exports through the ports increased[107] (Karkar, 1972; p. 65, p. 82; Quataert, 1977; Inalcik and Quataert, 1996; p. 814). Furthermore,

[107] In addition to international trade, railroads led to higher interregional trade in the Ottoman Empire. For instance, the railroad lines passing along Usak facilitated trade between Usak and places which were close to Usak through decreasing transportation costs. Previously, it was not possible to sell products of these places (Owen, 2002; p. 113).

railroads led to higher agricultural production in connected places through expanding available markets for agricultural goods (Hanioglu, 2008; p. 137). Eldem (1994; p. 94) shows that there was a 114 percent increase in agricultural production in places that had gained access to railroads in comparison to a 63 percent increase in agricultural production in other places between 1889 and 1911[108]. Moreover, gaining access to the railroads had a positive impact on population —in such areas as Damascus, Maan, Amman, Der'a, Izmir, Usak, and Konya— because of increasing trade, agricultural production, safety, and employment opportunities[109] (British Parliamentary Paper, 1896; p. 10; Clay, 1994; Gulsoy, 1994; pp. 245-6; Inalcik and Quataert, 1996; pp. 813-4; Gulsoy, 2010, pp. 181-2, p. 270; Hulagu, 2010; pp. 14-45). Given these historical facts, I test following hypothesis.

Hypothesis l: *Access to railroads was positively associated with economic growth in the respective judicial district.*

Hypothesis 1 suggests that there was an increase in trade and production in judicial districts that gained access to railroads. The likely mechanism for this is decreasing transportation costs. Increasing trade and production could create new jobs, which could attract greater numbers of workers and their families. This means

[108] Figure 2.8 plots the population density against density of railroads in the Ottoman Empire for the period 1890-1913. Figure 2.8 shows a positive relationship between population density and railroad density in the Ottoman Empire. Figure 2.9 plots foreign trade per capita against railroad density in the Ottoman Empire over the period 1890-1913. Figure 2.9 reports that there was a weak positive relationship between railroad density and foreign trade per capita in the Ottoman Empire. Population density could be a related indicator of economic change and development in the Ottoman Empire, as argued by Atack et al. (2009a). Figures 2.8 and 2.9 could suggest that railroads facilitated the Ottoman foreign trade through decreasing transportation costs, which led to higher agricultural production and economic activity in the Ottoman Empire over time.

[109] As shown in Figure 2.10, the number of rail passenger in the Ottoman Empire gradually increased to 14 millions in 1913, on average. Although there is no data source with information about internal migration in the Ottoman Empire, Figure 2.10 implies that population gradually increased in places that had gained access to railroads, because many passengers were commuters and people had came to the connected places in order to find jobs (British Parliamentary Paper, 1896; p. 10; Gulsoy, 1994; pp. 245-6; Inalcik and Quataert, 1996; pp. 810-4; Gulsoy, 2010, pp. 181-2, p. 270; Hulagu, 2010; pp. 14-45).

that railroads could be seen as directly inducing economic growth, and perhaps be a main reason for the increase in population of connected judicial districts, as backed by the historical literature.

On the other hand, another branch of the historical literature argues that decreasing transportation costs due to railroads gradually opened up the Ottoman Empire to imports, causing the traditional handicraft industry to be hampered by foreign competition and eventually disappearing in places that had gained access to railroads such as Ankara. However, production in the traditional handicraft industry increased in places that were not close to railroad lines —such as Amasya, Tokat, and Diyarbakir (Inalcik and Quataert, 1996; p. 814). This leads to me hypothesis 2.

Hypothesis 2: *Access to railroads was negatively associated with economic growth in the respective judicial district.*

In suggesting hypothesis 2, I argue that railroads hampered domestic industry by increasing imports, which could have led to lower production, trade, and employment opportunities in connected judicial districts. So, railroads could have resulted in increased migration, which could have led to a decrease in population in the connected judicial districts.

2.5 Data

To investigate the relationship between railroads and economic growth, I gathered data from multiple sources. There is no available data for economic outcomes in the

Ottoman Empire, to best of my knowledge. So, I use population of judicial districts (P) for the years 1893 and 1914, following Hornung (2012)[110].

Population data come from 1881/82-93[111] and 1914 censuses, which have been made available by Karpat (1985; pp. 122-50, pp. 167-90). These censuses contained detailed information on population of judicial districts which were located in a county of a province[112] within borders of the Ottoman Empire in a given year, as shown in Figure 2.1.

---

[110] Hornung (2012) uses urban population to examine the impact of railroads on population growth. There was an absence of definition of urban and rural areas in available resources on the Ottoman Empire, to best of my knowledge. Also, the average population in a judicial district was 31,190 and larger than the average city size in Prussia between 1831 and 1871. Places that had population over 5,000 were considered as city by the Prussian administration.

[111] One concern with the censuses is that the historical literature does not provide any information about when the 1881/82-93 census finished even if it was conducted since 1881 and was submitted to the Sultan in 1893 (Karpat, 1985; pp. 30-6). On the other hand, it seems that population figures of the 1881/82-93 census can be used as a good proxy for total number of people which lived in the judicial districts in 1893, as suggested by Dolek (2007; p. 16) who compares the population figures of the 1881/82-93 census with the population figures in other reliable sources which provided detailed information on population of provinces. Karpat (1985; p. 33) argues that the censuses of most of territories in the Ottoman Empire was finished in 1889. In this sense, I re-estimate regressions after considering 1889 as the completion year of the 1881/82-93 census. The results are presented in Table 2.11. This exercise does not change the results much (See column (4) of Tables 2.2, 2.3, 2.4, and 2.5). Also, as shown in Table 2.10 of Appendix B, there were not many lines that were built between 1881 and 1893. So, this does not constitute a big problem. Another concern with the censuses is that several factors—such as undercounting of people living in several places due to religious reasons—cause measurement error in population data (Karpat, 1985; p. 34), which means that the measurement error in population data is unlikely to be correlated with the regressors that I use in this study. So, measurement error in population data do not lead to bias in the OLS estimates and only results in increasing of the variance of the error term (Wooldridge, 2009; p. 292). On the other hand, people that lived in a distant location could be undercounted (Karpat, 1985; p. 10). This may cause measurement error in population data which could be related to access to railroads, and as a result, leads to biased OLS estimates. To address the issue of bias due to measurement error, I pursue an instrumental variable strategy. The final concern with the censuses is that female population in Musul and Basra provinces, Ipek and Prizren counties in Kosova province could have been neglected in the 1881/82-93 census (Karpat, 1985; p. 151). To address this issue, in Table 2.12 I re-estimate regressions after omitting judicial districts in these places from the analysis which leads to a decrease in the number of observations from 686 to 666. This exercise does not change the direction of the relationship. However, the statistical significance of the OLS estimate for the impact of railroads changes as magnitude of OLS and IV (Instrumental Variable) estimates decreases. The OLS estimate in column (1) is statistically different from zero at 14 percent. This means that the results in my study are sensitive to using an alternative sub-sample or exclusion of places that female population could have been partly or totally neglected.

[112] In this chapter, the administrative division of the Ottoman Empire is based on Karpat (1985; p. 190) to maintain consistency in province borders. Due to administrative reasons, there were changes in borders of provinces in the censuses that population data come from. As several provinces of the Ottoman Empire were not covered by the censuses, the Ottoman Empire was divided to the 32 largest administrative units in Karpat (1985). These units were special districts (e.g. Izmit and Catalca Special Districts), provinces (e.g. Aydin province), a county (i.e. Zor Sancak), and capital city of the Empire

Even if the censuses contained detailed information on the total number of people who lived in provinces, counties, and judicial districts, judicial district level-population data are used for four reasons. First, I achieve the most disaggregated level of observation possible. Second, Beeson et al. (2001) argue that provinces and counties are aggregates of local economies. So, they provide few details about local economies. Third, judicial district borders in the Ottoman Empire were less likely to change due to administrative reasons and wars in comparison to borders of provinces, as pointed by Sezen (2006). Last, in the 1881/82-93 census several provinces (e.g. Biga province) were only composed of judicial districts.

Furthermore, the selection of these censuses is not arbitrary. Karpat (1985) provides detailed information on other population censuses which were conducted in different years (e.g. 1831, 1844, 1866/73, 1877/78, and 1906/07 censuses). I do not use these censuses for several reasons. First, the female population was neglected in some of these censuses. Second, several censuses did not provide detailed data on population of judicial districts[113]. Last, after administrative reforms of 1864, borders of administrative units in the Ottoman Empire could have changed (Sezen, 2006). In this respect, the 1881/82-93 and 1914 censuses present relatively more reliable figures for population of the judicial districts.

(i.e. Istanbul). The province (known as vilayet) was generally subdivided into counties (known as sancaks). Counties were composed of judicial districts (known as kazas). English translations of terms on administrative units (i.e. vilayet, sancak, and kaza) are taken from Karpat (1985; p. 151, p. 189). Like provinces, special districts, Zor county, and capital city were composed of judicial districts (Karpat, 1985; pp. 122-51). In this study, special district, Zor county, and the capital city are considered provinces.

[113] For instance, Trabzon province was composed of Lazistan and Gumushane counties in the 1881/82-93 and 1914 censuses. The Lazistan was subdivided into two judicial districts, which were Atina and Hopa. However, the 1831 census did not contain detailed information on population of these judicial districts. Furthermore, population data are not available at judicial district-level in the 1906/07 census (Karpat, 1985; p. 114, p. 138. p. 180).

Over the sample period, the Ottoman Empire lost some of its territories due to wars. Also, there might be changes in borders of administrative units due to administrative reasons. These mean that judicial district borders could have changed over the 1893-1914 period. There is no available map which contained detailed information on all judicial district borders in a given year, to best of my knowledge. On the other hand, Sezen (2006) provides detailed information on administrative divisions of the Ottoman Empire, historic boundaries of judicial districts and changes in the judicial district borders over time. I use Sezen (2006) to examine whether judicial district borders changed over the 1893-1914 period. It seems that borders of judicial districts in the sample remained relatively unchanged over the sample period. Only one judicial district (i.e. Eregli judicial district) was split into two parts (i.e. Zonguldak and Eregli judicial districts) after 1899. To maintain consistency in judicial district boundaries over the 1893-1914 period, I aggregate their data following Donaldson (2008). This means that the final sample includes judicial districts whose borders did not change over the sample period. On the other hand, the results do no change when I drop these judicial districts[114].

Although population data is available for 537 judicial districts for the years 1893 and 1914, my final sample only contains 455 judicial districts from 32 provinces[115] for two reasons. First, there is no available information for locations of

[114] Also, since the Ottoman Empire lost several of its territories in the Rumelia after 1893, the judicial district borders that were close to the Rumelia could have changed due to wars. To address this possibility, I re-estimate regressions after exclusion of its province in Rumelia in 1914 (i.e. Edirne province), which leads to a decrease in the number of observations from 686 to 666. This exercise does not change the magnitude of coefficient estimate for the impact of railroads and the direction of relationship, as the OLS estimate is statistically significant at 11 percent.

[115] These provinces were Aydin, Edirne, Erzurum, Adana, Iskodra, Ankara, Izmit, Bagdat, Basra, Beyrut, Bitlis, Biga, Cezayir-i Bahr-i Sefid, Catalca, Halep, Hudavendigar, Diyarbekir, Zor, Suriye, Selanik, Sivas, Istanbul, Trabzon, Kastamonu, Kosova, Konya, Kudus, Elaziz, Musul, Manastir, Van, and Yanya. All of the province names are given in the form in which they appear in Karpat (1985). (See Figure 2.11 in Appendix A). Cezayir-i Bahr-i Sefid province consisted of islands. Also, there were islands (i.e. Adalar judicial district) in Istanbul province. There were no railroad lines in these islands. Moreover, the islands had not direct access to railroads. So, in Table 2.13 I re-estimate

several judicial districts, even in the historical maps and documents. So, the final sample does not contain 53 judicial districts[116]. Second, there was a change in administrative status of several judicial districts in the censuses. While some judicial districts —such as Konya central judicial district— were named as central judicial districts (known as merkez kazas) in the 1881/82-93 census, they were classified as province capitals (known as vilayet merkezes) in the 1914 census[117]. Furthermore, several provinces, e.g. Istanbul and Kosova provinces had no judicial district which was classified as central judicial district (or province capital) in the censuses (Karpat, 1985; p. 142, p. 180, p. 189). Accordingly, central judicial districts or province capitals are omitted from the analysis[118], which leaves 455 judicial districts.

The last thing to worth mentioning is that the sample comprises of an unbalanced panel with 686 judicial district-year level observations[119] for several reasons. First, there is no information for population of several judicial districts — such as Malkara judicial district in Edirne province— in the 1881/82-93 census although these judicial districts were still parts of the Ottoman Empire in a given

---

regressions after exclusion of Cezayir-i Bahr-i Sefid province and Adalar judicial district in Istanbul province which does not make difference in the results.

[116] This is not due to changes in names of judicial districts over time as Sezen (2006) provides detailed information on changes in names of judicial districts. It seems that because there are not enough sources that provide detailed information on location of these judicial districts in the Ottoman Empire, I have missing observations. Only 9 percent the observations are missing (Wooldridge, 2009; p. 298).

[117] Also, it seems that central judicial district borders changed as several judicial districts were parts of the central judicial districts before 1900—such as Kangal judicial district in Sivas province (Sezen, 2006).

[118] As a robustness test of the results, I run regressions after inclusion of the central judicial districts. The findings are presented in Table 2.14. This changes the magnitude and statistical significance of coefficient estimates for the impact of railroads, as the OLS estimate yields higher statistical significance and IV estimate gains statistical significance. This is because the central judicial districts were more developed and populated in comparison to most of the judicial districts in my sample. The results provide evidence that reverse causality is a concern and measurement error could lead to biased OLS estimate for the effect of railroads. Also, the instrumental variable has a strong effect on railroad location, which means that the IV estimate for the impact of railroads can be interpretable as causal effect on population of access to railroads.

[119] I estimate regressions with a balanced sub-sample of my data, which results in decreasing of the number of observations to 203. This does not change the direction of the relationship. Also, magnitude of the coefficient estimate for the impact of railroads does not change much. However, the OLS estimate is statistically different from zero at 14 percent as standard error increases, which could be due to small sample size (Wooldridge, 2009; p. 397).

year, which is supported by Sezen (2006)[120]. Second, the 1881/82-93 and 1914 censuses did not cover several provinces in the Ottoman Empire at the censuses dates such as Hicaz, Trablusgarp, and Yemen provinces. Third, several judicial districts were parts of central judicial districts or counties before 1900 (Sezen, 2006)[121]. Last, the Ottoman Empire lost its territories in the Rumelia before 1914. So, judicial districts which were located in Rumelia were not parts of the Ottoman Empire in 1914.

To analyse the impact of railroad access on economic growth in the respective judicial district, I use the shortest distance between each judicial district centre and railroad line at the census dates (R). To construct this variable, I collect data for all railroad lines for which construction was completed between 1866 and 1914[122]. A possible challenge is that the layout of railroad networks in the Ottoman Empire is not available in digital format. However, there are many sources[123] that give detailed information on the location of tracks and railroad stations, where construction of railroad lines were planned, construction and opening dates of railroad lines. These sources also contain many maps of the railroad networks for the Ottoman Empire, as

[120] Missing values are likely to stem from reporting issues and technical errors in this census (Karpat, 1985; pp. 10-1). It seems that the data are not systematically missing for a particular judicial district.

[121] According to Sezen (2006), out of 455 judicial districts, only 14 judicial districts were parts of the central judicial districts or counties before 1900 (e.g. Babaeski, Ceyhan, and Kangal judicial districts). Exclusion of these judicial districts leads to a decrease in sample size to 672. The findings do not change in terms of the direction of the relationship. Also, this exercise does not change magnitude of coefficient estimate for the impact of railroads. However, the OLS estimate is statistically significant at 12 percent.

[122] As shown in Table 2.10 of Appendix B, 40 railroad lines were built and began to operate in the Ottoman Empire after 1855. Out of 40 railroad lines, 6 of the railroad lines were not within the borders of the Ottoman Empire at the census dates, as the Ottoman Empire lost its territories in Rumelia. Some parts of Edirne-Dedeagac and Edirne-Philipopoli-Belova railroad lines were within the borders of the Ottoman Empire at the census dates. Most of the railroad lines began to operate more than 10 years before each census year, on average. Railroad lines that began to operate earlier could have larger effect on population and production than other railroad lines. It is not possible to examine this issue as I use the distance between each judicial district and the nearest railroad line as regressor of interest and the railroad networks of the Ottoman Empire were not so dense.

[123] These sources are Kolars and Malin (1970; p. 289), Landau (1971), Karkar (1972; pp. 64-76), Schoenberg (1977; p. 264), Cotterell (1984), Tourret (1989), Engin (1993), Eldem (1994; p. 104), Gulsoy (1994), McMurray (2001), Nicholson (2005), Gulsoy (2010; pp. 41-55, p. 243), Hulagu (2010; pp. 128-30), McMeekin (2010), Geyikdagi (2011; pp. 88-9; 2011b), and Yilmaz (2011; p. 10, p. 18).

some of them are shown in Appendix A[124]. Using the historical data on railroad lines in the Ottoman Empire and ArcGIS software, I construct a detailed map of the railroad lines in the Ottoman Empire that shows the location of railroad lines by both place and year[125].

The previous literature on the effect of transportation networks on economic and demographic outcomes in a region uses various measures for road access: such as kilometres of roads within a given area (Duranton and Turner, 2007; Beyzatlar, 2010; Banerjee et al., 2012), distance from a place to the nearest railroad line (Banerjee et al., 2009), number of roads in a given location (Baum-Snow, 2007; Baum-Snow et al., 2012), and presence of railroad lines in a given area (Beeson et al., 2001; Donaldson, 2008; Atack et al., 2009a; Atack et al., 2009b; Hornung, 2012). Furthermore, several studies use the number of railroad stations per square km in a given location, the shortest distance between a location and railroad station, and dummies for distance from a location to the nearest railroad line (Suziki and Muromachi, 2010; Kotavaara et al., 2011; Schwartz et al., 2011; Jedwab and Moradi, 2012). Even the travel time among two places is used after it is weighted by number of people and employment in the respective places (Huijg et al., 2010; Sanchis-Guarner, 2012).

For my context, some measures of road access that are used in the studies cited above are not appropriate for several reasons. First, due to the nature of my database on judicial district borders, it is not feasible to construct reliable measures for presence and kilometres of railroads in a given area in a particular year. Second,

[124] Additionally, I use maps from the online Trains of Turkey map collection for the period 1860-1914 (http://www.trainsofturkey.com) and maps in the National Archives at Kew for the period 1860-1917. The reference numbers of the maps in the National Archives at Kew are MFQ/1/378, FO 925/4575, and MPI/1/720.

[125] See Figure 2.12 in Appendix A.

there is no available data on all railroad stations along several railroad lines —such as the Rumelia railway— and travel time. Last, the railroad networks of the Ottoman Empire were not so dense to use the number of railroad tracks and kilometres of railroads in a given area. Thus, following Banerjee et al. (2009), as a measure of railroad access, I compute the distance from each judicial district centre to nearest railroad line in a given year (*R*), using ArcGIS software. Since there is no reliable information for road networks in the Ottoman Empire[126], I use geographic distance instead of travel distance as kilometres[127].

The regression analysis also includes several control variables from other historical data sources. The first control variable is a dummy variable for the presence of natural disasters which were seen in a judicial district between 1800s and 1850s (*D*). The natural disasters were caused by rainfall shortages, drought, floods, and earthquakes. The data for natural disasters come from Evengelatou-Notora (2001; pp. 99-121), Vogt (2001; pp. 11-71), Gul (2009), and Erler (2010; pp. 102-31). These sources provide detailed information on where and when natural disasters occurred, and the types of the natural disasters in the Ottoman Empire. Natural disasters occurred in many places of the Ottoman Empire and were more destructive in this period because of poor transportation networks and public health services. They resulted in higher economic losses and mortality rates. The natural disasters were

[126] Karkar (1972; pp. 15-8), Inalcik and Quataert (1996; pp. 698-708, p. 775), and Owen (2002; p. 48) includes information on trade and caravan routes in the Ottoman Empire. Also, Eldem (1994) and TCKGM (2007; pp. 40-3) contain information on highways. Issawi (1970), Karkar (1972), Schoenberg (1977), Engin (1993; pp. 27-9), Inalcik and Quataert (1996; p. 768), and TCKGM (2007; p. 40), and Altug (2010) argue that the highways were in a poor condition as several factors such as wars damaged trade and caravan routes. However, these sources do not provide detailed information on damaged trade and caravan routes, and which highways were not in use over the sample period. Finally, another reason of using geographic distance is that there are no reliable and detailed maps on physical geography of several parts of the Ottoman Empire (i.e. the Arab provinces of the Ottoman Empire).

[127] This is a similar methodology applied by Banerjee et al. (2009). However, as geographic distance does not consider physical geography, there could be measurement error in the independent variable of interest in my study which leads to biased OLS coefficients. This may not constitute a big problem, as the OLS estimates for the impact of railroads are statistically significant. Also, I pursue an instrumental variable strategy to correct for measurement error in independent variable of interest.

common in Ankara, Hudavendigar, Konya, Bursa, and Sivas provinces (Inalcik and Quataert, 1996; p. 789; Erler, 2010; p. 106).

The second control variable is a dummy variable for the presence of mines that were operated within a judicial district in a given year (M)[128]. The data for mines are extracted from Su (1939), Refik (1989), Eldem (1994; pp. 41-57), Inalcik and Quataert (1996; pp. 55-64), Yorulmaz (1998), Quataert (2006; pp. 1-52), Bayartan (2008), and Geyikdagi (2011; pp. 119-126). These sources provide detailed information on the location of mines, the years that mines were operating, and which mines were operating. Over the sample period, there were many mines in the Ottoman Empire. Mines were operated by foreign firms and the Ottoman state. An important coal mine was at Eregli judicial district in the Black Sea region, which was opened in the early nineteenth century. Copper mines were located in Erzurum, Diyarbekir, and Elaziz provinces. Furthermore, there were gold and silver mines in the Rumelia and there was a chrome mine in Hudavendigar province (Su, 1939; pp. 6-12; Eldem, 1994; pp. 41-57; Quataert, 2006; pp. 1-52).

To assess the magnitude and direction of potential bias in the OLS estimates due to reverse causality, I instrument for regressor of interest (i.e. R) with the shortest distance from each judicial district centre to the caravan and trade routes (T), following Baum-Snow (2007), Duranton and Turner (2007), and Baum-Snow et al. (2012)[129]. There is no available map of caravan and trade routes in digital format. On

[128] The sources do not provide enough information on how many mines were operating within a judicial district in a given year. So, I use dummy variable for presence of an operating mine within a judicial district in a given year, as in Beeson et al. (2001).

[129] They instrument for kilometres and numbers of roads in a place with kilometres and numbers of initial roads in the respective place, respectively. In a similar vein, since the regressor of interest in this study is the distance from each judicial district centre to the nearest railroad line (i.e. R), the distance from each judicial district centre to the nearest caravan and trade route (i.e. T) is used as an instrumental variable for regressor of interest. Furthermore, this is a similar methodology applied by Banerjee et al. (2009).

the other hand, several sources give detailed information on start and end points of the caravan and trade routes[130]. Furthermore, Owen (2002; p. 48) contains a map that give detailed information on a network of trade and caravan routes connecting various locations, as shown in Figure 2.13. Using the information on the trade and caravan routes and ArcGIS software, I create a map of the caravan and trade routes, which identifies various links among places along the trade and caravan routes in the Ottoman Empire[131]. Next, I compute the distance between each judicial district centre and the nearest caravan and trade route using ArcGIS software. Due to data constraints, I use geographic distance as kilometres. The caravan and trade routes were in use for carrying goods and people by camels since the Roman Empire. Some of places along the caravan and trade routes were Edirne, Istanbul, Bursa, Izmir, Tokat, Konya, Trabzon, Erzurum, Aleppo, Mosul, Beirut, Damascus, and Baghdad, as shown in Figure 2.13.

To deal with the endogeneity issue of where railroad lines in the Ottoman Empire were built, I further analyse the effect of lines which were planned but that were never built. To this end, I compute the distance from each judicial district centre to the nearest line which was proposed by Colonel Chesney and Levant Herald (*PC* and *PH*), respectively. I use geographic distance in kilometres. Colonel Chesney, who was a British engineer, prepared a project in 1836 for the UK government. In the project, he proposed construction of several railroad lines, which would connect the Syrian coast with Baghdad through Homs, and Palmyra. The data for the lines that

[130] These sources are Karkar (1972; pp. 15-8), Inalcik and Quataert (1996; pp. 698-708, p. 775), and Owen (2002; p. 48).

[131] The sources only contain information for start and end points of caravan and trade routes in some parts of the Ottoman Empire (i.e. the Arab provinces of the Ottoman Empire). So, as there are not reliable data on road networks in the Ottoman Empire, I put a straight line between start and end points of caravan and trade routes in these places.

were proposed by Colonel Chesney are extracted from von Pressel (1966; p. 92)[132]. The second proposal to build a railroad line was made by Levant Herald to the Ottoman state in the 1870s. Levant Herald was an English newspaper and published in Istanbul since 1856. The line would connect Ankara with Kayseri and the data for the line comes from Erler (2010; pp. 309-10).

Finally, to test the robustness of the baseline results, I estimate regressions using an alternative sub-sample that does not contain provinces whose population could increase due to Circassian immigrants, because they were placed by the Ottoman state in areas that were close to the railroad lines. The Ottoman state aimed at employing Circassian immigrants on construction of railroads –such as the Anatolian and Hejaz Railway, as it was difficult to build railroads due to labour shortage in the Ottoman Empire[133] (Inalcik and Quataert, 1996; p. 795; Karpat, 2010; p. 166). To best of my knowledge, there is no available data to determine how many Circassians settled in different parts of the Ottoman Empire. On the other hand, Inalcik and Quataert (1996; p. 795) and Karpat (2010; p. 171) provide detailed information on provinces that Circassians were placed by the Ottoman state. The provinces whose populations could increase due to Circassian immigrants were Erzurum, Sivas, Istanbul, Izmit, Halep, Hudavendigar, Ankara, and Kudus provinces.

Summary statistics for the variables in the sample are presented in Table 2.1. The average population of a judicial district was 31,190. On average, a judicial district was 173 km away from a railroad line. This shows that railroad networks in the Ottoman Empire were not that dense. In seven percent of judicial districts, natural

[132] Additionally, I use a map from the National Archives at Kew, which contained detailed information on the lines that were proposed by Colonel Chesney. The reference number of the map is FO 925/4575.

[133] Also, Circassian immigrants brought new cultivation techniques and methods, and decreased labour shortage which led to higher agricultural production in regions that were close to the Anatolian railway (Inalcik and Quataert, 1996; p. 795).

disasters were seen between 1800s and 1850s. There was at least one operating mine in fifteen percent of judicial districts over the sample period. On average, a judicial district was 90 km away from the caravan and trade routes. Last, on average, a judicial district was 705 km away from the lines proposed by Colonel Chesney and 446 away from the lines proposed by Levant Herald.

2.6 Empirical Approach

In this section, I present the empirical model to analyse the association between railroads and economic growth in the Ottoman Empire. The empirical methodology in this study is based on the idea that railroad access would lead to a change in population of a judicial district through its impact on economic growth in the respective judicial district. As in Hornung (2012), I run the following regression:

$$\log(P_{icpt}) = \beta_0 + \beta_1 \log(R_{icpt}) + \beta_2 D_{icp} \times \gamma_t + \beta_3 M_{icpt} + \rho_p + u_{icpt} \quad (2.1)$$

where i, c, p, and t index judicial district, county, province, and year, respectively. Following Hornung (2012), $\log(P_{icpt})$ is the logarithm of judicial district level population for judicial district i, located in county c of province p, in year t[134]. $\log(R_{icpt})$ is logarithm of the distance between nearest railroad line and each judicial district, in year t[135]. To control for initial conditions in a judicial district, I use D_{icp}

[134] As an alternative specification, Hornung (2012) uses growth rate of population as dependent variable instead of log (P_{icpt}). Similarly, I estimate regressions using growth rate of population as dependent variable, which results in decreasing of the sample size to 203. Due to the absence of population data for judicial districts in the sample before 1893, I use population of the judicial districts in 1893 as a control variable, following Beeson et al. (2001). The coefficient estimate for the impact of railroads does not change substantially in magnitude after using growth rate of population as dependent variable. However, it is not statistically different from zero as standard error goes up, which could be due to small sample size (Wooldridge, 2009; p. 397). So, due to small sample issues, I run equation (2.1) to examine the effect of railroads on economic growth.

[135] I use logarithm of R_{icpt} instead of its levels following Banerjee et al. (2009). Furthermore, taking logarithm of R_{icpt} makes the estimates less sensitive to extreme observations in railroad variable

that equals 1 if natural disasters were seen in judicial district *i* of county *c,* located in province *p*, between 1800s and 1850s, and zero otherwise. M_{icpt} is a dummy variable which equals 1 if there was at least one operating mine —such as coal, gold, and copper mine— in judicial district *i* of county *c,* located in province *p,* in year *t,* and zero otherwise. Additionally, I use the interaction of D_{icp} with year dummies (y_t) which control for the time varying effects of different initial conditions in judicial districts on population. p_p are province fixed effects which account for time-invariant characteristics at province level (e.g. presence of mountains, rivers, lakes, and geographic size)[136]. Lastly, u_{icpt} is the error term[137] while β_1 is coefficient of interest.

If being closer to a railroad line was positively associated with economic growth through increasing production and trade which attracted an inflow of workers and their families, then there is evidence supporting the hypothesis 1. That is $\beta_1<0$. However, a positive coefficient estimate of β_1 supports the hypothesis 2. This is because being closer to a railroad line could lead to lower production and trade

(Wooldridge, 2009; p. 184). Last, there are zero values in R_{icpt}. So, I add one to each observation before taking logarithm of R_{icpt}.

[136] Due to small sample size issues, I do not use judicial district dummies to control for time-invariant unobserved judicial district characteristics such as presence of mountains in judicial districts, which are associated with log(P_{icpt}). Furthermore, this is a similar methodology applied by Banerjee et al. (2009) who examine the effect of railroads on economic and demographic outcomes in China, using data for 353 counties over the period 1986-2003. Their models include province dummies instead of county fixed effects. One concern with province fixed effects is that judicial districts in a given province may have different characteristics that are constant over time than the province in question. On the other hand, the difference between time-invariant characteristics of a province and those of a judicial district in the province in question might be negligible as there were only few provinces whose land area was large and were composed of more than 10 judicial districts such as Aydin. Furthermore, it seems that D_{icp} can capture time-invariant unobserved judicial district characteristics that cannot absorbed by province fixed effects. Last, in Section 2.7, the results show that magnitude of the OLS estimate for the impact of railroads does not change much when I re-estimate regression after removing unobserved judicial district characteristics by first differences. This means that province dummies can be close to being sufficient variables to control for time-invariant judicial district characteristics.

[137] Standard errors are clustered at the highest level (i.e. province), following Angrist and Pischke (2008; p. 319). On the other hand, since there are 32 provinces in the sample, number of clusters is few. This means that the standard errors can be downward biased. As suggested by Cameron et al. (2008), I also use bootstrap-t procedure to reduce bias in the standard errors when number of clusters is not large. The baseline results are not sensitive to using bootstrap-t procedure.

through increasing imports which resulted in hampering of domestic industry, and consequently population went down due to increasing migration.

The previous literature on the impact of railroads uses a variety of control variables that measure initial conditions, climate, educational infrastructure, and physical geography[138]. In this study, the model does not include these variables due to data constraints. Instead, I use D_{icp} and M_{icpt} along with province fixed effects, which can mitigate concerns of bias due to omitted variables.

The previous studies on the relationship between economic growth and railroads uses the population of location before the first railroad was built as a control variable, which captures initial conditions or pre-existing trends in the respective places (Atack et al., 2009a; Hornung, 2012; Jedwab and Moradi, 2012). On the other hand, there is no available data for population of judicial districts in the sample before the first railroad lines was built[139]. In order to control for initial conditions in a judicial district, the model includes a variable for presence of natural disasters in a judicial district between 1800s and 1850s (D_{icp})[140], which was a period before the first railroad line was built. The historical literature shows that the natural disasters often appeared during this period and killed many people (Issawi, 1982; pp. 98-9; Inalcik and Quataert, 1996; pp. 787-90). So, if β_2 is negative, this means that the natural disasters had long-lived effects on population. As initial characteristics (i.e. population) might have lead to differential trends for the population of judicial

[138] Some of the control variables are dummy variables for presence of mountains, lakes, and rivers, school enrolment rate, and average annual rainfall (Beeson et al., 2001; Hornung, 2012; Jedwab and Moradi, 2012).

[139] Karpat (1985) contains information on population in the Ottoman Empire in years before the first railroad lines were built. On the other hand, population data are not available for several judicial districts in the sample. Furthermore, borders of judicial districts, counties, and provinces in the Ottoman Empire were likely to change before the sample period due to wars and administrative reforms.

[140] Also, it seems that I could control for the effect of time-invariant unobserved judicial district characteristics through D_{icp}.

districts. To this end, following Hornung (2012), I use the interaction of D_{icp} with year fixed effects (γ_t).

Beeson et al. (2001) and Hornung (2012) provide evidence that presence of operating mines in a location is positively related to economic development and growth in the respective place. Likewise, historical literature argues that there was an increase in population and production in several places —such as Balya judicial district in Balikesir— after coal mines had been operating in the 1900s in the respective locations (Su, 1939; pp. 6-12). Accordingly M_{icpt} might have a positive impact on population, which would imply a positive β_3.

Finally, Beeson et al. (2001), Duranton and Turner (2007), Atack et al. (2009a), Schwartz et al. (2011), and Jedwab and Moradi (2012) use dummy variables to control for physical geography[141] that could be related to population of judicial districts. Additionally, the historical literature argues that physical geography was one of the important factors which prevented construction of railroads in the Ottoman Empire (Schoenberg, 1977). This means that placement of railroad lines could be associated to physical geography. Available sources do not provide detailed information on physical geography in judicial districts[142]. Due to lack of available data on physical geography in a judicial district, the regression includes province fixed effects (p_p) which account for time-invariant province characteristics (e.g. presence of mountains and geographic size[143]), following Combes and Lafourcade (2001) and Banerjee et al. (2009).

[141] Their models include dummy variables for presence of mountains, lakes, and rivers.
[142] This arises from preliminary nature of my database on judicial district borders.
[143] Also, I use province fixed effects to control for geographic size, following Beeson et al. (2001) who use size of counties in their sample as independent variable in their regressions, because counties in their sample do not have same size, as those of judicial districts in my sample.

2.6.1 Alternative Estimation Methods

The previous literature on the impact of railroads addresses the possibility that the OLS estimates for the impact of railroads could be biased if there is an endogeneity problem that arises from reverse causality[144]. Similarly, the historical literature argues that railroad line placement decisions might not be independent of a judicial district`s economic importance or population. For instance, a British firm built railroad line connecting Izmir with Aydin. Izmir was an important port as Aydin was rich in agricultural resources (Kolars and Malin, 1970; Karkar, 1972; p. 65, p. 79). So, the OLS estimates for the impact of railroads could be biased upward[145] due to reverse causality.

However, several railroads were allocated to unpopulated places. For instance, the Ottoman state wanted the railroads to be built in Bandirma, Balikesir, Konya, Kayseri, Mersin, and Adana due to famines. The railroads would prevent future famines through decreasing food shortages in the respective places (Inalcik and Quataert, 1996; p. 789; Erler, 2010; pp. 304-12). Furthermore, since the Ottoman state aimed to extend its political control over distant areas via railroads, many railroad lines were assigned to politically important places where not many people lived. Foreign railroad firms had been paid for each kilometre of lines put into

[144] Additionally, the OLS estimates could be biased due to omitted variables and measurement error in regressor of interest. On the other hand, the model in this study controls for province and years fixed effects along with presence of natural disasters and operating mines. These variables can capture omitted factors due to data constraints. Furthermore, the results show that the IV estimates for the impact of railroads are larger than the OLS coefficients in magnitude, which suggests that omitted variable bias may not be a serious problem in this study, as showed by Acemoglu et al. (2001). Measurement error in the independent variable of interest in my study could be a concern although I use exhaustive data for railroads in the Ottoman Empire. This is because I use geographic distance due to data constraints. Also, undercounting of people living in distant locations (Karpat, 1985; p. 10) might cause measurement error in population data, which leads to bias in the OLS estimates. For this reason, I will compare the results from different strategies that I use to deal with bias due to endogeneity of placement of railroad lines in the Ottoman Empire.

[145] In this chapter, the upward bias means that the OLS will overestimate coefficient estimate for β_1 in absolute value.

operation (i.e. the kilometric guarantee system) or the Ottoman state provided financial aid. For this reason, they agreed to build and operate lines in politically important places for the Ottoman state despite the low population, which caused to railroads not to be used much (Karkar, 1972; p. 75, p. 111; Quataert, 1977; Schoenberg, 1977; Issawi, 1982; p. 60; Engin, 1993; pp. 44-5; Owen, 2002; pp. 196-7; Gulsoy, 2010, pp. 27-8, p. 132). Accordingly, the OLS estimates for the impact of railroads could be biased downward due to reverse causality. Taken together, the bias in the OLS estimates for the impact of railroads due to reverse causality may be in either direction.

On the other hand, placement of railroad lines may not be endogenous, as selection of a place for railroad construction in the Ottoman Empire was related to strategic, religious, and political rather than economic reasons. This means that lines were located in a place regardless its economic importance or population[146] (Karkar, 1972; p. 75; Quataert, 1977; Schoenberg, 1977; Gulsoy, 1994; pp. 41-50; Inalcik and Quataert, 1996; p. 806; Illich, 2007; pp. 91-2; Gulsoy, 2010; pp. 27-8; Hulagu, 2010; pp. 23-25). So, endogeneity problem due to reverse causality may not be a serious problem in the relationship between railroads and economic growth, as argued by Jedwab and Moradi (2012).

Following Donaldson (2008), Banerjee et al. (2009), and Jedwab and Moradi (2012), I use two strategies to assess the direction and magnitude of potential bias in the OLS estimates for the impact of railroads due to reverse causality. First, the

[146] From Illich (2007; p. 92), "*….in the Ottoman Empire the railroads often avoided the economically promising areas for military expediency.*" Additionally, this could be due to kilometric guarantee system. The historical literature argues that foreign firms built unnecessary lines to get more money (Issawi, 1982; p. 60). So, several railroad lines could not be allocated to places on the basis of their population or economic importance. However, the Ottoman state used this method in the later nineteenth century to encourage railroad construction and there is no detailed information on which lines were built in unneeded places.

distance between each judicial district centre and the nearest caravan and trade route is used as an instrumental variable for measure of railroad access in this study. Second, I estimate the effect of lines which were planned but that were never built[147].

2.6.1.1 Instrumental Variable Methodology

To tackle the endogeneity issue of where railroad lines in the Ottoman Empire were built, I construct an instrumental variable for railroad access based on the caravan and trade routes, which were used for carrying goods and passengers for long time. Baum-Snow (2007), Duranton and Turner (2007), and Baum-Snow et al. (2012) provide evidence that new roads are likely to be built in places where initial roads are located. This is because initial roads are located in suitable places that construction of new roads is easy and inexpensive[148]. Similarly, the historical literature argues that several railroad lines —such as line between Izmir and Aydin, and the Anatolian railway were built in places along the caravan and trade routes (Inalcik and Quataert, 1996; pp. 820-21). This feature of railroad construction in the Ottoman Empire motivates my instrumental variables strategy. If $\log(R_{icpt})$ is assumed to be endogenous in the equation (2.1), then the first stage regression is as follows:

$$\log(R_{icpt}) = \delta_0 + \delta_1 log(T_{icp}) + \gamma_t + \rho_p + e_{icpt}$$

[147] Donaldson (2008) uses an additional strategy to tackle the endogeneity issue of where railroad lines are placed. He compares the effect of railroad lines that are placed in different categories according to the intended purpose of railroad lines in question. Kolars and Malin (1970) and Schoenberg (1977) provide information on the intended purpose of railroad lines that were built in borders of present day-Turkey by 1914. However, there are no available sources or reports that reported all railroad projects in the Ottoman Empire according to their intended purpose. Furthermore, railroad lines were built on both economic and political motives such as the line linking Izmir with Aydin. On the other hand, as a further check of endogeneity I run regressions excluding the line between Izmir and Aydin, because the line was said to be mainly built for economic considerations. This exercise does not make difference to the results.

[148] Baum-Snow (2007), Duranton and Turner (2007), and Baum-Snow et al. (2012) examine the effect of roads on employment, population, and suburbanization in the US and China, respectively. They argue that current road networks in a place would be located close to historical road networks in the respective place for two reasons. First, historical road networks indicate straight level routes that connect a place to another. Second, old roads can be easily converted to new roads easily.

(2.2)

where $\log(T_{icp})$ is logarithm of the distance from each judicial district centre to the nearest caravan and trade route[149]. If δ_1 is positive, then this suggests that railroad lines had been built close to the caravan and trade routes.

The exclusion restriction requires that the instrumental variable in this study does not have an effect on population via any other channel such as physical geography. There are three potential concerns with the exclusion restriction.

The first potential concern is that commercial, production, and financial activities were concentrated in places along the caravan and trade routes. For instance, Bursa was an important cotton cloth manufacturing place as Istanbul and Izmir were the most important ports in the Ottoman Empire (Schoenberg, 1977; Owen, 2002; pp. 45-50).

It seems that the instrumental variable is not likely to be related to population via this channel. This is because the caravan and trade routes —such as the route connecting Erzurum with Trabzon— declined in importance for the Ottoman economy in the nineteenth century due to several reasons. First, roads along the caravan and trade routes were not repaired due to financial difficulties. Second, there were security problems in places along the caravan and trade routes due to wars and rebellions. Also, several caravan and trade routes were disrupted by wars. Third, the Ottoman state did not prevent local officials from imposing heavier taxes or corruption from taking place in locations along the caravan and trade routes. So, prices of goods were high in the places along the caravan and trade routes, which

[149] Since taking logarithm of variables makes estimates less sensitive to outliers in the variables in question (Wooldridge, 2009; p. 184), I take its log. Furthermore, this is in line with Banerjee et al. (2009). Finally, T_{icp} includes zero values. So, I add one to each observation before taking its log.

resulted in decreasing of trade. Last, other routes —such as the Suez Canal— were opened, and resultantly, they bypassed the caravan and trade routes in the Ottoman Empire (Issawi, 1970; Karkar, 1972; pp. 59-61; Engin, 1993; pp. 27-9; Inalcik and Quataert, 1996; p. 768; TCKGM, 2007; p. 40; Altug, 2010).

Similarly, the historical literature argues that trade through ports along the caravan and trade routes in the Ottoman Empire were low in nineteenth century due to several reasons[150]. First, the Ottoman state had limited funds for maintenance and improvement of the ports. Second, wars led to a decrease in trade through the ports. Last, opening of new roads and ports in border countries shifted trade through the ports of the Ottoman Empire to ports of border countries. For instance, railroads that were built on the Georgian coast by Russia hampered trade through port in Trabzon (Schoenberg, 1977; Eldem, 1994; pp. 95-6; Inalcik and Quataert, 1996; pp. 767-8).

The second potential concern is that since existing road networks of the Ottoman Empire were in poor condition, the caravan and trade routes were still in use for carrying goods and people by camel caravans over the sample period (Karkar, 1972; pp. 59-61; Schoenberg, 1977; Engin, 1993; pp. 28-9; Inalcik and Quataert, 1996; pp. 817-19). So, it would be better, if the model includes appropriate control variables for existing road networks in the Ottoman Empire. There is no reliable data on road networks of the Ottoman Empire that were used over the sample period. On the other hand, the regression includes many control variables, including time varying measure of operating mines, along with province and year fixed effects which can capture omitted factors that should have been included.

[150] This is in line with arguments and findings of Acemoglu et al. (2002b). Acemoglu et al. (2002b) show that trade through Mediterranean ports—such as ports of the Ottoman Empire—were not increasing as much as trade through Atlantic ports during the nineteenth century.

The third potential concern is that places along the caravan and trade routes could be attractive destinations to live if they are geographically suitable places for building railroads. This suggests that the instrumental variable in this study could affect population through physical geography. On the other hand, the model includes province dummies (i.e. p_p) to control for physical geography[151]. So, it seems that an association between population and the instrumental variable via physical geography may not be troubling for IV (Instrumental Variable) estimates for the impact of railroads[152].

2.6.1.2 Placebo Regression

In this section, I further address concerns regarding reverse causality by examining the effect of lines that were planned but which were never built due to various exogenous reasons, following Donaldson (2008) and Jedwab and Moradi (2012). Two alternative railroad routes were planned and placement of proposed lines was related to population in a similar way as the railroad lines were actually built. So, I argue that un-built lines would exhibit spurious effects on population in OLS regressions, if placement of railroad lines was endogenous to population growth, which leads to bias in the OLS estimates for the impact of railroads. Also, events that were less likely to be related to economic conditions in the judicial districts (such as construction of roads in the third countries, political factors, and financial difficulties faced by the Ottoman state which could have arisen due to wars and its debt) were mainly responsible for the fact that the proposed lines did not attract considerable interest. To this end, I augment the equation (2.1) by $\log(PC_{icp})$ and $\log(PH_{icp})$:

[151] Hornung (2012) uses a similar approach to eliminate the effect of his instrumental variable on population through historical trade routes. Additionally, in section 2.7., unobservable judicial district characteristics that are constant over time—such as presence of mountains in a judicial district—are removed by taking first differences of variables. This does not make any difference in the direction of the relationship between population and railroads.

[152] The IV estimates refer to 2SLS estimates for the equation (2.1).

$$\log(P_{icpt}) = \beta_0 + \beta_1 \log(R_{icpt}) + \beta_2 \log(PC_{icp}) + \beta_3 \log(PH_{icp}) + \beta_4 D_{icp} \times \gamma_t + \beta_5 M_{icpt} + \rho_p + u_{icpt}$$

(2.3)

where $\log(PC_{icp})$ and $\log(PH_{icp})$ are logarithm of the distance from a judicial district centre to the nearest line that was proposed by Colonel Chesney and Levant Herald, respectively.

In 1836, construction of several lines in the Ottoman Empire was proposed by Colonel Chesney to the UK government. The lines were supposed to link Syrian coast with Baghdad through Homs and Palmyra (von Pressel, 1966; p. 92). The proposal of Colonel Chesney did not attract considerable interest. This is because railroad line connecting Alexandra with Cairo had already been built by the UK as construction of Suez Canal began. So, London had been already connected with India through the railroad line and Suez Canal (Earle, 1966, pp. 2-3, pp. 10-19; Engin, 1993; p. 36; Gulsoy, 2010; pp. 22-4)[153]. Accordingly, the lines were never built.

The proposal of Colonel Chesney is useful for my identification strategy for two reasons. First, places along the lines that were proposed by Colonel Chesney might be important commercially, because goods were carried from Persian Gulf to Istanbul passing through Basra, Baghdad, Aleppo, and Anatolia until the fifteenth century, as shown in Figure 2.13, which would imply a negative β_2. Accordingly, the OLS estimates for the impact of railroads could be biased upward due to reverse causality. Second, the historical literature argues that the UK would protect its dominance in colonial trade with India if lines that were proposed by Colonel Chesney had been built, because railroads would open a new and short route to reach

[153] Additionally, Gulsoy (2010; pp. 43-4) argues that France blocked building of railroad lines in proposal of Colonel Chesney politically, because construction of the railroad lines would create a threat to economic dominance of France in areas that the railroad lines would connect.

India from London. The control of these places by other major European powers (e.g. France, Germany) via their railroad investments would create a threat to the UK`s dominance in colonial trade with India (Engin, 1993; pp. 34-5; Gulsoy, 2010; pp. 22-4). This means that lines would be constructed for political reasons. So, the lines would be allocated to places that were politically important for the UK regardless their economic importance or population, which would lead to an estimate of β_2=0. This is consistent with the hypothesis that reverse causality is not an important concern. Moreover, von Pressel (1966; p. 92) argues that the lines in the Colonel Chesney proposal were supposed to be built in places that were "un-habited, sterile, and immense". That is β_2>0. This means that the OLS estimates for the impact of railroads could be biased downward due to reverse causality.

Another un-built line was proposed by Levant Herald in the 1870s. The line was supposed to be built between Ankara and Kayseri. During the nineteenth century, famines were often seen in this region. The line would decrease transportation costs, which would result in preventing future famines through mitigating food shortages in the respective location. This line was not built, which could have arisen due to financial difficulties that the Ottoman state was suffering (Erler, 2010; pp. 309-10). If β_3 is positive, then this suggests that railroad lines in the Ottoman Empire were allocated to places that were affected by negative population shocks due to famines. So, the OLS estimates for the impact of railroads could be biased downward due to reverse causality. On the other hand, an insignificant coefficient estimate for β_3 would cast doubt whether reverse causality is an important issue.

2.7 Results

The first regression results, presented in this section, are OLS estimates for the effect of the logarithm of the shortest distance between each judicial district and the railroad line ($\log(R_{icpt})$) on logarithm of the population in a judicial district ($\log(P_{icpt})$), which refers to the equation (2.1) that I examine the relationship between railroads and economic growth in the Ottoman Empire[154].

The OLS estimates for the equation (2.1) are reported in Table 2.2. Column (1) does not include presence of mines and natural disasters, province and year fixed effects. Column (2) controls for province and year fixed effects. I add presence of mines and natural disasters, province and year fixed effects in column (3). Column (4) includes presence of natural disasters-year interactions instead of year fixed effects. Adding these variables does not change the magnitude of coefficient estimates for the impact of distance to railroads much. Columns (1)-(4) show that the coefficient estimates for the effect of distance to railroads are stable at about -0.03 as standard errors decrease. This means that the point estimates are not sensitive to the inclusion of control variables. On the other hand, adding control variables gives more precise coefficient estimates for the effect of distance to railroads.

Column (1) reports that the coefficient estimate for the effect of distance to railroads is not statistically significant even at 10 percent. This could imply that access to railroads is not statistically related to economic growth in the Ottoman Empire. However, the coefficient estimate is less precisely estimated than those in

[154] Hereafter, "*population*" refers logarithm of the population in a judicial district in year *t* ($\log(P_{icpt})$), *"distance to railroads"* refers to logarithm of the shortest distance between each judicial district and the railroad line in year *t* ($\log(R_{icpt})$), *"presence of mines"* refers presence of operating mines—such as coal, gold, and copper—in judicial district *i* of county *c,* in province *p,* in year *t* (M_{icp}), finally "*presence of natural disasters"* refers presence of natural disasters in judicial district *i* of county *c,* in province *p* from 1800s to 1850s (D_{icp}).

columns (2)-(4). Columns (2)-(4) show that the coefficient estimates for the effect of distance to railroads are negative and statistically different from zero at 10 percent. The point estimates in columns (2)-(4) report that one percent decrease in the distance to railroads increases population of a judicial district by 0.033 percent, as is consistent with production, trade, and employment opportunities increasing. So, there is quite robust evidence in Table 2.2 to confirm the hypothesis 1, i.e. access to railroads was positively related to economic growth in the Ottoman Empire.

As discussed in section 2.6.1., railroad line placement decisions can be related to population, which means that the OLS estimates for the impact of distance to railroads could be biased due to reverse causality. The first strategy that I pursue to mitigate concerns about reverse causality is constructing an instrumental variable for distance to railroads, which is the logarithm of the distance from each judicial district centre to the nearest caravan and trade route ($\log(T_{icp})$)[155]. Table 2.3 shows the first stage regressions of distance to railroads on population, which refers to the equation (2.2). In the equation (2.2), distance to railroads is regressed on the distance to trade routes.

Column (1) of Table 2.3 does not include presence of mines and natural disasters, year and province fixed effects. Column (2) adds year and province fixed effects. Column (3) uses presence of mines and natural disasters in addition to year and province fixed effects. Column (4) controls for the presence of natural disasters-year interactions instead of year fixed effects. Adding these variables makes only little difference to the results. Columns (1)-(4) report that coefficient estimates for the impact of distance to trade routes are between 0.284 and 0.308 as standard errors go

[155] Hereafter, *"distance to trade routes"* refers to logarithm of the distance from each judicial district to the caravan and trade routes ($\log(T_{icp})$).

down. This means that the point estimates for the impact of distance to trade routes are not sensitive to inclusion of control variables and are precisely estimated.

Column (1) of Table 2.3 reports that the coefficient estimate for the effect of distance to trade routes is positive and statistically different from zero at 10 percent, as expected. Also, columns (2)-(4) show that the coefficient estimates for the impact of distance to trade routes are positive and statistically significant at 1 percent. The point estimates suggest that one percent decrease in the distance to trade routes reduces the distance to railroads by 0.30-0.28 percent, on average. The findings show that the instrumental variable has strong and statistically significant impact on railroad location, which is consistent with arguments of the historical literature (Inalcik and Quataert, 1996; pp. 820-1).

At the bottom of each column, I report the F-statistics on the excluded instrument. The F-statistics on the excluded instrument are between 3.86 and 7.90. Columns (2)-(4) show that the F-statistics are statistically significant at the 1 percent level. In columns (1)-(4), the F-statistics are not larger than 10. However, the model is just-identified, so standard concerns over weak instrument is not likely to occur here (Angrist and Pischke, 2008; p. 209; Donaldson, 2008).

The second stage results, using the instrument to predict distance to railroads, are presented in Table 2.4. In column (1), I do not control for year and province fixed effects, presence of mines and natural disasters. Column (2) introduces year and province fixed effects. Column (3) adds presence of mines and natural disasters in addition to year and province fixed effects. I use presence of natural disasters-year interactions instead of year fixed effects in column (4). Columns (1)-(4) show that coefficient estimates for the distance to railroads are between -0.249 and -0.056 as

standard errors decrease. These findings mean that the IV estimates for the impact of distance to railroads are sensitive to inclusion of control variables. Furthermore, adding control variables gives more precise IV estimates for the effect of distance to railroads.

Columns (1)-(4) report that the IV estimates are not statistically different from zero. This could mean that access to railroads is not statistically related to economic growth in the Ottoman Empire. However, they are less precisely estimated than OLS estimates, as weak instrument could result in imprecise IV estimates for the impact of distance to railroads. Furthermore, the IV estimates are larger than OLS coefficients in magnitude, which suggests that the OLS estimates are biased downward. This could imply that railroad lines were built in places that had low population growth. My conclusion is that the IV estimates are not precise enough to provide information on railroad line placement decisions, as suggested by Banerjee et al. (2009).

Second strategy that I follow to mitigate concerns of bias due to reverse causality is to examine the effect of lines that were planned but which were never built, which refers to the equation (2.3). In the equation (2.3), population is regressed on distance to railroads, logarithm of the distance from each judicial district centre to the lines proposed by Colonel Chesney ($\log(RC_{icp})$) and logarithm of the distance from each judicial district centre to the line proposed by Levant Herald ($\log(RH_{icp})$) [156].

Table 2.5 shows OLS estimates for the equation (2.3). Column (1) does not include fixed effects for years and provinces, presence of mines and natural disasters.

[156] Hereafter, *"Colonel Chesney`s proposal",* refers to logarithm of the distance from each judicial district centre to the lines proposed by Colonel Chesney ($\log(RC_{icp})$) and *"Levant Herald`s proposal"* refers to logarithm of the distance from each judicial district centre to the lines proposed by Levant Herald ($\log(RH_{icp})$).

In column (2), I control for year and province fixed effects. Column (3) includes dummy variables for the presence of mines and natural disasters in addition to year and province fixed effects. I use the presence of natural disasters-year interactions instead of year fixed effects in column (4). The coefficient estimates for the impact of distance to railroads are between -0.036 and -0.034 as standard errors go down. This means that adding these variables makes only little change on the coefficient estimates for the impact of distance to railroads. Furthermore, the point estimates are precisely estimated. The coefficient estimates for the impact of Colonel Chesney`s proposal are between -0.118 and 0.052 as standard errors increase. This suggests that the coefficient estimates for the impact of Colonel Chesney`s proposal are not robust to inclusion of control variables and precise. The coefficient estimates for the impact of Levant Herald`s proposal range from -0.193 to -0.004 as standard errors go down. This implies that the coefficient estimates for the impact of Levant Herald`s proposal are sensitive to adding control variables and are precisely estimated.

Column (1) reports that the coefficient estimate for the impact of distance to railroads is negative and not statistically different from zero, as before. On the other hand, columns (2)-(4) show that coefficient estimates for the impact of distance to railroads are more precise. They are negative and statistically significant at 10 percent, as previously. Columns (1)-(4) report that the coefficient estimates for the impact of distance to railroads are similar to those in Table 2.2 in magnitude.

Additionally, column (1) reports that the coefficient estimate for the impact of Colonel Chesney`s proposal is positive. This means that railroad lines could be assigned to places that had low population growth. Columns (2)-(4) show that coefficient estimates for the impact of Colonel Chesney`s proposal are negative.

Columns (1)-(4) indicate that coefficient estimates for the impact of Levant Herald`s proposal are negative, on the contrary to my expectation. Also, the coefficient estimate for the effect of Levant Herald`s proposal in column (1) is statistically significant at 5 percent. These imply that railroad lines could be allocated to places that had high population growth. Column (1) shows that the point estimates for the impacts of Colonel Chesney`s proposal and Levant Herald`s proposal are different from the coefficient estimates for the impact of distance to railroads in magnitude. However, columns (2)-(4) report that the coefficient estimates for the effects of Chesney`s proposal and Levant Herald`s proposal are not statistically different from zero. To sum up, the findings in Table 2.5 provide no robust evidence for that reverse causality is an important concern.

The results are consistent with findings of Hornung (2012) who provides evidence that there is an increase in population of a city in Prussia for the period 1840-1871 as it gains access to railroads. Hornung (2012) interprets this finding to mean that railroads were positively associated with economic growth through increasing productivity and creating new jobs, which attracted an inflow of migrants looking for employment opportunities. The historical literature argues that there was an increase in trade and agricultural production in places that had gained access to railroads due to decreasing transportation costs, which led to higher employment opportunities and population in the respective places[157]. So, my findings imply that being closer to a railroad line induced economic growth at the judicial district level. Here, it is worth mentioning that IV results are not in line with OLS results, as weak

[157] See British Parliamentary Paper (1896; p. 10), Karkar (1972; p. 65, p. 82), Quataert (1977), Eldem (1994; p. 94), Gulsoy (1994; pp. 245-6), Inalcik and Quataert (1996; pp. 810-4), Gulsoy (2010, pp. 181-2, p. 270), and Hulagu (2010; pp. 14-45).

correlation between distance to railroads and trade routes could produce imprecise IV estimates for the impact of railroads.

Additionally, the findings from the second strategy that I pursue to mitigate concerns of bias due to reverse causality are mostly consistent with the hypothesis that Ottoman state or foreign railroad companies of the major European powers did not allocate railroad lines to places that were economically important or that were affected by negative population shocks due to famines. However, the IV estimates are not precise. Also, the coefficient estimate for the impact of Levant Herald`s proposal is sensitive to inclusion of control variables. The findings could be explained by the fact that railroads in the Ottoman Empire were primarily built for political and military reasons. So, railroad lines were not assigned to places on the basis of their economic importance or population (Karkar, 1972; p. 111; Quataert, 1977; Schoenberg, 1977; Gulsoy, 2010, pp. 27-8, p. 132). Furthermore, the results are parallel to findings of Jedwab and Moradi (2012) who do not show that un-built lines are statistically related to cocoa production and population growth in Ghana. Their interpretation is that construction of railroads in Ghana had strong military and political motivations.

Apart from these results, Tables 2.2, 2.4, and 2.5 also provide no evidence that population is associated with presence of natural disasters. The absence of a statistically significant relationship between presence of natural disasters and population in the respective judicial districts could be due to improvements in public health services and growth in transportation networks of the Ottoman Empire during the late nineteenth century, which could mitigate the negative effect of natural disasters on the population of judicial districts. Accordingly, the population of the

Ottoman Empire nearly doubled by 1914 (Issawi, 1982; 94; Inalcik and Quataert, 1996; p. 787-9). The findings also show that the coefficient estimates for presence of mines are positive and statistically significant at 1 percent. The point estimates indicate that population of a judicial district where a mine was operated would be 22 percent higher than population of the other judicial districts, on average. This suggests that operation of a mine in a judicial district was positively associated with economic growth in the respective judicial district, which is in line with the historical literature (Su, 1939; pp. 6-12).

2.7.1 Robustness Checks

In this section, I examine the robustness of the baseline results along two dimensions[158]. First, I address the possibility that Circassian migration from Russia to the Ottoman Empire affect the results. The historical literature argues that more than half million Circassians migrated to the Ottoman Empire from Russia after the 1870s. Circassian immigrants were placed by the Ottoman state in regions that were located close to railroad lines (Inalcik and Quataert, 1996; p. 795; Karpat, 2010; p. 171). This suggests that the positive relationship between population and railroads could be due to Circassian immigrants. Furthermore, as Circassian immigrants led to higher agricultural production in regions that were close to the railroad lines through decreasing labour shortage and bringing new cultivation methods, coefficient estimates for the effect of distance to railroads could be biased upward. As in

[158] Even though I do not report them here, I also do other robustness checks. For instance, I examine whether there is a nonlinear relationship between population and railroads by adding a quadratic term of regressor of interest (i.e $\log(R_{icpt})$). I find that the coefficient estimates of the quadratic term of regressor of interest are not statistically different from zero. The result provides no evidence that there is a nonlinear relationship between population and railroads. As another robustness check of the results, I re-estimate regressions after exclusion of places whose population was smaller than the average population (i.e. 31,190). This does not change the magnitude of the coefficient estimate for the impact of railroads. The OLS estimate yields higher statistical significance, as this exercise leads to a decrease in sample size to 288.

Baum-Snow et al. (2012), I re-estimate the regressions for a sample without the 8 provinces whose population increased due to Circassian immigrants.

Columns (1)-(2) of Table 2.6 present the OLS and IV estimates for the equation (2.1) that I examine the impact of distance to railroads, respectively. Table 2.7 shows the first stage regression for the distance to railroads on population, which refers to the equation (2.2). Column (3) of the Table 2.6 reports the OLS estimates for the equation (2.3) that I look at the impact of un-built and built lines. Finally, Tables 2.6 and 2.7 add presence of mines, presence of natural disasters-year interactions, and province fixed effects.

Column (1) of Table 2.6 shows that OLS estimate for the effect of distance to railroads is -0.039. The point estimate is larger than that of column (4) in Table 2.2 in magnitude, which means that inclusion of provinces with higher population and agricultural production due to Circassian immigrants does not constitute a big problem. However, it is not statistically significant[159], on the contrary to that of column (4) in Table 2.2. The standard error increases in magnitude as compared to the previous specifications using full sample. Column (2) reports that IV estimate for the effect of distance to railroads is -0.086 as standard error decreases. The point estimate is not statistically different from zero, again. In sum, the OLS and IV estimates are sensitive to using an alternative sub-sample.

Columns (1)-(2) report that the IV estimate has 2 times the magnitude of the OLS estimate. So, this means that the railroad lines were placed in areas where population was less likely to grow. However, the IV estimate is not statistically different from zero as it is less much precisely estimated than the OLS coefficient. So,

[159] The point estimate is statistically different from zero at 11 percent.

it is not precise enough to be informative about railroad line placement decisions, as previously.

In Table 2.7, the coefficient estimate for the impact of distance to trade route is 0.418 and statistically significant at 1 percent, as before. This suggests that the instrumental variable is statistically significant predictor of the distance to railroads. This means that the finding in Table 2.7 is in line with the previous findings using full sample (column (4) of Tables 2.3). At the bottom of Table 2.7, the F-statistic on the excluded instrument is reported. The F-statistic on the excluded instrument is 8.21, which means that the instrumental variable is weakly correlated with the distance to railroads. However, the standard concerns over weak instrument are unlikely arise here, because the model is just-identified. Weak instrument could only produce imprecise IV estimate, as that in column (2) of Table 2.6 (Angrist and Pischke, 2008; p. 209; Donaldson, 2008).

Finally, column (3) of Table 2.6 shows that coefficient estimates for the impacts of Colonel Chesney`s proposal and Levant Herald`s proposal are -0.118 and -0.088, respectively. The coefficient estimate for the impact of Levant Herald`s proposal is larger than that in column (4) of Table 2.5 in magnitude. The point estimates are not statistically different from zero, again. Column (3) of Table 2.6 reports the coefficient estimate for the impact of distance to railroads as -0.039. It is statistically significant at 10 percent, as previously. The point estimate is not much different from those in column (4) of Tables 2.2 and 2.5. To sum in a nutshell, the findings in column (4) of Table 2.5 are only little sensitive to exclusion of provinces that Circassian immigrants settled.

Second, I test the robustness of the baseline results to eliminating unobserved judicial district characteristics by taking first differences. Due to small sample issues, the regressions do not include unobserved judicial district characteristics that are constant over time (e.g. presence of mountains in a judicial district). This could lead to bias in the OLS and IV estimates for the impact of distance to railroads due to fact that unobserved judicial district characteristics could have an effect on railroad access, caravan and trade routes, and settlement patterns in the Ottoman Empire. So, I remove unobserved judicial district characteristics that are constant over time by taking first differences of variables in equation (2.1) across two periods. I run regressions with first difference of variables[160] by OLS and IV, which leads to a decrease in sample size to 203.

The OLS and IV estimates for the resulting equation (see footnote 160) are reported in columns (1) and (2) of Table 2.8, respectively. Table 2.9 reports first stage regression of the resulting equation. In Tables 2.8 and 2.9 I add year fixed effects and a control variable (i.e. $M_{icp1914} - M_{icp1893}$). Column (1) of Table 2.8 reports that the OLS estimate for the impact of railroads is -0.037. The coefficient estimate for the impact of railroads is not much different from that in previous table in magnitude and sign (column (4) of Table 2.2). However, it is not statistically different from zero as standard error increases, which could be due to small sample size (Wooldridge, 2009; p. 397). This means that OLS estimate for the impact of railroads is little sensitive to removing unobserved judicial district characteristics by first differences.

[160] $log(P_{icp1914}) - log(P_{icp1893}) = \beta_1(log(R_{icp1914}) - log(R_{icp1893})) + \gamma_t + \beta_5(M_{icp1914} - M_{icp1893}) + u_{icp1914} - u_{icp1893}$ is the resulting equation. Constant term and D_{icp} is dropped, because they do not vary by time. γ_t are year fixed effects. Furthermore, since RC_{icpt} and RH_{icpt} in equation (2.3) do not vary by time, it is not possible to estimate the effect of Colonel Chesney`s proposal and Levant Herald`s proposal on population.

Column (2) reports that the IV estimate for the impact of railroads is -0.494. The point estimate is not statistically significant, as in that of previous table (column (4) of Table 2.4). The direction of the relationship is not sensitive to removing unobserved judicial district characteristics by first differences. However, the IV estimate for the impact of railroads is much different from that in previous table in magnitude. The results suggest that the IV estimate for the impact of railroads is not robust to wiping out unobserved judicial district characteristics by taking first differences.

Table 2.9 reports that the coefficient estimate for the impact of the distance to trade routes is 0.025. It is not statistically different from zero, on the contrary to those in Tables 2.3 and 2.7. Furthermore, the F-statistic on the excluded instrument, which is presented at the bottom of the Table 2.9, is not larger than 10 and is not statistically significant. For this reason, as standard error goes up, the IV estimate in column (2) is not precisely estimated.

Finally, columns (1) and (2) of Table 2.8 show that the IV estimate is 13 times larger than the magnitude of the OLS coefficient. The finding implies that the OLS could underestimate the impact of railroads, which could be due to reverse causality. This could suggest that railroad lines were built in places that population growth was low. This result is not parallel to the findings from the second strategy that I examine the impact of lines which were proposed but that were never built (Tables 2.5 and 2.6). Additionally, it seems that the IV estimate is not precise enough to be informative about railroad line placement decisions, again. The results from the second strategy mostly fail to validate that reverse causality is an important issue.

Using IV corrects for measurement error[161]. So, the estimates in column (2) of Table 2.8 should be free of measurement error.

2.8 Conclusion

Based on arguments and empirical findings of previous studies on impact of railroads, railroads are expected to have a strong effect on economic growth in the respective place through increasing trade and production because of decreasing transportation costs (Donaldson, 2008; Atack et al., 2009b; Banerjee et al., 2009; Huijg et al., 2010; Atack and Margo, 2011; Schwartz et al., 2011; Kotavaara et al., 2011; Hornung, 2012; Jedwab and Moradi, 2012). In this study I find that being closer to a railroad line led to an increase in the population of a judicial district. Here, it is worth mentioning that the findings are sensitive to using different samples. The historical literature argues that there was an increase in population of places that had gained access to railroads. This is because agricultural products could be transported to distant places and ports easily due to decreasing transportation costs, which led to higher production in the respective places. Furthermore, increasing production and trade created new jobs, which attracted an inflow of migrants to the places where railroads were located. The findings mean that railroad access induced economic growth in the respective judicial districts. The results are also parallel to the findings of Hornung (2012), showing that railroad access led to higher population through its positive effect on economic growth in Prussia.

The historical literature argues that placement of railroad lines could be endogenous to population, because several railroad lines were built in places that

[161] Using geographic distance might cause measurement error in railroad data. Another reason for measurement error could be undercounting of people that lived in distant locations (Karpat, 1985; p. 10)

were rich in agricultural resources or that population was low due to famines. The paper addresses endogeneity issue of placement of railroad lines in the Ottoman Empire and uses two strategies to mitigate concerns of bias due to reverse causality.

Inalcik and Quataert (1996; pp. 820-21) argue that several railroad lines were built in places that were close to the trade and caravan routes. In line with this argument, the instrument I use for railroads is the distance from each judicial district centre to the trade and caravan routes. In many cases, I find that the instrumental variable is a statistically significant predictor of railroad location. Additionally, the IV estimates for the impact of railroads are similar in sign to the OLS coefficients. However, the IV coefficients are much larger than the OLS estimates in magnitude. The historical literature argues that the Ottoman state wanted the railroads to be built in places of political importance that population was likely to be low. Furthermore, several railroad lines were assigned to places that many people did not live due to famines[162]. On the other hand, the findings do not necessarily mean that railroad lines in the Ottoman Empire were built in places where population growth was low. This is because OLS could underestimate the impact of railroads in absolute value in case of measurement error, as in reverse causality. Accordingly, measurement error in the railroad data could be also a concern.

To further address reverse causality concerns I estimate the effect of lines which were proposed by Colonel Chesney and Levant Herald, but that were never actually built. The lines in proposals of Colonel Chesney and Levant Herald would be built with the same motivations as lines that were actually constructed. The lines in proposal of Colonel Chesney were supposed to be built in places of both political and

[162] See Karkar (1972; p. 75, p. 111), Schoenberg (1977), Quataert (1977), Engin (1993; pp. 44-5), Inalcik and Quataert (1996; p. 795, p. 789), Erler (2010; pp. 296-14), and Gulsoy (2010, pp. 27-8, p. 132).

commercial importance for the UK. To prevent future famines, the line in proposal of Levant Herald would be constructed in unpopulated places that famines were often seen (von Pressel, 1966; p. 92; Engin, 1993; p. 35; Erler, 2010; pp. 309-10). If placement of lines is endogenous to population, this suggests that un-built lines could have spurious effects on population. The results mostly show that the coefficient estimates for the impact of un-built lines are not statistically significant. The findings cast doubt on which Ottoman state or foreign railroad companies of the major European powers were able to build the railroads in places that were economically important or unpopulated.

The findings from the strategy that I look at the impact of un-built lines are not consistent with the IV results in my study. However, they are parallel to findings of Jedwab and Moradi (2012) who do not find a statistically significant effect of un-built lines on cocoa production and population growth in Ghana. They conclude that placement of lines in Ghana was not endogenous, because railroads in Ghana were primarily built for military and political reasons. Similarly, since construction of railroads in the Ottoman Empire had strong political, religious, and military motivations, many railroad lines were allocated to places regardless their economic importance or population (Kolars and Malin, 1970; Karkar, 1972; p. 75; Schoenberg, 1977; Quataert, 1977; Gulsoy, 1994; pp. 41-50; Inalcik and Quataert, 1996; p. 806; Illich, 2007; 91; Gulsoy, 2010; pp. 27-8; Hulagu, 2010; pp. 23-25). Accordingly, my empirical results mean that the bias in the OLS estimates for the impact of railroads could be attributed to measurement error in railroad data, because some measurement error could be always unavoidable due to preliminary nature of my database on railroads.

The policy implication of this chapter is that railroads can be an important driver of economic growth in a place where road networks are poor before railroads are built, as those of the Ottoman Empire were, even if economic factors do not play an important role in construction of railroads. A positive relationship between railroads and economic growth could result because of a large decrease in transportation costs. Accordingly, railroads give people a cheap way to transport agricultural goods to distant areas and facilitate trade, which results in higher agricultural production and creation of new jobs for people, and as a result, induces economic growth.

On the basis of a unique historical dataset from the Ottoman Empire, there is no empirical study to test the relationship between railroads and economic growth in the Ottoman Empire, to the best of my knowledge. This study is the first attempt to provide empirical evidence on railroad line placement decisions in the Ottoman Empire. At this point, it is important to note that there are several limitations of this study due to data constraints. The first limitation is that there is no data source with information about famines that occurred in the Ottoman Empire over the sample period. Railroads led to an increase in population after 1908 through preventing future famines, which could arise from transporting goods to food-short areas easier than before (Issawi, 1982; p. 94; Inalcik and Quataert, 1996; p. 787-9). So, the positive effect of railroads could be driven by the negative relationship between railroads and future famines. The second limitation is that I could not directly examine whether there was a positive effect of railroads on production, trade, and migration due to current data availability. There is an absence of data on economic outcomes and migration at the judicial district level in the Ottoman Empire, because

only several economic and financial data in the Ottoman Empire were gathered even in the early twentieth century, to best of my knowledge.

The third limitation is that the instrumental variable in this study could fail to satisfy the exclusion restriction. This is because caravan and trade routes could be still in use over the sample period due to lack of good roads in the Ottoman Empire although historical literature argues that caravan and trade routes were disrupted by wars and financial difficulties (Issawi, 1970; Inalcik and Quataert, 1996; p. 768; TCKGM, 2007; p. 40; Altug, 2010). However, given the lack of available historical data on the Ottoman Empire, it is not possible to build a better instrument.

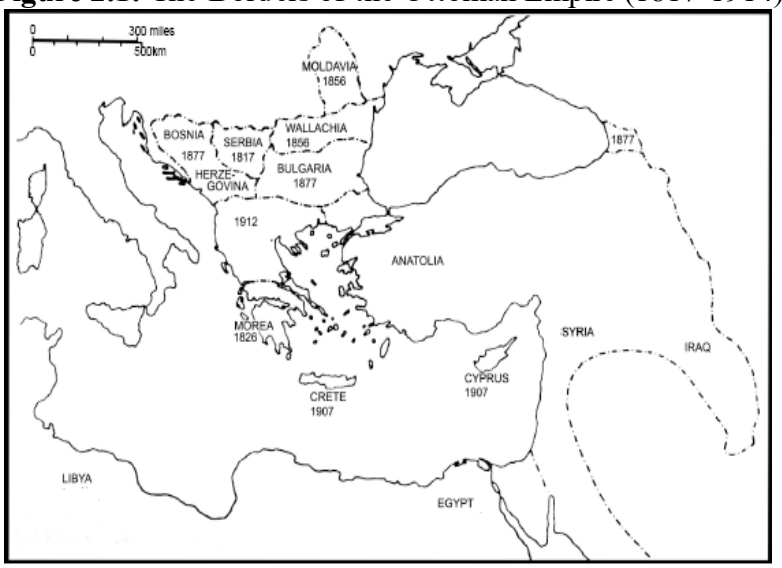
The fourth limitation is possibility of measurement error in the regressor of interest, as shown by the IV results. This is inevitable, because historical data might not be precisely measured. However, as in Baum-Snow et al. (2012) it is not possible to further address the issue of measurement error by using alternative measures of railroad access due to data constraints in my study. Additionally, it would be better if there is a GIS (Geographic Information System) database of all railroad lines in the Ottoman Empire or I can digitize a series of maps that come from different sources — such as the National Archives at Kew— by scanning these maps. This may reduce concerns of bias due to potential measurement error in railroad data. Furthermore, it will be possible to construct a detailed map showing physical geography in judicial districts —such as rivers and mountains—, judicial district borders, and the area of a judicial district. On the other hand, there are no more detailed maps of several territories and all railroad lines in the Ottoman Empire such as Rumelia railway. This limitation leads to future research on a GIS database of railroad lines in the Ottoman Empire, following framework in Akgungor et al. (2011) who create a GIS map of

railroad lines within the borders of today`s Turkey that were built between 1856 and 1914. The last limitation is that there might be measurement error in the population data due to several reasons such as undercounting of people living in distant locations (Karpat, 2010; pp. 106-11). However, there are no alternative dataset that have superior quality, to the best of my knowledge.

2.9 Appendix A: Figures and Tables

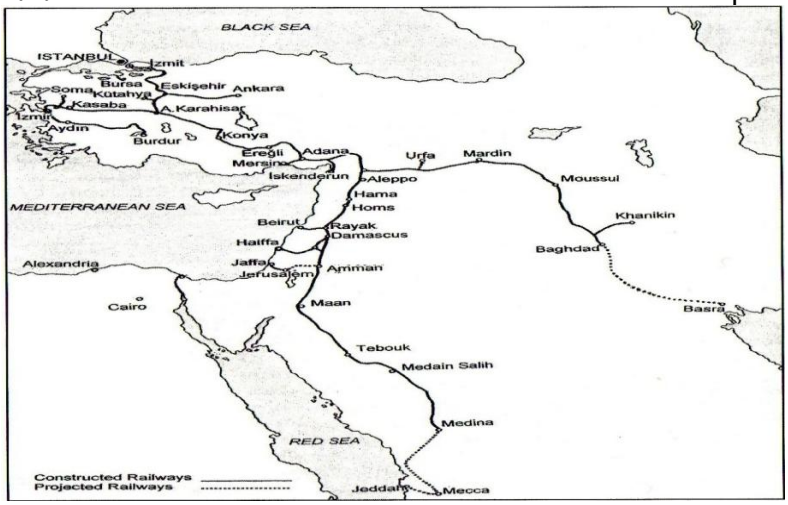
2.9.1 Figures

Figure 2.1: The Borders of the Ottoman Empire (1817-1914)



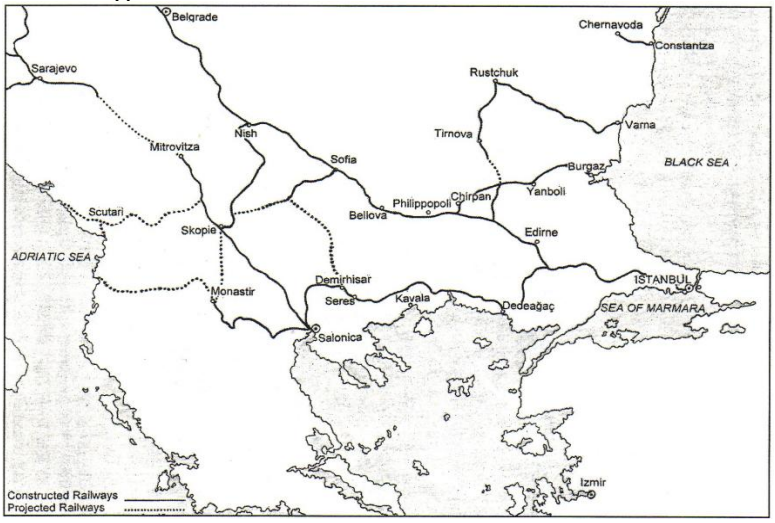
Notes: Figure 2.1 shows the borders of the Ottoman Empire between 1817 and 1914. The dates show when each territory gained independence from the Ottoman Empire. Over the sample period, Egypt is considered as a separate country from the Ottoman Empire in this study. Anatolia is today`s Turkey. Figure 2.1 is taken from Pamuk (1987; p. 22).

Figure 2.2: Railroad Lines in the Asian Part of the Ottoman Empire in 1918



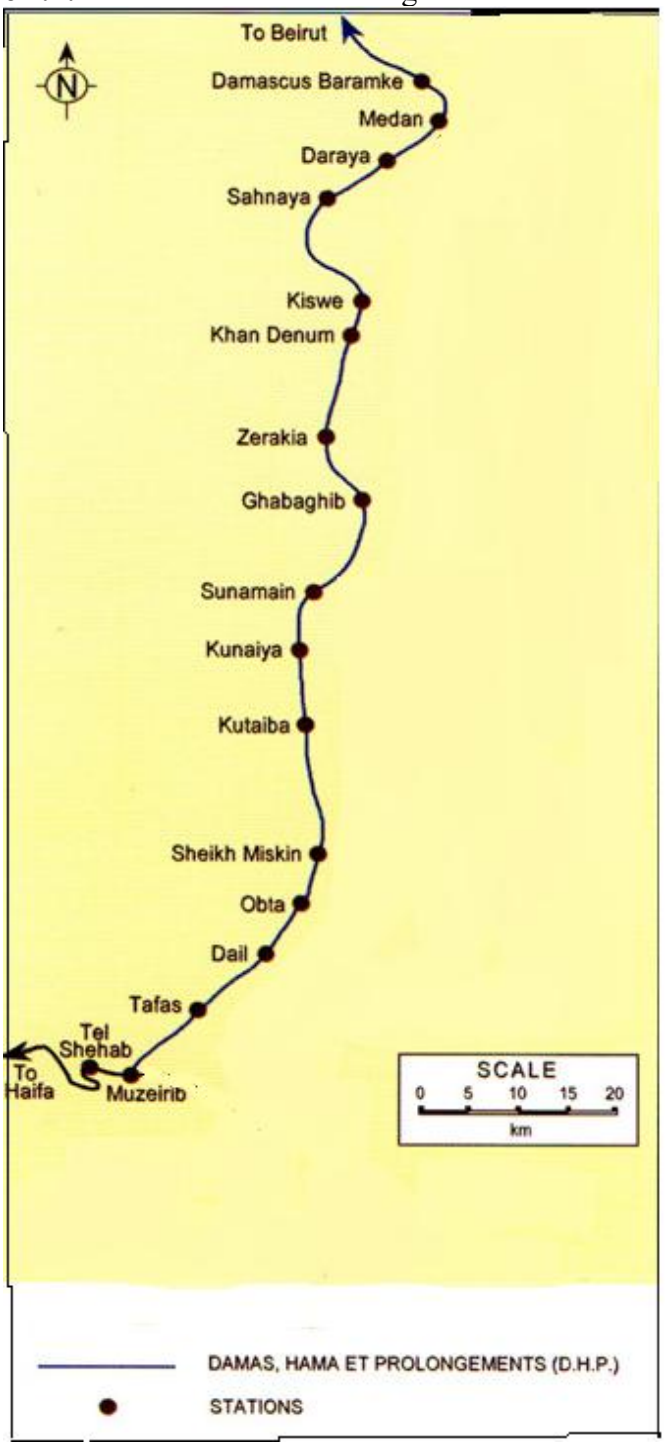
Notes: Figure 2.2 shows railroad lines which were built between 1856 and 1918 in the Asian part of the Ottoman Empire. Some of them are Izmir-Aydin, Izmir-Turgutlu, Izmit-Eskisehir, Istanbul-Izmit, Afyonkarahisar-Konya, Eskisehir-Ankara, Bursa-Mudanya, Adana-Mersin, and Haifa-Damascus railroad lines. Baghdad-Basra and Medina-Mecca railroad lines were not built. Construction of many railroad lines running from Aleppo to Moussul (i.e. Mosul) and running from Moussul to Baghdad finished after 1914. Figure 2.2 is taken from Geyikdagi (2011; p. 81).

Figure 2.3: Railroad Lines in Rumelia in 1914



Notes: Figure 2.3 shows railroad lines which were built in the European part of the Ottoman Empire (i.e. Rumelia) by 1914. Some of them are Istanbul-Edirne, Salonica-Monastir, Salonica-Mitrovitza, and Edirne-Dedeagac railroad lines. Figure 2.3 is taken from Geyikdagi (2011; p. 80).

Figure 2.4: Railroad Line Connecting Damascus with Muzeirib



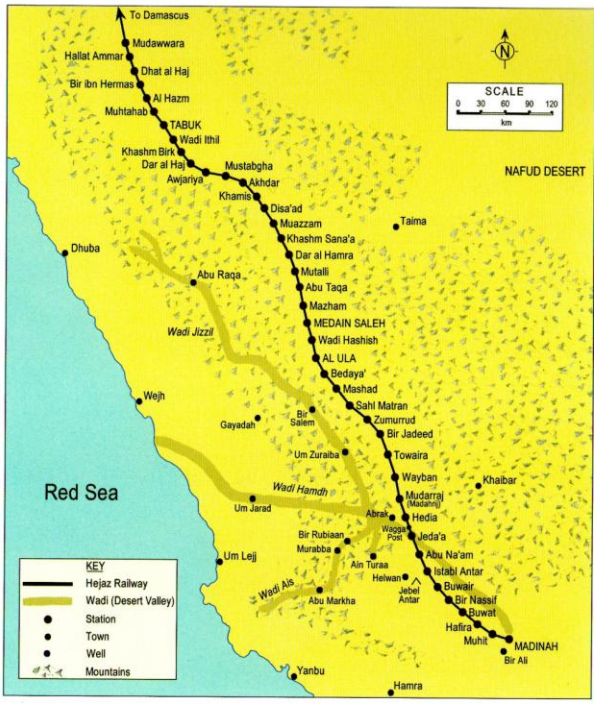
Notes: Figure 2.4 shows railroad line linking Damascus with Muzeirib. The line was built by Damas, Hama et Prologements of France. Figure 2.4 also shows stations along the line. Figure 2.4 is taken from Nicholson (2005; p. 18).

Figure 2.5: The Anatolian and Baghdad Railways in 1914



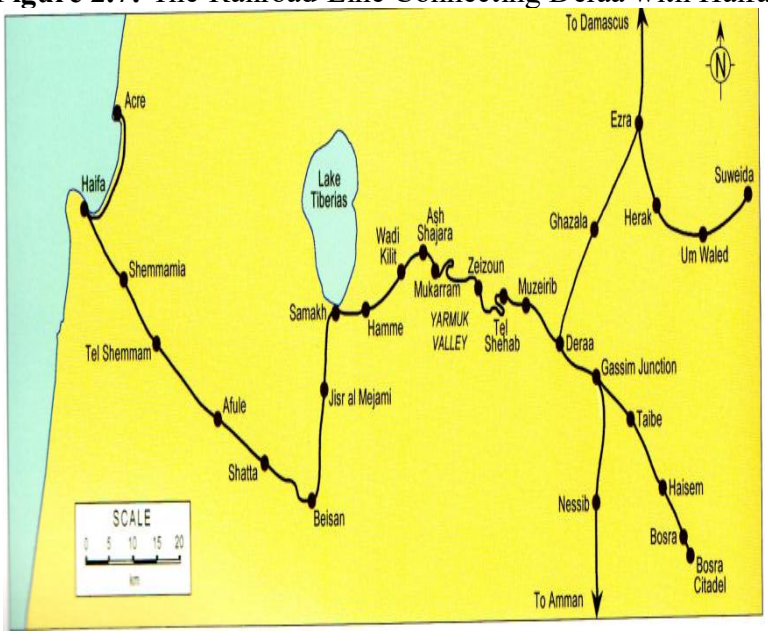
Notes: Figure 2.5 shows the Anatolian and Baghdad railways. The railways would connect Istanbul with Bagdad (i.e. Baghdad) through Turkey (i.e. Anatolia). Construction of many lines running from Aleppo to Mosul and running from Mosul to Baghdad was finished after 1914. Some of the railroad lines are Istanbul-Izmit, Izmit-Eskisehir, Eskisehir-Konya, Adana-Aleppo, and Mosul-Bagdad railroad lines. Figure 2.5 is taken from McMurry (1919; p. 6).

Figure 2.6: The Hejaz Railway in 1914



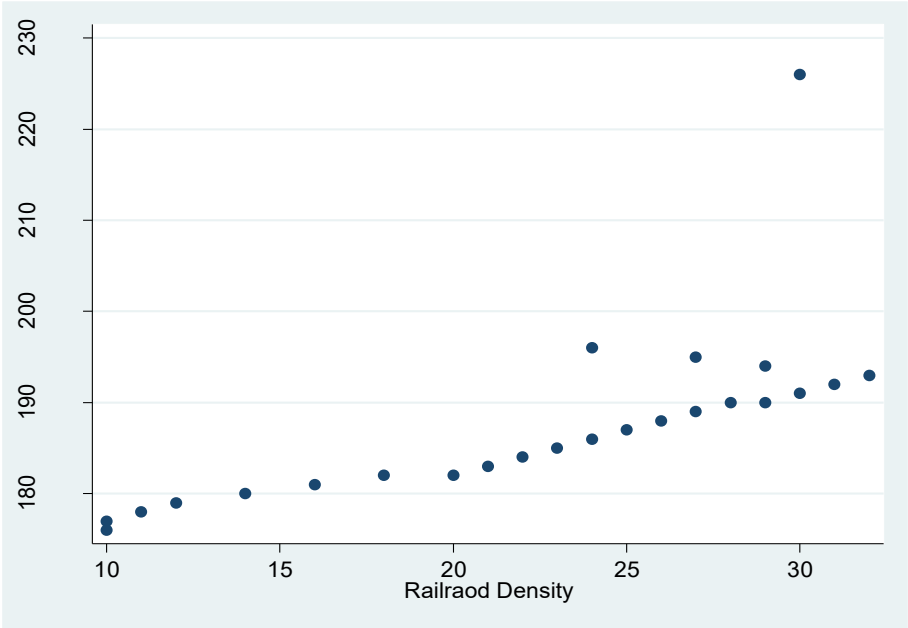
Notes: Figure 2.6 shows the Hejaz railway, which connected Damascus with Madinah (i.e. Medina). Figure 2.6 also shows railroad stations along the Hejaz railway. The Figure 2.6 is taken from Nicholson (2005; p. 100).

Figure 2.7: The Railroad Line Connecting Deraa with Haifa



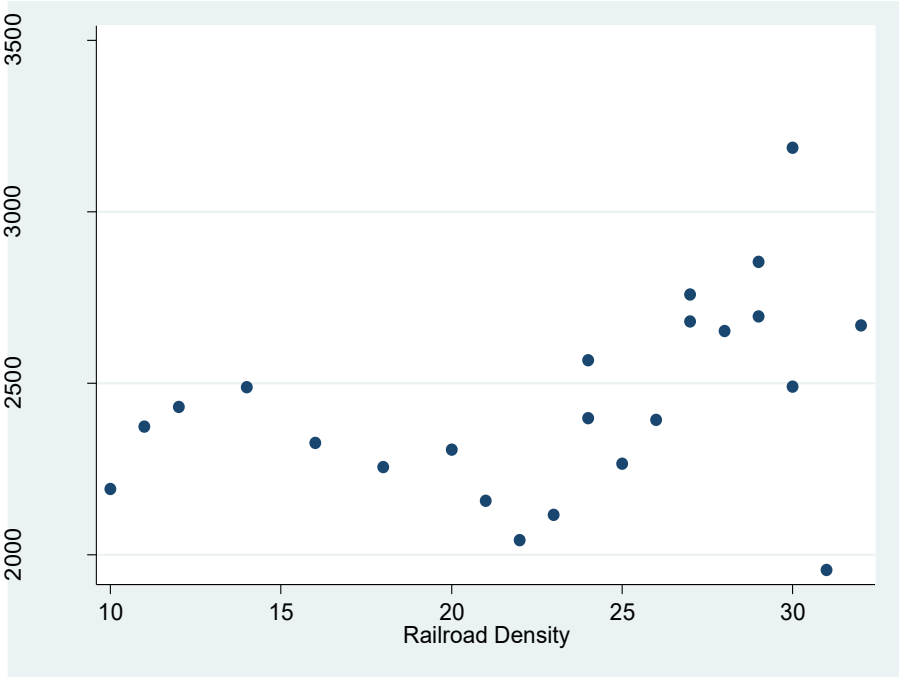
Notes: Figure 2.7 shows Haifa-Deraa railroad line of the Hejaz railway. Figure 2.7 also shows railroad stations along the line. The Figure 2.7 is taken from Nicholson (2005; p. 50).

Figure 2.8: The Relationship between Population Density and Railroad Density in the Ottoman Empire (1890-1913)



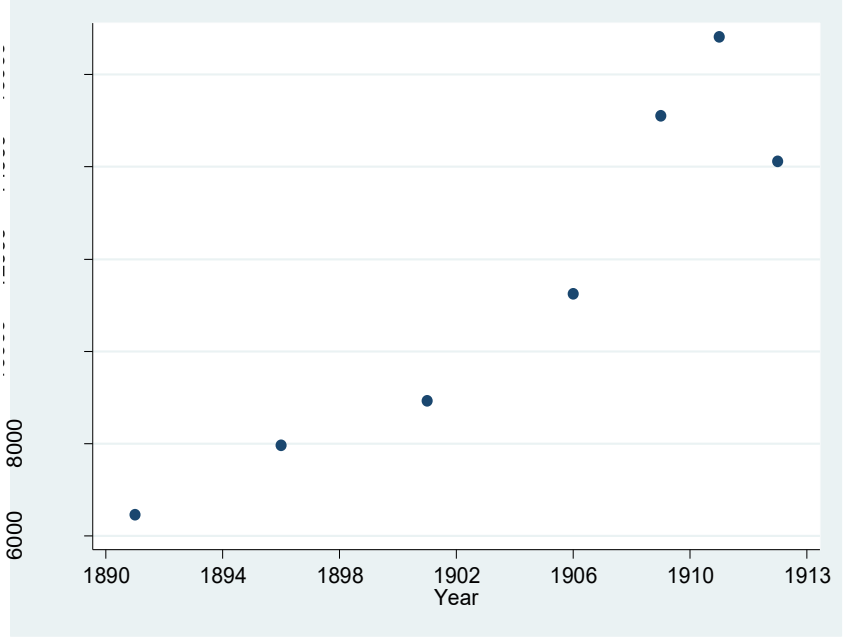
Notes: Figure 2.8 plots the population density against railroad density in the Ottoman Empire over the period 1890-1913. The population and railroad density data come from Banks and Wilson (2002). The population and railroad density are calculated as total population and miles of railroad lines in the Ottoman Empire in a given year divided by the area of the Ottoman Empire in square miles in a given year, respectively.

Figure 2.9: The Relationship between Foreign Trade per capita and Railroad Density in the Ottoman Empire (1890-1913)



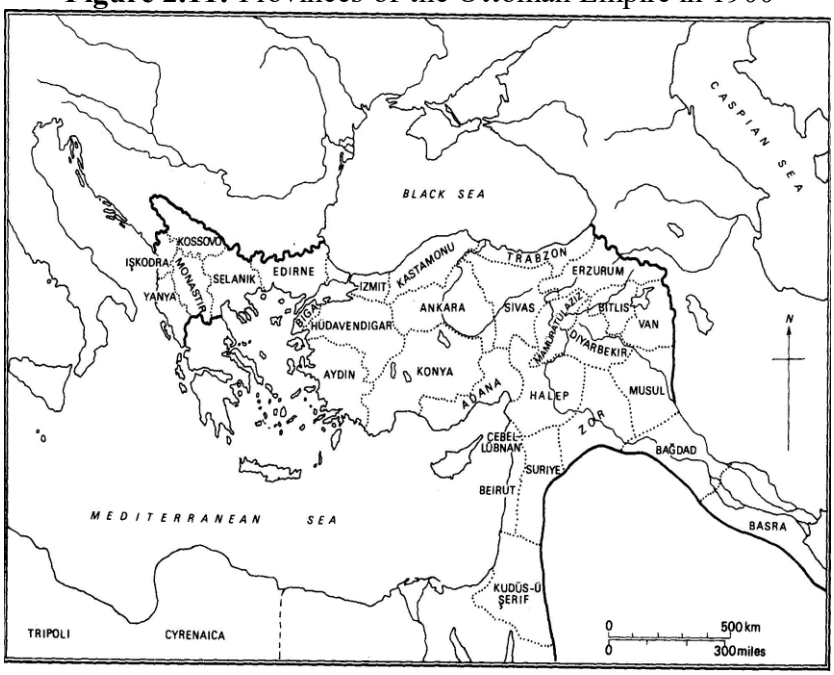
Notes: Figure 2.9 plots foreign trade per capita against railroad density in the Ottoman Empire. The foreign trade data for the Ottoman Empire is sum of the Ottoman exports and imports in constant prices for the period 1890-1913. Foreign trade per capita is expressed in constant British pounds. The Ottoman export and import data for the Ottoman Empire come from Pamuk (1984; p. 140). All values in Pamuk (1984) are expressed in million British pounds. The Ottoman exports and imports are deflated using the Istanbul consumer price index. The data for price index of Istanbul come from Pamuk (1990; pp. 30-1). All values in Pamuk (2000; p. 18) are expressed in akces. Akce was silver coin. I converted the Istanbul consumer price index to British pounds using exchange rates in Inalcik and Quataert (1996; pp. 972-3). Since base year in Pamuk (1990) is 1469, the base year is changed to 1913. The population data for the Ottoman Empire are available in Eldem (1994; p.14) and Behar (1996; pp. 51-6). There are missing values in the data. Missing observations are filled in by extrapolation using the average annual growth rate of the years for which population data are available. Based on the extrapolated data, I construct foreign trade per capita in the Ottoman Empire over the period 1890-1913. The railroad density data are taken from Banks and Wilson (2002). The railroad density is calculated as total miles of railroad lines in the Ottoman Empire in a given year divided by the area of the Ottoman Empire in square miles in a given year.

Figure 2.10: Total Rail Passengers in the Ottoman Empire (1891-1913)



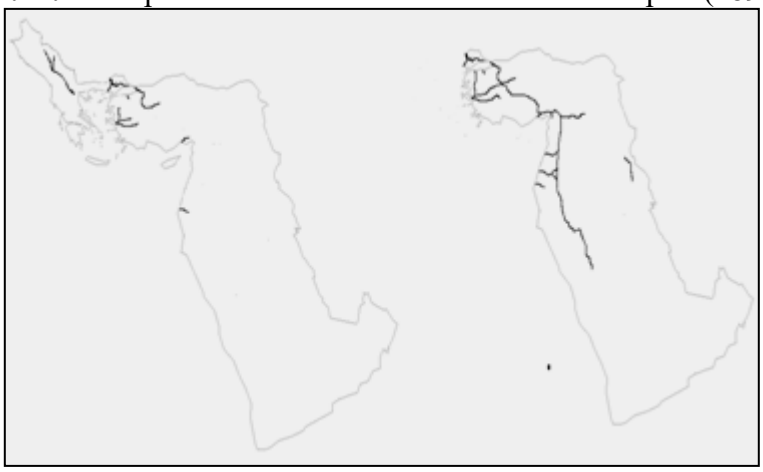
Notes: Figure 2.10 shows total number of rail passengers in the Ottoman Empire for the period 1891-1913. Total number of rail passengers data for the Ottoman Empire come from Eldem (1994; p. 102). All values in Figure 2.10 are expressed in thousand persons. The data are only available for 1891, 1896, 1901, 1906, 1909, 1911, and 1913.

Figure 2.11: Provinces of the Ottoman Empire in 1900



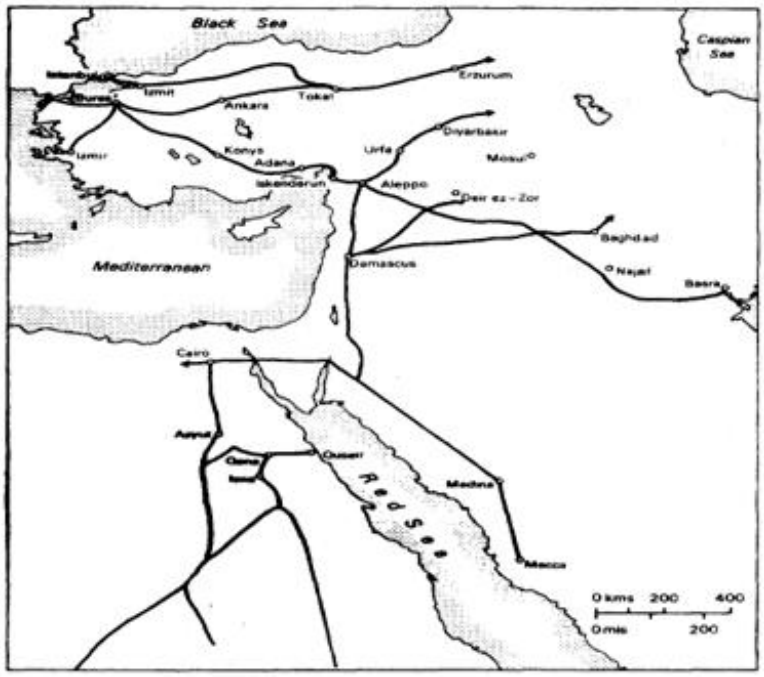
Notes: Figure 2.11 displays the provinces of the Ottoman Empire in 1900. Istanbul, Cezayir-i Bahr-i Sefid, and Catalca provinces are not shown in the Figure 2.11. Bagdad, Kossovo, Kudus-u Serif, Monastir, Beirut, and Mamuratulaziz refer to Bagdat, Kosova, Kudus, Manastir, Beyrut, and Elaziz provinces, respectively. Cebel-Lubnan is accepted as a part of Halep in this chapter, as the administrative division of the Ottoman Empire is based on Karpat (1985: p. 190). Figure 2.11 is taken from Quataert (2005; p. 104).

Figure 2.12: A Map of Railroad Lines in the Ottoman Empire (1893 and 1914)



Notes: Figure 2.12 displays the railroad networks in the Ottoman Empire in 1893 (on the left) and 1914 (on the right). The Ottoman Empire lost several of its territories in Rumelia (e.g. Northern Greece) after 1893. Also, there were several territorial changes before 1893. The Ottoman Empire lost several of its territories in Rumelia (e.g. Bulgaria and Bosnia). There had been several railroad lines that were operated in these territories before they did not gain independence from the Ottoman Empire. However, Figure 2.12 only shows railroad lines that were within the border of the Ottoman Empire at the census dates. Author`s calculations based on the maps and data mentioned in the data section.

Figure 2.13: The Middle Eastern Caravan and Trade Routes



Notes: Figure 2.13 shows trade and caravan routes which were in use for carrying goods and people in the Ottoman Empire for a long time. Several places along the caravan and trade routes are Istanbul, Izmit, Tokat, Izmir, Urfa, Adana, Erzurum, Iskenderun, Damascus, Aleppo, Baghdad, Medina, and Mecca. Figure 2.13 is taken from Owen (2002; p. 48).

2.9.2 Tables

Table 2.1: Descriptive Statistics

Variable	N. of obs.	Mean	Std. Dev.
Population	686	31,190	20,469
Distance to Railroad Lines	686	172.780	195.925
Presence of Natural Disasters	686	0.069	0.255
Presence of Mines	686	0.151	0.358
Distance to Trade and Caravan Routes	686	90.469	87.441
Distance to Un-built Lines Proposed by Colonel Chesney	686	705.308	522.671
Distance to Un-Built Lines Proposed by Levant Herald	686	445.892	264.618

Notes: N. of obs. denotes the total number of judicial district-year observations. Std. Dev. displays standard deviations of variables in my sample.

Table 2.2: The Impact of Railroads on Populations of Judicial Districts (1893 and 1914)

Dependent Variable: log(Population)				
	1	2	3	4
log(Distance to Railroad Lines)	-0.039	-0.033*	-0.033*	-0.033*
	(0.036)	(0.019)	(0.019)	(0.019)
Presence of Natural Disasters	--	--	0.059	0.065
			(0.120)	(0.143)
Presence of Mines	--	--	0.223***	0.223***
			(0.072)	(0.072)
Province Fixed Effects	NO	YES	YES	YES
Year Fixed Effects	NO	YES	YES	NO
Presence of Natural Disasters×Year Fixed Effects	NO	NO	NO	YES
Constant	10.308***	9.690***	9.629***	9.628***
	(0.125)	(0.034)	(0.031)	(0.031)
N. of obs.	686	686	686	686
R^2	0.01	0.40	0.41	0.41

Notes: Columns (1)-(4) report the OLS estimates for equation (2.1). Heteroskedasticity-robust standard errors corrected for clustering at the province level are reported in parentheses. *** and * denote statistically significantly different from zero at 1% and 10% levels, respectively. N. of obs. is number of observation. R^2 is the R-squared.

Table 2.3: First Stage Regressions (1893 and 1914)

Dependent Variable: log(Distance to Railroad Lines)				
	1	2	3	4
Presence of Natural Disasters	--	--	-0.240	-0.466
			(0.270)	(0.316)
Presence of Mines	--	--	0.092	0.092
			(0.147)	(0.147)
log(Distance to Trade and Caravan Routes)	0.284*	0.308***	0.301***	0.302***
	(0.144)	(0.109)	(0.110)	(0.110)
Province Fixed Effects	NO	YES	YES	YES
Year Fixed Effects	NO	YES	YES	NO
Presence of Natural Disasters×Year Fixed Effects	NO	NO	NO	YES
Constant	3.103***	0.996***	0.990***	1.008***
	(0.710)	(0.293)	(0.290)	(0.296)
N. of obs.	686	686	686	686
R^2	0.03	0.58	0.58	0.58
F	3.86*	7.90***	7.48***	7.58***

Notes: Table 2.3 shows the first-stage regressions of distance to railroad lines on population whose results are reported in Table 2.4. The columns (1)-(4) correspond to the columns (1)-(4) of Table 2.4. Heteroskedasticity-robust standard errors corrected for clustering at the province level are reported in parentheses. *** and * denote statistically significantly different from zero at 1% and 10% levels, respectively. N. of obs. is number of observation. R^2 is the centred R-squared. At the last row of Table 2.3, F statistics on the excluded instrument in the first stage regressions are reported. Last, distance to trade and caravan routes is instrumental variable.

Table 2.4: Instrumental Variable Estimates for the Impact of Railroads on Population of Judicial Districts (1893 and 1914)

Dependent Variable: log(Population)				
	1	2	3	4
log(Distance to Railroad Lines)	-0.249	-0.056	-0.056	-0.056
	(0.192)	(0.099)	(0.103)	(0.103)
Presence of Natural Disasters	--	--	0.051	0.052
			(0.130)	(0.158)
Presence of Mines	--	--	0.226***	0.226***
			(0.069)	(0.069)
Province Fixed Effects	NO	YES	YES	YES
Year Fixed Effects	NO	YES	YES	NO
Presence of Natural Disasters×Year Fixed Effects	NO	NO	NO	YES
Constant	11.201***	9.734***	9.670***	9.670***
	(0.834)	(0.182)	(0.187)	(0.188)
N. of obs.	686	686	686	686
R^2	--	0.40	0.41	0.41

Notes: Columns (1)-(4) of Table 2.4 report the IV estimates for equation (2.1). Heteroskedasticity-robust standard errors corrected for clustering at the province level are reported in parentheses. *** denotes statistically significantly different from zero at 1 % level. N. of obs. is number of observation. R^2 is the centred R-squared.

Table 2.5: Placebo Regressions: The Impact of Lines in the Proposals of Colonel Chesney and Levant Herald on Populations of Judicial Districts (1893 and 1914)

Dependent Variable: log(Population)				
	1	2	3	4
log(Distance to Railroad Lines)	-0.036	-0.034*	-0.035*	-0.035*
	(0.034)	(0.019)	(0.018)	(0.018)
log(Distance to Lines Proposed by Colonel Chesney)	0.052	-0.110	-0.118	-0.118
	(0.062)	(0.072)	(0.072)	(0.073)
log(Distance to Lines Proposed by Levant Herald)	-0.193**	-0.010	-0.004	-0.004
	(0.081)	(0.062)	(0.069)	(0.069)
Presence of Natural Disasters	--	--	0.065	0.072
			(0.121)	(0.144)
Presence of Mines	--	--	0.228***	0.228***
			(0.071)	(0.071)
Province Fixed Effects	NO	YES	YES	YES
Year Fixed Effects	NO	YES	YES	NO
Presence of Natural Disasters×Year Fixed Effects	NO	NO	NO	YES
Constant	11.095***	10.492***	10.468***	10.467***
	(0.643)	(0.482)	(0.471)	(0.471)
N. of obs.	686	686	686	686
R^2	0.05	0.41	0.42	0.42

Notes: Columns (1)-(4) report the OLS estimates for equation (2.3) that I examine the impact of lines that were planned by Colonel Chesney and Levant Herald but which were not built. Heteroskedasticity-robust standard errors corrected for clustering at the province level are reported in parentheses. ***, **, and * denote statistically significantly different from zero at 1%, 5%, and 10% levels, respectively. N. of obs. is number of observation. R^2 is the R-squared.

Table 2.6: Robustness Check: Circassian Immigrants (1893 and 1914)

Dependent Variable: log(Population)			
	1	2	3
log(Distance to Railroad Lines)	-0.039	-0.086	-0.039*
	(0.023)	(0.089)	(0.022)
log(Distance to Lines Proposed by Colonel Chesney)	--	--	-0.118
			(0.073)
log(Distance to Lines Proposed by Levant Herald)	--	--	-0.088
			(0.067)
Presence of Natural Disasters	0.109	0.079	0.114
	(0.267)	(0.273)	(0.267)
Presence of Mines	0.258***	0.266***	0.269***
	(0.084)	(0.076)	(0.086)
Province Fixed Effects	YES	YES	YES
Year Fixed Effects	NO	NO	NO
Presence of Natural Disasters×Year Fixed Effects	YES	YES	YES
Constant	6.931***	9.256***	8.172***
	(0.166)	(0.414)	(0.447)
N. of obs.	474	474	474
R^2	0.45	0.44	0.45

Notes: In columns (1)-(3), all regressions are estimated after dropping provinces whose population increased due to Circassian immigrants. Columns (1) and (2) report the OLS and IV estimates for equation (2.1), respectively. Column (3) shows the OLS estimates for equation (2.3). Heteroskedasticity-robust standard errors corrected for clustering at the province level are reported in parentheses. *** and * denote statistically significantly different from zero at 1% and 10% levels, respectively. N. of obs. is number of observation. R^2 is the R-squared in columns (1) and (3) as R^2 is the centred R-squared in column (2).

Table 2.7: First Stage Regression: Circassian Immigrants (1893 and 1914)

Dependent Variable: log(Distance to Railroad Lines)	
Presence of Natural Disasters	-0.507
	(0.478)
Presence of Mines	0.054
	(0.216)
log(Distance to Trade and Caravan Routes)	0.418***
	(0.146)
Province Fixed Effects	YES
Year Fixed Effects	NO
Presence of Natural Disasters×Year Fixed Effects	YES
Constant	3.066***
	(0.555)
N. of obs.	474
R^2	0.55
F	8.21***

Notes: Table 2.7 shows the first-stage regression of distance to railroad lines on population whose result is reported in column (2) of Table 2.6. In Table 2.7, first stage regression is estimated after dropping provinces whose population increased due to Circassian immigrants. Heteroskedasticity-robust standard errors corrected for clustering at the province level are reported in parentheses. *** denotes statistically significantly different from zero at 1% level. N. of obs. is number of observation. R^2 is the centred R-squared. At the last row of Table 2.7, F statistic on the excluded instrument in the first stage regression is reported. Last, distance to trade and caravan routes is instrumental variable.

Table 2.8: Robustness Check: First Differences (1893 and 1914)

Dependent Variable: Δlog(Population)		
	1	2
Δlog(Distance to Railroad Lines)	-0.037	-0.494
	(0.035)	(1.023)
ΔPresence of Mines	0.190*	0.361
	(0.091)	(0.571)
Province Fixed Effects	NO	NO
Year Fixed Effects	YES	YES
Presence of Natural Disasters ×Year Fixed Effects	NO	NO
N. of obs.	203	203
R^2	0.40	--

Notes: In column (1), the resulting equation is estimated by OLS. To obtain the resulting equation, I take first differences of variables in the equation (2.1) across two periods for each judicial district *i*. The first differences remove both constant term and presence of natural disasters. Column (2) shows the IV estimates for the resulting equation. In Table 2.8, "*Δlog(Population)*" refers to *log(Population in 1914) - log(Population in 1893)*. "*Δlog(Distance to Railroad Lines)*" refers to *log(Distance to Railroad Lines in 1914) - log(Distance to Railroad Lines in 1893)*. "*ΔPresence of Mines*" refers to *Presence of Mines in 1914 – Presence of Mines in 1893*. Heteroskedasticity-robust standard errors corrected for clustering at the province level are reported in parentheses. * denotes statistically significantly different from zero at 10% level, respectively. N. of obs. is number of observation. R^2 is the R-squared in column (1) as R^2 is the centred R-squared in column (2).

Table 2.9: First Stage Regression: First Differences (1893 and 1914)

Dependent Variable: Δlog(Distance to Railroad Lines)	
ΔPresence of Mines	0.387
	(0.832)
log(Distance to Trade and Caravan Routes)	0.025
	(0.053)
Province Fixed Effects	NO
Year Fixed Effects	YES
Presence of Natural Disasters×Year Fixed Effects	NO
N. of obs.	203
R^2	0.01
F	0.23

Notes: Table 2.9 shows the first-stage regression of the resulting equation whose finding is reported in column (2) of Table 2.8. First differences remove both constant term and presence of natural disasters. In Table 2.9, the dependent variable is "*Δlog(Distance to Railroad Lines)*". It refers to *log(Distance to Railroad Lines in 1914) - log(Distance to Railroad Lines in 1893)*. "*ΔPresence of Mines*" refers to *Presence of Mines in 1914 – Presence of Mines in 1893.* Heteroskedasticity-robust standard errors corrected for clustering at the province level are reported in parentheses. N. of obs. is number of observation. R^2 is the centred R-squared. At the last row of Table 2.9, F statistic on the excluded instrument in the first stage regression is reported. Last, distance to trade and caravan routes is instrumental variable.

2.10 Appendix B: Tables

Table 2.10: The Railroad Lines in the Ottoman Empire (1856 and 1914)

Railroad Lines	Length of Lines	Dates of Concession	Dates of Opening
Baghdad-Samarra	119	--	1914
Islahiye-Resulayn	453	--	1914
Toprakkale-Iskenderun	59	--	1913
Babaeski-Kirkkilise	46	1910	1911-13
Soma-Bandirma	190	1888	1912
Aydin-Dinar-Egridir	342	1879	1889-1912
Durak-Yenice	18	--	1912
Rayak-Aleppo-Karkamis	203	--	1912
Ulukisla-Karapinar	53	--	1912
Bulgurlu-Ulukisla	38	--	1911
Damascus-Medina	1564	--	1908
Haifa-Deraa	161	--	1905
Konya-Bulgurlu	200	--	1904
Homs-Jarabulus	102	1891	1903
Rayak-Aleppo	331	1893-98	1902
Arifiye-Adapazari	9	1898	1898-99
Eskisehir-Konya	455	1893	1896
Salonica-Dedeagac	508	1892	1896
Alasehir-Afyon	251	1884	1895
Beirut-Damascus-Muzeirib	258	1890	1894-95
Salonica-Monastir	219	1890	1894
Jaffa-Jerusalem	87	1888	1892
Mudanya-Bursa	42	1871	1892
Izmit-Ankara	486	1888	1892
Manisa-Soma	92	1885	1888
Mersin-Adana	67	1883	1886
Tire-Odemis-Civril	137	1879-1882	1883-4
Kasaba-Alasehir	75	1872	1875
Uskub-Mitrovitza	119	--	1874
Istanbul-Edirne	318	1869	1873
Istanbul-Izmit	93	--	1873
Edirne-Philipopoli-Belova	243	--	1872
Salonica-Uskub	244	--	1872
Tirnova-Yanboli	106	--	1872
Banialuka-Doberlin	102	--	1872
Edirne-Dedeagac	149	--	1872
Izmir-Kasaba	98	1863	1866
Varna-Rustchuk	220	1860	1866
Izmir-Aydin	130	1856	1866
Chernovoda-Constantza	66	1856	1860

Notes: Table 2.10 shows all railroad lines that were built in the Ottoman Empire between 1856 and 1914. Table 2.10 displays concession, opening dates, and length of the railroad lines as kilometres. Some of the railroad lines (i.e. Chernovoda-Constantza, Varna-Rustchuk, Banialuka-Doberlin, Timova-Yanboli, Salonica-Dedeagac, and Salonica-Monastir railroad lines) and some parts of railroad lines (i.e. Edirne-Dedeagac and Edirne-Philipopoli-Belova railroad lines) were not within the border of the Ottoman Empire at the census dates as the Ottoman Empire lost several of its territories in Rumelia. The first constructed railroad line that was operated in the border of the Ottoman Empire at the census dates was Izmir-Aydin line. Finally, some parts of railroad lines were opened in different years. For instance, Aydin-Dinar railroad line was opened in 1889 as Egridir-Dinar railroad line was in operation in 1912. The information in the Table 2.10 are gathered from several sources such as British Parliamentary Paper (1986), Schoenberg (1977), Eldem (1994; p. 104), Nicholson (2005; p. 50), Gulsoy (2010; pp. 51-3), and Geyikdagi (2011; pp. 89-90). All of the railroad line names are given in the form in which they appear in Schoenberg (1977), Eldem (1994; p. 104), Nicholson (2005; p. 50), and Geyikdagi (2011; pp. 89-90).

Table 2.11: The Completion Year of the 1881/82-93 Census (1893 and 1914)

Dependent Variables: log(Population) and log(Distance to Railroad Lines)				
	1	2	3	4
log(Distance to Railroad Lines)	-0.041*	-0.066	--	-0.043**
	(0.021)	(0.121)		(0.020)
log(Distance to Trade and Caravan Routes)	--	--	0.255***	--
			(0.092)	
log(Distance to Lines Proposed by Colonel Chesney)	--	--	--	-0.118
				(0.072)
log(Distance to Lines Proposed by Levant Herald)	--	--	--	-0.004
				(0.070)
Presence of Natural Disasters	0.060	0.048	-0.251	0.067
	(0.143)	(0.134)	(0.219)	(0.145)
Presence of Mines	0.225***	0.229***	0.127	0.230***
	(0.073)	(0.072)	(0.107)	(0.072)
Province Fixed Effects	YES	YES	YES	YES
Year Fixed Effects	NO	NO	NO	NO
Presence of Natural Disasters×Year Fixed Effects	YES	YES	YES	YES
Constant	9.657***	9.712***	1.435***	10.500***
	(0.043)	(0.263)	(0.242)	(0.475)
N. of obs.	686	686	686	686
R^2	0.41	0.41	0.62	0.42
F	--	--	7.57***	--

Notes: In columns (1)-(4), all regressions whose results are reported in column (4) of Tables 2.2, 2.3, 2.4, and 2.5 are re-estimated after considering 1889 as the completion year of the 1881/82-93 census. Columns (1) and (2) show the OLS and IV estimates for equation (2.1), respectively. Column (3) reports the first-stage regressions of distance to railroads on population whose result is presented in column (2). Column (4) reports the OLS estimates for equation (2.3) that I examine the effect of lines that were planned by Colonel Chesney and Levant Herald but were not built. In columns (1), (2), and (4), the dependent variable is logarithm of the population in a judicial district in year *t* (i.e. log(Population)). In column (3), the dependent variable is logarithm of the distance between each judicial district and the nearest railroad line in a given year (i.e. log(Distance to Railroad Lines)). Heteroskedasticity-robust standard errors corrected for clustering at the province level are reported in parentheses. ***, **, and * denote statistically significantly different from zero at 1%, 5% , and 10% levels, respectively. N. of obs. is number of observation. R^2 is the centred R-squared in columns (2) and (3) as R^2 is the R-squared in the other columns. At the last of column (3), F statistic on the excluded instrument in the first stage regressions is reported. Last, distance to trade and caravan routes is instrumental variable.

Table 2.12: Female Population in Musul and Basra provinces, Ipek and Prizren Counties (1893 and 1914)

Dependent Variables: log(Population) and log(Distance to Railroad Lines)				
	1	2	3	4
log(Distance to Railroad Lines)	-0.027	-0.042	--	-0.029
	(0.018)	(0.101)		(0.017)
log(Distance to Trade and Caravan Routes)	--	--	0.304***	--
			(0.113)	
log(Distance to Lines Proposed by Colonel Chesney)	--	--	--	-0.112
				(0.075)
log(Distance to Lines Proposed by Levant Herald)	--	--	--	-0.019
				(0.069)
Presence of Natural Disasters	0.068	0.060	-0.465	0.073
	(0.143)	(0.158)	(0.316)	(0.144)
Presence of Mines	0.201***	0.202***	0.105	0.205***
	(0.065)	(0.063)	(0.145)	(0.065)
Province Fixed Effects	YES	YES	YES	YES
Year Fixed Effects	NO	NO	NO	NO
Presence of Natural Disasters×Year Fixed Effects	YES	YES	YES	YES
Constant	9.623***	9.649***	1.000***	10.513***
	(0.031)	(0.186)	(0.299)	(0.494)
N. of obs.	666	666	666	666
R^2	0.35	0.35	0.57	0.35
F	--	--	7.47***	--

Notes: In columns (1)-(4), all regressions whose results are reported in column (4) of Tables 2.2, 2.3, 2.4, and 2.5 are re-estimated after exclusion of provinces and counties where female population could have been neglected (i.e. Musul and Basra provinces, Ipek and Prizren counties). Columns (1) and (2) report the OLS and IV estimates for equation (2.1), respectively. Column (3) shows the first-stage regressions of distance to railroads on population whose result is presented in column (2). Column (4) reports the OLS estimates for equation (2.3) that I look at the effect of lines that were planned by Colonel Chesney and Levant Herald but were never built. In columns (1), (2), and (4), the dependent variable is logarithm of the population in a judicial district in year *t* (i.e. log(Population)). In column (3), the dependent variable is logarithm of the shortest distance between each judicial district and the railroad line in a given year (i.e. log(Distance to Railroad Lines)). Heteroskedasticity-robust standard errors corrected for clustering at the province level are reported in parentheses. *** denotes statistically significantly different from zero at 1% level. N. of obs. is number of observation. R^2 is the centred R-squared in columns (2) and (3) as R^2 is the R-squared in the other columns. At the last of column (3), F statistic on the excluded instrument in the first stage regressions is reported. Last, distance to trade and caravan routes is instrumental variable.

Table 2.13: Exclusion of Islands in the Sample (1893 and 1914)

Dependent Variables: log(Population) and log(Distance to Railroad Lines)				
	1	2	3	4
log(Distance to Railroad Lines)	-0.032*	-0.048	--	-0.034*
	(0.019)	(0.103)		(0.018)
log(Distance to Trade and Caravan Routes)	--	--	0.301***	--
			(0.110)	
log(Distance to Lines Proposed by Colonel Chesney)	--	--	--	-0.119
				(0.073)
log(Distance to Lines Proposed by Levant Herald)	--	--	--	-0.001
				(0.068)
Presence of Natural Disasters	0.023	0.013	-0.492	0.030
	(0.144)	(0.163)	(0.342)	(0.146)
Presence of Mines	0.218***	0.220***	0.093	0.222***
	(0.074)	(0.072)	(0.148)	(0.074)
Province Fixed Effects	YES	YES	YES	YES
Year Fixed Effects	NO	NO	NO	NO
Presence of Natural Disasters×Year Fixed Effects	YES	YES	YES	YES
Constant	9.722***	9.751***	1.000***	10.545***
	(0.031)	(0.187)	(0.291)	(0.468)
N. of obs.	672	672	672	672
R^2	0.38	0.38	0.58	0.39
F	--	--	7.42***	--

In columns (1)-(4), all regressions whose results are reported in column (4) of Tables 2.2, 2.3, 2.4, and 2.5 are re-estimated after exclusion of Cezayir-i Bahr-i Sefid province and Adalar judicial district in Istanbul province. Columns (1) and (2) show the OLS and IV estimates for equation (2.1), respectively. Column (3) shows the first-stage regressions of distance to railroads on population whose result is presented in column (2). Column (4) shows the OLS estimates for equation (2.3) that I look at the effect of lines that were planned by Colonel Chesney and Levant Herald but were never built. In columns (1), (2), and (4), the dependent variable is logarithm of the population in a judicial district in year *t* (i.e. log(Population)). In column (3), the dependent variable is logarithm of the shortest distance between each judicial district and the railroad line in a given year (i.e. log(Distance to Railroad Lines). Heteroskedasticity-robust standard errors corrected for clustering at the province level are reported in parentheses. *** and * denote statistically significantly different from zero at 1% and 10% levels, respectively. N. of obs. is number of observation. R^2 is the centred R-squared in columns (2) and (3) as R^2 is the R-squared in the other columns. At the last of column (2), F statistic on the excluded instrument in the first stage regressions is reported. Last, distance to trade and caravan routes is instrumental variable.

Table 2.14: Inclusion of Central Judicial Districts (1893 and 1914)

Dependent Variables: log(Population) and log(Distance to Railroad Lines)				
	1	2	3	4
log(Distance to Railroad Lines)	-0.071***	-0.286**	--	-0.076***
	(0.022)	(0.130)		(0.021)
log(Distance to Trade and Caravan Routes)	--	--	0.297***	--
			(0.085)	
log(Distance to Lines Proposed by Colonel Chesney)	--	--	--	-0.162***
				(0.055)
log(Distance to Lines Proposed by Levant Herald)	--	--	--	0.041
				(0.066)
Presence of Natural Disasters	0.260	0.128	-0.487***	0.273
	(0.178)	(0.196)	(0.185)	(0.179)
Presence of Mines	0.402***	0.350***	-0.161	0.403***
	(0.081)	(0.079)	(0.138)	(0.080)
Province Fixed Effects	YES	YES	YES	YES
Year Fixed Effects	NO	NO	NO	NO
Presence of Natural Disasters×Year Fixed Effects	YES	YES	YES	YES
Constant	9.706***	10.187***	1.414***	10.586***
	(0.056)	(0.303)	(0.242)	(0.435)
N. of obs.	738	738	738	738
R^2	0.38	0.27	0.63	0.37
F	--	--	12.12***	--

In columns (1)-(4), all regressions whose results are reported in column (4) of Tables 2.2, 2.3, 2.4, and 2.5 are re-estimated after inclusion of 29 judicial districts that were called as central judicial district in the 1881/82-93 census (e.g. Konya central district). Columns (1) and (2) report the OLS and IV estimates for equation (2.1), respectively. Column (3) shows the first-stage regressions of distance to railroads on population whose result is presented in column (2). Column (4) reports the OLS estimates for equation (2.3) that I look at the effect of lines that were planned by Colonel Chesney and Levant Herald but were never built. In columns (1), (2), and (4), the dependent variable is logarithm of the population in a judicial district in year *t* (i.e. log(Population)). In column (3), the dependent variable is logarithm of the shortest distance between each judicial district and the railroad line in a given year (i.e. log(Distance to Railroad Lines). Heteroskedasticity-robust standard errors corrected for clustering at the province level are reported in parentheses. *** and ** denote statistically significantly different from zero at 1% and 5% levels, respectively. N. of obs. is number of observation. R^2 is the centred R-squared in columns (2) and (3) as R^2 is the R-squared in the other columns. At the last of column (2), F statistic on the excluded instrument in the first stage regressions is reported. Last, distance to trade and caravan routes is instrumental variable.

2.11 References

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

Acemoglu, D. S. Johnson, and J. Robinson (2002a). "Reversal of Fortune: Geography and Institutions in the Making of the Modern World Income Distribution". *The Quarterly Journal of Economics.* 177(4). pp. 1231-1294.

Acemoglu, D. S. Johnson, and J. Robinson (2002b). "The Rise of Europe: Atlantic Trade, Institutional Change and Economic Growth". *NBER Working Papers No. 9378.*

Akgungor, S., C. Aldemir, Y. Kustepeli, Y. Gulcan, and V. Tecim (2011). "The Effect of Railway Expansion on Population in Turkey, 1856–2000". *Journal of Interdisciplinary History.* 42(1). pp.135-57.

Al-Hameed, A. M. (1989). "The Hejaz railway 1900-1918: Policy Objectives and Consequences". *Unpublished PhD Thesis*. Colchester: University of Essex.

Altug, S. (2010). "Historical Trade Routes: Is This the Road to Regional Development? ". *TUSIAD Article Series No. 2010/05*.

Angrist, J. D. and J. Pischke (2009). *Mostly Harmless Econometrics*. Princeton: Princeton University Press.

Atack, J., and R. Margo (2011). "The Impact of Access to Rail Transportation on Agricultural Improvement: The American Midwest as a Test Case, 1850-1860". *The*

Journal of Transport and Land Use, Centre for Transportation Studies, University of Minnesota. 4(2), pp. 5-18.

Atack, J., F. Bateman, M. Haines, and R. A. Margo (2009a). "Did Railroads Induce or Follow Economic Growth? Urbanization and Population Growth in the American Midwest, 1850-60". *NBER Working Papers No. 14640.*

Atack, J., M. R. Haines, and R. A. Margo (2009b). "Railroads and the Rise of the Factory: Evidence for the United States, 1850-70". *NBER Working Paper No. 14410*

Banerjee, A., E. Duflo, and N. Qian (2009). "On the Road: Access to Transportation Infrastructure and Economic Growth in China". *University of California Berkeley Working Papers*.

Banerjee. A. V., E. Duflo, and N. Qian (2012). "On the Road: Access to Transportation Infrastructure and Economic Growth in China". *MIT Department of Economics Working Papers No. 12-06.*

Banks, A. S. and K. A. Wilson (2012). *Cross-National Time-Series Data Archive*, *Databanks International*. Online: http:// databanksinternational.com.

Baum-Snow, N. (2007). "Did Highways Cause Suburbanization?". *The Quarterly Journal of Economics*. 122(2). pp. 775–805.

Baum-Snow, N., L. Brandt, J. Henderson, M. Turner, and Q. Zhang (2012). "Roads, Railroads and Decentralization of Chinese Cities". *Brown University Working Papers*.

Bayartan, M. (2008). "XIX. Yuzyilda Osmanli Madenlerinin Cografi Dagilisi". *Osmanli Bilimi Arastirmalari*. 10(1). pp. 137-56.

Bayraktaroglu, S. (1995). “Developments of Railways in the Ottoman Empire and Turkey”. *Unpublished MA Thesis*. Istanbul: Bogazici University.

Beeson, P. E., D. N. DeJong, and W. Troesken (2001). “Population Growth in US Counties, 1840-1990”. *Regional Science and Urban Economics*. 31(6). pp. 669-99.

Behar, C. (1996). *Osmanli Imparatorlugu'nun ve Turkiye`nin Nufusu 1500-1927*. Ankara: Devlet Istatistik Enstitusu.

Beyzatlar, M. A. (2010). “The Impact of Railway Infrastructure on Economic Growth and Population in Turkey”. *Unpublished MA Thesis*. Izmir: Dokuz Eylul University.

British Parliamentary Paper (1896). *Report by Major Law on Railways in Asiatic Turkey*. 19th Century House of Commons Sessional Papers No. C. 8019. pp.1-21.

Cameron, A.C., J.G. Gelbach, and D.L. Miller (2008). “Bootstrap-Based Improvements for Inference with Clustered Errors”. *Review of Economics and Statistics*. 90. pp. 414-427.

Clay, C. (1994). “The Origin of Modern Banking in the Levant: The Branch Network of the Imperial Ottoman Bank, 1890-1914”. *International Journal of Middle East Studies*. 26. pp. 589-614.

Combes, P. and M. Lafourcade (2001). “Transport Cost Decline and Regional Inequalities: Evidence from France”. *Centre for Economic Policy Research (CEPR) Working Papers No. 2894.*

Cotterell, P. (1984). *The Railways of Palestine and Israel.* Abingdon: Tourret.

Dolek, D. (2007). “Change and Continuity in the Sivas Province, 1908-1918”. *Unpublished MA Thesis*. Ankara: Middle East Technical University.

Dominian, L. (1916). “The Geographical Foundation of Turkey`s World Relation”. *Journal of the American Oriental Society*. 36. pp. 168-80.

Donaldson, D. (2008). “Railroads and the Raj: Estimating the Economic Impact of Transportation Infrastructure”. *LSE Seminar Papers*.

Duranton, G. and M. A. Turner (2007). “Urban Growth and Transportation”. *University of Toronto Department of Economics Working Papers No.305.*

Earle, M. E. (1966). *Turkey, the Great Powers, and the Baghdad Railway; a Study in Imperialism*. New York: Russell & Russell.

Eldem, V. (1994). *Osmanli Imparatorlugu’nun Iktisadi Sartlari Hakkinda Bir Tetkik*. Istanbul: Turk Tarih Kurumu Yayınları.

Engin, V. (1993). *Rumeli Demiryollari*. Istanbul: ErenYayincilik.

Erler, M. Y. (2010). *Osmanli Devleti`nde Kuraklik ve Kitlik Olaylari (1800-1880)*. Istanbul: Libra Yayinevi.

Evengelatou-Notora, F. (2001). “Ikincil Onemdeki Yunanca Kaynaklarda Dogal Afetler (14.-19. Yuzyillar)”. in Zachariadou, E. (ed). *Osmanli Imparatorlugu`nda Dogal Afetler*. Istanbul: Tarih Vakfi Yurt Yayinlari. pp. 121-33.

Geyikdagi, V.N. (2011). *Foreign Investment in the Ottoman Empire: International Trade and Relations 1854-1914*. London: Tauris Academic Studies.

Gul, A. (2009). “Osmanli Devlet`inde Kuraklik ve Kitlik (Erzurum Vilayeti Ornegi: 1892–1893 ve 1906–1908 Yillari)”. *Uluslararasi Sosyal Arastirmalar Dergisi*. 2(9). pp. 144-58.

Gulsoy, U. (1994). Hicaz Demiryolu. Istanbul: ErenYayinlari.

Gulsoy, U. (2010). *Kutsal Proje – Ortadogu` da Osmanli Demiryollari*. Istanbul: Timas Yayinlari.

Guran, T. (1997). *Osmanli Donemi Tarim Istatistikleri, 1909, 1913, ve 1914*. Ankara: Devlet Istatistik Enstitusu.

Hanioglu, M. S. (2008). *A Brief History of the Late Ottoman Empire*, Princeton: Princeton University Press.

Hornung, E. (2012). “Railroads and Micro-regional Growth in Prussia”. *Competitive Advantage in the Global Economy (CAGE) Working Paper Series No. 79.*

Hourcade, B. (2008). “The Demography of Cities and the Expansion or Urban Space”. in Peter Sluglett (ed). *The Urban Social History of the Middle East, 1750-1950*. Syracuse: Syracuse University Press. pp. 154-82.

Huijg, A., C. Koopmans, and P. Rietveld (2010). “An Accessibility Approach to Railways and Municipal Population Growth, 1840-1930”. *IMET Working Papers.*

Hulagu, M. M. (2010). *The Hejaz Railway: the Construction of a New Hope*. New York: Bluedome Press.

Illich, N. S. (2007). “German Imperialism in the Ottoman Empire: a Comparative Study”. *Unpublished PhD Thesis*. Texas: Texas A&M University.

Inalcik, H. and D. Quatert (1996). *An Economic and Social History of the Ottoman Empire 1300-1914*. Cambridge: Cambridge University Press.

Irtem, S. K. (1999). *Sark Meselesi Osmanli`nin Somurgelesme Tarihi Osmanli Demiryollari Duyun-u Umumiye Misyonerlik*. Haz. Osman Selim Kocanoglu. Istanbul: Temel Yayinlari.

Issawi, C.P. (1970). "The Tabriz–Trabzon Trade, 1830–1900: Rise and Decline of a Route". *International Journal of Middle East Studies*. 1(1). pp 18-27.

Issawi, C.P. (1980). *The Economic History of Turkey, 1800-1914.* London: The University of Chicago Press.

Issawi, C.P. (1982). *An Economic History of the Middle East and North*. London: Columbia University Press.

Jedwab, R. and A. Moradi (2012). "Revolutionizing Transport: Modern Infrastructure, Agriculture and Development in Ghana". *LSE Open Access Publications*.

Karkar, Y. N. (1972). *Railway Development in the Ottoman Empire, 1856-1914.* New York: Vantage Press.

Karpat, K. H. (1985). *Ottoman Population 1830-1914: Demographic and Social Characteristics*. Wisconsin: The University of Wisconsin Press.

Karpat, K. H. (2010). *Osmanli'dan Gunumuze Etnik Yapilanma ve Gocler*. Istanbul: Timas Yayinlari.

Kasaba, R. (1993). *Osmanli Imparatorlugu ve Dunya Ekonomisi, On Dokuzuncu Yuzyil*. Istanbul: BelgeYayınlari.

Kolars, J. and H. J. Malin (1970). "Population and Accessibility: An Analysis of Turkish Railroads". *The Geographical Review*. 60(2). pp. 229-46.

Kotavaara, O., H. Antikainen, and J. Rusanen (2011). "Urbanization and Transportation in Finland, 1880-1970". *Journal of Interdisciplinary History.* 42(1). pp. 89-109.

Landau, J. M. (1971). *The Hejaz Railway and the Muslim Pilgrimage: A Case of Ottoman. Political Propaganda*. Detroit: Wayne State University Press.

McMeekin, S. (2010). *The Berlin-Baghdad Express: The Ottoman Empire and Germany`s Bid for World Power, 1898-1918*. London: Allen Lane.

McMurray, J. S. (2001). *Distant Ties: Germany, the Ottoman Empire, and the Construction of the Baghdad Railway*. Westport, Conn.: Praeger.

McMurry, F. M. (1919). *The Geography of the Great War*. New York: Macmillan Co.

Nicholson, J. (2005). *The Hejaz Railway*. London: Stacey International.

Ortayli, I. (2010). *Osmanli Imparatorlugu'nda Alman Nufuzu*. Istanbul: Timas Yayinlari.

Owen, R. (2002). *The Middle East in the World Economy, 1800-1914*. London: Tauris and Co Ltd.

Pamuk, S. (1984). *Osmanli Ekonomisi ve Dunya Kapitalizmi, (1820-1913): Ticaret, Sermaye ve Uretim Iliskileri*. Ankara: Yurt Yayinevi.

Pamuk, S. (1987). *The Ottoman Empire and European Capitalism: 1820-1913*. Cambridge: Cambridge University Press.

Pamuk, S. (2000). *Istanbul ve Diger Kentlerde 500 Yillik Fiyatlar ve Ucretler*, *1469-1998*. Ankara*:* Devlet Istatistik Enstitusu.

Quataert, D. (1977). "Limited Revolution: The Impact of the Anatolian Railway on Turkish Transportation and the Provisioning of Istanbul, 1890-1908". *The Business History Review*. 51(2). pp. 139-60.

Quataert, D. (1987). *Osmanli Devleti`nde Avrupa Iktisadi Yayilimi ve Direnis (1881-1908)*. Ankara: Yurt Yayinlari.

Quataert, D. (2005). *The Ottoman Empire, 1700-1922.* Cambridge: Cambridge University Press.

Quataert, D. (2006). *Miners and the State in the Ottoman Empire*. New York: Berghahn Books.

Refik, A. (1989). *Osmanli Devrinde Turkiye Madenleri, 967-1200*. Istanbul: Enderun Kitabevi.

Sanchis-Guarner, R. (2012). "Essays on Urban and Spatial Economics". *Unpublished PhD Thesis*. London: LSE.

Schoenberg, P.E. (1977). “The Evolution of Transport in Turkey (Eastern Thrace and Asia Minor) under Ottoman Rule, 1856-1918”. *Middle Eastern Studies*. 13 (3). pp. 359-72.

Schwartz, R. M., I. Gregory, and T. Thevenin (2011). “Spatial History: Railways, Uneven Development, and Population Change in France and Great Britain, 1850-1914”. *Journal of Interdisciplinary History*. 42(1). pp. 53-88.

Sezen, T. (2006). *Osmanli Yer Adlari*. Ankara: T.C. Basbakanlik Devlet Arsivleri Genel Mudurlugu.

Su, K. (1939). *Balıkesir Madenleri*. Istanbul: Resimli Ay Matbaasi.

Suziki, T. and Y. Muromachi (2010).“Empirical Analysis on the Railroad Development Impact on Local Population Density in Japan”. *Journal of the Eastern Asia Society for Transportation Studies*. 8(0). pp.1039-52.

TCKGM (Turkiye Cumhuriyeti Karayollari Genel Mudurlugu) (2007). *Karayollari Tarihi*. Ankara: Pelin Ofset.

Tourret, R. (1989). *Hedjaz Railway*. Abingdon: Tourret.

Tuncer, H. (2009). *Osmanli Devleti ve Buyuk Gucler, 1815-1878*. Istanbul: Kaynak Yayinlari.

Vogt, J. (2001). “Osmanli Topraklarinda Tarih Boyunca Depremsellik: Batili Kaynaklardan ve Taniklarin Ifadelerinden Ornekler”. in Zachariadou, E. (ed). *Osmanli Imparatorlugu`nda Dogal Afetler*. Istanbul: Tarih Vakfi Yurt Yayinlari. pp. 13-59.

Von Pressel, W. (1966). “Railway Projects in Turkey, 1872-1900”. in Issawi, C. (ed). *The Economic History of the Middle East 1800-1914.* Chicago: University of Chicago Press. pp. 90-4.

Wooldridge, J. F. (2009). *Introductory Econometrics: a Modern Approach*. Mason: South-Western Pub.

Yilmaz, O. F. (2011). *Sultan Ikinci Abdulhamid Han`in Hicaz Demiryolu Projesi*. Istanbul: Camlica Basim-Yayin.

Yorulmaz, S. (1998). “Turkiye’de Komurun Kesfi ve Komur Isletme Imtiyazlari, 1829-1937”. *Turkiye 11. Komur Kongresi Bildiriler Kitabi*. Turkey: Bartin.

Chapter 3: Banking Competition in the Ottoman Empire and the Imperial Ottoman Bank between 1895 and 1914

3.1 Introduction

Recent research shows that foreign bank presence is expected to decrease profitability of domestic banks through increasing competition in domestic banking markets[163]. This literature is based on the idea that foreign banks compete against domestic banks instead of engaging in collusion. Since foreign banks need to cover the costs of entry, they attract customers through decreasing interest margins, which leads to lower interest rates in the market, and as a result, the profit of domestic banks decrease (Bresnahan and Reiss, 1991; Clarke et al., 1999; Claessens et al., 2001; Wang, 2011;

[163] See Claessens and Laeven (2003), Yildirim and Philippatos (2007), and Jeon et al. (2010).

Xu, 2011). Even if there is no collusion among domestic banks, the impact of foreign banks on the profits of domestic banks may also depend on the number of foreign competitors or the amount of time foreign banks are present in the market (Calem, 1987; Cetorelli, 2002). However, the effect of foreign competitors on domestic banks` profits might be limited, because domestic banks may enjoy the advantage of early mover status which can arise from switching costs faced by costumers (Kerin et al., 1992; Berger and Dick, 2007). There is another strand of the literature, which argues that foreign banks can increase profits of domestic banks through an efficiency improvement channel though (Hermes and Lensink, 2001; Pohl, 2011; Xu, 2011). By considering this ongoing debate about the relationship between foreign banks and domestic bank performance, this chapter will examine whether foreign banks affected the profits of Imperial Ottoman Bank branches in the period 1895 to 1914.

In 1863, the Imperial Ottoman Bank was founded by a group of British and French financiers[164] (Clay, 1994; Clay, 2008; p. 109). Since there were not many European style financial banks[165] in the Ottoman Empire until 1900, the Imperial Ottoman Bank carried out the functions of a state (or central[166]) bank in the Ottoman Empire. For this reason, the relationship between the Imperial Ottoman Bank and the Ottoman state was strong. Furthermore, the Imperial Ottoman Bank enjoyed a monopoly position in commercial banking operations (Thobie, 1991; p. 407; Clay, 1994; Frangakis-Syrett, 1997; p. 268; Eldem, 2005; Autheman, 2008; pp. 104-6; Clay, 2008; p. 109). By 1900, the bank`s strong position started to decline due to the

[164] More than 80 percent of total assets were owned by French investors in the 1880s (Thobie, 1991; p. 413; Pamuk, 2000a; p. 221).
[165] By European style banks, I refer to modern commercial bank practices such as accepting deposits, money lending, money changing, and transferring funds in a more institutional setting.
[166] As in Tuncer (2012), central bank term refers to the central bank of issue, because the Imperial Ottoman Bank had the right to issue notes in addition to its commercial activities. According to Pamuk (2000a; p. 204) and Pamuk (2004a), it operated as a quasi-central bank for the Ottoman Empire. In my study the central bank term does not refer to the modern meaning of the term "central bank".

presence of foreign banks in the Ottoman Empire. Foreign banks offered more favourable interest rates to costumers than those of the Imperial Ottoman Bank (Thobie, 1991; pp. 424-5; Frangakis-Syrett, 1997; p. 272), and they competed against the Imperial Ottoman Bank by providing loans to the Ottoman state (Eldem, 1999a; p. 54; Kazgan, 1999; p. 319; Cottrell, 2008; p. 73). Therefore, in the 1900s the Imperial Ottoman Bank profits went down in some branches that were under competitive pressure due to the presence of foreign banks, as argued by Clay (1994). However, the effect of foreign bank presence on the Imperial Ottoman Bank profits is not a settled topic. Thobie (1991; p. 425) argues that the Imperial Ottoman Bank was in a better position than any of its competitors in terms of market power[167], and that there was no effect of foreign banks entering.

In this chapter, I examine the controversial arguments of Clay (1994) and Thobie (1991): whether the strong position of the Imperial Ottoman Bank was affected by foreign banks and analyse the impact of the foreign banks on profits of the Imperial Ottoman Bank. In order to shed light on the relationship between foreign banks and profits of the Imperial Ottoman Bank I use the historical data for profits of the Imperial Ottoman Bank branches and foreign bank branches operating in the Ottoman Empire from 1895 to 1914.

The results show that that foreign bank branches in a market were not associated with lower profits for Imperial Ottoman Bank branches in these areas. The non-effect does not go away at even high levels of foreign bank branch numbers. Since the historical literature argues that there was a positive relationship between foreign bank branches and competition in the domestic banking market, it is

[167] From Thobie (1991; p. 425), *"...the bank was in better position than any of its competitors, from 1905 onwards, to reduce the gap between interest owed and interest due, and between the purchase and sale prices of foreign exchange."*

important to note that this non-effect does not necessarily mean that foreign bank branches did not lead to an increase in competition in the respective market. I interpret this finding to mean that the positive effect of foreign competitors on efficiency cancelled out the negative effect of foreign competitors on profits, which is parallel to findings of the previous literature on banking[168]. The results imply that increasing competition might be positively associated with profits due to decreasing costs[169]. I cannot examine the effect of foreign bank branches on costs of the Imperial Ottoman Bank branches in the respective market due to data constraints, but these results are in line with the historical literature that show that increasing competition due to foreign banks enhanced efficiency of the Imperial Ottoman Bank, which could lead to lower costs in the respective markets[170] (Clay, 1994).

Additionally, my empirical results could be the results of an early mover advantage for the Imperial Ottoman Bank[171]. Due to this advantage, interest margins

---

[168] Lensink and Hermes (2004) find that foreign banks are not statistically related to profits of domestic banks as foreign banks have a negative effect on costs and interest margins of domestic banks. They conclude that increasing competition due to foreign banks force domestic banks to work more efficiently. The positive effect of foreign banks on efficiency cancels out the negative impact of foreign banks on profits of domestic banks.

[169] Claessens et al. (2001; p. 17): *"Foreign bank entry may force domestic bank managers to give up their sheltered 'quiet life' and to exert greater effort to reach cost efficiency."*

[170] Additionally, as foreign banks introduced new techniques and services in the Ottoman Empire (Frangakis-Syrett, 1997; pp. 271-2), the positive spill-over effects might lead to efficiency improvements, which resulted in lower costs of the Imperial Ottoman Bank branches in the respective market. However, the findings do not provide evidence that the positive effects of spill-overs on profits of the Imperial Ottoman Bank branches could be high in size.

[171] Unlike foreign banks in the sample, the Imperial Ottoman Bank had been operating for a long time in the Ottoman Empire. The historical literature shows that the bank might have an early mover advantage over later entrants (i.e. foreign banks) for several reasons. First, the Imperial Ottoman Bank gradually employed local non-Muslims after 1900s. Thanks to its non-Muslim personnel, the Imperial Ottoman Bank had a strong relationship with local costumers (Clay, 1994; Eldem, 1997; p. 263; Eldem, 1999b; pp. 426-8), who were more likely to be non-Muslims due to fact that industrial and financial sectors were dominated by non-Muslims in the Ottoman Empire after the 1830s (Clay, 1994; Frangakis-Syrett, 1999). On the contrary, foreign banks generally employed people from their home countries. For instance, Deutsche Orient Bank employed German people in the Ottoman Empire due to fact that transferring personnel from its competitors, employing local merchants or bankers might lead to insider trading (Cottrell, 2008, p. 73). In fact, the official language of the Imperial Ottoman Bank was French (Eldem, 1999b, p. 425). Furthermore, French was the language of business, finance, and trade in the Ottoman Empire. Accordingly, the Imperial Ottoman Bank could easily collect information about local customers and community in comparison to foreign banks (e.g. Deutsche Orient Bank), which had usually employed people from their home countries (Cottrell, 2008, pp. 73-74).

and, resultantly profits at Imperial Ottoman Bank branches might not be negatively affected by foreign bank branches in the respective markets[172]. This is because the Imperial Ottoman Bank branches might still have relatively strong market power. So, the negative effect of competition on profits could be easily mitigated by the positive effect of competition on efficiency, which is confirmed with insignificant coefficient estimates for the impact of foreign bank branches on profits of Imperial Ottoman Bank branches. Although data constraints do not allow me to test if there is an early mover advantage[173], the existence of such an advantage is in line with the historical literature (Thobie, 1991; p. 425).

The contributions of this study are three-fold: (i) it is the first study that uses a unique historical dataset to examine the banking sector in the Ottoman Empire, (ii) it represents the first attempt to undertake a comprehensive empirical test of the hypotheses on the Imperial Ottoman Bank and foreign bank entry into the Ottoman Empire, to the best of my knowledge, (iii) it contributes to the extensive empirical literature on the impact of foreign banks on the domestic banking sector by providing empirical evidence from history. Moreover, none of the previous studies on banking examines whether there is a change in the effect of foreign banks on domestic bank performance with the amount of time the foreign banks are present in a market; I will examine if the length of time a foreign bank has been present matters.

The rest of this chapter proceeds as follows: the next section reviews the previous literature, section 3.3 describes historical context of the Imperial Ottoman Bank and domestic banking sector in the Ottoman Empire, section 3.4 outlines the

[172] See Kerin et al. (1992) and Berger and Dick (2007).
[173] Berger and Dick (2007) provide evidence that an early entrant might have a higher market share due to its early mover advantages over later entrants in the banking market. So, subsequent profits of an early entrant might be high with later entrants.

hypotheses and corresponding predictions, section 3.5 provides information on the unique dataset and discusses the descriptive statistics, section 3.6 describes the empirical strategy to tackle these hypotheses, section 3.7 presents the empirical results and the robustness analysis, and section 3.8 concludes.

3.2 The Effect of Foreign Banks on Domestic Bank Performance: Theory and Evidence

In recent years, there has been an increasing interest among researchers about the effect of foreign banks on domestic bank performance. On the one hand, the economic literature on the banking market in the Ottoman Empire is scant and the research on the Imperial Ottoman Bank has been done primarily by historians. The literature will be briefly analyzed in Section 3.3. The literature on the banking market in the Ottoman Empire does not provide empirical evidence on different channels through which foreign banks could affect the Imperial Ottoman Bank performance. Furthermore, it is important to note that the effect of foreign banks on the Imperial Ottoman Bank performance in the scant literature is far from a settled topic[174]. Hence, it is essential to know the findings and arguments from the previous literature on the impact of foreign banks on domestic bank performance before developing hypotheses about how foreign banks affected the Imperial Ottoman Bank`s performance.

3.2.1 Theoretical Framework

A large body of literature argues that opening financial markets to foreign banks is an important factor to enhance competition (Claessens and Laeven, 2003; Yildirim and

[174] For instance, Clay (1994) argues that foreign banks led to a decrease in profits of the Imperial Ottoman Bank branches through increasing competition, contrary to the argument of Thobie (1991; p. 425). However, Clay (1994) states that foreign banks forced the Imperial Ottoman Bank to be more efficient, which may suggest a positive relationship between foreign banks and profits of the Imperial Ottoman Bank through an efficiency improvement channel.

Philippatos, 2007; Jeon et al., 2010) and to improve efficiency (Denizer, 2000; Claessens et al., 2001; Hermes and Lensink, 2001; Lensink and Hermes, 2004; Pohl, 2011; Xu, 2011) in domestic banking markets. First of all, foreign bank presence may be negatively related to the market power and shares of domestic banks through increasing competition, which could result in lower profits for domestic banks and better outcomes for costumers. Foreign banks try to attract customers through decreasing interest margins to cover fixed costs of entry. So, in the presence of foreign banks, collecting new deposits and giving credit gets more difficult for domestic banks. Consequently, domestic banks decrease their interest margins in order to protect their market share, which leads to lower profits (Bresnahan and Reiss, 1991; Clarke et al., 1999; Claessens et al., 2001; Cetorelli, 2002; Unite and Sullivan, 2003; Heffernan, 2005; p. 511; Wang, 2011; Xu, 2011).

On the other hand, there is another group of studies that do not link competition in the domestic banking market to the foreign banks in the short run. The literature on toehold entry captures the practical facts on this situation. Calem (1987) argues that if foreign banks are small in size, their only aim is to get a niche in the short run, which means that they do not directly compete against domestic banks before they have matured. This also explains the reason why domestic banks do not deter foreign banks from entering the market in the case of toehold entry. The foreign banks will compete against the domestic banks at some point after they have entered the market as they build their market share, which suggests that the effect of the foreign banks on profits of domestic banks may increase with the amount of time the foreign banks are present in the market (Easterbrook, 1949; Reid, 1995; Malueg and Schwartz, 1991; Biggs, 2002; Berger and Ostromogolsky, 2006).

Furthermore, market structure matters for the impact of foreign banks on domestic bank profits and competition in the domestic banking market. Freixas and Rochet (1997; p. 61), Cetorelli (2002), and Neuberger (2007) argue that in a monopoly setting, a domestic bank may charge higher interest rates on loans and keep the interest rate on deposits below what it would otherwise be under perfect competition. Similarly, domestic banks may collude with foreign banks to maximize joint monopoly profits. This would mean that domestic banks maintain higher profits under monopoly or effectively collusive oligopoly with foreign banks (Cetorelli, 2002; Bikker and Bos, 2004). Additionally, entry barriers —such as the sunk costs and institutional regulations— are positively related to profits of domestic banks through discouraging foreign bank entry which leads to an increase in concentration of the domestic banking market (Besley, 1994; Dell'Arricia and Marquez, 2004; Neuberger, 2007). Last, although profits of domestic banks might decrease due to foreign banks, subsequent profits of domestic banks might still be high due to an early mover advantage over foreign banks. This advantage can be attributed to switching costs faced by costumers or costs of collecting information about local customers and depositors. Because of this advantage, domestic banks might not suffer as badly as one would expect due to the entry of foreign banks (Kerin et al., 1992; Berger and Dick, 2007).

The more common belief is that since domestic banks do not modify their production levels as a consequence of foreign bank entry, interest margins and profits of domestic banks decrease as the number of foreign competitors increases, as would be expected under non-collusive oligopoly or Cournot models[175] (Bresnahan and Reiss, 1991; Cetorelli, 2002; Matthews and Thompson, 2008; p. 90). Additionally,

[175] in case of a downward sloping market demand.

domestic banks under monopolistic competition have some market power due to product differentiation, and as a result, they would enjoy higher profits in the short run which attracts a greater number of foreign banks. Due to low barriers to entry, there would be many foreign banks in the market over time, which would result in an increase of competition. Thus, interest margins and profits of domestic banks decrease in the long run (Heffernan, 1993, 2002; Freixas and Rochet, 1997; pp. 67-73; Matthews and Thompson, 2008; pp. 89-90, p. 179).

Finally, based on previous studies, foreign banks can be expected to decrease the profits of domestic banks through increasing competition as long as domestic banks do not perfectly collude with foreign competitors or foreign banks are large enough and there are little to no entry barriers. However, several other studies argue that the presence of foreign banks could be positively related to profits of domestic banks due to improved efficiency in the domestic banking market for several reasons. First, increasing competition due to foreign banks forces domestic banks to be more efficient, which leads to a decrease in costs of domestic banks. Second, foreign banks may lead to the positive spill-over effects through introducing techniques and services that are new to domestic banks. If domestic banks copy them, even a small number of foreign banks could lead to higher domestic bank profits because of improved efficiency in the domestic banking market which reduces costs of domestic banks (Hermes and Lensink, 2001; Lensink and Hermes, 2004; Schafer and Talavera, 2007; Xu, 2011).

3.2.2 Empirical Evidence

There is also a substantial amount of empirical evidence on the relationship between foreign banks and domestic bank performance[176], which can yield conflicting findings. Most papers in the previous literature find a negative impact of foreign banks on profits, interest margins, and costs of domestic banks, which arise from increasing competition and efficiency (Clarke et al., 1999; Denizer, 2000; Claessens et. al., 2001; Hermes and Lensink, 2001; Unite and Sullivan, 2003; Schafer and Talavera, 2007; Pohl, 2011; Xu, 2011). On the other hand, there is another strand of literature, which does not show a statistically significant relationship between foreign banks and profits of domestic banks if the positive effect of foreign banks on profits balances out negative effects (Hermes and Lensink, 2001; Lensink and Hermes, 2004). Finally, several papers find that foreign banks are positively related to costs, interest margins, and profits of domestic banks. By copying new techniques and services of foreign banks, the costs of domestic banks increase, and as a result, domestic banks increase their interest margins to finance their investments in techniques and services due to their market power (Hermes and Lensink, 2001; Hermes and Lensink, 2004; Lensink and Hermes, 2004; Xu, 2011).

One of the pioneering studies on the relationship between foreign banks and domestic bank performance is provided by Clarke et al. (1999). Clarke et al. (1999) analyse the effect of foreign banks on domestic bank performance in Argentina for the period 1995-1997. Clarke et al. (1999) find that foreign bank entry leads to a decrease in profits and interest margins of domestic banks through increasing

[176] Previous studies use a large set of measures of domestic bank performance, which are the shares of net interest margins, non-interest income, overhead costs, and profits in total assets of domestic banks. As a measure of foreign bank presence, they use the number of foreign banks, the share of foreign banks in total banks, and the share of foreign bank` assets in total assets.

competition only if foreign and domestic banks operate in same field. Also, Schafer and Talavera (2007) report a negative relationship between foreign bank presence and profits of domestic banks, using data on domestic banks in Ukraine for the period 2003-2005. Schafer and Talavera (2007) conclude that foreign banks increase competition in the domestic banking market.

Denizer (2000) carries out a similar analysis focusing on the Turkish banking system, using data for the period 1980-1997. Denizer (2000) finds that foreign bank entry is negatively associated with net interest margins and the profits of domestic banks. Denizer (2000) concludes that the presence of foreign banks is positively related to competition in the domestic banking market. Additionally, Denizer (2000) focuses on the effect of foreign banks on costs faced by domestic banks. Denizer (2000) provides evidence that foreign bank entry leads to a decrease in costs faced by domestic banks. Denizer (2000) interprets this finding to mean that increasing competition due to foreign banks forces domestic banks to operate more efficiently.

Claessens et al. (2001) provide a comprehensive study on the effect of foreign banks on the domestic banking market. Using data from both developing and developed countries, Claessens et al. (2001) examine the effect of foreign banks on domestic bank performance for the period 1988-1995. They use the share of foreign banks in total banks as a measure of foreign bank presence. Their results show that foreign bank entry is associated with decreasing profitability and non-interest income of domestic banks. Claessens et al. (2001) conclude that foreign banks are positively associated with competition in the domestic banking market. Claessens et al. (2001) also find a negative relationship between foreign bank entry and costs faced by domestic banks. They interpret this finding to mean that increasing competition might

force domestic banks to be more efficient. Additionally, foreign banks might lead to positive spill-over effects through introducing techniques and services which are new to domestic banks. Thus, foreign banks lead to efficiency improvements in the domestic banking market if domestic banks copy new techniques and services. Furthermore, to examine the manner in which foreign banks might affect domestic bank profits Claessens et al. (2001) use the share of the foreign banks` assets in total bank assets as an alternative definition of foreign bank presence. Claessens et al. (2001) do not find a statistically significant relationship between asset shares of foreign banks and domestic bank performance. Their interpretation is that competition in the domestic banking market depends on number of foreign banks rather than their asset shares or sizes.

In line with these papers, Unite and Sullivan (2003) show that foreign bank entry leads to a decrease in interest rate margins and profits of domestic banks, using data on domestic banks in Philippines from 1990 to 1998. Unite and Sullivan (2003) interpret this finding to mean that the presence of foreign banks is related to increasing competition in the domestic banking market. Also, Unite and Sullivan (2003) find that the costs faced by domestic banks are negatively associated with foreign bank entry. In line with Denizer (2000) and Claessens et al. (2001), Unite and Sullivan (2003) conclude that foreign banks compel domestic banks to work more efficiently through increasing competition in the domestic banking market.

Similarly, Pohl (2011) provides evidence that foreign bank entry is negatively related to interest margins of domestic banks, using data on domestic banks in sub-Saharan Africa for the period 1999-2006. Pohl (2011) concludes that presence of foreign banks leads to an increase in competition. Furthermore, Pohl (2011) finds a

negative impact of foreign bank entry on costs of domestic banks. In line with Claessens et al. (2001), Pohl (2011) interprets this finding to mean that as domestic banks copy new techniques and services of the foreign banks, positive spill-over effects lead to efficiency improvements, which result in decreasing costs faced by domestic banks.

Despite the results found in the studies listed above, some studies have found no effect of foreign banks on profits of domestic banks. Using data on domestic banks only from less developed countries, Hermes and Lensink (2001) do not find a statistically significant relationship between profits of domestic banks and foreign bank entry at low levels of foreign bank numbers. They also show that foreign bank entry leads to an increase in interest margins and costs of domestic banks at low levels of foreign bank numbers. Hermes and Lensink (2001) conclude that the positive effect of foreign banks on profits of domestic banks cancels out the negative effect of foreign banks on profits of domestic banks at low levels of foreign bank numbers. Hermes and Lensink (2001) argue that domestic banks make investments to copy new services and technologies of foreign banks. They then increase their interest margins to finance costs of copying new services and technologies, since they have market power at low levels of foreign bank numbers, which leads to an increase in profits of domestic banks. Furthermore, if there are not many foreign banks in the domestic banking market, the negative effect of competition on profits and interest margins of domestic banks is more likely to be modest in size. On the other hand, Hermes and Lensink (2001) show that foreign bank entry is negatively associated with profits, interest margins, and costs of domestic banks at high numbers of foreign banks. Their interpretation is that there is not enough market power of domestic banks to increase their interest margins if there are many foreign banks in the domestic

banking market, which results in decreasing of profits of domestic banks due to increasing competition. Additionally, many foreign banks force domestic banks to work more efficiently through increasing competition in the domestic banking market, which leads to lower costs faced by domestic banks at high numbers of foreign banks.

Contrary to the efficiency gains found above, Lensink and Hermes (2004) find that costs, profits, and interest margins of domestic banks are positively related to foreign banks in less financially developed countries. They use data for 990 banks in 48 countries for the period 1990-1996. Lensink and Hermes (2004) conclude that domestic banks in less financially developed countries make investments to copy new techniques and services of foreign banks, which results in increasing of costs faced by domestic banks. Furthermore, market power of domestic banks in less financially developed countries may let them increase their interest rate margins to finance costs of investments for new techniques. However, Lensink and Hermes (2004) show that profits of domestic banks are not statistically related to foreign banks in financially developed countries as the foreign banks are associated with decreasing of costs and interest margins for the domestic banks. Lensink and Hermes (2004) interpret this finding to mean that the positive effect of foreign banks on efficiency cancels out the negative effect of competition on profits of domestic banks in more financially developed countries. Lensink and Hermes (2004) argue that the positive effects of spill-overs on domestic bank performance in more financially developed countries are modest in size as there is a small gap between domestic and foreign banking techniques.

In line with Lensink and Hermes (2004), Hermes and Lensink (2004) provide evidence that costs, profits, and interest margins of domestic banks are positively associated with foreign banks in less financially developed countries by using the data of 982 banks in 48 countries from 1990 to 1996. Hermes and Lensink (2004) conclude that domestic banks might still have a relatively strong market power in less financially developed countries. Therefore, they increase their interest margins to finance costs in implementation of new techniques and services that are introduced by foreign banks.

A recent study by Xu (2011) also finds a positive relationship between foreign bank presence and costs of domestic banks. Xu (2011) uses data from 114 Chinese banks for the period 1999-2006. As in Lensink and Hermes (2004) and Hermes and Lensink (2004), Xu (2011) concludes that foreign banks lead to an increase in costs of domestic banks as domestic banks make investment to implement new services and technologies of foreign banks. In this sense, Xu (2011) argues that the presence of foreign banks is negatively related to costs faced by domestic banks through an efficiency improvement channel only in the long run. Different from Lensink and Hermes (2004) and Hermes and Lensink (2004), Xu (2011) shows that there is a negative impact of foreign banks on interest rate margins of domestic banks as foreign banks do not have a strong negative effect on profits of domestic banks. Xu (2011) interprets this finding to mean that presence of foreign banks is positively associated with competition in domestic banking market.

3.3 Historical Background: an Overview of the Ottoman Financial System

In the early nineteenth century, because the Ottoman economy remained primarily a traditional agricultural economy, European style banks did not develop enough.

Money lenders had conducted all financial transactions until the European banks entered into the Ottoman Empire. Even the Ottoman state obtained loans from the money lenders that were called Galata Bankers[177] in Istanbul on unfavourable terms (Toprak, 2008; p. 145). In this setting, the Imperial Ottoman Bank was founded by a group of the British[178] and French financiers in 1863. It opened branches in Salonika, Izmir, and Aydin in addition to its head office in Istanbul[179]. At the beginning, original shareholders had been British and French in equal proportions. However, it became a French bank over time (Thobie, 1991; p. 413; Clay, 1994; Autheman, 2002; pp. 39-45; Clay, 2008; p. 109).

The Imperial Ottoman Bank was multinational and had networks in both the London and Paris money markets. Also, it was the only corporate bank in the Ottoman Empire until 1888. Therefore, it provided loans to the Ottoman Treasury on more favourable terms than local money lenders (Thobie, 1991; p. 407; Clay, 1990; p. 142, p. 146; Autheman, 2002; p. 74; Clay, 2008; p. 109). There were also other operations done by the Imperial Ottoman Bank on behalf of the Ottoman state. These operations were transmission of tax revenues from the provinces to Istanbul, stabilizing the currency and exchange rates, and issuing notes (Eldem, 1997; p. 115-8; Frangakis-Syrett, 1997; pp. 268-9; Autheman, 2002; p. 82; Clay, 2008; p. 109). This relationship between the Ottoman state and the Imperial Ottoman Bank became even stronger when the Ottoman Empire went bankrupt in 1875. This is because some additional privileges such as controlling the budget, expenditures, and incomes of the Ottoman state were granted to the Imperial Ottoman Bank after bankruptcy.

[177] The Galata Bankers were generally Jews, Armenians, and Greeks that located in Galata in Istanbul (Toprak, 2008; p. 145).
[178] In 1856, British financiers founded the Ottoman Bank. The Ottoman Bank had several branches in London and the Near East. In 1863, British financiers transferred assets of the Ottoman Bank to the Imperial Ottoman Bank (Autheman, 2008; p. 98).
[179] See Table 3.1 which indicates the places where the Imperial Ottoman Bank opened branches in the Ottoman Empire with opening dates of the branches.

Additionally, it played a leading role in the establishment of the Ottoman Public Debt Administration in 1881 for managing old debts of the Ottoman state (Frangakis-Syrett, 1997; p. 268; Eldem, 2005).

The Imperial Ottoman Bank also promoted financial development in less developed regions at the request of the Ottoman Empire, by opening a number of branches in Edirne, Ruscuk, Bursa, and Damascus in 1875. Similarly, the Imperial Ottoman Bank had promoted economic development in the Ottoman Empire through financing infrastructure projects of the Ottoman state such as construction of a railway connecting Istanbul with Edirne (Baster, 1935; p. 101, Clay, 1994; Eldem, 2005; Autheman, 2008; pp. 104-6). Overall, due to these operations, the Imperial Ottoman Bank acted as a state (or central) bank for the Ottoman Empire (Clay, 1990; p. 142; Thobie, 1991; p. 407; Clay, 1994) and a very high proportion of its profits were obtained from operations with the Ottoman state for the majority of its existence[180] (Clay, 1994; Eldem, 1999b; pp. 291-2).

The Imperial Ottoman Bank increasingly became a commercial bank after 1890, which could be said to have occurred due to increasing competition from foreign banks. So, it began conducting an active commercial banking operation and its net profit from commercial banking operations became 50 percent of total profit in 1913 (Frangakis-Syrett, 1997; p. 271; Autheman, 2008; p. 101, pp. 103-6; Geyikdagi, 2011a; p. 101). The Imperial Ottoman Bank also opened new branches such as the Afyonkarahisar branch in addition to former branches[181] in the capitals of provinces, ports, and centres of international trade to make commercial profits. It is not

[180] Clay (1994) argues that only profits of Izmir, Aydin, Beirut, and Salonika branches were derived from commercial activities until the 1880s. On the contrary, profits of other branches such as Stamboul branch and head office in Istanbul were mainly obtained from operations with the Ottoman state.
[181] As shown in Table 3.1, the former branches were Izmir, Aydin, Beirut, and Salonika branches, which were established after 1862.

surprising that they were the most profitable branches of the Imperial Ottoman Bank (Eldem, 1999b; p. 91)[182].

At this point, it is important to note that many foreign banks entered into the Ottoman Empire after the 1890s. For instance, in 1899, the Deutsche Bank opened branches in Jerusalem, Jaffa, and Haifa. Similarly, in 1905, the Banque de Salonique, Bank of Athens, and the Banque d`Orient opened branches in Istanbul and Izmir. Additionally, in 1907, the Deutsche Palastina Bank and Banca di Roma set up branches in Beirut and Tripoli, respectively (Thobie, 1991; pp. 421-4; Frangakis-Syrett, 1997; pp. 269-70). As shown in Figure 3.1 and Table 3.2, the number of foreign bank branches increased from 16 in 1895 to 58 in 1914. On the contrary, there were only a few foreign banks operating in the Ottoman Empire in addition to the Imperial Ottoman Bank[183] by the 1900s. Its main competitor was Credit Lyonnais which had branches in Istanbul and Izmir in 1895. Also, some bankers —such as Engendi & Co., Siegfried Adler Gurundi & Co. and H. Heald & Co.— operated in Istanbul, Aleppo, and Bayreuth in 1895 (The Banking Almanac, 1895; Thobie, 1991; p. 421).

There were several reasons why foreign banks entered the Ottoman Empire. Thobie (1991; p. 421) and Cottrell (2008; pp. 71-2) argue that the economic recovery and the increase in international trade after 1899 led to an increase in the number of foreign banks. Another reason was that the major European powers[184] wanted to extend their economic and political control over the Ottoman Empire via their

[182] As shown in Table 3.9 of Appendix B, they were Stamboul, Izmir, Aleppo, Salonika, Aleppo, and Beirut branches. Between 1895 and 1914, their profits ranged from 13,494 to 5,489 gold liras, on average.
[183] Even the Imperial Ottoman Bank had only a few branches before 1900, as shown in Figure 3.2. After 1900, the number of the Imperial Ottoman Bank branches gradually increased to 63 in 1914 (The Banking Almanac, 1914).
[184] They were the UK, Germany, Russia, Italy, France, and Austria-Hungary.

investments[185] (Geyikdagi, 2011a; pp. 54-5). They often used banks for foreign policy purposes and to protect their positions in the Ottoman Empire. Thus, foreign bank entry into the Ottoman Empire was motivated by political reasons as well as financial ones (Baster, 1934). Additionally, foreign banks operated in the Ottoman Empire to support merchants and investors from their home countries[186]. For instance, the Deutsche Bank and the Deutsche Palastina Bank opened branches in Istanbul, Aleppo, Haifa, Jaffa, and Jerusalem to serve German merchants. Similarly, the Societa Commerciale d`Oriente set up a branch in Istanbul to serve Italian merchants[187] (Cottrell, 2008; p. 71, p. 75; Geyikdagi, 2011a; p. 104). Finally, the Ottoman state encouraged foreign bank entry in order to facilitate the availability of new financial resources (Eldem, 1999a; p. 54-5).

Over time, foreign banks gradually increased competition in the domestic banking market, which led to competitive pressure on the Imperial Ottoman Bank (Clay, 1994; Autheman, 2002; p. 181). First, they attracted costumers by offering competitive terms. For instance, German banks such as the Deutsche Bank offered credit to the entrepreneurs on more favourable rates than those of the Imperial Ottoman Bank (Thobie, 1991; pp. 424-5; Frangakis-Syrett, 1997; p. 272). Second, rather than the Imperial Ottoman Bank, foreign banks provided loans to the Ottoman State so it could finance infrastructure investments and wars (Eldem, 1999a; p. 54-5; Kazgan, 1999; p. 319; Cottrell, 2008; p. 73). For instance, out of thirty four loan

[185] From Illich (2007; p. 89), *"The combination of financial (banking and trade) and transportation (railroad and ports) monopolies in areas of the Ottoman Empire tended to facilitate the ability of individual powers to identify specific areas of the Ottoman Empire as imperial territory."*

[186] From Geyikdagi (2011a; p. 54), *"as the number of foreign investors increased, through a ripple effect there was a corresponding increase in the number of foreign banks and insurance companies to serve them."*

[187] Foreign banks also established financial groups for industrial investment with firms from their home countries. For instance, the Deutsche Bank and the National Bank of Turkey, which was a British bank, established these kinds of financial groups with firms from their home countries (Thobie, 1991; pp. 429-30).

operations between 1881 and 1914, German and French banks had managed fifteen loan operations[188] (Thobie, 1991; p. 413; Frangakis-Syrett, 1997; p. 270).

On the other hand, there is an additional channel through which foreign banks could affect the Imperial Ottoman Bank performance. First, foreign banks brought new financial services and technologies to the Ottoman Empire. So, foreign banks might increase efficiency in the domestic banking market, which might also help to decrease costs of the Imperial Ottoman Bank. For instance, German banks offered a new service to merchants from Germany involved in trade with the Ottoman Empire. After exporting goods to the Ottoman Empire, German merchants were able to discount their bills to their banks in Europe. When the bill matured in the bank, German banks collected the money from the Ottoman importers through their branches in the Ottoman Empire. Other banks that had operated in the Ottoman Empire also imitated this new service (Frangakis-Syrett, 1997; pp. 271-2). Second, increasing competition due to foreign bank entry forced the Imperial Ottoman Bank to be more efficient, and thus its financial administration focused on lowering expenses (Clay, 1994).

3.4 Hypotheses

Given the above brief summary on the Imperial Ottoman Bank and foreign bank entry, I proceed to construct hypotheses that incorporate empirical findings from previous literature and theoretical research results reviewed in Section 3.2 as well as relevant historical facts on the relationship between foreign banks and Imperial Ottoman Bank performance.

[188] The Imperial Ottoman Bank had managed nineteen loan operations (Thobie, 1991; p. 413).

The historical literature argues that foreign banks competed against the Imperial Ottoman Bank by offering competitive terms of contracts to costumers (Thobie, 1991; pp. 424-5; Frangakis-Syrett, 1997; p. 272). Moreover, Thobie (1991; pp. 424-5) argues that increasing competition forced the Imperial Ottoman Bank to follow interest rates set by foreign banks. For instance, after German banks had entered the Ottoman Empire in 1906, they offered 3.5 percent interest rate for deposits whereas the Imperial Ottoman Bank offered a 1 percent interest rate (Toprak, 2008; p. 158). By 1914 the Imperial Ottoman Bank had increased its interest rate for deposits; arguably due to the increasing presence of foreign banks (Eldem, 1997; p. 119 pp. 146-7; Eldem, 1999b; p. 277; Autheman, 2002; p. 181-2). Similarly, Clay (1994) indicates that increasing competition due to foreign banks led to a decrease in the interest rate on the Imperial Ottoman Bank`s advances. Consequently, profits of several branches of the Imperial Ottoman Bank decreased because of increasing competition. For instance, profits in Salonika branch were gradually decreasing from 9,484 British pounds in 1897-99 to 1,753 British pounds in 1909-11. Likewise, profits of branches in Izmir and Istanbul decreased after the 1900s. On the contrary, profits of branches that were not under competitive pressure increased (Clay, 1994). These historical facts lead to me hypothesis 1.

Hypothesis 1: *The Presence of foreign bank branches in a market reduced profits of the Imperial Ottoman Bank branch in the respective market.*

As shown in the previous studies on banking, Hypothesis 1 suggests that if foreign banks in a market had competed against an Imperial Ottoman Bank branch in the respective market instead of participating in collusion, then increasing competition in the market would decrease interest margins, which could lead to lower

profits for the Imperial Ottoman Bank branch as compared to other branches that were not under competitive pressure.

Additionally, the previous literature on toehold entry argues that the association between foreign banks and competition could increase at some point after foreign banks entered the market. This is because foreign banks are too small in size to directly compete against domestic banks before they have matured (Easterbrook, 1949; Calem, 1987; Reid, 1995; Malueg and Schwartz, 1991; Biggs, 2002; Berger and Ostromogolsky, 2006). Similarly, Frangakis-Syrett (1997; pp. 271-2), Cottrell (2008; pp. 71-75), and Geyikdagi (2011a; p. 104, 2011b) argue that the primary aim of foreign banks was to support their countries` entrepreneurs in the Ottoman Empire, and then to expand their activities. This leads me to the next hypothesis.

Hypothesis 2: *The impact of foreign bank branches on the profits of the Imperial Ottoman Bank branch in a market increased with the amount of time the foreign bank branches were present in the respective market.*

In hypothesis 1, I argue that foreign bank branches in a market competed against the Imperial Ottoman Bank branch in the respective market instead of engaging in collusion, which resulted in lower profits for the Imperial Ottoman Bank branch in the respective market. Furthermore, hypothesis 2 suggests that as foreign banks expanded their activities, they may have potentially attracted a higher number of costumers. Accordingly, the association between competition and foreign bank branches would be positively related to the amount of time the foreign bank branches were present in the respective market. This means that the effect of foreign bank branches on profits of the Imperial Ottoman Bank branch would increase at some point after they entered the respective market.

Claessens et al. (2001) provide evidence that competition in a market is positively related to the number of foreign banks in the respective market. So, as the number of foreign banks increases, interest margins and profits of domestic banks decrease, which would also be expected under Cournot models (Bresnahan and Reiss, 1991; Cetorelli, 2002; Coelho et al., 2007). Similarly, the historical literature argues that the competition in a market was positively associated with the number of foreign banks in the respective market. That is, places where the number of foreign bank branches increased gradually —such as Istanbul, Salonika, Izmir, and Beirut— were the ones that affected by the competition most (Clay, 1994; Autheman, 2002; p. 181). Based on the empirical findings of Claessens et al. (2001) and the historical fact, I purpose to test following hypothesis.

Hypothesis 3: *As the number of foreign bank branches increased in a market, the profits of the Imperial Ottoman Bank branch in the respective market decreased.*

Hypothesis 3 examines whether the number of foreign bank branches in a market mattered. With more foreign banks present, competition may have been fierce resulting in lower interest margins and profits for the Imperial Ottoman Bank branch in the respective market. Under hypothesis 3, if there had not been many foreign bank branches in a market, then the effect of foreign bank branches on profits of the Imperial Ottoman Bank branch in the respective market would be modest in size, as backed by the historical literature. Moreover, this suggests that there might be a difference in the effect of different numbers of foreign bank branches on profits of the Imperial Ottoman Bank branch in the respective market.

3.5 Data

To examine the effect of foreign bank branches on profits of the Imperial Ottoman Bank branch in the respective markets, I collect data from several sources. Following the previous literature on the impact of foreign banks on domestic bank performance, I construct a variable reflecting performance of the Imperial Ottoman Bank branches[189]. I use the before tax profits for 64 branches of the Imperial Ottoman Bank for the period 1895-1914 and all values are expressed in gold liras[190]. These branches operated in 64 counties[191] of 27 provinces[192] within the borders of the Ottoman Empire in a given year, as shown in Figure 3.3. This is the only available information

[189] The previous studies on the impact of foreign banks use many variables to examine the impact of foreign banks on domestic bank performance such as the shares of net interest margins and before tax profits to total assets.

[190] The Ottoman lira was the currency of Ottoman Empire from 1844 to 1923. After 1844, the Ottoman lira was tied to gold, i.e. gold lira (Inalcik and Quataert, 1996; p. 971)

[191] For administrative purposes, the Ottoman Empire was divided in several administrative units. The largest unit was generally province (known as vilayet), which were composed of counties (known as sancaks). Counties were again subdivided in judicial districts (known as kazas) (Karpat, 1985; p. 148). English translations of terms on administrative division of the Ottoman Empire (i.e.vilayet, sancak, and kaza) are borrowed from Karpat (1985; p. 151, p. 189). In the Ottoman Empire, provinces were divided in counties, one of which had the same name as the provinces. The counties were generally again subdivided in judicial districts, one of which had the same name as the county and the province in question. For instance, Konya was a judicial district in Konya county of Konya province. So, many branches of the Imperial Ottoman Bank were located in a judicial district of a county in a province. For instance, there was a branch of the Imperial Ottoman Bank which operated in Konya judicial district of Konya county in Konya province. On the other hand, several provinces had no judicial district with the same name as the county and the province in question. For instance, Edirne was a county in Edirne province. However, in the Edirne province and county, there was no judicial district which was named as Edirne. Accordingly, several branches of the Imperial Ottoman Bank were located in a county of a province. For instance, there was a branch of the Imperial Ottoman Bank, which Eldem (1999b) says that it operated in Edirne. This branch was located in Edirne county of Edirne province. This is because in the Edirne county and province there was no judicial district which was named as Edirne. Hereafter, the term *"county"* also refers to the term "*judicial district*".

[192] In this chapter, the administrative division of the Ottoman Empire is based on Karpat (1985: p. 150, p. 155, p. 190) to maintain consistency in province and county borders as there were changes in borders of the administrative units due to administrative reasons. In Karpat (1985), the Ottoman Empire was divided in the 34 largest administrative units. They were special districts (e.g. Izmit and Catalca Special Districts), provinces (e.g. Aydin province), a county (i.e. Zor Sancak), and capital city of the Empire (i.e. Istanbul). Like provinces, special districts, Zor county and capital city had judicial districts (Karpat, 1985; pp. 122-51). In this study, the special districts, Zor county, and the capital city are considered provinces. Finally, the Imperial Ottoman Bank did not open branches in several provinces such as Zor and Catalca provinces.

for performance indicators of the Imperial Ottoman Bank branches[193] and come from Eldem (1999b; pp. 510-2).

In previous literature on the effect of foreign banks on domestic bank performance, profits of domestic banks are used after dividing by total assets of domestic banks. There is no available data for assets of the Imperial Ottoman Bank branches. However, all values in Eldem (1999b) are expressed in gold liras and prices remained stable between 1844 and 1914 because of the gold standard[194] (Pamuk, 2004b; Tuncer, 2012). So, profit data in my study are treated as constant prices[195].

Although the before tax profit data are available for 78 branches of the Imperial Ottoman Bank for the period 1895-1914, my final sample only contains 64 branches of the Imperial Ottoman Bank which were located in 27 provinces from 1895 to 1914 for three reasons. First, I use the logarithm of profit in the Imperial Ottoman Bank branches as the dependent variable ($\log(G)$) in my econometric models[196]. Under this transformation, negative values have to be dropped. So, the final sample does not contain several branches —such as Bitlis and Bolu branches— that only reported losses. Second, due to missing values for a control variable (i.e.

[193] The sample does not include profits of the head office of the Imperial Ottoman Bank in Galata (Istanbul). A very high proportion of profits of head office were obtained from operations with the Ottoman state (Eldem, 1999b; p. 291). It seems that profits of branches in the sample were mainly derived from commercial activities. One exception could be Stamboul branch.

[194] Also, the metal content of Ottoman lira did not change between 1844 and 1923, because the Ottoman state did not debase lira (Inalcik and Quataert, 1996; p. 971).

[195] As shown in Table 3.11, the results do not change when I re-estimate regressions after profits are deflated by the Istanbul consumer price index (See column (4) of Tables 3.4, 3.6, and 3.7). The data for price index of Istanbul come from Pamuk (2000b; p. 18). To best of my knowledge, there are not available price indices for all places where the Imperial Ottoman Bank branches operated, as prices in Istanbul might not be same in there over the sample period.

[196] It seems that taking logarithm of the profits in the Imperial Ottoman Bank branches is superior to using level of the profits as dependent variable for two reasons. First, the log makes the estimates less sensitive to extreme observations on the profits. Second, classical linear model (CLM) assumptions such as homoskedasticity and no serial correlation are likely to hold after taking logarithm of the profits (Wooldridge, 2009; p. 184). I re-estimate regressions using level of profits in the Imperial Ottoman Bank branches. The findings are presented in columns (1)-(3) of Table 3.10. This leads to an increase in sample size to 704. The results show a statistically significant impact of three and more than three foreign bank branches. So, the findings are little sensitive to using different form of dependent variable.

population), some observations are dropped. Last, since there is no available data for foreign bank branches operated in Cyprus, which was part of the Ottoman Empire before 1908 (Figure 3.3), my sample does not contain the three branches that were located in Cyprus (i.e. Larnaka, Limassol, and Nicosia branches).

The sample comprises of an unbalanced panel[197] with 623 branch-year level observations for four reasons. First, branches of the Imperial Ottoman Bank were opened in different years (Table 3.1). Additionally, some of Imperial Ottoman Bank branches were closed after operating several years. Second, the Ottoman Empire lost some of its territories in Rumelia[198] and North Africa after 1910. So, several branches —such as Monastir, Tripoli of Libya, Rhodes, and Skopje branches— which operated in these territories were not within the border of Ottoman Empire after 1910 (Figure 3.3). Third, some of the Imperial Ottoman Bank branches such as Aydin branch reported losses in several years. Last, in several years, there is no information for profits of Nazilli and Bassorah branches in available sources although they were still operating[199].

To examine the effect of foreign bank branch presence on profits of the Imperial Ottoman Bank branches in the respective market, I use a dummy variable (*F*) for foreign bank branch presence in a county where there was a branch of the Imperial Ottoman Bank for the period 1895-1914[200]. Additionally, to investigate the relationship between number of foreign bank branches and profits of the Imperial

[197] I estimate regressions using a balanced sub-sample of my data, which leads to a substantial drop in the number of observations (about 45 percent). On the other hand, the results are not sensitive to using the sub-sample of my data.
[198] It refers the lands of the Ottoman Empire in the Europe.
[199] The data do not appear to be randomly missing. However, in my sample, there are only 5 missing observations. Furthermore, missing values are more likely to be due to reporting issues.
[200] As a measure of foreign bank presence, the share of foreign banks in total banks, and the share of foreign bank`s assets in total assets are also used in the previous literature on the impact of foreign banks on domestic bank performance. On the other hand, there is no available data for other domestic banks which operated in the Ottoman Empire and assets of the Imperial Ottoman Bank branches.

Ottoman Bank branches in the respective market, I use dummy variables (D) for the number of foreign bank branches in the county in a given year. The data for foreign bank branches are extracted from *the Banking Almanac*, which was a specialized journal published by Waterlow and Sons since 1844. *The Banking Almanac* was published annually and contained detailed information on British and foreign banks —such as German, French, Italian, Russian banks— operating outside the UK. Based on such information, the data for foreign bank branches provides detailed information on foreign bank branches operating in the county within the border of the Ottoman Empire even before 1895. I only use data for the period 1895-1914, similar to the data range for dependent variable ($\log(G)$). The data also contain detailed information on how many foreign bank branches operated in the county in a given year. Some of foreign banks are as follows: The Deutsche Bank, Deutsche Palestine Bank, Banca Di Roma, Banque de Salonique, Thomas Cook and Sons, Credit Lyonnais, A. E. Wasserman, E. U. Engendi, H. Heald & Co., Sarkis Gulbenkian, and Stephen Lynch & Cie..

I also construct several control variables from other historical data sources to use in the regression analysis. The first control variable is the distance from each branch of the Imperial Ottoman Bank to the nearest rail track in a given year (R)[201]. The layout of the railway lines in the Ottoman Empire is not available in digital format. However, several sources —such as Kolars and Malin (1970), Karkar (1972; pp. 64-76), Schoenberg (1977), Engin (1993), Eldem (1994; p. 104), and Geyikdagi (2011a; pp. 88-9, 2011b)— provide detailed information on establishment and

[201] Previous studies for the impact of railroads on economic and demographic outcomes in a country use several variables. For instance, they use a dummy variable for railroad presence in a place (district, county, province, and state). Also, they control for distance between the place and nearest rail line. Since there was not a branch of the Imperial Ottoman Bank which had direct access to railroads, to best of my knowledge, I use the distance between each branch and the nearest rail line in a given year, following Banerjee et al. (2009). Another reason is that preliminary nature of my database on county borders.

opening dates of railroad lines, location of each station, where construction of each line was planned, which places had access to railroads in a given year. Additionally, there are many railway network maps in these resources. Using ArcGIS software and the information on railroad networks in the Ottoman Empire, I create a detailed railroad network map of the Ottoman Empire[202]. The map gives detailed information on the development of railroad networks year by year and place by place. Next, I compute the nearest distance from each branch to the railroads using ArcGIS software. On the other hand, there is no information on addresses of the Imperial Ottoman Bank branches in a county. Instead, I use the distance from the county centre to the nearest railroad line. The branches of the Imperial Ottoman Bank were more likely to be in the county centre. So, it seems that this variable is a good proxy for the proximity of each branch to the railroad lines. Another thing worth mentioning is that since there is no reliable data for road networks in the Ottoman Empire, I use geographic distance rather than travel distance measured as kilometres[203]. Finally, the first railroad line in the Ottoman Empire began to be built in 1856. Between 1856 and 1914, the Ottoman railroad networks were gradually extended from Balkans to Hejaz with new tracks, as shown in Figure 3.5 (Issawi, 1980; p. 183; Geyikdagi, 2011a; pp. 88-9). For this reason, this variable is a time-varying measure of distance to the railroads.

The second control variable is the shortest distance from each branch of the Imperial Ottoman Bank to the caravan and trade routes (T). A possible challenge is that there is no available digital map of the caravan and trade routes in the Ottoman Empire. On the other hand, Karkar (1972; pp. 15-8), Inalcik and Quataert (1996; pp.

[202] See Figure 3.4 in Appendix A.
[203] Another reason is the lack of reliable and detailed maps on physical geography of several parts of the Ottoman Empire (i.e. the Arab provinces of the Ottoman Empire).

698-708, p. 775), and Owen (2002; p. 48) provide detailed information on start and end points of the caravan and trade routes which were in use for carrying of people and goods. Also, Owen (2002; p. 48) contains a map of the caravan and trade routes, which identifies various links among places along caravan and trade routes in the Ottoman Empire, as shown in Figure 3.6. Using ArcGIS software and historical data on the caravan and trade routes, I construct a map of the caravan and trade routes in the Ottoman Empire, which provides detailed information on a network of trade and caravan routes connecting various locations[204]. Next, the minimum distance from each branch to the caravan and trade routes is computed by ArcGIS software. Due to data constraints, I use the distance from the county centre to the nearest caravan and trade route, as previously. Furthermore, I use geographic distance as kilometres. As shown in Figure 3.6, several places along the caravan and trade routes were Edirne, Istanbul, Bursa, Izmir, Tokat, Konya, Trabzon, Erzurum, Aleppo, Mosul, Beirut, Damascus, and Baghdad.

Finally, to control for the market size, I use total population of each province in 1893 (P)[205]. I do not have population figures for all years between 1895 and 1914. The Ottoman province-level population data come from 1881/82-93 census[206], which is available in Karpat (1985; pp. 122-48). The data give detailed information on the

[204] When the sources do not provide information for all places that caravan and trade routes passed through, I put a straight line between start and end points of caravan and trade routes in question due to the lack of reliable data on road networks in the Ottoman Empire.
[205] There is no available data for other proxies of the market size such as income. Also, population data are only available at province level for several places where the Imperial Ottoman Bank branches operated such as Ceyhan. Finally, I re-estimate regressions after inclusion of population density instead of population in provinces which does not make a difference in the results. Data for the area of provinces in square kilometres come from Eldem (1994; pp. 12-3).
[206] The 1881/82-93 census was submitted to the Sultan in 1893 as it was undertaken since 1881. So, it covers a period of 13 years and it is not possible to know when it exactly ended (Karpat, 1985; pp. 30-6). On the other hand, historical literature shows that the population figures of the 1881/82-93 census can be used as a good indicator of the total number of people which lived in each province in 1893 (Dolek, 2007; p. 16). One concern with population data is that the female population was neglected in some of provinces (e.g. Musul and Basra provinces). On the other hand, the findings are robust to exclusion of these provinces from the analysis.

total numbers of people which lived in each province in 1893. On the other hand, the 1881/82-93 census does not provide detailed information on population of Hicaz, Yemen, and Trablusgrap provinces. So, my final sample does not include profits of branches which operated in these provinces[207].

Table 3.3 provides summary statistics of the variable in my sample. The average before tax profit of the Imperial Ottoman Bank branches was 3,284 gold liras. On average, there was only one foreign bank branch in the county. On average, a foreign bank branch was 114 km away from the caravan and trade routes and 115 km from a railroad line. Lastly, the average number of individual residents in each province was 775,853.

As shown in Table 3.9 of Appendix B, in my sample Stamboul, Izmir, Aleppo, Salonika, Aleppo, and Beirut branches were the most profitable branches of the Imperial Ottoman Bank between 1895 and 1914. Their profits were between 13,494 and 5,489 gold liras, on average. The least profitable branches of the Imperial were Sandikli, Diyarbekir, Van, Serres, and Urfa branches. Their profits ranged from 330 to 91 gold liras, on average.

Additionally, using the data from *the Banking Almanac*, it is possible to map out the timing and location of arrival for foreign bank branches. Table 3.2 shows the number of foreign bank branches by place and year from 1895 to 1914. Columns (1) and (2) show the counties and provinces where foreign bank branches and the Imperial Ottoman Bank branches operated for the period 1895-1914. Last row of the Table 3.2 suggests that the number of foreign bank branches within the Ottoman

[207] As a robustness test for the results, regressions are estimated without *P*, which leads to an increase in sample size to 631 due to inclusion of profits of three branches that are dropped. The results do not change in terms of statistical significance.

Empire increased from 16 in 1895 to 58 in 1914. This implies that the number of foreign banks in the Ottoman Empire increased significantly between 1895 and 1914. The substantial increase in the overall number of foreign bank branches in the Ottoman Empire occurred after 1902. As can be quickly seen in Table 3.2, on average, twenty-eight counties including some of urban areas such as Jeruselam, Jaffa, Adana, and Bursa counties received their first foreign bank branch after 1902. On the other hand, many counties in the sample such as Mossul county did not have any foreign bank opened in its area between 1895 and 1914. Last, Table 3.2 highlights that there were excessive numbers of foreign bank branches in very large urban centres[208] such as Aleppo, Beirut, Izmir, and Salonika counties.

3.6 Empirical Approach

In this section, I present the empirical models I will use to examine the effects of foreign bank branches on profits of the Imperial Ottoman Bank. In the first hypothesis, foreign bank branch presence in a market is expected to decrease profits of the Imperial Ottoman Bank branch in the some market. In order to test this hypothesis, I run the following regression:

$$\log(G_{icpt}) = \beta_0 + \beta_1 F_{icpt} + \beta_2 \log(R_{icpt}) + \beta_3 \log(T_{icp}) \times \gamma_t + \beta_4 \log(P_p) \times \gamma_t + \rho_i + u_{icpt} \quad (3.1)$$

where i, c, p, and t index branch, county, province, and year, respectively. The dependent variable is $\log(G_{icpt})$, which is the logarithm of the branch level profits of the Imperial Ottoman Bank branch i, located in county c of province p, in year t.

[208] There was an absence of definition of urban and rural areas in available resources on the Ottoman Empire, to best of my knowledge. As a robustness check of the results, I re-estimate regressions without places whose population was smaller than population mean (i.e. 775,853) which does not make a difference in the results.

Following Chakrabarti and Roy (2011)[209], F_{icpt} is a dummy variable which equals 1 if there was at least one foreign bank branch operating where the Imperial Ottoman Bank branch *i* operated in year *t*, and zero otherwise. In order to mitigate concerns of bias due to omitted variables, three control variables are included: $\log(R_{icp})$ is logarithm of the distance between each branch and railroads in year *t*; $\log(T_{icp})$ is logarithm of the distance between each branch and caravan and trade routes; $\log(P_p)$ refers to logarithm of total population at province level in 1893[210]. Furthermore, in order to allow areas with different initial characteristics (such as market size, financial development) to have different time trends, I use the interaction of $\log(T_{icp})$ and $\log(P_p)$ with year dummies (y_t). p_i is branch fixed effects to control for time-invariant branch characteristics (e.g. location, size, funding structure, strategies). Finally, while u_{icpt} is the error term[211], coefficient of interest is β_1.

A negative coefficient estimate of β_1 provides supportive evidence for the hypothesis 1. Because a negative estimate shows that where there was a foreign bank branch presence profits of domestic bank decreased. However if there is a positive coefficient estimate of β_1, that would indicate that foreign bank branches had a positive effect on profits of operating branches in the respective market, which could arise from positive spill-over effects[212]. Finally, foreign branch presence might not be

[209] In order to investigate the impact of charter schools on private school enrolment in Michigan, Chakrabarti and Roy (2011) use a dummy variable for charter school presence in Michigan.

[210] I use logarithm of R_{icpt}, T_{icpt}, and P_p instead of their level following previous studies. Another reason is that taking logarithm of them might make the estimates less sensitive to extreme observations (Wooldridge, 2009; p. 184). Finally, since there are zero values in R_{icpt} and T_{icpt}, I add one to each observation before taking logarithm of them.

[211] Following Angrist and Pischke (2008; p. 319), standard errors are clustered at the highest level (i.e. province). Since the Imperial Ottoman Bank branches in the sample were located in 27 provinces, number of clusters is not large. So, the standard errors can be downward biased. On the other hand, the findings are robust to using bootstrap-t procedure, which is suggested by Cameron et al. (2008) to reduce bias in the standard errors when number of clusters is few.

[212] Foreign banks introduced new financial services and technologies to the Ottoman Empire (Frangakis-Syrett, 1997; pp. 271-2). Accordingly, this historical fact reveals a possibility that foreign bank branches might increase profits of the Imperial Ottoman Bank branch through decreasing costs in

related to lower or higher profits of operating branch in the respective market, which implies β_1=0. This can be due to collusion or efficiency improvements which could balance out away the negative impact of competition on profits[213].

The previous studies on the relationship between foreign banks and domestic bank performance use several control variables such as the shares of short and long term deposits, securities holding, and operating expenses in total assets[214]. Due to lack of available data on these variables for the Ottoman Empire, the regression does not include many control variables[215], which can result in omitted variable bias. Instead, since railroads, caravan and trade routes, and population might be related to both profits and foreign bank branches, I use log(R_{icpt}), log(T_{icp}), and log(P_p) as control variables along with branch fixed effects in my estimations, which can capture omitted factors.

Atack et al. (2009) and Banerjee et al. (2009) argue that railroads might decrease transportation costs, which leads to higher trade, production, and financial

---

the respective market, which arose from positive spill-over effects (Hermes and Lensink, 2001; Xu, 2011).

[213] The historical literature argues that foreign bank entry led to an increase in competition. So, increasing competition due to foreign banks compelled Imperial Ottoman Bank branches to operate more efficiently in the respective market (Clay, 1994). This means that increasing competition due to foreign bank branches might increase profits through decreasing costs in the respective market. Additionally, spill-over effects might lead to efficiency improvements in the respective market (Frangakis-Syrett, 1997; pp. 271-2). So, the negative effect of competition on profits might be mitigated by the positive effect of efficiency improvements on profits (Hermes and Lensink, 2001; Lensink and Hermes, 2004).

[214] Some bank-specific and branch-specific control variables are shares of the short and long term deposits, book value of equity, securities holding, and operating expenses in total assets. The macroeconomic control variables are GDP growth, GDP per capita, annual inflation rate, and real interest rate (Claessens et al., 2001; Lensink and Hermes, 2004; Xu, 2011).

[215] GDP and population data for the Ottoman Empire are available in Eldem (1994; p. 14, pp. 230-31) and Behar (1996; pp. 51-6). However, there are many missing observations in the data. Following Kalemli-Ozcan and Nikolsko-Rzhevskyy (2009), I extrapolate missing values under the assumption of constant growth using the average annual growth rate of the years for which GDP and population data are available. Based on this extrapolated data, I calculate GDP per capita and GDP growth. I again estimate regressions using GDP per capita or GDP growth, as in Claessens et al. (2001) and Xu (2011). This does not make any difference to the results. Furthermore, the results provide no evidence that profits of an Imperial Ottoman Bank branch were associated with GDP per capita as GDP growth is omitted, because it does not change much over time.

development due to easy access to financial services. Karkar (1972; p. 80-1), Clay (1994), Eldem (1994; p. 94), and Inalcik and Quataert (1996; p. 813) argue that, in the Ottoman Empire, there was a substantial increase in population, agricultural production, and trade in places which gained access to railroads as compared to other places. Accordingly, $\log(R_{icpt})$ might lead to an increase in profits of the Imperial Ottoman Bank branches through promoting economic activity and development in the respective market, which would lead to an estimate of $\beta_2<0$.

In addition to $\log(R_{icpt})$, following Lensink and Hermes (2004), and Flamini et al. (2009) I use $\log(T_{icp})$ in order to control for the effect of different levels of economic and financial development. Commercial, production and financial activities were concentrated in places along caravan and trade routes, as shown in Figure 3.6. Accordingly, a significant demand for banking services was present in the places along caravan and trade routes in comparison to other places (Schoenberg, 1977; Clay, 1994). Thus, as expected the most profitable branches of the Imperial Ottoman Bank were located in places along caravan and trade routes (Eldem, 1999b; pp. 291-2), which would imply a negative β_3.

The previous studies on the impact of bank entry on profits of domestic banks also control for market size, which can be measured by population as well as other variables such as income or GDP. Coelho et al. (2007) and Cohen and Mazzeo (2007) provide evidence that market size is positively associated with profits of banks through increasing demand for their services. Also, Amel and Liang (1997), and Berger et al. (2004) show that market size is positively related to the probability of entry and number of entrants in a market. In this sense, there may be many foreign bank branches in places where market size is large. At the same time, profits of the

Imperial Ottoman Bank branches might be high in these places. Due to current data availability, I use population of each province in 1893, $\log(P_p)$, which allows me to control for market size. If β_4 is positive, this suggests that there was a positive relationship between market size and profits of the Imperial Ottoman Bank branch in the respective market.

Finally, p_i are branch fixed effects. As in Xu (2011) and Cull (2012), branch fixed effects account for time-invariant branch characteristics such as branch size, location, funding structure, and strategies, which could affect performance of the Imperial Ottoman Bank branches in the respective markets. Additionally, I use the interaction of $\log(T_{icp})$ and $\log(P_p)$ with year fixed effects, y_t, which control for time-varying effects of different initial characteristics (e.g. market size, economic and financial development) on profits of the Imperial Ottoman Bank branches. This is because economic and financial characteristics might have lead to differential trends for profits of the Imperial Ottoman Bank branches.

In hypothesis 2, I argue that the effect of foreign bank branches on profits of an Imperial Ottoman Bank branch in a market was positively associated with the amount of time a foreign bank branch was present in a respective market. Equation (3.1) does not allow us to test the second hypothesis. I modify equation (3.1) following Chakrabarti and Roy (2011)[216] by adding the interaction of F_{icpt} with time trend ($Trend_{it}$):

$$\log(G_{icpt}) = \beta_0 + \beta_1 F_{icpt} + \beta_2 F_{icpt} \times Trend_{it} + \beta_4 \log(R_{icp}) + \beta_5 \log(T_{icp}) \times \gamma_t + \beta_6 \log(P_j) \times \gamma_t + \rho_i + u_{icpt}$$

(3.2)

[216] Chakrabarti and Roy (2011) use interaction of time trend with a dummy variable for charter school presence in Michigan to examine whether the impact of charter school competition on enrolment in private schools increase over time.

where $Trend_{it}$ starts when the Imperial Ottoman Bank branch i was affected by at least one foreign bank branch in year t[217]. Here, β_1 and β_2 indicate any intercept and trend shifts in profits of the Imperial Ottoman Bank branch i, located in county c of province p in year t ($\log(G_{icpt})$) due to foreign bank branches. They together show the effect of foreign bank branches on profits of an Imperial Ottoman Bank branch in the respective market. In particular, β_2 is the coefficient of interest for testing the second hypothesis.

Foreign bank branches (F_{icpt}) in a market might lead to lower profits of an Imperial Ottoman Bank branch in the respective market through increasing competition, which implies $\beta_1<0$. Additionally, if foreign banks attracted a higher number of costumers over time as they matured and built their market share[218], then there is evidence supporting hypothesis 2. That is $\beta_2<0$. On the contrary, if β_2 is positive, this suggests that the effect of foreign branch presence on profits decreased with the amount of time the foreign bank branch was present in the respective market, which could be due to spill-over effects. Several studies on the impact of foreign banks on profits of domestic banks argue that the positive spill-over effects due to technology transfer are expected to increase profits of domestic banks in the long

[217] As in Chakrabarti and Roy (2011), I use a linear time trend ($Trend_{it}$) to test whether the effect of foreign banks on profits of the Imperial Ottoman Bank branches had increased at some point after the foreign banks entered the market. Previous literature on toehold entry does not provide detailed information on the fact that there could be increasing effect of foreign banks over time. On the other hand, to allow for a non-linear time trend, I estimate equation (3.2) with dummies for $Trend_{it}$. The results indicate no evidence on the fact that effect of foreign banks changed at different years. Moreover, the coefficient estimates for regressors of interest are similar in statistical significance. In end, due to small sample size issues, I use $Trend_{it}$.

[218] De Young and Hassan (1998) provide evidence that new foreign banks can mature after nine years. So, a potential concern with specification (3.2) is that some of the foreign banks in my sample had already matured in 1895. On the other hand, in 1895, there were not many foreign banks which operated for more than nine years. For instance, only 5 of 16 foreign banks that operated in 1895 existed in the market in 1883. Additionally, activities of them, even those of Credit Lyonnais which was one of the important competitors of the Imperial Ottoman Bank, were limited to several cities even in 1895 (Cottrell, 2008; pp. 66-71). This suggests that most of the foreign banks in my sample might not be mature even in 1895. So, specification (3.2) can be used to test the hypothesis 2.

run[219]. So, the positive effects of spill-overs on profits of an Imperial Ottoman Bank branch might dominate the negative impact of competition on its profits over time.

Finally, in the third hypothesis I argue that an increase in the number of foreign bank branches in a market led to a decrease in profits of an Imperial Ottoman Bank branch in a respective market. To test this hypothesis, I run following regression[220], which also allows me to examine the different effects of foreign bank branches at different numbers of foreign competitors in a market:

$$\log(G_{icpt}) = \beta_0 + \beta_1 F_{icpt} + \sum_{m=2}^{3} \beta_m D_m + \beta_5 \log(R_{icpt}) + \beta_6 \log(T_{icp}) \times \gamma_t + \beta_7 \log(P_p) \times \gamma_t + \rho_i + u_{icpt}$$

(3.3)

where D_m are dummies for the number of bank branches in a place where the Imperial Ottoman Bank branch i operated in year t. D_m takes 1, if there was m[221] foreign bank branches in a location of an Imperial Ottoman Bank branch i in year t, and zero otherwise. As I control for F_{icpt}, β_m is the difference in logarithm of the profits in Imperial Ottoman Bank branch i ($\log(G_{icpt})$) between in a place that was affected by m foreign bank branches and in a place that was affected by one foreign bank branch[222]. So, β_2 is the difference in $\log(G_{icpt})$ between a place that was affected by two foreign bank branches and a place that was affected by one foreign bank branch; and β_3 is how much less $\log(G_{icpt})$ would be in a place that had three or more foreign

[219] Xu (2011) shows that since domestic banks spend more money to implement new services and techniques of foreign banks, foreign banks lead to an increase in costs of domestic banks. So, Xu (2011) argues that copying new services and techniques of foreign banks can be related to increasing profits of domestic banks through efficiency improvements only in the long run.

[220] I use a similar methodology in Coelho et al. (2007), which use dummy variables for number of competing private banks in a market in order to examine the effect of private banks on profits of public banks.

[221] m is bigger than 1.

[222] The omitted category (i.e. base group) here is that the number of foreign bank branches in a place equals 1.

bank branches compared with a place that had one foreign bank branch. As before, β_1 is the difference in log(G_{icpt}) between a place that was affected by at least one foreign bank branch and a place that was not affected by foreign bank branches.

A negative coefficient estimate for β_1 implies that foreign banks branches were negatively related to profits of an Imperial Ottoman Bank branch through increasing competition in the respective market. By contrast, β_1 could be zero or positive if there were efficiency improvements in the respective market. Additionally, an increase in the number of foreign bank branches in a market led to lower profits of Imperial Ottoman Bank branches in the respective market. This implies evidence supporting hypothesis 3, i.e. $\beta_2<0$ and $\beta_3<0$. In this sense, many foreign bank branches might lead to higher competition in the respective market, which implies $|\beta_2|<|\beta_3|$.

On the contrary, the negative effect of competition on profits of the Imperial Ottoman Bank branch might be cancelled out by efficiency improvements at low levels of foreign bank branches[223], which indicates $\beta_2=0$[224] and $\beta_3<0$. Finally, if $\beta_2>0$ and $\beta_3<0$, this suggests that spill-over effects would lead to an increase in profits if there were only a few foreign bank branches in the respective market.

3.7 Results

The equations in the section 3.6 are estimated by OLS and the results are reported for each hypothesis, separately. In all tables, the dependent variable is the logarithm of the profits of an Imperial Ottoman Bank branch (log(G_{icpt})). This variable is regressed

[223] Hermes and Lensink (2001) provide evidence that competition is high in the domestic banking market at high numbers of foreign banks. Furthermore, they argue that positive effects of spill-overs on profits of domestic banks can balance out away the negative effect of competition on profits of domestic banks only at low levels of foreign bank numbers or market shares.

[224] I define "small number" of foreign bank branches as smaller than three, because average number of the foreign bank branches is around three after dropping zero values.

on independent variables of interest, i.e. F_{icpt}, $F_{icpt} \times Trend_{it}$, and D_m, and control variables[225].

Table 3.4 shows OLS estimates of the equation (3.1) which refers to the hypothesis 1, i.e. presence of foreign bank branch in a market decreased profits of the Imperial Ottoman Bank branch in the respective market. Column (1) does not include year and branch dummies, the distance to railroads and trade routes, and population. Column (2) adds year and branch fixed effects. Column (3) uses the distance to railroads and trade routes, and population in addition to year and branch fixed effects. Column (4) adds the distance to trade routes and population-year interactions instead of year fixed effects. Columns (1)-(4) show that the point estimates for the impact of foreign bank presence range from -0.005 to 0.890 as standard errors go down. This suggests that the OLS estimates are sensitive to inclusion of control variables and are precisely estimated.

In column (1), the coefficient estimate for the impact of foreign bank presence is positive. The point estimate is statistically different from zero at 1 percent, which suggests that foreign bank branches lead to an increase in profits of the Imperial Ottoman Bank branches in the respective market. On the other hand, foreign bank branches may operate in places where profits of the Imperial Ottoman Bank branches were high. Accordingly, the OLS estimate for the effect of foreign bank presence could be biased upward. Column (2) shows that coefficient estimate for the impact of foreign bank presence is negative, which implies that foreign bank branch presence leads to lower profits of the Imperial Ottoman Bank branches in the respective

[225] Hereafter *"foreign bank presence"* refers to foreign bank branch presence (F_{icpt}), *"foreign bank presence-time trend interaction",* refers to foreign bank branch presence-time trend interaction ($F_{icpt} \times Trend_{it}$), *"distance to railroads"* refers to logarithm of the distance from each branch to the railroads ($\log(R_{icpt})$), *"distance to trade routes"* refers to logarithm of the distance from each branch to the caravan and trade routes ($\log(T_{icp})$), finally "*population*" refers to logarithm of total population at province level in 1893 ($\log(P_p)$).

market, as is consistent with competition going up. However, the point estimate is not statistically different from zero. The point estimates in column (3) and (4) are positive. They are not statistically significant. This means that profits of a branch that is affected by a foreign bank branch are not significantly different from profits of a branch that is not under competitive pressure. Thus, there is no robust evidence in Table 3.4 to support hypothesis 1.

In Table 3.5, I focus on the impact of foreign bank branches on probability of observing loss for an Imperial Ottoman Bank branch. The dependent variable is a dummy variable to indicate if an Imperial Ottoman Bank branch reported loss in a given year, and zero otherwise. Column (1) does not add year and branch dummies, the distance to railroads and trade routes, and population. Column (2) includes year and branch fixed effects. Column (3) adds the distance to railroads and trade routes, and population in addition to year and branch fixed effects. Column (4) uses the distance to trade routes and population-year interactions instead of year fixed effects. Columns (1)-(4) show that the coefficient estimates for the impact of foreign bank presence on probability of loss in an Imperial Ottoman Bank branch are between -0.052 and 0.003 as standard errors go up. This suggests that the point estimates are not robust to inclusion of control variables. Furthermore, they are not precisely estimated.

Columns (1)-(3) report that the coefficient estimates for the impact of foreign bank presence are negative. The coefficient estimate for the impact of foreign bank presence is 0.003 in column (4). This means that the Imperial Ottoman Bank branches that are affected by foreign bank branches are more likely to report losses in comparison to the other branches. The point estimates in columns (1)-(4) are not

statistically different from zero, which suggests that foreign bank branch presence is not statistically related to the probability of loss for an Imperial Ottoman Bank branch. So, as dependent variable in my study is logarithm of the profits in the Imperial Ottoman Bank branches, exclusion of the Imperial Ottoman Bank branches that reported losses does not constitute a big problem[226].

These results in Table 3.4 are consistent with findings in the previous literature on the impact of foreign banks on profits of domestic banks where insignificant coefficient estimates are attributed to two reasons: collusion and efficiency improvements. On the other hand, the historical literature argues that foreign banks competed against the Imperial Ottoman Bank branches in the respective markets instead of participating in collusion[227]. Furthermore, the empirical findings in my study are in line with Lensink and Hermes (2004) who interpret insignificant coefficient estimate for foreign banks on profits of domestic banks to mean that the positive effect of foreign banks on profits of domestic banks cancels out the negative effect of foreign banks on profits of domestic banks[228]. So, I interpret the findings to mean that the positive impact of foreign bank branches on efficiency balances out away the negative impact of foreign bank branches on profits as well.

Due to data constraints, it is not possible to investigate the relationship between foreign bank branches and costs of the Imperial Ottoman Bank branches. On

[226] Also, there were no foreign bank branches in many places that the Imperial Ottoman Bank branches reported losses.
[227] See Thobie (1991), Clay (1994), Frangakis-Syrett (1997), Eldem (1999b), Autheman (2002), and Toprak (2008).
[228] Using 2970 observations from more financially developed countries, Lensink and Hermes (2004) find the coefficient estimate for the impact of number of foreign banks on the share of profits in the total assets is not statistically significant. Additionally, they find that foreign banks lead to a decrease in costs and interest margins of the domestic banks in more financially developed countries. The Ottoman Empire was not financially developed country. On the other hand, the historical literature argues that costs of the Imperial Ottoman Bank branches were negatively associated with foreign bank branches in the respective market, which is parallel to the findings of Lensink and Hermes (2004). Even if they use a different dependent variable to examine the effect of foreign banks, the point estimates in Table 3.4 are qualitatively comparable with that of Lensink and Hermes (2004).

the other hand, the historical literature argues that there could be a positive relationship between foreign bank branches and efficiency of the Imperial Ottoman Bank branches via two channels. First, increasing competition due to foreign bank branches forced Imperial Ottoman Bank branches in the respective market to work efficiently, which tends to be associated with a decrease in costs (Clay, 1994). Second, since foreign banks introduced new techniques and services (Frangakis-Syrett, 1997; pp. 271-2), they could have led to positive spill-over effects, which could have resulted in efficiency improvements. If the Imperial Ottoman Bank branches had adopted these new techniques and services of foreign banks, then the presence of foreign banks might be negatively associated with costs.

Additionally, the non-effect might be related to the fact that the Imperial Ottoman Bank had an early mover advantage over foreign banks due to several reasons. Because of this advantage, the Imperial Ottoman Bank branches could enjoy relatively strong market power which may limit decrease in interest margins due to foreign banks which entered the market. Although there is no available data to test the impact of the early mover advantage on profits, historical facts support that interest margins of the Imperial Ottoman Bank were still high as compared to those of foreign banks (Thobie, 1991; p. 425). So, the negative impact of foreign bank branches on profits could be easily mitigated by the positive effect of foreign bank branches on efficiency.

On the other hand, the association between competition due to foreign banks and domestic bank performance is expected to be positively affected by the amount of time the foreign banks are present in the respective market, as suggested by the previous literature on toehold entry. So, in hypothesis 2 I examine whether the effect

of foreign bank branches on profits of the Imperial Ottoman Bank branch was positively correlated with the amount of time the foreign bank branches were present in the respective market. Berger and Ostromogolsky (2006) examine what kind of small businesses are most likely to be affected by banking market conditions. They use bank presence dummies as well as the market shares of banks as independent variables. The market shares of banks allow them to test that small banks in the market may affect firms over time through attracting a higher number of costumers. Since there is no available data for market shares of foreign banks, I run equation (3.2) including foreign bank presence-time trend interaction ($F_{icpt} \times Trend_{it}$) to test the hypothesis 2.

OLS estimates of the equation (3.2) are reported in Table 3.6. In column (1), I do not control for year and branch fixed effects, the distance to railroads and trade routes, and population. Column (2) introduces year and branch fixed effects. Column (3) adds the distance to railroads and trade routes, and population in addition to year and branch fixed effects. I use the distance to trade routes and population-year interactions instead of year fixed effects in column (4). These make a difference in the OLS estimates. Columns (1)-(4) show that the point estimates for the effect of foreign bank presence on logarithm of the profits in an Imperial Ottoman Bank branch are between 0.073 and 0.595 as standard errors go down. This implies that adding control variables gives more precise coefficient estimates for the impact of foreign bank presence. The point estimates for foreign bank presence-time trend interaction variable range from -0.052 to 0.046. Furthermore, adding these variables results in increasing of standard errors. This means that the point estimates are not precisely estimated. To sum up, the OLS estimates for equation (3.2) are sensitive to inclusion of control variables.

Table 3.6 indicates that the OLS estimates for the effect of foreign bank presence on logarithm of the profits in the Imperial Ottoman Bank branches are positive. The point estimate in column (1) and its standard error are smaller in magnitude than those in column (1) of Table 3.4. Column (1) shows that the point estimate is statistically different from zero at 1 percent, which means that foreign bank branches are correlated with higher profits of the Imperial Ottoman Bank branches in the respective market, as before. The point estimates in columns (2)-(4) are larger in magnitude than those in columns (2)-(4) of Table 3.4 as their standard errors decrease. This suggests that foreign bank branches lead to a large increase in profits of Imperial Ottoman Bank branches in the respective market after controlling for foreign bank presence-time trend interaction variable. However, the coefficient estimates for foreign bank presence are not statistically different from zero, as previously. This means that there is no statistically significant effect of foreign bank branch presence on profits of an Imperial Ottoman Bank branch in the respective market. The non-effect can be attributed to the increasing competition which leads to a positive relationship between foreign bank branches and efficiency through forcing the Imperial Ottoman Bank branches to work more efficiently[229].

Column (1) of Table 3.6 also shows that coefficient estimate for foreign bank presence-time trend interaction variable is positive and statistically different from zero at 1 percent. This result suggests that the effect of foreign bank branches on profits of an Imperial Ottoman Bank branch is positively related to the amount of time the foreign bank branches are present in the respective market. This could be due to fact that foreign banks might lead to spill-over effects, which are expected to

[229] Lensink and Hermes (2004) provide evidence that increasing competition due to foreign banks are negatively associated with costs faced by domestic banks through forcing them to be more efficient even in the short run. The spill-over effects are likely to increase profits over time (Xu, 2011).

increase profits over time. On the other hand, foreign banks opened branches in places where profits of the Imperial Ottoman Bank branches were high, which leads to bias in the OLS estimate for foreign bank presence-time trend interaction variable. Columns (2)-(4) of Table 3.6 report that coefficient estimates for foreign bank presence-time trend interaction variable are negative. This result suggests that the effect of foreign bank branches on profits of an Imperial Ottoman Bank branch goes away after 2-3 years, on average. This could be due the fact that the relationship between competition and foreign bank branches is positively correlated with the amount of time the foreign bank branches are present in the respective market, as foreign banks have a higher number of costumers. However, the point estimates are not statistically significant. This suggests that the impact of foreign bank branches on profits of an Imperial Ottoman Bank branch is not statistically associated with the amount of time the foreign bank branches are present in the respective market. In end, there is no evidence in Table 3.6 to support the hypothesis 2.

Finally, previous literature on the effect of foreign bank on profits of domestic banks shows that this effect may be associated with the number of foreign banks in the respective market. So, in the hypothesis 3, I examine how the profits of an Imperial Ottoman Bank branch in a market adjusted as the number of foreign bank branches increased. The specification in equation (3.3) including dummies for the number of foreign bank branches in a market is used to test the hypothesis 3. Furthermore, the equation (3.3) allows for a non-linear relationship between the number of foreign bank branches and profits of the Imperial Ottoman Bank branch in the respective market.

Table 3.7 shows OLS estimates of the equation (3.3). Column (1) does not include year and branch fixed effects, the distance to railroads and trade routes, and population variables. In column (2), I only control for year and branch fixed effects. Column (3) includes the distance to railroads and trade routes, and population variables in addition to year and branch fixed effects. I control for the distance to trade routes and population-year interactions instead of year fixed effects in column (4). These lead to a change in the OLS estimates. The point estimates for β_1, β_2, and β_3[230] decrease in magnitude with smaller standard errors. The coefficient estimates for β_1 are between -0.057 and 0.458. The point estimates for β_2 range from 0.217 to 0.546. The coefficient estimates for β_3 are between -0.269 and 0.788. These findings suggest that the OLS estimates for equation (3.3) are sensitive to adding control variables and are precisely estimated.

Column (1) of Table 3.7 shows that the coefficient estimate of β_1 is positive. The point estimate for β_1 is smaller than that in column (1) of Table 3.4 in magnitude as its standard error decreases. The coefficient estimate in column (1) is significantly different from zero, as before. The coefficient estimates of β_1 in columns (2)-(3) are negative, which suggests that foreign bank presence leads to lower profits of the Imperial Ottoman Bank branches in the respective market. Column (4) of Table 3.7 shows that the coefficient estimate of β_1 is positive. The point estimate is smaller than that in column (4) of Table 3.4 in magnitude with smaller standard error. The finding implies that foreign bank presence increases profits of the Imperial Ottoman Bank branches in the respective market. However, the coefficient estimates of β_1 in columns (2)-(4) are not significantly different from zero, as before. This suggests that

[230] They are coefficients of foreign bank presence, two foreign bank branches, three and more than three foreign bank branches variables, respectively.

foreign bank branch presence is not statistically related to profits of an Imperial Ottoman Bank branch in the respective market.

Additionally, column (1) reports positive coefficient estimates for β_2 and β_3. The point estimates are statistically different from zero at 5 percent. Furthermore, coefficient estimate of β_3 is larger than the coefficient estimates of β_2 in magnitude. On the other hand, there were many foreign bank branches in places where the Imperial Ottoman Bank branches had high profits, which leads to biased OLS estimates. Columns (2)-(4) show that the coefficient estimates of β_2 are positive. Coefficient estimates of β_3 are negative. This result suggests that as the number of foreign bank branches increases in a market, profits of an Imperial Ottoman Bank branch in the respective market decreases. The results also could indicate that many foreign bank branches in a market lead to higher competition in the respective market. However, the coefficient estimates of β_2 and β_3 in columns (2)-(4) are not statistically significant. This means that there is no statistically significant relationship between profits of an Imperial Ottoman Bank branch and the number of foreign bank branches. So, there is no evidence to support the hypothesis 3.

These findings are consistent with a theory of efficiency improvements in the domestic banking market due to foreign banks. Foreign banks facilitate more competition. This is in line with the historical literature, arguing that places with many foreign bank branches were affected the most by the competition (Clay, 1994). My point estimates support this argument. Increasing competition might force an Imperial Ottoman Bank branch to be more efficient, which means that having foreign competitors might be positively related to profits because costs were driven down. However, foreign banks branches might not lead to a large decrease in interest

margins, and resultantly profits (Thobie, 1991; p. 425), which could arise from an early mover advantage of the Imperial Ottoman Bank. So, the absence of a statistically significant relationship between foreign banks and profits of an Imperial Ottoman Bank branch does not go away even at high numbers of foreign bank branches.

Apart from these findings, Tables 3.4, 3.6, and 3.7 also provide no evidence that population is associated with profits of an Imperial Ottoman Bank. Interestingly, the results mostly do not show a statistically significant impact of the distance to railroads on profits of an Imperial Ottoman Bank branch. Only column (3) of Table 3.6 shows that coefficient estimate for the impact of distance to railroads is statistically different from zero at 10 percent. The point estimate implies that one percent decrease in the distance to railroads increases profits in an Imperial Ottoman Bank branch by 0.102 percent. Columns (3)-(4) report that the coefficient estimates for the effect of distance to trade routes are statistically significant at 1 percent. The point estimates are negative, as expected. The point estimates suggest that one percent decrease in the distance to trade routes increases profits in an Imperial Ottoman Bank branch by 0.626-0.551 percent. This implies that the most profitable branches of the Imperial Ottoman Bank might be located close to places along the caravan and trade routes.

On the other hand, Tables 3.4, 3.6, and 3.7 report coefficient estimates for regressors of interest with large standard errors in magnitude in many cases. This could be due to the small sample size. The lack of precision could yield insignificant coefficient estimates (Wooldridge, 2009; p. 132). However, the point estimates are consistently estimated in many specifications (McCloskey, 1985). Furthermore,

following Wooldridge (2009; pp. 132-3), I use significance levels larger than usual which does not leads to a statistically significant point estimates for regressors of interest.

Last thing worth mentioning is that the OLS estimates may be biased due to the fact that some important time-varying determinants of bank profitability —such as costs, deposits, real interest rate, and economic growth— were not included in the regressions due to data constraints. For example, Clay (1994) and Autheman (2008; p. 103) show that the economic growth[231] led to an increase in profits of the Imperial Ottoman Bank as foreign banks began their operations outside Istanbul thanks to economic recovery. This implies that omitted time-varying determinants of profits could be positively related to both foreign bank branches and profits of Imperial Ottoman Bank branches over time. In this case, the OLS estimates may be biased (Wooldridge, 2009; p. 91)[232]. To mitigate concerns of bias due to omitted variables, several variables are used as instrumental variables for regressors of interest, i.e. F_{icpt}, $F_{icpt} \times Trend_{it}$, and D_m. The results[233] show that as the F-statistics on the excluded instruments are higher than 10 in many cases. The IV (Instrumental Variables)[234] estimates have same signs and are not statistically significant as the OLS coefficients in column (4) of Tables 3.4, 3.6, and 3.7. So, the OLS estimates can be interpretable

[231] This was due to the increase in the volume of overseas trade after 1899 (Clay, 1994).
[232] Additionally, the OLS estimates may be biased downward due to measurement error in foreign bank branch data, which is inevitable due to fact that historical data might not be always precisely measured. On the other hand, *the Banking Almanac* is the only available source. Apart from this, as shown in Table 3.2 and 3.9, foreign bank branches mainly operated in places where average profits of the Imperial Ottoman Bank branches were high –such as Stamboul, Izmir, and Salonika branches. This means that the OLS estimates could be biased upward due to reverse causality which could be responsible for insignificant coefficient estimates for the effect of foreign banks on profits in the Imperial Ottoman Bank branches, if there was negative relationship between foreign bank branches and profits of the Imperial Ottoman Bank branches.
[233] They do not mention here.
[234] Regressions are estimated by 2SLS.

as causal effect on profits of the Imperial Ottoman Bank branches of foreign bank branches.

3.7.1 Robustness Check

In this section, as a robustness test of my results[235] in Tables 3.4, 3.6, and 3.7, I again estimate equations (3.1)-(3.3) using alternative sub-sample. In my sample, the number of foreign bank branches was constant in more than 30 counties —such as Aksehir county— out of 64 counties over the sample period, as can be seen in Table 3.2. So, inclusion of these counties may affect the results I find. Following Pohl (2011), I run the same regressions for a sample without these counties. The OLS estimates for the equations (3.1)-(3.3) are presented in columns (1)-(3) of Table 3.8, respectively. Table 3.8 includes all control variables as well as branch fixed effects, and the distance to trade routes and population-year interactions instead of year fixed effects. The coefficient estimates for the impact of foreign bank presence in columns (1) and (3) are negative, on the contrary to those in column (4) of Tables 3.4 and 3.7. However, the point estimates are not statistically different from zero, again. Apart from this, the results do not change in terms of statistical significance and direction of the relationship. This means that the baseline results are little sensitive to exclusion of counties with a constant number of foreign bank branches over the sample period.

[235] As another robustness test for the results in Table 3.4, I focus on the short-term impact of foreign bank branch presence. The findings are reported in column (4) of Table 3.10 in Appendix B. The regressor of interest in column (4) of Table 3.10 is "*new foreign bank branch presence*" which equals 1 if there was a foreign bank entry, and zero otherwise. The point estimate is larger in magnitude than that in column (4) of Table 3.4 with smaller standard error. However, the findings in column (4) of Table 3.10 do not show a statistically significant effect of foreign bank branches in the short-term. Also, I examine whether the baseline results are sensitive to inclusion of the share of non-Muslim population in total population in 1893. There was a strong relationship between the Imperial Ottoman Bank and local costumers thanks to its non-Muslim personnel, as non-Muslims were dominant in industrial and financial sectors after the 1830s (Clay, 1994; Eldem, 1999b; pp. 426-8; Frangakis-Syrett, 1999). The data for non-Muslim population in 1893 come from Karpat (1985). To this end, I re-estimate regressions after adding the share of non-Muslim population in total population. The findings do not change much, as the coefficient estimate for the effect of the share of non-Muslim population in total population is negative.

3.8 Conclusion

Previous literature on banking shows that foreign bank entry can be negatively associated with interest margins, and resultantly profits of domestic banks if there is no collusion in the respective market (Claessens et al., 2001; Cetorelli, 2002; Bikker and Bos, 2004). The historical literature argues that the Imperial Ottoman Bank had a strong position in the Ottoman Empire and operated as the state bank for a long time (Clay, 1994, Thobie, 1991; p. 407). On the other hand, this situation changed after the 1900s with entry of many foreign banks (Thobie, 1991; pp. 424-5; Frangakis-Syrett, 1997; p. 272). Increasing competition due to foreign banks led to a decrease in profits for Imperial Ottoman Bank branches (Clay, 1994). Based on banking and historical literature, I investigate whether abnormal profits of Imperial Ottoman Bank due to its strong position in the domestic banking market were negatively related to the presence of foreign banks. To the best of my knowledge, this chapter is the first attempt to test several hypotheses about the domestic banking market in the Ottoman Empire, using a new historical dataset of profits for Imperial Ottoman Bank branches and foreign bank branches operating in the Ottoman Empire for the period 1895-1914.

This chapter does not find that profits of Imperial Ottoman Bank branches were related to foreign bank branch presence or the number of foreign bank branches in a market. Furthermore, the findings show that the relationship between foreign bank branches and profits of Imperial Ottoman Bank branches did not depend on the amount of time the foreign bank branches were present in the respective market. However, the findings do not mean that foreign bank branches were not associated with increasing competition in the respective market. I predict a negative relationship

between foreign banks and profits of the Imperial Ottoman Bank branches in case of three and more than three foreign bank branches. The point estimates also show that foreign banks had a positive effect on profits of Imperial Ottoman Bank branches at initial entry as this effect went away over time. The historical literature is consistent with the point estimates. Additionally, Clay (1994) argues that increasing competition due to foreign bank branches might force Imperial Ottoman Bank branches to operate more efficiently, which could lead to an increase in profits through decreasing costs. So, the empirical results could imply that the negative effect of competition on the Imperial Ottoman Bank branch profits was mitigated by the positive effect of foreign banks on efficiency. This is also consistent with the findings of Lensink and Hermes (2004), showing that increasing competition due to foreign banks is positively associated with profits of domestic banks through efficiency improvements which balance out the negative effect of foreign banks on profits of domestic banks.

Thus in the context of the Ottoman Empire, it seems that foreign banks might not necessarily have lead to a substantial decrease in market power of the domestic bank, even though opening banking markets to foreign banks could be positively related to competition. So, the policy implication of this chapter is that domestic banking market could benefit from an increase in competition due to foreign banks in various ways such as efficiency improvements. Accordingly, foreign entry encourages improved efficiency of domestic banks. Otherwise, domestic bank managers will not want to "give up their sheltered quiet life", as suggested by Claessens et al. (2001; p. 17).

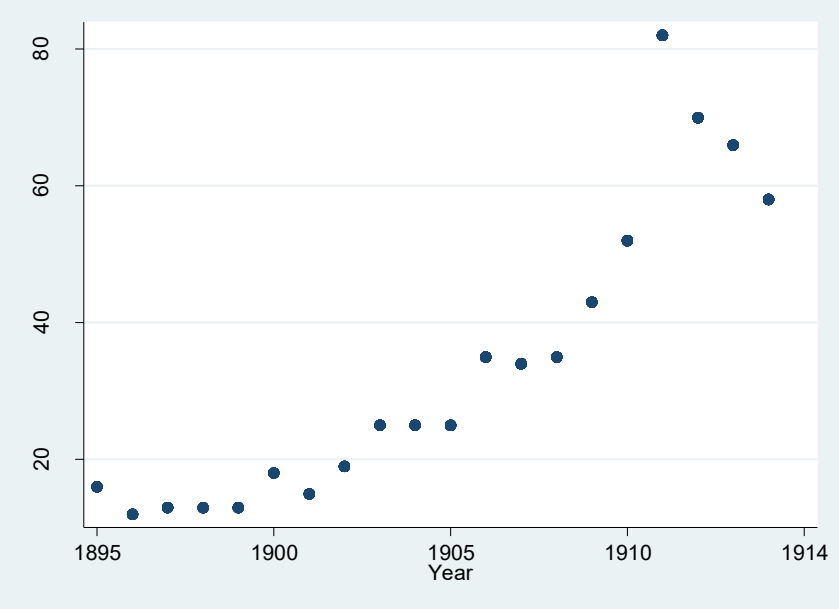
Finally, it is important to note that there are several limitations in this chapter due to data availability. This chapter could be refined by future research if there are

available balance sheet data for costs, market shares, assets of banks, macro determinants of profitability. The inclusion of any of these variables would make it possible to use many control variables to reduce concerns of bias due to omitted variables and test the robustness of the baseline results. Also, the existence of the effects of efficiency improvements as well as an early mover advantage of the Imperial Ottoman Bank over foreign banks on profits of the Imperial Ottoman Bank branches could be tested. Moreover, it would be possible to examine determinants of profits of the Imperial Ottoman Bank branches. Apart from these, small sample size can yield imprecise point estimates. Additionally, measurement error in foreign bank branch data is a concern. Endogeneity of the Imperial Ottoman Bank branches locations may be a potential issue that yields insignificant coefficient estimates for the impact of foreign bank branches. However, it is difficult to obtain historical data on the Ottoman Empire as compared to other European countries, because economic and financial data in the Ottoman Empire are only available for some areas such as public finance.

3.9 Appendix A: Figures and Tables

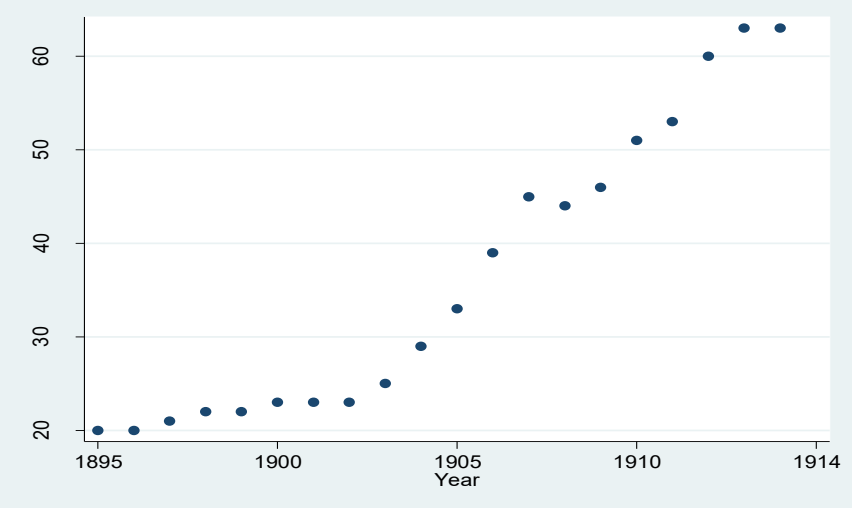
3.9.1 Figures

Figure 3.1: The Number of Foreign Bank Branches (1895-1914)



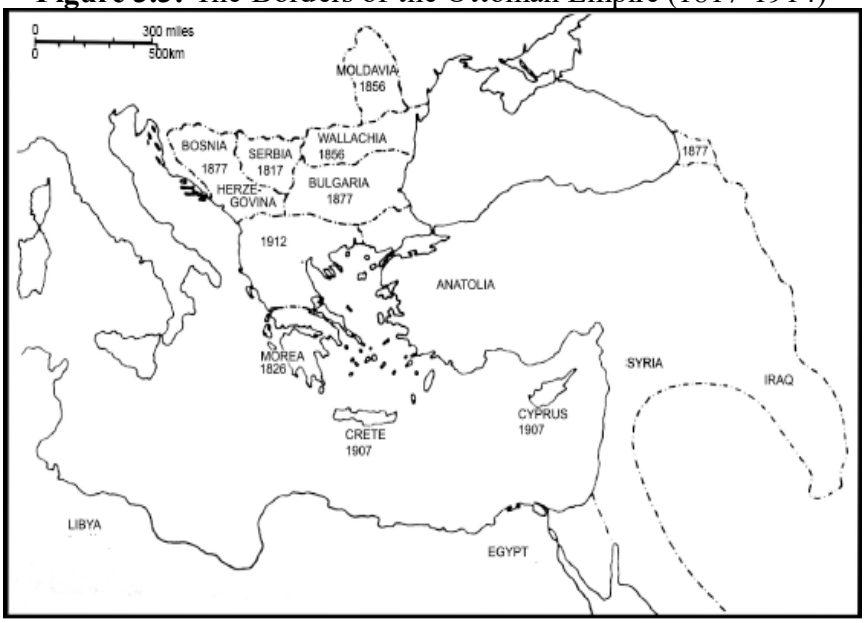
Notes: Figure 3.1 shows total number of foreign bank branches in the Ottoman Empire in a given year for the sample. Author's calculations based on data from *the Banking Almanac (1895-1914)*.

Figure 3.2: The Number of the Imperial Ottoman Bank Branches (1895-1914)



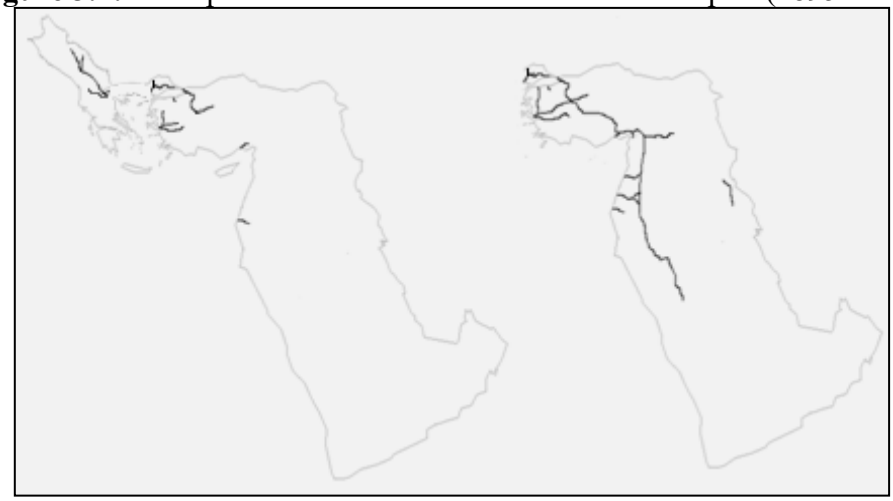
Notes: Figure 3.2 shows total number of the Imperial Ottoman Bank branches in the Ottoman Empire from 1895 to 1914. Author's calculations based on data from *the Banking Almanac (1895-1914),* Clay (1994), and Eldem (1999b; pp. 510-2).

Figure 3.3: The Borders of the Ottoman Empire (1817-1914)



Notes: Figure 3.3 shows the borders of the Ottoman Empire between 1817 and 1914. The dates indicate the last year for which each territory is considered as part of the Ottoman Empire. Also, in this study Egypt is considered as a separate country from the Ottoman Empire over the sample period. Figure 3.3 is taken from Pamuk (1987; p. 22).

Figure 3.4: A Map of Railroad Lines in the Ottoman Empire (1895 and 1914)



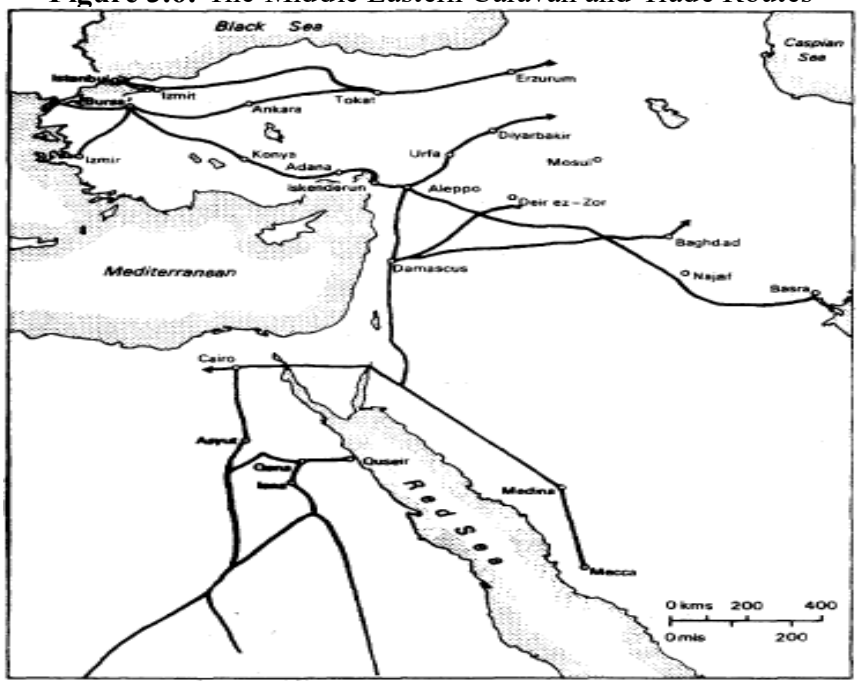
Notes: Figure 3.4 displays the railroad networks in the Ottoman Empire in 1895 (on the left) and 1914 (on the right). The Ottoman Empire lost several of its territories in Rumelia (e.g. Northern Greece) after 1895. Apart from this, there were several territorial changes before 1895 (e.g. today`s Bulgaria and Bosnia). Some of railroad lines had been in operation in these territories before they gained independence from the Ottoman Empire. Figure 3.4 does not show the railroad lines that were not within the border of the Ottoman Empire in 1895 and 1914. Author`s calculations based on the maps and data mentioned in the data section.

Figure 3.5: Railroad Lines in the Ottoman Empire (1856-1914)



Notes: Figure 3.5 shows all railroad lines which were built between 1856 and 1914 in the Ottoman Empire. Figure 3.5 displays railroad lines in territories that the Ottoman Empire lost in 1877 and 1912 (e.g. Northern Greece and Bulgaria). Figure 3.5 is taken from McCarthy (2001; p. 29).

Figure 3.6: The Middle Eastern Caravan and Trade Routes



Notes: Figure 3.6 shows trade and caravan routes in Middle East and the Ottoman Empire, which was used since the Roman Empire. Figure 3.6 is taken from Owen (2002; p. 48).

3.9.2 Tables

Table 3.1: The Opening Dates of Imperial Ottoman Bank Branches (1863-1914)

County	Province	Dates of Opening
Beirut	Beirut	1863
Izmir	Aydin	1863
Aydin	Aydin	1864
Salonika	Selanik	1864
Antalya	Konya	1869
Bursa	Hudavendigar	1875
Damascus	Suriye	1875
Edirne	Edirne	1875
Konya	Konya	1881
Stamboul	Istanbul	1886
Adana	Adana	1889
Pera	Istanbul	1891
Samsun	Trabzon	1891
Trabzon	Trabzon	1891
Usak	Hudavendigar	1891
Baghdad	Baghdat	1892
Mersin	Adana	1892
Aleppo	Halep	1893
Ankara	Ankara	1893
Mitylini	Cezayi-i Bahr-i Sefid	1898
Afyonkarahisar	Hudavendigar	1899
Kastamonu	Kastamonu	1899
Sivas	Sivas	1899
Monastir	Manastir	1903
Skopje	Kosova	1903
Bassorah	Basra	1904
Dedeagatch	Edirne	1904
Eskisehir	Hudavendigar	1904
Kavala	Selanik	1904
Tripoli of Syria	Suriye	1904
Bandirma	Hudavendigar	1905
Bilecik	Hüdavendigar	1905
Jaffa	Kudus	1905
Jeruselam	Kudus	1905
Nazilli	Aydin	1905
Aksehir	Konya	1906
Antep	Halep	1906
Erzurum	Erzurum	1906
Giresun	Trabzon	1906
Haifa	Kudus	1906
Kutahya	Hudavendigar	1906
Silifke	Aydin	1906
Tripoli of Libya	Trablusgarp	1906
Xanthi	Edirne	1906
Adapazari	Izmit	1907
Mossul	Musul	1907
Homs	Suriye	1908
Tarsus	Adana	1908
Komotoni	Edirne	1909

Table 3.1 Continued

County	Province	Dates of Opening
Balikesir	Hudavendigar	1910
Bolvadin	Hudavendigar	1910
Drama	Selanik	1910
Inebolu	Kastamonu	1910
Ioannina	Yanya	1910
Kayseri	Ankara	1910
Ordu	Trabzon	1910
Serres	Selanik	1910
Tekfur Dagi	Edirne	1910
Bitlis	Bitlis	1911
Ceyhan	Adana	1911
Diyarbekir	Diyarbekir	1911
Hama	Suriye	1911
Mamuret-ul-Aziz	Elaziz	1911
Rhodes	Cezayi-i Bahr-i Sefid	1911
Shkodra	Iskodra	1911
Van	Van	1911
Sandikli	Hudavendigar	1912
Soke	Aydin	1912
Bolu	Kastamonu	1913
Hodeidah	Yemen	1913
Jeddah	Hicaz	1913
Urfa	Halep	1913
Canakkale	Biga	1914
Iskenderun	Halep	1914
Zahle	Beyrut	1914

Notes: Table 3.1 shows opening dates of the Imperial Ottoman Bank branches. Column (1) shows name of counties where the Imperial Ottoman Bank opened branches. Column (2) shows name of provinces, which the counties in question were located. The head office of the Imperial Ottoman Bank is not shown in Table 3.1. It was opened in 1863 in Istanbul (Galata). Also, the Imperial Ottoman Bank branches in Cyprus (i.e. Larnaka, Limassol, and Nicosia branches) are not shown in Table 3.1. The information in Table 3.1 are gathered from *the Banking Almanac (1895-1914),* Clay (1994), and Eldem (1999). All of the county and province names are given in the form in *the Banking Almanac*, Karpat (1985), and Eldem (1999).

Table 3.2: The Number of Foreign Bank Branches in the Ottoman Empire by County, Province, and Year (1895-1914)

The Imperial Ottoman Bank Branches		Foreign Bank Branches					
County	**Province**	**1895**	**1898**	**1902**	**1906**	**1910**	**1914**
Adana	Adana	0	0	0	0	0	1
Adapazari	Izmit	0	0	0	0	0	0
Afyonkarahisar	Hudavendigar	0	0	0	0	0	0
Aksehir	Konya	0	0	0	0	0	0
Aleppo	Halep	2	2	2	2	1	1
Ankara	Ankara	0	0	0	0	0	0
Antalya	Konya	0	0	0	0	0	0
Antep	Halep	0	0	0	0	0	0
Aydin	Aydin	0	0	0	0	0	0
Baghdad	Baghdat	0	0	0	0	0	1
Balikesir	Hudavendigar	0	0	1	0	0	0
Bandirma	Hudavendigar	0	0	0	0	0	0
Bassorah	Basra	0	0	0	0	0	0
Beirut	Beirut	2	2	2	3	3	6
Bilecik	Hüdavendigar	0	0	0	0	0	0
Bitlis	Bitlis	0	0	0	0	0	0
Bolu	Kastamonu	0	0	0	0	0	0
Bolvadin	Hudavendigar	0	0	0	0	0	0
Bursa	Hudavendigar	0	0	0	0	1	1
Canakkale	Biga	0	0	0	0	0	1
Ceyhan	Adana	0	0	0	0	0	0
Damascus	Suriye	0	0	0	0	0	1
Dedeagatch	Edirne	0	0	0	0	0	--
Diyarbekir	Diyarbekir	0	0	0	0	0	0
Drama	Selanik	0	0	0	0	1	--
Edirne	Edirne	0	0	0	0	0	2
Erzurum	Erzurum	0	0	0	0	0	0
Eskisehir	Hudavendigar	0	0	0	0	0	0
Giresun	Trabzon	0	0	0	0	0	1
Haifa	Kudus	0	0	0	0	1	2
Hama	Suriye	0	0	0	0	0	0
Hodeidah	Yemen	0	0	0	0	0	0
Homs	Suriye	0	0	0	0	0	0
Inebolu	Kastamonu	0	0	0	0	0	0
Ioannina	Yanya	0	0	0	0	0	--
Iskenderun	Halep	0	0	0	0	0	0
Izmir	Aydin	2	2	4	6	7	9
Jaffa	Kudus	0	0	0	1	2	1
Jeddah	Hicaz	0	0	0	0	0	0
Jeruselam	Kudus	0	0	0	4	4	--
Kastamonu	Kastamonu	0	0	0	0	0	0
Kavala	Selanik	0	0	0	1	2	--
Kayseri	Ankara	0	0	0	0	0	0
Komotoni	Edirne	0	0	0	0	0	--
Konya	Konya	0	0	0	0	0	0
Kutahya	Hudavendigar	0	0	0	0	0	0
Mamuret-ul-Aziz	Elaziz	0	0	0	0	0	0
Mersin	Adana	0	0	0	0	1	3

Table 3.2 Continued

The Imperial Ottoman Bank Branches		Foreign Bank Branches					
County	**Province**	**1895**	**1898**	**1902**	**1906**	**1910**	**1914**
Mitylini	Cezayi-i Bahr-i Sefid	0	0	0	2	0	--
Monastir	Manastir	0	0	0	1	2	--
Mossul	Musul	0	0	0	0	0	0
Nazilli	Aydin	0	0	0	0	1	1
Ordu	Trabzon	0	0	0	0	0	0
Pera	Istanbul	0	0	1	1	3	1
Rhodes	Cezayi-i Bahr-i Sefid	0	0	0	0	1	--
Salonika	Selanik	3	3	2	2	5	--
Samsun	Trabzon	0	0	0	0	2	7
Sandikli	Hudavendigar	0	0	0	0	0	1
Serres	Selanik	0	0	0	0	1	--
Shkodra	Iskodra	0	0	0	0	0	--
Silifke	Aydin	0	0	0	0	0	0
Sivas	Sivas	0	0	0	0	0	0
Skopje	Kosova	0	0	0	0	1	--
Stamboul	Istanbul	6	6	7	11	12	15
Soke	Aydin	0	0	0	0	0	0
Tarsus	Adana	0	0	0	0	0	0
Tekfur Dagi	Edirne	0	0	0	0	0	0
Trabzon	Trabzon	1	0	0	1	2	1
Tripoli of Libya	Trablusgarp	0	0	0	0	1	--
Tripoli of Syria	Suriye	0	0	0	0	0	2
Urfa	Halep	0	0	0	0	0	0
Usak	Hudavendigar	0	0	0	0	0	0
Van	Van	0	0	0	0	0	0
Xanthi	Edirne	0	0	0	0	1	--
Zahle	Beyrut	0	0	0	0	0	0
Total		16	15	19	35	53	58

Notes: Column (1) of Table 3.2 shows name of counties where the Imperial Ottoman Bank and its competitors opened branches in the Ottoman Empire between 1895 and 1914. In each county, the Imperial Ottoman Bank had one branch in a given year. Table 3.2 shows all branches of the Imperial Ottoman Bank that operated in the Ottoman Empire between 1895 and 1914, including the branches that reported losses and operated in places that population data are not available. Column (2) displays name of provinces, which were composed of the counties in question. Columns (3)-(8) show the number foreign bank branches in places that the Imperial Ottoman Bank branches operated for the period 1895-1914. Number of foreign bank branches is calculated by using data from *the Banking Almanac (1895-1914)*. All of the county and province names are given in the form in which they appear in *the Banking Almanac*, Karpat (1985), and Eldem (1999). Since the Ottoman Empire lost some of its territories in Rumelia and North Africa after 1910, several branches of the Imperial Ottoman Bank which were operated in these territories —such as Monastir, Tripoli of Libya, Rhodes, and Skopje branches— were not within the border of Ottoman Empire after 1910. So, data of foreign bank branches for these branches are missing after 1910. Also, several branches of the Imperial Ottoman Bank were closed after 1910. Finally, due to lack of observation on foreign bank branches operated in Cyprus, which was a part of the Ottoman Empire before 1908 (Figure 3.3), I have to exclude branches of the Imperial Ottoman Bank in Cyprus (i.e. Larnaka, Limassol, and Nicosia branches).

Table 3.3: Descriptive Statistics

Variable	N. of obs.	Mean	Std. Dev.
Profits	623	3,284	3,714
Number of Foreign Bank Branches	623	1	2.204
Distance to Railroads	623	114.520	220.068
Distance to Caravan and Trade routes	623	114.349	130.458
Population	623	775,853	429,176

Notes: N. of obs. denotes the total number of branch-year observations. Std. Dev. displays standard deviations of variables in question.

Table 3.4: The Impact of Foreign Bank Branch Presence on Profits of Imperial Ottoman Bank Branches (1895-1914)

Dependent Variable: log(Profits)				
	1	2	3	4
Foreign Bank Branch Presence	0.890***	-0.005	0.001	0.045
	(0.157)	(0.126)	(0.125)	(0.155)
log(Distance to Railroads)	--	--	-0.080	-0.048
			(0.061)	(0.073)
log(Distance to Caravan and Trade Routes)	--	--	-0.592***	-0.564***
			(0.016)	(0.100)
log(Population in Provinces)	--	--	0.008	0.392
			(0.114)	(0.266)
Branch Fixed Effects	NO	YES	YES	YES
Year Fixed Effects	NO	YES	YES	NO
log(Distance to Caravan and Trade Routes)×Year Fixed Effects	NO	NO	NO	YES
log(Population in Provinces)×Year Fixed Effects	NO	NO	NO	YES
Constant	7.197***	8.220***	8.217***	3.011
	(0.087)	(0.214)	(1.634)	(3.620)
N. of obs.	623	623	623	623
R^2	0.12	0.63	0.63	0.67

Notes: Columns (1)-(4) report the OLS estimates for equation (3.1). Heteroskedasticity-robust standard errors corrected for clustering at the province level are reported in parentheses. *** denotes statistically significantly different from zero at the 1% level. N. of obs. is number of observation. R^2 is the R-squared.

Table 3.5: The Impact of Foreign Bank Branch Presence on Probability of Loss in an Imperial Ottoman Bank Branch (1895-1914)

Dependent Variable: Probability of Loss				
	1	2	3	4
Foreign Bank Branch Presence	-0.052	-0.003	-0.004	0.003
	(0.034)	(0.040)	(0.040)	(0.039)
log(Distance to Railroads)	--	--	0.009	0.025*
			(0.012)	(0.012)
log(Distance to Caravan and Trade Routes)	--	--	0.007	0.007
			(0.011)	(0.033)
log(Population in Provinces)	--	--	-0.139***	-0.018
			(0.006)	(0.067)
Branch Fixed Effects	NO	YES	YES	YES
Year Fixed Effects	NO	YES	YES	NO
log(Distance to Caravan and Trade Routes)×Year Fixed Effects	NO	NO	NO	YES
log(Population in Provinces)×Year Fixed Effects	NO	NO	NO	YES
Constant	0.131***	0.099	1.888***	0.217
	(0.030)	(0.073)	(0.128)	(0.842)
N. of obs.	704	704	704	704
R^2	0.01	0.39	0.39	0.42

Notes: Columns (1)-(4) report the OLS estimates for equation (3.1), as dependent variable is a dummy variable which equals 1 if an Imperial Ottoman Bank branch reported loss in a given year, and zero otherwise. This sample contains 72 branches of the Imperial Ottoman Bank as population data are not available for several places. Heteroskedasticity-robust standard errors corrected for clustering at the province level are reported in parentheses. *** and * denote statistically significantly different from zero at the 1% and 10% levels. N. of obs. is number of observation. R^2 is the R-squared.

Table 3.6: The Impact of Foreign Bank Branch Presence and Foreign Bank Branch Presence-Year Interaction on Profits of Imperial Ottoman Bank Branches (1895-1914)

Dependent Variable: log(Profits)				
	1	2	3	4
Foreign Bank Branch Presence	0.595***	0.073	0.087	0.127
	(0.154)	(0.120)	(0.111)	(0.131)
Foreign Bank Branch Presence×$Trend_{ij}$	0.046***	-0.048	-0.052	-0.049
	(0.020)	(0.036)	(0.037)	(0.037)
log(Distance to Railroads)	--	--	-0.102*	-0.065
			(0.057)	(0.061)
log(Distance to Caravan and Trade Routes)	--	--	-0.595***	-0.551***
			(0.016)	(0.097)
log(Population in Provinces)	--	--	-0.013	0.375
			(0.099)	(0.279)
Branch Fixed Effects	NO	YES	YES	YES
Year Fixed Effects	NO	YES	YES	NO
log(Distance to Caravan and Trade Routes)×Year Fixed Effects	NO	NO	NO	YES
log(Population in Provinces)×Year Fixed Effects	NO	NO	NO	YES
Constant	7.197***	8.107***	8.402***	3.103
	(0.087)	(0.223)	(1.366)	(3.745)
N. of obs.	623	623	623	623
R^2	0.14	0.64	0.64	0.68

Notes: Columns (1)-(4) report the OLS estimates for equation (3.2). Heteroskedasticity-robust standard errors corrected for clustering at the province level are reported in parentheses. *** and * denote statistically significantly different from zero at the 1% and 10% levels. N. of obs. is number of observation. R^2 is the R-squared.

Table 3.7: The Impact of the Number of Foreign Bank Branches on Profits of Imperial Ottoman Bank Branches (1895-1914)

Dependent Variable: log(Profits)				
	1	2	3	4
Foreign Bank Branch Presence	0.458***	-0.053	-0.057	0.011
	(0.154)	(0.121)	(0.120)	(0.135)
Two Foreign Bank Branches	0.546**	0.231	0.260	0.217
	(0.212)	(0.166)	(0.162)	(0.188)
Three and More than Three Foreign Bank Branches	0.788**	-0.206	-0.190	-0.269
	(0.343)	(0.202)	(0.199)	(0.218)
log(Distance to Railroads)	--	--	-0.091	-0.056
			(0.055)	(0.064)
log(Distance to Caravan and Trade Route)	--	--	-0.626***	-0.585***
			(0.022)	(0.092)
log(Population in Provinces)	--	--	-0.010	0.346
			(0.104)	(0.267)
Branch Fixed Effects	NO	YES	YES	YES
Year Fixed Effects	NO	YES	YES	NO
log(Distance to Caravan and Trade Routes)×Year Fixed Effects	NO	NO	NO	YES
log(Population in Provinces)×Year Fixed Effects	NO	NO	NO	YES
Constant	7.197***	8.177***	8.439***	3.560
	(0.087)	(0.206)	(1.491)	(3.603)
N. of obs.	623	623	623	623
R^2	0.15	0.64	0.64	0.68

Notes: Columns (1)-(4) report the OLS estimates for equation (3.3). Heteroskedasticity-robust standard errors corrected for clustering at the province level are reported in parentheses. *** and ** denote statistically significantly different from zero at the 1% and 5% levels. N. of obs. is number of observation. R^2 is the R-squared.

Table 3.8: Robustness Check: an Alternative Sub-sample (1895-1914)

Dependent Variable: log(Profits)			
	1	2	3
Foreign Bank Branch Presence	-0.001	0.038	-0.071
	(0.143)	(0.113)	(0.147)
Two Foreign Bank Branches	--	--	0.253
			(0.167)
Three and More than Three Foreign Bank Branches	--	--	-0.221
			(0.175)
Foreign Bank branch Presence×$Trend_{ij}$	--	-0.072	--
		(0.045)	
log(Distance to Railroads)	-0.090	-0.136	-0.105
	(0.084)	(0.079)	(0.076)
log(Distance to Caravan or Trade Route)	-0.323***	-0.315***	-0.310***
	(0.067)	(0.056)	(0.062)
log(Population in Provinces)	-0.492***	-0.694	-0.519***
	(0.073)	(0.159)	(0.074)
Branch Fixed Effects	YES	YES	YES
Year Fixed Effects	NO	NO	NO
log(Distance to Caravan and Trade Routes)×Year Fixed Effects	YES	YES	YES
log(Population in Provinces)×Year Fixed Effects	YES	YES	YES
Constant	14.736***	17.165***	15.046***
	(0.906)	(1.873)	(0.900)
N. of obs.	385	385	385
R^2	0.61	0.63	0.62

Notes: Columns (1)-(3) report the OLS estimates for equations (3.1)-(3.3) when I run my regressions without counties with a constant number of foreign bank branches over the sample period. Heteroskedasticity-robust standard errors corrected for clustering at the province level are reported in parentheses. *** denotes statistically significantly different from zero at the 1% level. N. of obs. is number of observation. R^2 is the R-squared.

3.10 Appendix B: Tables

Table 3.9: Summary Statistics for Profits of Imperial Ottoman Bank Branches (1895-1914)

The Imperial Ottoman Bank Branches	N. of obs.	Mean	Std. Dev.
Stamboul	20	13,494	7,327
Izmir	20	11,370	4,824
Salonika	18	7,076	3,199
Aleppo	18	6,531	2,723
Beirut	20	5,489	3,230
Baghdad	18	5,445	3,146
Damascus	20	4,926	2,887
Bassorah	10	4,507	2,798
Tarsus	3	4,503	780
Giresun	8	4,171	1,770
Adana	20	4,055	2,476
Samsun	19	3,797	1,796
Bursa	20	3,574	1,621
Trabzon	19	3,522	1,638
Kavala	6	3,253	2,286
Haifa	8	3,228	2,592
Mersin	19	3,029	1,992
Jaffa	9	2,886	1,370
Konya	20	2,740	1,354
Bandirma	9	2,415	653
Homs	3	2,290	1,663
Pera	18	1,987	2,167
Balikesir	4	1,849	532
Ankara	19	1,793	1,319
Antep	9	1,793	934
Edirne	18	1,702	1,089
Mitylini	14	1,622	1,317
Eskisehir	10	1,595	593
Afyonkarahisar	13	1,589	686
Xanthi	5	1,572	826
Antalya	20	1,554	781
Erzurum	8	1,529	953
Tripoli of Syria	3	1,427	1,197
Ordu	4	1,396	659
Adapazari	8	1,310	712
Skopje	7	1,232	1,051
Usak	20	1,223	546
Aydin	19	1,195	774
Bilecik	8	1,191	202
Tekfur Dagi	3	1,129	172
Hama	3	1,113	376

Table 3.9 Continued

The Imperial Ottoman Bank Branches	N. of obs.	Mean	Std. Dev.
Kastamonu	14	1,043	602
Komotoni	3	1,042	325
Drama	2	1,039	202
Nazilli	8	951	468
Mossul	6	918	434
Kutahya	9	839	532
Kayseri	5	816	462
Dedeaghatch	6	803	472
Monastir	6	719	163
Inebolu	4	653	459
Jeruselam	7	652	343
Ceyhan	2	529	345
Sivas	8	504	344
Soke	1	471	--
Canakkale	1	470	--
Bolvadin	3	469	151
Aksehir	8	430	246
Mamuret-ul-Aziz	2	333	96
Sandikli	2	330	36
Diyarbekir	2	249	175
Van	2	133	159
Serres	1	108	--
Urfa	1	91	--
Total	623	--	--

Notes: Table 3.9 shows mean values and standard deviations of profits in the Imperial Ottoman Bank branches in my sample between 1895 and 1914. N. of obs. is number of observation.

Table 3.10: Robustness Checks: an Alternative Dependent Variable and the Short-term Impact of Foreign Bank Branch Presence on Profits of Imperial Ottoman Bank Branches (1895-1914)

Dependent Variables: Profits and log(Profits)				
	1	2	3	4
New Foreign Bank Branch Presence	--	--	--	0.142
				(0.134)
Foreign Bank Branch Presence	165.996	314.531	168.651	--
	(364.759)	(508.623)	(376.780)	
Two Foreign Bank Branches	--	--	341.149	--
			(434.844)	
Three and More than Three Foreign Bank Branches	--	--	-826.682*	--
			(460.574)	
Foreign Bank branch Presence×$Trend_{ij}$	--	-94.265	--	--
		(129.401)		
log(Distance to Railroads)	-277.267**	-319.138**	-290.751**	-0.044
	(135.722)	(153.050)	(142.486)	(0.073)
log(Distance to Caravan or Trade Route)	-444.862	-435.486	-421.810	-0.574***
	(507.413)	(502.351)	(528.135)	(0.094)
log(Population in Provinces)	2021.831**	2027.076**	1960.238*	0.403
	(953.602)	(986.397)	(973.241)	(0.270)
Branch Fixed Effects	YES	YES	YES	YES
Year Fixed Effects	NO	NO	NO	NO
log(Distance to Caravan and Trade Routes)×Year Fixed Effects	YES	YES	YES	YES
log(Population in Provinces)×Year Fixed Effects	YES	YES	YES	YES
Constant	-21762.510*	-22022.860*	-21060.940	2.825
	(12367.850)	(12750.830)	(12639.250)	(3.675)
N. of obs.	704	704	704	623
R^2	0.73	0.74	0.74	0.67

Notes: In columns (1)-(3), equations (3.1)-(3.3) are estimated by the OLS. In columns (1)-(3), I estimate regressions using level of profits in the Imperial Ottoman Bank branches as dependent variable. This sample contains 72 branches of the Imperial Ottoman Bank, as population data are not available for some places. Column (4) reports the OLS estimates for equation (3.1), as the regressor of interest is "*New Foreign Bank Branch Presence*" which takes the value 1 if there was a foreign bank entry, and zero otherwise. The dependent variable in column (4) is the logarithm of the profits in the Imperial Ottoman Branches in a given year. Heteroskedasticity-robust standard errors corrected for clustering at the province level are reported in parentheses. ***, **, and * denote statistically significantly different from zero at the 1%, 5%, and 10% levels. N. of obs. is number of observation. R^2 is the R-squared.

Table 3.11: Robustness Check: Prices (1895-1914)

Dependent Variable: log(Profits/Prices)			
	1	2	3
Foreign Bank Branch Presence	0.045	0.127	0.011
	(0.155)	(0.131)	(0.135)
Two Foreign Bank Branches	--	--	0.217
			(0.138)
Three and More than Three Foreign Bank Branches	--	--	-0.269
			(0.218)
Foreign Bank branch Presence×$Trend_{ij}$	--	-0.049	--
		(0.037)	
log(Distance to Railroads)	-0.048	-0.065	-0.056
	(0.073)	(0.061)	(0.064)
log(Distance to Caravan or Trade Route)	-0.564***	-0.551***	-0.585***
	(0.100)	(0.097)	(0.092)
log(Population in Provinces)	0.392	0.375	0.346
	(0.266)	(0.279)	(0.267)
Branch Fixed Effects	YES	YES	YES
Year Fixed Effects	NO	NO	NO
log(Distance to Caravan and Trade Routes)×Year Fixed Effects	YES	YES	YES
log(Population in Provinces)×Year Fixed Effects	YES	YES	YES
Constant	3.321	3.414	3.871
	(3.620)	(3.745)	(3.603)
N. of obs.	623	623	623
R^2	0.68	0.69	0.69

Notes: Columns (1)-(3) report the OLS estimates for equations (3.1)-(3.3) after profits are deflated by the Istanbul consumer price index. The data for price index of Istanbul are taken from Pamuk (2000b; p. 18). All values in Pamuk (2000b; p. 18) are expressed in akces. Akce was silver coin. I convert the Istanbul consumer price index to Ottoman gold lira using exchange rates in Inalcik and Quataert (1996; pp. 971-3). 1 kurus equals 120 akces. 1 Ottoman gold lira equals 100 kuruses. As base year in Pamuk (2000b) is 1469, the base year is changed to 1914. Heteroskedasticity-robust standard errors corrected for clustering at the province level are reported in parentheses. *** denotes statistically significantly different from zero at the 1% level. N. of obs. is number of observation. R^2 is the R-squared.

3.11 References

Amel, D. F. and J. N. Liang (1997). "Determinants of Entry and Profits in Local Banking Markets". *Review of Industrial Organization*. 12 (1). pp. 59–78.

Angrist, J. D. and J. Pischke (2009). *Mostly Harmless Econometrics*. Princeton: Princeton University Press.

Atack, J., B. F., M. Haines and R. A. Margo (2009). "Did Railroads Induce or Follow Economic Growth? Urbanization and Population Growth in the American Midwest, 1850-60". *NBER Working Paper No. 14640.*

Autheman, A. (2002). *The Imperial Ottoman Bank*. Istanbul: Ottoman Bank Archives and Research Centre.

Autheman, A. (2008). "A General Survey of the History of the Imperial Ottoman Bank". in Fraser, I. L., M. Pohle and P. L. Cottrell (eds). *East Meets West Banking, Commerce and Investment in the Ottoman Empire.* UK: Ashgate Publishing Limited. pp. 97-109.

Banerjee, A., E. Duflo and N. Qian (2009). "On the Road: Access to Transportation Infrastructure and Economic Growth in China". *University of California Berkeley Working Paper.*

Baster, A. (1934). "The Origins of British Banking Expansion in the Near East". *The Economic History Review*. 5(1). pp. 76–86.

Baster, A.S. J. (1935). *The International Banks*. London: P. S. King & Son, ltd.

Behar, C. (1996). *Osmanli Imparatorlugu'nun ve Turkiye'nin Nufusu 1500-1927*. Ankara: Devlet Istatistik Enstitusu.

Berger, A. N. and A. A. Dick (2007). "Entry into Banking Markets and the Early-Mover Advantage". *Journal of Money, Credit, and Banking.* 34(4). pp. 775-807.

Berger, A. N. and P. Ostromogolsky (2006). "Effects of Banks on "Debt-sensitive" Small Businesses". *Journal of Financial Economic Policy*. 1(1). pp.44-7.

Berger, A. N., S. D. Bonime, L. G. Goldberg and L. J. White (2004). "The Dynamics of Market Entry: The Effects of Mergers and Acquisitions on Entry in the Banking Industry". *Journal of Business*. 77(4). pp. 797-834.

Besley, T. (1994). "How Do Market Failures Justify Interventions in Rural Credit Markets?". *World Bank Research Observer*. 9(1). pp. 27-47.

Biggs, T. (2002). "Is Small Beautiful and Worthy of Subsidy? Literature Review". *International Finance Corporation (IFC) Working Papers*.

Bikker, J. and J. Bos (2004). "Trends in Competition and Profitability in the Banking Industry: A Basic Framework". *DNB Working Papers No. 18.*

Bresnahan, T. F. and P. C. Reiss (1991). "Entry and Competition in Concentrated Markets". *Journal of Political Economy*. 99(5). pp. 977-1009.

Calem, P. (1987). "Interstate Bank Mergers and Competition in Banking". *Business Review*. pp.3-15.

Cameron, A.C., J.G. Gelbach and D.L. Miller (2008). "Bootstrap-Based Improvements for Inference with Clustered Errors". *Review of Economics and Statistics*. 90. pp. 414-427.

Cetorelli, N. (2002). "Entry and Competition in Highly Concentrated Banking Markets". *Economic Perspectives*. pp. 18-27.

Chakrabarti, R. and J. Roy (2010). "Do Charter Schools Crowd Out Private School Enrolment? Evidence from Michigan". *Federal Reserve Bank of New York Staff Reports No. 472*.

Claessens, S. and L. Laeven (2003). "What Drives Bank Competition? Some International Evidence". *Journal of Money, Credit and Banking.* 36(3). pp. 563-83.

Claessens, S., A. Demirgüç-Kunt and H. Huizinga (2001). "How does Foreign Entry Affect the Domestic Banking Markets?". *Journal of Banking and Finance*. 25. pp. 891-911.

Clarke, G., R. Cull, L. D`Amato, and A. Molinari (1999). "The Impact of Foreign Entry on Domestic Banks in Argentina". *The World Bank Development Research Group Policy Research Working Papers No. 2158*.

Clay, C. (1990). "The Imperial Ottoman Bank in the Later Nineteenth Century: A Multinational "National" Bank". in G. Jones (ed). *Banks as Multinationals*. London. pp. 149-157.

Clay, C. (1994). "The Origin of Modern Banking in the Levant: The Branch Network of the Imperial Ottoman Bank, 1890-1914". *International Journal of Middle East Studies*. 26. pp. 589-614.

Clay, C. (2008). “State Borrowing and the Imperial Ottoman Bank in the Bankruptcy Era (1863-1877)”. in Fraser, I. L., M. Pohle and P. L. Cottrell (eds). *East Meets West Banking, Commerce and Investment in the Ottoman Empire*. UK: Ashgate Publishing Limited. pp.109-23.

Coelho, C. A., J. M. P. de Mello and L. Rezende (2007). “Do Public Banks Compete with Private Banks? Evidence from Concentrated Local Markets in Brazil”. *PucRIO Working Papers*.

Cohen, A., and M. J. Mazzeo (2007). “Market Structure and Competition among Retail Depository Institutions”. *The Review of Economics and Statistics*. 89(1). pp. 60-74.

Cottrell, P. L. (2008). “A Survey of European Investment in Turkey, 1854-1914: Banks and the Finance of the State and Railway Construction”. in Cottrell, P. L., M. Pohle and I. L. Fraser (eds). *East Meets West: Banking, Commerce and Investment in the Ottoman Empire*. UK: Ashgate Publishing Limited. pp. 54-97.

Cull, R. (2012). “Bank Ownership and Lending Patterns During the 2008–2009 Financial Crisis Evidence from Latin America and Eastern Europe”. *The World Bank Development Research Group Finance and Private Sector Development Team Working Papers No. 6195*

Dell’Ariccia, G., Marquez, R. (2004). “Information and Bank Credit Allocation”. *Journal of Financial Economics*. 72. pp. 185–214.

Denizer, C. (2000). “Foreign Entry in Turkey's Banking Sector, 1980-97”. *The World Bank Policy Research Working Papers No. 2462*.

DeYoung, R. and I. Hasan (1998). “The Performance of De Novo Commercial Banks: A Profit Efficiency Approach”. *Journal of Banking and Finance*. 22. pp. 565-587.

Dolek, D. (2007). “Change and Continuity in the Sivas Province, 1908-1918”. *Unpublished MA Thesis*. Ankara: Middle East Technical University.

Easterbrook, F. H. (1972). “Toehold Acquisitions and the Potential Competition Doctrine”. *The University of Chicago Law Review*. 40(1). pp. 156-84.

Eldem, E. (1997). *135 Yillik bir Hazine Osmanli Bankasi Arsivinde Tarihsel Izler*. Istanbul: Osmanli Bankasi A.S..

Eldem, E. (1999a). “The Imperial Ottoman Bank: Actor or Instrument of Ottoman Modernization?”. *in Kostis, K. P. (ed). Modern Banking in the Balkans and Wes-European Capital in the Nineteenth and Twentieth Centuries. UK: Ashgate Publishing Limited. pp. 50-61.*

Eldem, E., (1999b). *A History of the Ottoman Bank*. Istanbul: Ottoman Bank Historical Research Centre.

Eldem, E., (2005). “Ottoman Financial Integration with Europe: Foreign Loans, the Ottoman Bank and the Ottoman Public Debt”. *European Review*. 13(3). pp. 431–45.

Eldem, V. (1994). *Osmanli Imparatorlugu’nun Iktisadi Sartlari Hakkinda Bir Tetkik*. Istanbul: Turk Tarih Kurumu Yayınları.

Engin, V. (1993). *Rumeli Demiryollari.* Istanbul: Eren Yayincilik.

Flamini, V., C. McDonald and L. Schumacher (2009). “The Determinants of Commercial Bank Profitability in Sub-Saharan Africa”. *IMF Working Papers*.

Frangakis-Syrett, E. (1997). “The Role of European Banks in the Ottoman Empire in the Second Half of the Nineteenth and in the Early Twentieth Centuries”. in Teichova, A., Kurgan-Van Henteruk, G and D. Ziegler (eds). *Banking, Trade and Industry in Europe*. Cambridge: Cambridge University Press. pp. 263-67.

Frangakis-Syrett, E. (1999).“The Economic Activities of the Greek Community of Izmir in the Second Half of the Nineteenth and Early Twentieth Centuries”. in Gondicas, D. and C. Issawi (eds). *Ottoman Greeks in the Age of Nationalism: Politics, Economy, and Society in the Nineteenth Century.* Princeton: Darwin Press. pp. 17-44.

Freixas, X. and J. Rochet (1997). *Microeconomics of Banking.* Cambridge: the MIT Press.

Geyikdagi, V.N. (2011a). *Foreign Investment in the Ottoman Empire: International Trade and Relations 1854-1914*. London: Tauris Academic Studies.

Geyikdagi, V.N. (2011b). “French Direct Investments in the Ottoman Empire before World War I”. *Enterprise Soc*. 12 (3). pp. 525-61.

Heffernan, S. A. (1993). “Competition in British Retail Banking”. *Journal of Financial Services Research*. 7(3). pp. 309-32.

Heffernan, S. A. (2002). “How do UK Financial Institutions Really Price their Banking Products?”. *Journal of Banking and Finance*. 26. pp. 1997-2006.

Heffernan, S. A. (2005). *Modern Banking*. England: John Wiley and Sons Ltd..

Hermes, N. and R. Lensink (2001). "The Impact of Foreign Bank Entry on Domestic Banking Markets: a Note". *University of Groningen Research Reports No. 01E62.*

Hermes, N. and R. Lensink (2004). "Foreign Bank Presence, Domestic Bank Performance and Financial Development". *Journal of Emerging Markets Finance*. 3(2). pp. 207-29.

Illich, N. S. (2007). "German Imperialism in the Ottoman Empire: a Comparative Study". *Unpublished PhD Thesis.* Texas: Texas A&M University.

Inalcik, H. and D. Quatert (1996). *An Economic and Social History of the Ottoman Empire 1300-1914*. Cambridge: Cambridge University Press.

Issawi, C.P. (1980). *The Economic History of Turkey, 1800-1914.* London: The University of Chicago Press.

Jeon, B. N., M. P. Olivero and J. Wu (2011). "Do Foreign Banks Increase Competition? Evidence from Emerging Asian and Latin American Banking Markets". *Journal of Banking & Finance*. 35(4). pp. 856-75.

Kalemli-Ozcan, S. and A. Nikolsko-Rzhevskyy (2009). "Trade, Finance, and Sovereign Debt: Historical Evidence". *University of Memphis Working Papers.*

Karkar, Y. N. (1972). *Railway Development in the Ottoman Empire, 1856-1914*. New York: Vantage Press.

Karpat, K. H. (1985). *Ottoman Population 1830- 1914: Demographic and Social Characteristics*. Wisconsin: The University of Wisconsin Press.

Kazgan, H. (1999). *Turkish Financial History from the Ottoman Empire to the Present*. vol: 1. Istanbul: Istanbul Stock Exchange.

Kerin, R. A., R. P. Varadarajan, and R. A. Peterson (1992). "First-Mover Advantage: A Synthesis, Conceptual Framework, and Research Propositions". *Journal Marketing*. 56. pp. 33-52.

Kolars, J. and H. J. Malin (1970). "Population and Accessibility: An Analysis of Turkish Railroads". *The Geographical Review*. 60. pp. 229-46.

Lensink, R. and N. Hermes (2004). "The Short-term Effects of Foreign Bank Entry on Domestic Bank Behaviour: Does Economic Development Matter?". *Journal of Banking & Finance*. 28(3). pp. 553-68.

Malueg, D. A. and M. Schwartz (1991). "Preemptive Investment, Toehold Entry, and the Mimicking Principle". *The RAND Journal of Economic*s. 22(1). pp. 1-13.

Matthews, K. and J. Thompson (2008). *The Economics of Banking*. Hoboken: Wiley.

McCarthy, J. (2001). *The Ottoman Peoples and the End of Empire*. New York: Oxford University Press.

McCloskey, D. N. (1985). 'The Loss Function Has Been Mislaid: the Rhetoric of Significance Tests". *American Economic Review*. 75. pp. 201–5.

Neuberger, D. (2007). "The Evolution of Direct Banking: Entry, Exit and Long-run Equilibrium". in Cornwall, L. M. (ed). *New Developments in Banking and Finance*. New York : Nova Science Publishers. pp. 137-59.

Owen, R. (2002). *The Middle East in the World Economy, 1800-1914*. London: Tauris and Co. Ltd.

Pamuk, S. (1987). *The Ottoman Empire and European Capitalism: 1820-1913*. Cambridge: Cambridge University Press.

Pamuk, S. (2000a). *A Monetary History of the Ottoman Empire*. New York: Cambridge University Press.

Pamuk, S. (2000b). *Istanbul ve Diger Kentlerde 500 Yillik Fiyatlar* ve Ucretler, 1469-1998. Ankara: Devlet Istatistik Enstitusu.

Pamuk, S. (2004a). "The Evolution of Financial Institutions in the Ottoman Empire, 1600-1914". *Financial History Review*. 11(1). pp. 7-32.

Pamuk, S. (2004b). "Prices in the Ottoman Empire, 1469-1914". *International Journal Middle East Studies*. 36. pp. 451-468.

Pohl, B. (2011). "Spillover and Competition Effects: Evidence from the Sub-Saharan African Banking Sector". *GIGA Working Papers No. 165*.

Reid, G. C. (1995). "Early Life-Cycle Behaviour of Micro-Firms in Scotland". *Small Business Economics*. 7(2). *Special Issue on New Firm Formation and Regional Economic Development*. pp. 89-95.

Schafer, D and O. Talavera (2007). "The Impact of Foreign Banks Entry on Domestic Banks' Profitability in a Transition Economy". *1st Annual Meeting of the Portuguese Economic Journal*. Acores, Portugal: Universidade Dos Acores.

Schoenberg, P. E. (1977). "The Evolution of Transport in Turkey (Eastern Thrace and Asia Minor) under Ottoman Rule, 1856-1918". *Middle Eastern Studies*. 13(3). pp. 359-72.

The Banking Almanac (1895-1914). *The Colonial and Foreign Bank Branches and Bankers.* London: Waterlow and Sons.

Thobie, J. (1991). "European Banks in the Middle East". in Cameron, R. and V. I. Bovykin (eds). *International Banking 1870-1914*. New York: Oxford University Press.

Toprak, Z. (2008). "The Financial Structure of the Stock Exchange in the Late Ottoman Empire". in Cottrell, P. L., M. Pohle and I. L. Fraser (eds). *East Meets West: Banking, Commerce and Investment in the Ottoman Empire*. UK: Ashgate Publishing Limited. pp. 143-61.

Tuncer, A. C. (2012). "Monetary Sovereignty During the Classical Gold Standard Era: the Ottoman Empire and Europe, 1880-1913". *LSE Working Papers No. 165/12.*

Unite, A. A. and M. J. Sullivan (2003). "The Effect of Foreign Entry and Ownership Structure on the Philippine Domestic Banking Market". *Journal of Banking & Finance*. 27(12). pp. 23-45.

Wang, T. (2011). "Competition, Terms of Credit, and Collateral in Early American Banking". *ASSA Meetings Working Paper*.

Wooldridge, J. F. (2009). *Introductory Econometrics: a Modern Approach*. Mason: South-Western Pub.

Xu, Y. (2011). “Towards a More Accurate Measure of Foreign Bank Entry and its Impact on Domestic Banking Performance: The Case of China”. *Journal of Banking & Finance*. 35(4). pp. 886-901.

Yildirim, H. S. and G. C. Philippatos (2007). “Restructuring, Consolidation, and Competition in Latin American Banking Markets”. *Journal of Banking and Finance*. 31(3). pp. 629-39.