THE LONDON SCHOOL OF ECONOMICS

AND POLITICAL SCIENCE

Doctoral Dissertation

Essays on Currency Unions and the International Monetary System in Historical Perspective

Roger H. Vicquéry

A thesis submitted to the Department of Economic History in fulfillment of the requirements for the degree of Doctor of Philosophy.
London, August 2021.

Declaration of Authorship

I certify that the thesis I have presented for examination for the PhD degree of the London School of Economics and Political Science is solely my own work other than where I have clearly indicated that it is the work of others (in which case the extent of any work carried out jointly by me and any other person is clearly identified in it). The copyright of this thesis rests with the author. Quotation from it is permitted, provided that full acknowledgement is made. This thesis may not be reproduced without my prior written consent. I warrant that this authorisation does not, to the best of my belief, infringe the rights of any third party.

I declare that my thesis consists of 39,144 words.

The opinions expressed are my own and do not necessarily reflect those of the Banque de France or the Eurosystem.

Abstract

This thesis contributes to the empirical literature on currency unions and the international monetary system, as well as to the economic history of the Italian unification.

The first essay relies on the Italian unification as a unique exogenous variation to the membership of a currency union, looking at the closest historical predecessor to the Euro. This allows me to estimate a causal common currency effect on trade. Relying on original bilateral trade data and structural gravity equations, I estimate a causal common currency effect in the order of 35%. This is notably smaller than the average point estimate in the literature. However, my findings corroborate the original policy implications of Rose (2000) in a quasi-experimental setting.

The second essay revisits the optimum currency areas (OCA) framework and its endogeneity, looking at a large wave of European monetary integration occurring in the third quarter of the 19^{th} century, ranging from the Italian unification to the gold standard. I find patterns of ex-ante OCA criteria consistent with the predictive power of the OCA framework, and at odds with their endogeneity hypothesis formulated by Frankel and Rose (1998). Focusing on the Italian unification, I find evidence in line with the pessimistic view of OCA endogeneity of Krugman (2001). I explore to what extent these findings speak to patterns of post-unification regional divergence in Italy.

The third essay measures the rise and fall of global currencies and the structure of the international monetary system (IMS) over two centuries, relying on a new monthly and weekly dataset of foreign-exchange returns going back to 1820 and the Frankel and Wei (1994) factor model. I show that, from a two centuries perspective, the current dollar hegemony is a historical anomaly. I furthermore find preliminary evidence consistent with a positive relationship between the intensity of competition among global currencies and the prevalence of global financial turbulence, in line with the recent theoretical contribution of Farhi and Maggiori (2018).

Dedication

To my parents.

To Carole.

Acknowledgements

This thesis would not have been possible without the help, advice and support of several people. I must first thank, with immense gratitude, Joan Rosés, my supervisor, for his constant help, patience and feedback on my work. Without his encouragement, I would have never pursued the archival work that led to the new data used in Chapter 2. Max Schulze offered invaluable intellectual and moral support at several stages during the PhD. I must thank him in particular for the insightful discussions we had on Chapter 3.

I was honored to have Chris Meissner and Hélène Rey as my examiners and I am very grateful to them for accepting to read the thesis. Their feedback and comments will materially improve future versions of the work presented below.

Among the LSE faculty, I want to thank in particular Albrecht Ritschl for the numerous occurrences he gave me some of his time, as well as Olivier Accominotti, Natacha Postel-Viney and Oliver Volckart for feedback and comments at various stages of the PhD. I would like to also express my sincere gratitude to Loraine Long, as well as to Rose Harris, Shuma Begum and Rita Astuti for their administrative support. The LSE has provided an exceptional environment to pursue a PhD and allowed me to visit and collaborate with several institutions, together with the financial support of the Economic and Social Research Council, which is gratefully acknowledged.

I am extremely grateful to Barry Eichengreen for allowing me to visit the Economics department at UC Berkeley. Being able to discuss my research with the same scholar whose books initiated my interest in international finance and monetary history as an undergraduate has certainly been an highlight of the PhD. His advice has immensely helped in thinking about Chapter 4.

I am thankful to the Bank of England's International Directorate, and Alex Haberis and Ambrogio Cesa-Bianchi in particular, for inviting me as a PhD intern and academic visitor, providing institutional and financial support for part of the work presented in Chapter 4. I want to warmly thank Carlos Van Hombeeck for his advice and backing in kick-starting the project presented in Chapter 4. His moral support has been crucial during the job market season. The personnel of the Bank of England's Library provided outstanding advice on

historical statistics.

Parts of this thesis were completed while visiting and working at the Banque de France. I am indebted to Edouard Vidon for first providing me with institutional support as a visitor in my third year and then allowing me to join the Banque as a staff economist. I am grateful to Carine Bouthevillain, Jean-Baptiste Gossé, Rémy Lecat and Pierre-François Weber for their support in the last stages of the PhD.

Among the scholars not previously mentioned that took time in their busy schedule to provide encouragement and detailed feedback, including as a discussant, I would like to thank, with the hope I am not forgetting too many, Antoine Berthou, Michael Bordo, Céline Carrère, Guillaume Daudin, Michele Fratianni, Reuven Glick, Hiro Ito, Pierre-Olivier Gourinchas, Jerome Hericourt, Sevim Kosem, Robert McCauley, Eric Monnet, Alain Naef, Larry Neal, Kevin O'Rourke, Helen Popper, Andy Rose, Thomas Ryland, Julia Schmidt, Jacopo Timini and Yoto Yotov.

Colleagues at the LSE and elsewhere helped immensely in relieving some of the pressure of the PhD life. Among many others, Andrea, David, Filippo, Greta, Mattia, Oliver, Ousmène and Thilo contributed to making the experience both intellectually stimulating and enjoyable.

I am beyond grateful to my parents for pushing me to further my ambitions and investing in my education. It is only thanks to them that I was able to make the relatively improbable journey from a small Alpine village to the LSE, via Paris, Berkeley and many other places. I dedicate this work to them. I am very grateful to my sister Annele, who endured my several research stays in Paris and generously provided hospitality and moral support.

Last but not least, I would not have completed this journey without my fiancée Carole. I feel indebted to her for all the support she has given me and I am blessed to have her by my side for all the adventures ahead. This work is dedicated to her.

Contents

List of Tables

List of Figures

Chapter 1

Introduction

This thesis intends to provide a "historical economics" contribution to the empirical literature on currency unions and the international monetary system, as well as to the understanding of a major historical precedent of European economic integration, the Italian unification.

In their introduction to the recently published Handbook of Historical Economics, Bisin and Federico (2021) describe a "merger" of approaches, leveraging the comparative advantages of economics and history. They observe the richness of the new wave of economic history that has recently emerged: what they define as "historical economics" is indeed concerned with *"using the formal tools of economics to study the past"* as well as *"searching in the past the answer to questions about current economic conditions"*.

The thesis is composed of three papers. The first two chapters use the Italian unification as a "laboratory" to revisit the empirical literature on currency unions, while reassessing the Italian unification from an optimum currency area perspective. The last chapter is concerned with the measurement of the international monetary system architecture over the last two centuries.

Chapter 2 relies on the Italian unification as a unique exogenous variation to the membership of an existing currency area to estimate a causal common currency effect on trade. As such, the paper follows the path of a growing literature on historical natural experiments. This strand

of the literature has produced important results on a number of issues related to international trade (Cantoni and Yuchtman, 2021). Bernhofen and Brown (2004) and Bernhofen and Brown (2005) provide an extremely clean identification of the causal effect of openness and confirm the predictions of the theory of comparative advantage relying on the exogenous transition of Meiji Japan from autarky to openness. Feyrer (2021) identifies the causal effect of distance on trade looking at the closure of the Suez Canal in 1967. Juhász (2018) provides evidence that protection can promote industrialisation, exploiting the heterogeneity in protection to French industries afforded by the Napoleonic blockade of continental Europe. Similar methods have been put to use on topical international macro-financial issues: Bordo et al. (2009) identify the causal effects of exchange-rates depreciation on country risk, relying on an exogenous shock to the relative price of silver and gold; Palma (2021) exploits the exogenous variation in money supply in early-modern Europe, driven by shipment of precious metals from the New World, to estimate a causal effects of monetary expansions on real activity. This chapter also provides a substantial data contribution by compiling, thanks to archival research, a bilateral trade matrix for pre-unitary Italian states in the years before and after the 1861 unification.

Chapter 3 is concerned with the predictive power and the endogeneity of the optimum currency areas framework, looking at the wave of national and international monetary integration occurring in the mid of the 19^{th} century. It also revisits the economic history of the Italian unification and the Southern Question from an optimum currency area perspective. This paper follows an established tradition in relying on history as a way to increase the number of available observations of rare economic events, such as crises or, in this case, the creation of monetary unions. This approach has been a key factor shaping the revival of economic history after the 2009 crisis (Antipa and Bignon, 2018), with a renewed interest in historical analogy to tackle policy issues (Eichengreen, 2012). The chapter also follows previous efforts, ranging from cultural economics (Guiso et al., 2004) to the economics of agglomeration (A'Hearn and Venables, 2011), to explore the complexity of the Italian Southern Question through the lens of a particular body of economics literature.

Chapter 4 measures the rise and fall of global currencies and the structure of the international

monetary system over two centuries. The evolution of the international monetary system is a perfect example of a slow moving economic process, particularly suited to historical analysis. I therefore follow the path of previous studies, both empirical (Eichengreen and Flandreau, 2009, 2012; Chiţu et al., 2014; Eichengreen et al., 2017) and theoretical (Rey, 2001; Farhi and Maggiori, 2018), in using historical analogy to put into perspective the current academic and policy debate on the role of global currencies and the prospects of the current dollar hegemony. Furthermore, this chapter also relates to an important literature that has contributed to macro-financial topics by compiling extensive long run datasets. These include the chronologies of Carmen Reinhart, Kenneth Rogoff and co-authors on de facto exchange rate-regimes (Reinhart and Rogoff, 2004; Ilzetzki et al., 2019) and, above all, financial crises (Reinhart and Rogoff, 2008, 2009, 2011). Other prominent examples are the measurement of the "rate of return on everything" since 1870 by Jordà et al. (2019), alongside their long-run macro-financial dataset Jordà et al. (2017), the "eighth centuries of global real interests rates" compiled by Schmelzing (2020) and the reconstruction of long-run money supply series since the early-modern period by Palma (2018) and Chen et al. (2021). It is my hope that the measurement exercise I perform in Chapter 4, based on a novel dataset spanning two centuries of exchange-rate data at monthly and weekly frequency, will open opportunities to empirically investigate topics such as the determinants of global currency status and the relationship between the structure of the international monetary system and financial stability.

In what follows, I first provide a critical review of the literature on currency unions and the optimum currency area framework, including from a historical perspective. Second, I summarise the history of the Italian unification and the literature on the Southern Question. Third, I summarise the key literature on international currencies, the role of the dollar and the international monetary system from theoretical, empirical and historical perspectives.

1.1. Optimum Currency Areas and Currency Unions in Historical Perspective

1.1.1. The Original Optimum Currency Area Framework

Following the seminal contribution by Mundell (1961), an Optimum Currency Area (OCA) is typically defined as the optimal geographic area where the benefits of irrevocably pegging the exchange rate amongst its members are higher than the costs. The larger the area a single currency is in use, the stronger we should expect its microeconomic benefits to be, as increasing returns to scale magnify the lowering of transaction costs. However, frictions and asymmetric shocks mean that a global single currency would represent significant macroeconomic costs.

Early work by Mundell (1961), McKinnon (1963) and Kenen (1969) framed the OCA question in terms of "properties", "prerequisites" or "criteria" that, by mitigating or reducing the likelihood of shocks, decrease the cost of forbearing nominal exchange rate as an adjustment tool. Five key "criteria" commonly considered by the literature are summarised below[1].

First, price and wage flexibility between and within regions ensure that the adjustment process to shocks is not associated with excessive unemployment in one of the regions and inflation in another, with labour costs and margins adjustments acting as a substitute devaluations. Nominal convergence and price flexibility are commonly understood as necessary conditions for an OCA. This reasoning goes back to Friedman (1953) and received a recent theoretical treatment in the context of currency unions in Schmitt-Grohé and Uribe (2016) and Farhi et al. (2014). A contrarian view on the issue is provided by Galí and Monacelli (2016), who underline the important role of the endogenous monetary policy response to downward wage adjustments. The latter is by construction absent within a monetary union, questioning the role of price flexibility as an OCA condition.

[1] The below treatment heavily relies on the comprehensive review of the early literature by Mongelli (2008)

Second, as argued by Mundell (1961), factor mobility reduces the need for relative price adjustments - be it through the exchange rate or prices. Reduced frictions and transaction costs for the movement of factors, and labor in particular, were at the core of the seminal OCA framework. Farhi and Werning (2014) provide a recent theoretical treatment of the effectiveness of migration in helping macroeconomic adjustment in currency unions characterised by nominal rigidities. They emphasise how the source of shocks is crucial in determining the welfare implications of migration within a currency area, with emigration being unambiguously welfare improving for external demand shocks if trade linkages are strong. The same intuition is developed empirically in a general equilibrium model by House et al. (2018). They find that absorption of shocks through factor mobility differs from adjustment through the exchange rate in several respects. In particular, they highlight a trade-off between higher dispersion in output levels with the former, and higher dispersion of inflation with the latter. Looking at capital mobility within a monetary union, Fornaro (2021) shows how its welfare effects are also ambiguous, as financial integration allows for multiple equilibria booms and busts.

Third, McKinnon (1963) argued that economic openness substantially reduces any benefits related to flexible exchange rates. The higher the share of tradables in the economy, the faster international prices are transmitted to domestic ones, limiting the potential for money illusion and negating the benefit of a devaluation. This argument bears some parallels with ongoing work on dominant currency paradigms (Gopinath et al., 2020) and the global financial cycle (Rey, 2013) and their implications for exchange rate regimes. For example, Egorov and Mukhin (2020) argue that regional currency unions are welfare improving in a dollar pricing world. Following the original intuition of McKinnon (1963) both open and small economies are typically considered more likely to have lower costs of monetary integration.

Fourth, Kenen (1969) elaborated the implications of fiscal integration at the currency area levels as a way to smooth asymmetric shocks. He highlighted the benefits of diversification in economic structures as a risk-sharing mechanism when common fiscal tools are present.

The idea of risk-sharing via fiscal integration brings us to the fifth key point raised by the early OCA literature, namely political integration. It places the OCA debate in the wider context of the international economic integration literature. Balassa (1963) first considered the dynamics effects of international integration, where steps towards integration make further integration desirable, outlining a tentative theory of sequencing "stages" of regional integration[2]. Through the political integration criteria, the OCA debate is also nested in a wider literature on the optimal size of the "Leviathan" going back to Brennan et al. (1980). They argued that an absolute ruler faces a fundamental trade-off between the size of his empire, allowing for a larger rent extraction, and an higher degree of heterogeneity, which increases the cost of ensuring a certain level of consensus, avoiding an insurrection. This intuition was transposed to the international integration debate by Alesina and Spolaore (2005). They also relate the size of the state to a trade-off between increasing returns to scale in public goods provision and decreasing homogeneity in the preferences of its inhabitants.

1.1.2. The Operationalisation of the Optimum Currency Area Framework

In the post-Bretton Woods era, the OCA literature was long consigned to an "intellectual limbo" (Tavlas, 1993). Its original insights were embedded in a world of discretionary monetary policy and limited international capital mobility. They also exhibited some internal inconsistencies.

Dellas and Tavlas (2009) provide an insightful overview of the paradoxes and conundrums of the original OCA framework. First, the various criteria were not necessarily consistent with one another. As an example, while small economies tend to be more open, they typically are less diversified. Furthermore, many criteria are ambiguous and contingent. Consider a union formed by a small and a large regions. The larger one will receive higher weight in the monetary authorities' policy function and would then potentially experience lower costs of giving up monetary policy autonomy. The diversification criteria is a case in point here. The implications of diversification are very different depending on other characteristics,

[2]Free trade area, customs union, common market, economic union and finally total economic integration.

as heterogeneous economies provide higher potential for risk-sharing insurance but also increase the likelihood of asymmetric shocks.

The OCA problem underwent a redefinition with the new emphasis on monetary credibility of the 1970s. In line with Barro and Gordon (1983), the point was made that the benefits of discretionary monetary policy were at best low for most countries, putting into perspective the main cost of monetary integration. On the other hand, monetary unions and hard pegs were associated with significant gains for less credible or poorer economies, providing inflation expectation anchoring and therefore reducing the output costs of low-inflation equilibrium (Alesina and Barro, 2001). Alesina and Barro (2002) provide an in-depth reinterpretation of the OCA framework blending some of the original OCA insight with the issue of monetary policy credibility. They argue that countries benefiting most from currency union are smaller, with low credibility and highly integrated with a large anchor-country in terms of trade and business cycle synchronisation. This framework had two implications. First, one should expect free capital mobility to reduce the appeal of intermediate regime solutions and induce countries to the corner solutions of either floating or anchoring the exchange rate in a hard-peg (Eichengreen, 1994). Second, the OCA framework can be reinterpreted as an anchor-currency choice problem. The latter was prominently featured in the European policy debate of the 1980s and 1990s under what contemporaries dubbed the *"German dominance hypothesis"* (Giavazzi and Giovannini, 1988).

Steps towards European monetary integration undertook in the last quarter of the 20th century also led to a renewed interest in OCA, from a more empirical, policy-driven perspective. This literature got around the inconclusiveness of the original OCA framework by focusing on shock asymmetry as a "catch-all" criteria (Mongelli, 2008). Bayoumi and Eichengreen (1998) highlighted how foreign-exchange disturbances could be accounted for empirically by OCA criteria, and particularly by proxies for shock asymmetries. Eichengreen (1991) and Bayoumi and Eichengreen (1992) compared and quantified shock symmetry in America and Europe, documenting higher disparities in nominal and real disturbances in the old continent. They raised two important issues that continue to influence the current policy

debate.

First, the problem of mitigating regional asymmetries through fiscal transfers and financial flows. An important strand of the literature attempted to quantify how different channels could smooth asymmetric shocks within currency areas. Asdrubali et al. (1996) found most shocks within the American monetary union to be absorbed by private interstate financial flows. Sala-i Martin and Sachs (1991) underlined the role of fiscal federalism in smoothing shocks in the US. Sørensen and Yosha (1998) highlighted the potential inconsistency between the Maastricht Treaty's limits to intra-Euro Area fiscal transfers and the lack of capital markets integration in Europe.

Second, the issue of a core-periphery dichotomy. Bayoumi and Eichengreen (1992) documented how, contrary to future members of the Euro as a whole, a small group of countries around Germany exhibited shocks of similar magnitude and cohesion as US regions. Bayoumi and Eichengreen (1997) provided an empirical framework combining an anchor-client perspective and their previous findings (Bayoumi and Eichengreen, 1998) on the relationship between OCA criteria and exchange-rate variability, to estimate a synthetic "OCA Index". They found high dispersion in ex-ante optimality within candidate countries to EMU.

Nevertheless, other empirical work on currency unions encouraged a more optimistic view of EMU. In a widely influential article, Frankel and Rose (1998) recognised that some countries appeared, on the basis of historical data, poor candidates for EMU entry. However, they argued that EMU entry *per se*, by decreasing transaction costs and consequently increasing business-cycle synchronisation, could endogenously bring them to fulfill the OCA criteria. In other words, if the OCA criteria are endogenous, countries are more likely to fulfill them ex-post than ex-ante, and borders of currency unions should be drawn larger than what might seem optimal ex-ante. Frankel and Rose also recognised the theoretical ambiguity of the link between trade integration and the symmetry of shocks. Their contribution was chiefly empirical in nature and based on a large panel of developed countries over several decades.

Further optimism on the prospects of EMU derived from a separate strand of work by Rose, showing a strong historical relationship between currency unions and bilateral trade. The inclusion of a currency union dummy in gravity equations inaugurated by Rose (2000), Glick and Rose (2002) and Frankel and Rose (2002) provided additional reassurances regarding the first leg of the OCA endogeneity feedback-loop. They showed a surprisingly strong[3] positive relationship between monetary unions and trade. The estimated effect was subsequently revised down, as new literature pointed to methodological (Baldwin, 2006) and econometric (Silva and Tenreyro, 2006) issues. Head and Mayer (2014) provide a meta-analysis of the literature showing bilateral trade to be 136% higher among currency union pairs of countries. Estimations are however highly sensitive to different specifications (Glick and Rose, 2016), heterogeneity (Chen and Novy, 2019) and subject to endogeneity concerns (Campbell, 2013)[4]. From an historical perspective, Eichengreen and Irwin (1995), Lopez-Cordova and Meissner (2003), Estevadeordal et al. (2003), Mitchener and Voth (2011) and Timini (2018) approached the question looking at the gold standard and other historical currency unions.

The relationship between monetary integration and business-cycle co-movements also remains disputed. First, Kalemli-Ozcan et al. (2003) argued early on that financial integration may actually lead to more asymmetric business cycles. This might be linked to increased levels of risk-sharing afforded by capital flows, that make specialisation more sustainable. Recent empirical work overcoming the complexity of computing bilateral measures of financial integration provided further evidence consistent with this view (Kalemli-Ozcan et al., 2013). The double-edged nature of this relationship was analyzed in the context of the European crisis by Bayoumi and Eichengreen (2020).

Second, the sign of the effect of trade integration on business-cycle synchronisation might well be contingent. Looking at how trade integration affect monetary policy trade-offs in general equilibrium, Cacciatore and Ghironi (2021) obtain results broadly consistent with Frankel and Rose (1998). However, a longstanding literature pointed early on to risks of increased monetary and trade integration actually having a negative impact on business

[3] In line with a double or even triple increase of bilateral trade.
[4] A more comprehensive review of this literature is provided in Chapter 2.

cycle coherence. In a 1993 article, Krugman (2001) drew lessons from regional crises in the American monetary union for the incoming EMU project[5], focusing on the then recent experience of Massachusetts. He argued that European monetary integration was likely to increase both the likelihood of asymmetric shocks as well as the magnitude of their impact, as European regions would increase their relative specialisation in line with American ones. The key channel going from increased integration to regional divergence was described as a combination of very low transaction costs and high factor mobility. This is because increased factor mobility within fixed-exchange regimes might encourage adjustment to shocks through quantities rather than relative prices, *"adding or shedding resources rather than adding or shedding industries"*. According to Krugman (2001), regional imbalances were also more likely to widen regional inequality more than in the US, in the absence of American-style fiscal federalism.

The ambiguity of the relationship between integration and cyclical synchronisation was empirically analyzed by Imbs (2004). He found the overall impact of integration on real co-movements to heavily depend on the degree of specialisation and its nature, whether intra or inter-industry. Looking, at sub-national data, where transactions costs are lower, he found evidence to suggest similarity of economic structure to be an important OCA criteria. Previous work tackling this question from an historical perspective include Mathy and Meissner (2011) and Flandreau and Maurel (2005).

Ultimately, which of Frankel-Rose or Krugman-type endogenous effects of monetary integration dominate is an an empirical question. Preliminary evidence on OCA endogeneity in the Euro Area is again mixed. Both pre-crisis (Lane, 2006) and post-crisis (Spolaore, 2013) summaries on the debate in the EMU context characterise the early 2000s hopes of OCA endogeneity as not having been matched by subsequent events. Chapters 2 and 3 of this doctoral thesis will provide a new perspective on both the bilateral effects of monetary integration on trade and the endogeneity of OCA criteria looking at the history of the Italian unification.

[5] A similar parallel was drawn by Eichengreen (1991) looking at Michigan.

1.1.3. A Brief Overview of the Lessons from History

The present work is far from the first attempt to draw lessons for the EMU project, and monetary integration in general, from history. While the contemporary experience of the US was the main point of comparison from which to draw parallels for the incoming EMU project (Eichengreen, 1990), since the 1990s a number of authors have revisited the history of both international and national monetary integration in the view of the OCA framework and EMU policy issues.

The gold standard experience featured prominently in this literature. Eichengreen (1995a) characterised as *déjà vu* the then ongoing debate on EMU and cautioned the aspiring architects of the common currency. He argued the 19th century gold standard showed how a currency areas can be sustained despite asymmetric disturbances without fiscal federalism, this was achieved with high tolerance for labor migration. Although he argued the classical gold standard provided some support for the fiscal rules inscribed in the Maastricht Treaty, he worried about their credibility and the risk of self-fulfilling crises. In this respect, a cautionary tale for the EMU came from the numerous parallels between the gold-exchange standard crisis of 1931 and the then recent EMS crisis of 1992. Flandreau et al. (1998) draw lessons from the classical gold standard on the role of members' debt sustainability and its interaction with the monetary policy stance. In particular, they noted how the European periphery only managed to join the gold standard at the turn of the century, owing to a period of high growth and a benign monetary stance in the core, following gold discoveries in South Africa and Klondike. Many of the above cautionary tales were ex-post prescient.

Post-crisis, Eichengreen and Temin (2010) argued there were many parallels to draw between the mismanagement of the European debt crisis and the way the gold-exchange standard contributed to the Great Depression. One of the lessons of history they bring forward is that fixed-exchange regime can magnify adverse shocks and international tensions in the absence of international monetary cooperation, as it becomes clear comparing 1931 and 2010. Deficit countries - Germany in 1931, Greece and other peripherals in 2010 - bore the lion share of

the adjustment, at least at first. Comparing the attitute of EU authorities towards Greece to those of US President Hoover, who ultimately had to accept a moratorium on German debt, the authors were - with insight, rightly - skeptical that a deflationary adjustment could bring Greek debt back to sustainability without debt restructuring.

In their review of the literature, O'Rourke and Taylor (2013) highlighted how the EMU and the classical gold standard differed markedly in terms of the ability to adjust to idiosyncratic shocks. Both economic and political factors influencing external adjustments within a currency area were, conversely, comparable when contrasting the experiences of the interwar gold-exchange standard and the Euro Area. They argued that, similarly to the Euro Area crisis context, wages following the Great Depression were sticky (Bernanke and Carey, 1996) while deflationary pressures (Fisher, 1933), magnified in some countries by fiscal contractions (Almunia et al., 2010), brought forward political extremism (De Bromhead et al., 2013). As a large literature has long found a strong relationship between speed of recovery from the Great Depression and early exit from the gold standard (Eichengreen and Sachs, 1985), they also argued threats of unsustainability loomed large on the future of the EMU.

As the closest predecessor to Euro, the Latin Monetary Union formed around France in 1865 also received substantial attention. At a time where European countries were debating whether to establish a centralised central bank as part of EMU, Flandreau (1993) analyzed the problem of coordination and inflationary bias in a monetary union from the perspective of the Latin Union experience with seignoriage. Flandreau (2000b) questioned early interpretations of the Latin Union as a mere political attempt to foster French international influence and underlined its economic rationale. As France became a leading capital exporter, incentives aligned both in France and capital recipients to make the Franc an international anchor. The destabilisation of the French external position after the 1870 defeat against Prussia as well as the lack of coordination mechanisms to prevent inflationary bias led to the failure of the project. In parallel to Flandreau, Einaudi (2001) wrote a very detailed account of the diplomatic history of the Latin Union. A key lesson he draws from the Latin Union experience (Einaudi, 2000) is that political commitment, but not necessarily political union,

is a necessary condition for international monetary unions to be sustainable.

The lessons from the Scandinavian Union and the Austro-Hungarian Empire monetary union were also considered. The former's experience can be hardly disentangled from the one of gold standard countries more broadly. Accordingly, Bergman (1999) notes that the Scandinavian Union was sustainable and functioned without frictions until WWI despite no clear evidence of OCA endogeneity looking at output disturbances. Flandreau (2003) revisited the experience of the Austro-Hungarian monetary union, focusing on its lessons for the institutional set up of the Euro. He argued that, in the Austrian empire, market discipline provided an effective line of defence to limit its members' deficits, despite the absence of fiscal rules. In Flandreau (2006), the same author focused on the bargaining dimension of monetary policy within a multinational union. Despite being the junior partner in the Austro-Hungarian union, Hungary influenced the common monetary policy in its favor, relying on threats to quit the union. Finally, Flandreau and Maurel (2005) looked at the OCA endogeneity issue from the perspective of the late 19^{th} century monetary arrangements. They found that, in the contexts of the gold standard, Scandinavian Union and the Austro-Hungarian empire, cyclical synchronisation increased with trade integration, with no signs of adverse specialisation effects. They however underlined how OCA endogeneity was consistent with levels of integration in line with international arrangements, and that furthering European integration more in line with a national market might well make Krugman-type effects of monetary union more relevant.

Accordingly, national experiences of monetary integration were also examined by the literature. The history of the US monetary union spurred several attempts at drawing lessons, both before and after the Euro crisis. Eichengreen (1990) noted early on that US history showed that monetary integration would increase pressure for forms of fiscal federalism and required higher levels of financial integration among Euro member states. Rockoff (2003) re-examined over two centuries of American history, highlighting how it is far from clear whether the US formed an OCA before at least the 1930s, when fiscal federalism was substantially enhanced following the New Deal. Throughout American history, asymmetric shocks

occurred, spurring debates about regional effects of monetary policy. One such episode that has long received substantial attention is the demonetisation of silver in 1873, which had a pronounced deflationary impact with vastly differing consequences for creditor regions in the East Coast and debtor regions in the Mid-West (Rockoff, 1990). This regional shock had a long political shadow, as it emboldened a populist pro-inflation, anti-gold standard movement who ultimately took control of the Democratic party nomination and came close to winning the presidency in 1896 (Friedman, 1990). Eichengreen et al. (2019) recently quantified the impact of adverse monetary conditions on the 1896 electoral results at the county-level. Frieden (2016) surveyed those long-run political conflicts around monetary policy. Post-crisis, in their article entitled "Cross of Euros" O'Rourke and Taylor (2013) directly referenced the slogan of the American populist candidate William Jennings Bryan, who concluded its address to the 1896 Democratic National Convention accusing its adversaries of the willingness to *"crucify mankind upon a cross of gold"*. They highlighted how the US experience as a monetary union changed dramatically following crisis episodes. The Civil War brought about currency and banking harmonisation as well as debt mutualisation and a no-bailout clause. The 1907 panic ultimately led to the creation of a federal central bank in 1913. Following the Great Depression, a fiscal and banking union solved many of the chronic issues experienced during the first century of the American monetary union, providing a foot-print for solving the sovereign-banking doom-loop experienced by the EMU after 2010. More recently, the lessons from US history were developed in a report commissioned by the European Commission to the Peterson Institute of International Economics (Kirkegaard and Posen, 2018). They provided detailed lessons on the sequencing followed by the US towards fiscal and banking integration.

Other experiences of relatively recent national monetary integration, such as Germany and Italy, were examined in search of historical lessons, albeit to a lesser extent. Holtfrerich (1993) looked at the then topical issue of the sequencing between economic, monetary and political integration from the perspective of German history. He argued that, although it followed a secular process of economic integration, monetary integration in Germany preceded political integration, in line with the then Maastricht project. James (1997) revisited the sequencing of

the German monetary unification, partly disagreeing with Holtfrerich (1993). He underlined how the first decades of German unification in the 19th century brought forward a number of political conflicts around the control of the central bank, competition among financial centers and, later on, the appropriate level of fiscal policy. Central bank reforms and the functioning of monetary policy in the newly unified German Empire were the core theme of recent work by Mandeng (2019). He argued that a decentralised monetary policy conduct was an effective stabilisation tool within a regionally diverse German Empire.

The Italian monetary unification received comparatively less attention, providing partial motivation for some of the present doctoral work. Monetary historians, such as De Mattia (1959) and Di Nardi (1953) studied early on the relatively complex arrangements that led from multiple central banks inherited from pre-unitary states to a coherent central banking framework following unification. Recent work by Chiaruttini (2020) explored in more details the integration of the banking system and its regional implications post-unification. With respect to the historical lessons for monetary unions from the Italian unification two previous contributions exist. Collet (2013) provided a quantitative analysis of pre-unitary states' bond pricing following the consolidation of pre-unitary debts, looking at factors that increased the perceived credibility of the sustainable character of the Italian union. Foreman-Peck (2005) is the closer forerunner to some of the work in this thesis. He argued that Italy was far from being an OCA at unification, and that unification itself likely brought about specialisation effects dominating over any OCA endogeneity phenomenon. I provide a more in-depth, empirical formalisation of some of his arguments in Chapter 3.

1.2. The Italian Unification: Economic Integration and Divergence

The Italian unification is the "laboratory" I rely on to study monetary integration in Chapters 2 and 3. What follows summarises the historical events surrounding the geopolitical shock that constituted the unification of the Italian peninsula, the monetary unification

process and key themes on the Italian economy in the 19th century, with a particular focus on the early history of the North-South economic divergence.

1.2.1. From a "Geographical Expression" to Full Political Integration

At the eve of the Congress of Vienna, the Foreign Minister of the Austrian Empire Von Metternich described Italy as a mere "geographical expression". Less than half a century later, the Italian peninsula was ruled as a centralised state under the Savoy Monarchy. To appreciate the interest of the geopolitical shock of the Italian unification as a laboratory to study economic integration it is crucial to underline how the eventual outcome of this process was, until a few months before 1861, to a large extent both unintended and unexpected (Barbagallo, 2017).

An Unforseen Union

Prior to unification, the Italian states had very loose economic, political and even cultural links. Economically, intra-Italian trade was around 15-20% of Italian polities' total trade (Federico and Tena-Junguito, 2014). Politically, while all states shared the same frustration towards various forms of foreign domination or interference, eight sovereign or semi-sovereign states existed, with an increasing degree of diversification in terms of political regimes starting in the late 1840s. Culturally, the great Italian linguist De Mauro (2017) estimated that, at unification, Italian speakers amounted to less than 2% of the then population, with a higher estimate of 10% if speakers of central-Italian dialects and the Church's hierarchy are included.

It is true that an elite nationalist movement arose in both the political and cultural domains in the early 19th century. While heterogeneous, the early "patrioti" were political radicals that did not hesitate to resort to secret societies and terrorism, wishing, like Giuseppe Mazzini to establish a centralised Italian Republic. In reaction to Mazzini's revolutionary nationalist-republican movement, a "moderate" political movement arose, advocating the independence

of Italy from Austrian influence and some degree of integration between the then existing Italian kingdoms. While the moderates' believes were rather heterogeneous (Banti, 2013), they broadly differed from Mazzini's project in a key respect. Far from advocating a unitary, centralised Italian republic, what they had in mind was an Italian confederation of kingdoms, modelled over the German Confederation, possibly under the moral authority of the Pope (Hearder, 2014).

The moderate project came close to being kick-started in the 1840s, when the constitution of a "league" involving the Papal States, Tuscany and Piedmont was at an advanced stage of negotiation. However, the 1848 revolutions definitively put an end to the project. At the same time, the radical party under the leadership of Mazzini continued its terrorist activities. Two attempts to kill the French Emperor were made in 1855 and 1858 by Italian anarchists. Those attempts were exploited by Piedmont-Sardinia to gain the support of France and Britain as the guarantor of geopolitical stability in the Italian peninsula (Romeo, 1984).

The final set up of a unitary Italian Kingdom is then the result of the interaction between the contradictory aims of moderate Piedmontese politicians and radical Italian "patriots". This interaction led to a major, unexpected, geopolitical shock, as in the space of a few months most of the pre-unitary Italian states were annexed, as part of a centralised state, by Piedmont-Sardinia.

The Unification Shock

Piedmontese Prime Minister Cavour, an influential figure in European diplomatic circles, is without doubt the key character behind the events that unfolded in the Italian peninsula around the unification. Nevertheless, Cavour never planned for Italy to become unified nor pursued territorial expansion towards the South of the peninsula before events forced him in that direction (Mack Smith, 1958). He described as "silly non-sense" the mere idea of Italian unification in a letter to a close adviser as late as 1856. The goals of Cavour were, more practically, territorial expansion into neighboring Lombardy-Venetia and a weakening

of Austrian influence in the peninsula.

Conservative elites in Northern Italy might have been attracted to the idea of an anti-Austrian Italian confederation put forward by moderate catholic intellectuals such as Vincenzo Gioberti (Gioberti, 1848). However, as mentioned above, they largely opposed Italian nationalism as a dangerous, radical proposition. Their views and interests contrasted markedly with the ones of the small extremist groups of conspirators who supported the Italian national cause. Those extremist views were not shared by the general population either. Several attempts to foster popular revolts in favor of Italian nationalism failed in the fifty years preceding unification, due to lack of broad-based support (Banti, 2013).

Paradoxically, that same fear of political instability, which was inherently associated with Italian nationalism in the first part of the 19th century, ultimately pushed the Piedmontese elite to support the creation of a centralised Italian state, in the aftermath of the war against Austria in 1859.

In 1858 Cavour and Napoléon III met in Plombières to negotiate France's military support against an imminent Austrian attack on Piedmont-Sardinia. The two statesmen agreed, in case of victory against Austria, on a Piedmontese territorial expansion into Lombardy and Venetia and on the creation of a loose Italian confederation. This was very far from the centralised political, economic and monetary union that unfolded only a couple of years later.

The success of the French-Piedmontese armies in the first stage of the 1859 campaign led, as expected, to the annexation of Lombardy by Piedmont-Sardinia. However, several unintended developments tilted the course of events towards Italian unification (Romeo, 1984).

First, Napoléon III dropped his support for Piedmontese expansion into Venetia, frustrating Cavour's ambitions. The Emperor insisted that Central and Eastern Italy were to remain under Austrian influence and an Italian confederation presided by the Pope was to be created. This partial disavowal of the original French-Piedmontese pact made the conservative Piedmontese elite keener on bolder initiatives against the status quo (Romeo, 1984).

Second, anti-Austrian riots took place in several cities in central Italy in the second half of 1859. Faced with the risk of revolution in neighboring states and the opportunity of further territorial expansion, Cavour skilfully secured the annexation of the smaller Italian duchies as well as the Granduchy of Tuscany and the Romagna territories by March 1860.

Third, in May 1860, Garibaldi's private militias landed in Sicily. Cavour likely opposed the expedition and unsuccessfully attempted to stop to it (Smith, 1988). However, the Sicilian and Neapolitan army unexpectedly collapsed against an out-numbered Garibaldi. As Garibaldi's expedition was able to march on Naples by August 1860, Cavour was once again forced to adapt. The threat of a revolutionary government in Naples pushed Cavour and the great powers to support the annexation of the Two Sicilies by Piedmont-Sardinia in October 1860. As a result, in March 1861 the Kingdom of Italy was officially formed, paving the way for the unification process.

State Building, "Piedmontisation" and the Southern Question

The sudden annexation by Piedmont-Sardinia of a territory several times its own size, with the threat of Austrian attacks still looming, immediately brought to light the issue of state building. The Piedmontese were conscious of the significant heterogeneity of the newly acquired states, in terms of administrative habits, economic preferences and "social capital". Cavour, who died right after unification in 1861, foresaw the risks of having to recur to military force in order to get the state building process under way. Four years of civil war in the South, causing more deaths than the preceding Sardo-Austrian wars, were to follow the proclamation of the Kingdom of Italy (Barbagallo, 2017).

The only way the Piedmontese elite could consolidate their territorial gains and organise the new state in the space of a few months, was a blanket extension of their own institution to the rest of the country, a process known as "Piedmontisation". Within the monetary domain, this process provides an ideal exogenous variation that is at the core of Chapter 2. The extension of the, French-inspired, centralised approach to government of Piedmont to very heterogeneous

territories was bound to create tensions and idiosyncrasies. At the same time, as unified Italy adopted Piedmont's custom unions, monetary standard and civil service in less than five years, legacies of the pre-unitary states persisted. "Piedmontisation" was resented by many in the South, even leading to accusations of "colonialism" (Barbagallo, 2017). Those idiosyncrasies led to a "weak centralism" (Melis, 2014) with implications regarding both economic policy and the speed of national market integration. This background bears the question of a no-unification counterfactual where Italian states take a more progressive route towards integration, more akin to how Germany integrated, which is part of my analysis of the Italian unification through an OCA prism in Chapter 3.

1.2.2. The Italian Economy in the First Globalisation

The period going from the Italian unification to WWI coincides with an initial tail of sluggish growth (1861-1896) followed by the beginning of a prolonged economic catch up that lasted until the early 1990s (Toniolo, 2013). To assess Italy's economic performance throughout the 19^{th} century one has to start from its initial condition of relative backwardness, the fruit of a process of economic declinet. Italy went from being Europe's richest area in the 16th century to a GDP per capita roughly half of that of Great Britain in 1861.

The first thirty years of unification saw Italy's relative decline with respect to the productivity frontier continuing, despite favorable global conditions (Toniolo, 2013). With an annual average GDP per capita growth of 0.6%, Italy's growth lagged behind both the United Kingdom and other peripheral countries over the period. Growth was largely driven by factor accumulation, as labor force participation reached its all-time peak in 1881 and fixed-investment grew steadily between the end of the third Sardo-Austrian war and the 1890s. On the other hand, TFP growth remained at 0.6% for the agricultural sector and close to zero for industry and services. The debate over the question of why, for close to four decades, the Italian latecomer was largely precluded from modern economic growth remains open. The first interpretations in the 1950s ranged from the lack of "original accumulation" and infrastructure (Romeo, 1959) to the absence of the "agents of industrialisation" that were

universal banks (Gerschenkron, 1955). Fenoaltea (2011) later emphasised the weight of the international cycle, and particularly capital flows, on the growth of those years. Toniolo (2013) raises the interesting issue of why growth did not accelerate in the aftermath of unification, despite a clear upside to potential output coming from the creation of a single market and institutional change. While external shocks and policy mistakes - the trade war with France in the 1880s, the 1890 banking crisis and the recurrent fiscal instability - played a role, Toniolo underlines how the unfolding of economic and institutional convergence remained slow, explaining part of the growth sluggishness in the early years of unification.

While by the late 1890s Italian GDP per capita had fallen to 38% of the British one (it was 45% in 1870), at the eve of WWI it had reached almost 54%. Ciocca (2007) observed how only one fifth of this sharp acceleration is attributable to cyclical factors, the rest being caused by a structural change in the trend. In 1897-1913, real GDP grew on average by 2.4% per year, thanks to sustained growth in industrial production and overall productivity. Modern industries such as metal making, electricity and electro-mechanics expanded at double digit pace, on the back of foreign direct investment and technology transfers concentrated in the Turin-Milan-Genoa triangle. The monetary and fiscal stabilisation brought about after the 1890s banking crisis contributed to a policy environment supportive of foreign capital flows, as interest rates slowly converged to the European core levels.

While then Italy as a whole started to converge in the 1890s, this is also the period where the Southern Question arose to prominence in the Italian policy debate.

1.2.3. An Overview of the Early Italian Southern Question

The Pre-Conditions: from the Spring of Nations to 1861

The political process that led to the unification marked the collapse of the then largest Italian state, the Kingdom of the Two Sicilies led by the Bourbon monarchy, as well as the success of the expansionary designs of the Kingdom of Piedmont-Sardinia. The comparison

with the German unification, and the role played by Prussia in its unfolding, raises the question of how small Piedmont, which until a few years before 1861 certainly fitted the description of an "Ancien Régime" backward country, managed to play such a hegemonic role in the Italian peninsula. Both Piedmont and the South largely shared a common fate in a foreign dominated Italy throughout the Napoleonic wars - when partly francophone Piedmont was annexed to France while a Bonaparte king ruled on Naples - and the post 1815 Restoration (Hearder, 2014). A number of authors, including Barbagallo (2017) and Felice (2013) identify the origins of the North-South divergence by contrasting the institutional reactions taken by the Savoy and Bourbon monarchies to the 1840s uprisings. Under Carlo Alberto and Vittorio Emanuele I, the Kingdom of Piedmont-Sardinia successfully managed to take a relatively smooth path towards institutional modernisation. First, by reforming the legal codes, largely reintroducing the Napoleonic ones. Second, by introducing a *de facto* constitution (the "Statuto") in 1848 and resisting Austrian demands to withhold it following the defeat in the first Sardo-Austrian War (Hearder, 1983). On the contrary, the Kingdom of the Two Sicilies, remained anchored to its aboslutist institutions and thus continued to be afflicted by internal institutional conflicts, between Sicily and the mainland on the one side, and the monarchy and the Neapolitan liberal elites on the other side. The withholding of the 1848 Neapolitan Constitution as well as the fierce repression of Sicilian separatists in 1849 led to a substantial international isolation of the Bourbon monarchy, famously depicted by William Gladstone as the *"negation of God erected as a system of government"* (Hearder, 2014).

The results of this divergence became visible in the decade that precedes unification in key areas commonly associated with early stage economic development (Felice, 2013). In terms of infrastructures, despite the first Italian railroad having been built between the Bourbon summer palace of Portici and Naples in 1839, Piedmont counted 25 meters of railroads per km^2 in 1859 against 0.9 meters in the Two Sicilies. A similar picture emerges looking at financial development, as only one out of the 130 savings banks operating in the Italian peninsula was based in the Two Sicilies at unification, as well as human capital: in 1861 the literacy rate in the South was 14% against 50% in Piedmont and Lombardy. All in all, while in a low productivity pre-industrial economic environment the above divergence might

not have translated into a marked difference in terms of income per capita, the question of why this gap persisted despite the adoption by the South of the same institutions also bears the question of looking at counterfactuals and the potential adverse effects of economic integration.

The Initial North-South Divide

Despite the increasing North-South gap in terms of institutions, infrastructure and human capital observable in the 1850s, the extent of the purely economic differential between the Centre-North and the Two Sicilies in 1861 is vastly debated. An early, widely influential estimate by Eckaus (1961) put the gap at 15-20%. On the other hand, a number of authors have attempted to downplay the gap at unification, a view in line with Southern economists of the late 19th century (Nitti, 1900). For example, Fenoaltea et al. (2007) argue that such a large gap is inconsistent with the 1871 "hard" estimate of regional industrial productions, showing a level of industrialisation broadly comparable across the Western Italian regions from North to South.

More recent cliometric estimates of income per capita by Felice and Vecchi (2015) and Daniele et al. (2007) also show markedly different results, with the former pointing to an initial gap close to 15% early estimates of by Eckaus (1961) and the latter arguing against any meaningful regional gap at unification. Overall, given the absence of direct quantitative evidence on regional GDP before 1871, both approaches to the existence of an 1861 gap rely on an indirect interpretation of what was the trajectory of the gap between 1861 and 1871. In other words, different views on the net early effect of unification point to different assessments of the 1861 gap. Daniele and Malanima implicitly assume that the net effect of unification was a negative one, as the Southern economy was weakened by popular unrest and the adoption of the Piedmontese tariff. Conversely, Felice underlines how the negative effect on industry was probably more than compensated for by the advantages of free trade and infrastructure investment for the Southern tradable sector, which should have translated in a decrease in North-South inequality, as national GDP per capita barely grew in the 1860s.

To summarise, while there is agreement about the fact that big socio-institutional differences predate the unification, it is unclear whether those same differences already translated into an economic gap before the start of a proper industrialisation of the country in the 1880s.

Measuring the 1861-1914 Divergence

One way to reconcile those different views on the North-South gap starting point might be to consider the role of inequalities within pre-unitary states: the "Ancien Régime" economic geography of pre-unitary Italy, where clustering occurred around the capital city, is likely to have determined greater divergence in output within rather than between pre-unitary polities in the early stage of unification (Fenoaltea, 2011). Unsurprisingly, regional disparities were lower than in other European countries in 1871 (Iuzzolino et al., 2013).

The two cliometric reconstructions of North-South income differentials by Daniele et al. (2007) and Felice and Vecchi (2015) outlined above, while disagreeing on the early years, largely converge in their measure of the gap as soon as the industrialisation becomes broader based. While industrialisation does not differ markedly in 1871 between Piedmont and the Naples region, the period up to World War I marks the impressive rise of the "industrial triangle" (Milan-Turin-Genoa) in the North-West. The relative North-South industrialisation performance is only partially explained by the initial specialisation in sectors that will register lower growth over the following decades. Indeed, the growth rate of the new "modern" sectors such as basic metals, engineering, and chemicals was almost double in the North-West compared to the South. By 1911, GDP per capita in the South was only shy of 80% of the Centre-North level (Iuzzolino et al., 2013).

The deepening of the gap was however not the product of industrialisation alone. The rise of the "industrial triangle" coincides with a major external shock to the modern, export-oriented farming sector in the South, driven by the trade war with France and the international agrarian crisis of the late 19th century (O'Rourke, 1997). Davis (1999) sees the effect of this severe blow as a key development in the history of the Southern Question, leading to mass

migration[6]. The latter actually contributes negatively to the regional GDP per capita gap until the early 20th century, as the ratio of gross migration to total population remained higher in the Centre-North throughout the 1880s and 1890s (Felice, 2007). Even at the peak of mass migration from the South, the positive population effect on the GDP per capita gap was dwarfed by the numerator effect by a factor of three (Iuzzolino et al., 2013). Migration patterns also differed in terms of destination, with Southerners largely migrating to the Americas and therefore registering a lower repatriation rate. An appreciable (positive) effect from internal migration on macro-regional income inequality is not to be felt until the post-WWII period.

All in all, the North-South gap widened at the turn of the century, as industrial activities vastly concentrated in the "triangle". This is when the Southern Question arises as a policy issue, as public discussions of "two Italies" became widespread. It is important to bear in mind that at the eve of WWI, the dimension of the gap is still far from the dramatic levels that it will reach in the interwar period, remaining lower than the one registered between the components of the Hapsburg empire[7]. Still, while industrialisation in the "triangle" translated into a divergence of GDP per capita amounting to 18 percentage points between the East and the West, the same figure was significantly higher for the North-South gap at 26 percentage points.

Interpretations of the early Southern Question

In more than a century of persistence of the Italian North-South divide, several interpretations of its causes have emerged.

The first interpretations made by contemporaries emphasises the cultural backwardness of the Mezzogiorno (Franchetti and Sonnino, 1877), looking at the political clientelism and extreme poverty of the Southern countryside. They framed the Southern Question as a "national question" relating it to the broader flaws of the limping centralised state brought

[6]This shock will be analyzed through the prism of the OCA literature in Chapter 2
[7]But significantly higher than in the Germany (Iuzzolino et al., 2013).

about by the unification shock. The recent emphasis on institutional and cultural factors as drivers of the Italian regional divide bears many echoes with those very first analyses. This strand of literature goes back to Banfield (1967) and his classical study of ”amoral familism” - a fundamental lack of social capital and trust - as a key impediment to the provision of public goods and modernisation in the South. This was recently analyzed in an experimental setting by Bigoni et al. (2016). From an historical perspective, Putnam et al. (1994) traced back the cultural-institutional divergence between Northern and Southern Italy to the Middle Ages, opposing the Center-North Italian city state model to the feudal Norman monarchy that dominated the South. Differences in mutual trust among Italian regions owed to long-run historical path-dependences have causally been linked to key aspects of economic development, including financial deepening (Guiso et al., 2004) and institutional accountability (Nannicini et al., 2013).

A second generation of *“meridionalisti”*, the one that coincides with the 1880s industrialisation of the Northern “triangle”, linked the divergence to specific economic policies of the newly unified State. Nitti (1900), a leading proponent of a unification-induced duality, estimates a large net positive fiscal contribution from the South to the unified Italian State. He claimed higher taxation per capita in the South drained resources from the former Two Sicilies allowing for the industrialisation of the North-West. The consolidation of the pre-unitary states debts, where Piedmont alone accounted for more than half of the initial debt level, owing to several conflicts with Austria, the blanket extension of the Piedmontese tax code and public spending dis-proportionally allocated to the North were, according to Nitti, at the core of the Southern Question. A similar assessment of a fiscal residual penalising the South in post-unification Italy was implied by Fortunato (1973).

The trade policy of unified Italy has long been a point of contention. A ”folk view” of the Southern Question sees the extension of the Piedmontese tariff to the South as a key driver of regional divergence, with the Southern ”infant industry” being wiped out by the unification shock. It is certainly conceivable that the highly protectionist South experienced adverse effects from an abrupt shift to what amounted to practically free trade (James and O’Rourke,

2011). However, no precise quantification of the effects of trade policy at unification is available[8]. The political economy of tariff policy between the agricultural South and the industrial North and the effects of trade policy in the decades following unification have also been a central theme of the early literature, summarised by James and O'Rourke (2011). However, as shown by Federico and Tena-Junguito (1998) and Federico and O'Rourke (2000) Italian protectionism was far from being out of the ordinary when compared to countries with similar economic structures and characterised by capital scarcity.

The view that Italian dualism was driven by specific economic policies has been more generally opposed by a number of scholars, starting with Fortunato (1904) underlining the poor natural endowment of the South, and followed by Zamagni (1984) and Cafagna (1989). This alternative strand of literature has emphasised starting endowments and economic geography types of determinants in explaining the Southern Question. Estimating provincial real wages since 1861, a recent contribution by Federico et al. (2019) traces the divergence to different starting levels in human capital. A'Hearn and Venables (2011) review the economic geography's approach. They argue that the first three decades of unification saw Heckscher-Ohlin-type channels favoring the North, which was better endowed in natural resources related to agglomeration in the key silk industry. Starting in the 1880s, with the deepening of a national Italian market (Federico, 2007), New Economic Geography-type of channels, relating economic agglomeration to market access, are again consistent with a further deepening of the economic gap in favor of the North. This characterisation was further confirmed by Missiaia (2016, 2019) looking at GDP per capita and the localisation of industry. In Chapter 3, I explore whether a further argument can be made about integration-induced specialisation, alongside the Krugman-view of OCA endogeneity (Krugman, 2001), in explaining part of the early manifestation of this exceptional phenomenon or regional divergence.

[8]This gap could however be filled relying on new data collected as part of my analysis of the trade effect of the monetary integration shock in Chapter 2 and not yet exploited.

1.2.4. Monetary Unification and the Exchange Rate Regime

The following summary of monetary developments in post-unification Italy heavily relies on the classical book by Fratianni and Spinelli (2005). Two key dimensions, tightly linked with the process of political integration achieved in 1861, characterise those developments. First, the institutional structure of the monetary regime, with the destabilising features of a decentralised system of banks of issue. Second, and more importantly to the themes of this thesis, the difficulties experienced by a peripheral country, reliant on foreign capital, to strike a balance between adherence to the gold standard and the adjustment to local and global shocks.

At unification, nine, broadly defined, banks of issue operated in the Italian peninsula. This reflected a wide diversity in the stock of currencies and monetary policies in force in the pre-unitary States. The Piedmontese Banca Nazionale immediately emerged as the only bank of issue with a truly national presence, even though six "legacy" banks of issue continued to operate. However, multiple banks of issue prevented a effective banking regulation (Di Nardi, 1953), leading the way to a large banking crisis in the early 1890s (di Meana and Sarcinelli, 1990). This encouraged to further centralisation of monetary power in 1893 with the creation of the Banca d'Italia[9]. Despite this progressive transition to a single central bank, the harmonisation of metallic circulation[10] was implemented as soon as 1862 extending Piedmont's monetary standard to the annexed territories. As such, the Italian polities annexed by Piedmont found themselves part of a wide European area using a currency standard intrinsically equivalent to the Frenc Franc. In 1865, unified Italy will join the Latin Union as a founding member.

Fratianni and Spinelli (2005) identify the tension between fiscal dominance and monetary stability as a recurrent stylised fact in Italian monetary history. At 45% of GDP immediately after unification, Italian government debt almost doubled by 1866, leading to an increase in the risk premium and a substantial outflow of metal at the eve of the third Sardo-Austrian

[9]The two Southern banks of issue were however to survive in their capacity until 1926.
[10]Which represented the overwhelming majority of the monetary stock at unification.

war of 1866. This led to the introduction of a parallel, inconvertible paper circulation. The latter was meant to be a temporary measure, with convertibility to be resumed soon after the war. However, the paper lira became officially convertible only for a brief period in 1883. At the same time, the lira was, throughout the 19th century, relatively close to its gold parity, at odds with most of the periphery.

Tattara and Volpe (2002) characterise the Italian authorities constant hesitation between the flexibility of a parallel paper standard and the credibility benefits of the gold standard, for a country hugely reliant on capital inflows, as a "gold shadowing" regime. They argue that this regime, while allowing for temporary deviations, resulted in monetary and nominal developments fairly in line with full adherence to the gold standard. Indeed, contrary to other instances of peripheral countries, nominal movements of the paper lira were frequent but never exceeded a 10% depreciation versus the gold lira. Also, foreign inflows substantially mitigated the inflationary potential of monetary shocks, as the price index remained remarkably stable within the overall pre-WWI period. Investigating this apparent inconsistency between long lasting in-convertibility and relative monetary stability, Tattara (2003) observes that "gold shadowing" was partly sustained through forms of financial repression. In particular, Italian authorities segmented their sovereign debt market, with foreign residents being granted repayments in gold lira in Paris or London.

"Gold shadowing" meant Italy pursued a monetary stance markedly different from the one of floating peripheral economies. While other poor Mediterranean economies were able to adjust to shifts in agricultural prices through the nominal exchange-rate, Ciocca and Ulizzi (1990) estimate that the lira experienced a real-effective appreciation in the order of 30% between 1870 and the turn of the century[11]. The link between the deterioration of the agricultural terms of trade and the Italian exchange-rate policy was noted by contemporaries (Benini, 1894). It likely put the burden of the terms of trade adjustment on factor movements, and particularly migration. The latter was a key channel of adjustment to shocks in the gold standard period (Khoudour-Casteras, 2003). Looking again at Spain, Sánchez-Alonso (2000)

[11] No peripheral countries are included in their measure, which should therefore be seen as a lower bound estimate.

argues the depreciation of the peseta limited emigration following the global agricultural crisis of the 1890s. In Chapter 3, I look more closely to these developments from an OCA perspective.

1.3. Global Currencies and the International Monetary System in Historical Perspective

Chapter 4 of the present doctoral thesis quantifies the relative importance of global currencies and the structure of the international monetary system (IMS) over the last two centuries.

Eichengreen (2019) summarises the current debate on the IMS by distinguishing two key views. On the one hand, he defines a "Harvard view", emphasising the persistence of dollar hegemony in the last 75 years and the fundamentally hegemonic character of the IMS. He describes this view, developed among others by Gopinath (2015) and Farhi and Maggiori (2018), as "fundamentally empirical". On the other hand, he describes a "Berkeley view", based on Eichengreen's work with several co-authors as well as, among others, Gourinchas and Obstfeld (2012). This second view is characterised as "fundamentally historical" and consists in seeing dollar dominance as a "historical anomaly", and a more multipolar IMS as both desirable and likely to arise.

In what follows, I first summarise the literature on global currencies around the hegemonic role of the dollar. Second, I provide a survey of existing work looking at the IMS from an historical, long-run perspective.

1.3.1. Dollar Hegemony and the IMS

The debate on the past and future evolution of the IMS is rooted in the implications of dollar hegemony, for the functioning of international economic relations as well as the domestic economic policy of third countries. Kenen (1983) provided a synthetic framework to analyze

the multiple dimensions of international currencies. The latter provide first of all a unit of account for both real and financial transactions. They also are the unit of account the official sector targets when managing a fixed-exchange regime. Second, they are used as a medium of exchange to settle international transactions. Third, it is a store of value for both the official and private sectors. Along all these dimensions, we very much *"live in a dollar world"* (Gourinchas, 2021).

Looking at the dollar as a unit of account and medium of exchange, many important contributions, including Goldberg and Tille (2008) and Gopinath (2015), have examined its extensive role as an international trade vehicle currency. Boz et al. (2020) provide a new cross-country dataset on trade currency invoicing, confirming previous findings that the dollar share in invoicing is roughly 4 times the US share in global trade. Ilzetzki et al. (2019) document a secular increase of the dollar as unit of account by the official sector: while in 1970 around 1/3 of currencies used the dollar as an anchor, this figure is now close to 70%.

Those two dimensions of a global currency's role interact in important ways. The emergence of an international currency from strategic complementarities in international markets was rationalised early on by Rey (2001). Gopinath and Stein (2018) set forward both theoretically and empirically a "Dominant Currency Paradigm" (DCP), where export prices are set and sticky in a dominant currency and firms use imported intermediate inputs. This means the exchange rate pass-through to import prices is mainly driven by the dollar as opposed to the bilateral exchange-rate for non-US countries. Therefore, dollar dominance increases the desirability of stabilising the dollar exchange rate (Egorov and Mukhin, 2020), as domestic monetary policy is unable to stabilise demand for exports.

The network externality component of international currencies was already present in Mundell (1961). Dollar use is likely to increase endogenously in other currency functions the more it is used to invoice trade. As agents are likely to hold liquid assets in the currency they transact, there are spillovers from DCP to the use of international currency safe assets as stores of value. Maggiori et al. (2018) document, relying on security-level holdings data, how global portfolios have substantial home-bias in terms of currency of denomination. The

only - major - exception is the dollar, with close to 3/4 of foreign holdings in the US being denominated in dollars. Gopinath and Stein (2021) argue that a two-way feedback loop occurs, where, as dollar invoicing increases, higher demand for dollar safe assets depresses dollar borrowing costs, in turn making it attractive to finance and invoice international trade in dollars. In turn, this reinforces the desirability for dollar reserves to the official sector (Gopinath and Stein, 2018). This is consistent with a multiple equilibria winner-takes all IMS, where there are pervasive network effects.

The above characterisation of international currency hegemony has implications for the functioning of the IMS as well as domestic financial systems and policies.

Based on the dollar hegemonic experience, the IMS architecture revolves around the provision of safe assets by the hegemon (Gourinchas, 2017). As shown in Gourinchas and Rey (2007a) this implies a peculiar balance-sheet for the "world banker" hegemon, long risky foreign denominated assets and short risk-free dollar liabilities. In the case of the US, this nets the hegemon an excess return on its foreign assets position - an "exorbitant privilege" - estimated at about 2% annual real returns. Meissner and Taylor (2006) and Van Hombeeck (2020) find a similar pattern looking at the external position of a past hegemon, the United Kingdom in the late 19th century. This balance sheet structure also provides a further advantage to the hegemon: an additional adjustment channel of external deficit through a valuation effect[12] (Gourinchas and Rey, 2007b). At the same time, this world banker is also an insurer, as the safe-heaven character of the dollar means it tends to appreciate in bad times, transferring resources to the rest-of-the-world holders of dollar safe assets in a global crisis (Gourinchas et al., 2018).

The implications of dollar hegemony are however not limited to the "exhorbitant privilege and duty" of issuing the safe asset at the core of the IMS architecture. More contentiously, dollar hegemony has important spill-overs on the transmission of shocks and domestic policies. Rey (2013) first described a "global financial cycle", characterised by strong co-movement of global asset prices and capital flows, transforming the Mundellian "trilemma" into a

[12] As when the dollar depreciates this improves the net external position of the US.

"dilemma". US monetary policy is a key determinant of the global cycle (Miranda-Agrippino and Rey, 2020). The dilemma therefore implies that, regardless of their exchange-rate regime, countries have a choice of either limiting capital flows or experiencing significant spillovers from Fed policy on monetary and financial conditions, particularly via the credit channel (Gerko and Rey, 2017). These considerations are reminiscent of the characterisation of the Bank of England as the "conductor" of the gold standard global monetary "orchestra" by Keynes (1930), making third countries such as the US susceptible to destabilising gold flows. The global financial cycle can therefore magnify boom and bust credit cycles, suggesting that, in a "dilemma" world, macro-prudential policies should play a prominent role (Rey, 2019).

Having described the main features of the current hegemonic IMS architecture, I turn to the recurrent theme of whether dollar hegemony is sustainable and whether a more multipolar IMS is both possible and desirable. The asymmetric features of the IMS have long been a concern for observers outside the US. On the one hand, it has been a source of frustration, at least since French President De Gaulle and his finance minister Giscard d'Estaing denounced the "exorbitant privilege" of the dollar. On the other hand, many have feared that dollar hegemony could prove destabilising. In path-breaking article, Triffin (1960) observed dollar dominance faced a "dilemma", as the need for an increased supply of safe dollar assets - to fill the needs of a growing global economy - was inconsistent with maintaining a constant value of gold in terms of dollars.

As explicit efforts by both the Euro Area and China to foster the international use of their currency are ongoing, the case for a more multipolar IMS was put forward, among other policy makers, by Carney (2019). He argued a more multipolar IMS would reduce monetary and financial spillovers, allowing countries to alleviate the "dilemma", but would also increase the total supply of safe assets, with important benefits for global financial stability. He particularly underlined the potential of new payment technologies in supporting such a transition.

The scarcity of safe assets, signaled by the decline of equilibrium interest rates globally, supports the view that dollar hegemony might become a more unstable equilibrium. The

need for the US to continue supplying safe assets to the world, although the share of the US in the world economy is declining, might well give rise to a "new Triffin dilemma" (Gourinchas and Rey, 2007a; Farhi et al., 2011), with provision of safe assets becoming inconsistent with the US fiscal capacity. However, whether a decline of the dollar would give rise to a multipolar IMS is ambiguous. Farhi and Maggiori (2018) describe a model of the IMS where multiple equilibria can arise and competition among global currencies leads to self-fulfilling crises with investors coordinating in and out of global currencies. As such, they argue (Farhi and Maggiori, 2019), in line with Gopinath and Stein (2018), that an equilibrium might be more likely to be found in the replacement of the current hegemon with a new one. Their view echoes the early assessment of the interwar gold-exchange standard experience of global currency competition by Nurkse (1944).

1.3.2. An Historical Perspective on Discontinuity and Multipolarity in the IMS

Eichengreen (2019) notes how the pessimistic view on the sustainability of a multipolar IMS is not necessarily justified in light of history. Based on a large body of literature he contributed to with several co-authors[13], he argues that IMS hegemony is an historical anomaly and that the stability of a multipolar IMS is contingent on the policies and the degree of cooperation pursued by key countries. The latter can be conductive to a functioning multipolarity such as during the classical gold standard, or, consistently with the "Harvard view", destabilising, similar to the interwar experience. The below summarises how the historical experience is at odds with a natural monopoly view of the IMS.

There is ample evidence that at least some elements of multipolarity were present as the first globalisation unfolded in the 19th century. Before 1870, three blocs, based on different monetary standards, coexisted: the Gold one around the British Empire, the bimetallic one around France and the silver one, spanning from Eastern Europe to Asia coexisted

[13]Summarised in Eichengreen et al. (2017).

(Eichengreen and Flandreau, 1994). As highlighted above, French monetary diplomats attempted to gather momentum towards the harmonisation of the IMS around the French Franc in the 1860s. As the 1870 Franco-Prussian war destabilised the French external position and prevented effective cooperation with the newly formed German Empire (Flandreau, 1996), a global movement towards the gold standard occurred (Eichengreen and Flandreau, 1994).

This apparent shift towards British hegemony however hid some key features of multipolarity. Countries wishing to adopt the gold standard found it costly to acquire the gold needed to back internal circulation. Starting with the National Bank of Belgium in 1872, central banks began to accumulate foreign-currency denominated assets (Ugolini, 2012) that could be used to intervene in bullion and foreign-exchange markets as well as to back domestic circulation in place of gold. This gold-exchange standard became attractive for a number of countries, mainly poorer or smaller economies, as a way to reduce the cost of operating a gold standard. Assets denominated in sterling certainly represented the lion share of those early foreign balances. London was the deepest bullion market and the confidence in the safe asset character of the pound was justified by a central bank playing its role of lender of last resort in an credible way (Bignon et al., 2012). However, the classical gold standard was far from consistent with a winner-takes all IMS. Flandreau and Jobst (2005) show that several financial centers played a significant role in the global foreign-exchange market. Lindert (1969) estimates of foreign balances holdings show how sterling only accounted for roughly half of global reserves, with the franc and the mark each playing a substantial role.

The second key point documented by Eichengreen's historical view of the IMS is that, historically, network-effects of global currencies have not been strong enough to justify a pervasive incumbent advantage in IMS competition. This is obviously at odds with the literature grounded in the dollar hegemony experience (Gopinath and Stein, 2018), but also contradicts early views on the slow transfer of leadership between the pound and the dollar. While Triffin (1964) and Chinn and Frankel (2005) posited that the dollar only overtook the sterling after WWII, new estimates of global reserve holdings contradict this stylised fact and put

into perspective the role of inertia in global currency status.

Eichengreen and co-authors show that the dollar rapidly competed on par and even surpassed the sterling as soon as WWI. Looking at new foreign reserves data for the interwar period, Eichengreen and Flandreau (2009) show that reserve currency status was evenly shared in the 1920s and that dollar balances overtook sterling ones by 1925. The picture was complicated by the 1931 and 1933 respective devaluations of the sterling and the dollar, which prompted liquidations of foreign balances. However, dollar balances again equalled and surpassed sterling ones at the eve of WWII.

A similar picture, at odds with pervasive network externalities, emerges looking at trade credit financing. Eichengreen and Flandreau (2012) highlight how US intermediaries managed to gain significant shares of the market for acceptances by the early 1920s, a market traditionally dominated by the previous IMS hegemon. Analogous findings were uncovered in Chiţu et al. (2014), examining the currency denomination of interwar global bond markets. In this case the dollar overtook sterling by 1929, with financial deepening in the US providing the necessary boost to overcome sterling's incumbency. The fact that sterling managed to retake back prominence in bond markets denomination in the 1930s highlights the potentially room for rapid reversals in global currency status.

In Chapter 4, I will document further the degree of multipolarity of the IMS, providing a continuous measure, based on foreign-exchange co-movements, of the relative rise and fall of global currencies over two centuries.

Chapter 2

The Common Currency Effect on International Trade: Evidence from an Accidental Monetary Union

2.1. Introduction

This paper fills an important gap in the literature on the real effects of exchange rates by providing for the first time quasi-experimental evidence on the effect of a currency union on international trade. In a path-breaking study, Rose (2000) first estimated the effect of currency unions on bilateral trade. Looking at post-WWII currency areas, he suggested their pro-trade effect to be as high as 300%. A vast literature has since attempted to dispute, with some success, Rose's seminal findings. Despite those efforts, the Rose Effect has managed to survive. In their meta-analysis, sampling 37 estimates using structural gravity equations, Head and Mayer (2014) computed an average estimated effect of 136%.

One key reason why Rose's insights have been met with skepticism is the endogeneity bias implied by the decision to join a currency union. As noted by Head and Mayer (2014) the literature's findings *"should not be interpreted as preferred estimates of the causal effects*

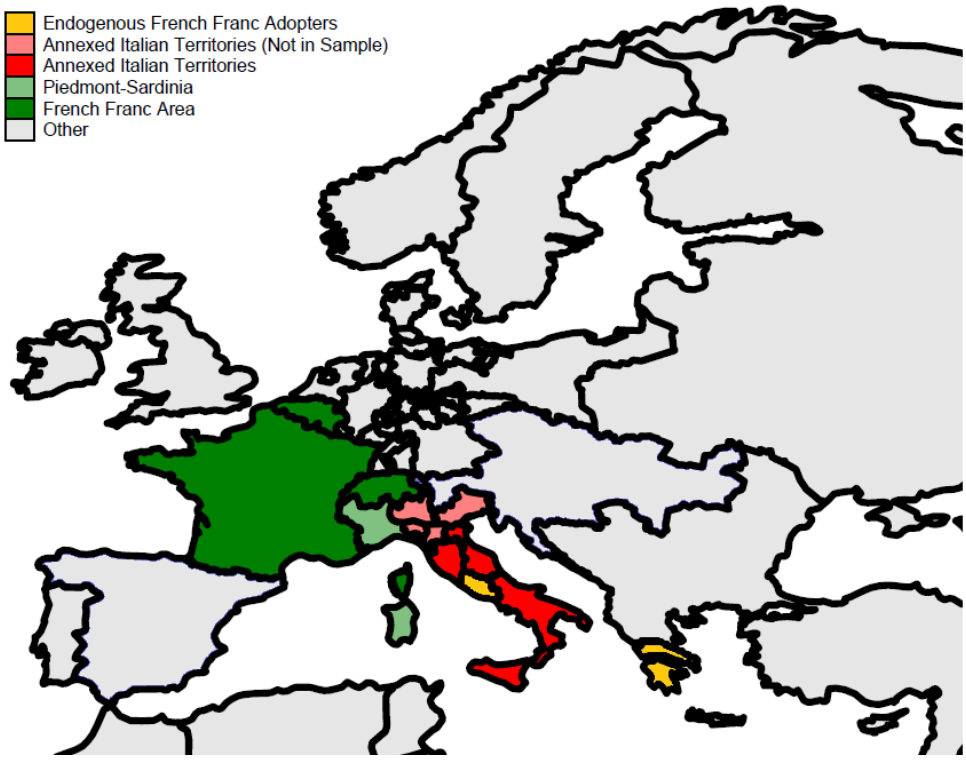
of the policy variables". This is an important point, given that trade creation is commonly considered as the key benefit stemming from the establishment of currency unions. Whether a causal Rose Effect exists is therefore a topical policy question, as calls to leave the Euro Area have mounted in several European nations and new projects of monetary integration are considered around the world, particularly in Africa.

The issue of *"systematic selection into common currencies of countries with peculiar characteristics"* was raised early on by Persson (2001). However, those concerns have so far only partially been addressed by the literature using matching techniques, deeming experimental evidence *"practically impossible"* to obtain (Persson, 2001). Indeed, in order to infer causality on the effect of currency areas, one would ideally need countries to randomly join a common currency. As it is unlikely that we will observe a random adoption of the Euro any time soon, I turn to the history of European monetary integration to make causal inference tractable.

My identification strategy relies on a quasi-experimental setting, involving what is probably the closest historical precedent to the Euro Area. Since the Napoleonic period and throughout the 19th century, the French franc monetary standard was adopted by several European nations, resulting in a large common currency area. The latter was institutionalised in 1865 as the Latin Monetary Union. Around 1861, a major exogenous variation in the membership of the French franc zone took place (Figure 2.1). It was brought about by the sudden unification of the Italian peninsula by the Kingdom of Piedmont-Sardinia, following random diplomatic and military events. Piedmont-Sardinia was a long-standing French satellite state, home of an important Francophone minority and, importantly, an early adopter of the French franc in the first half of the 19th century. This meant that the Italian states annexed by Piedmont-Sardinia suddenly found themselves to be part of an accidental currency area with France and its French-speaking satellites.

This geopolitical shock makes for an ideal set-up for drawing causal inference. The unexpected character of the Italian unification, and the fact that it involved a mechanical extension of Piedmont-Sardinia's institutions to the annexed states, mean that their policy preferences could not be endogeneised. Furthermore, based on standard determinants of

Figure 2.1: An Exogenous Variation in French Franc Adoption



foreign-exchange rate regime choice, it would have been highly unlikely for the Italian provinces annexed by Piedmont to endogenously join a common currency with France in a no-unification counter-factual scenario.

I estimate the effect of this exogenous shock to trade costs by merging newly collected data on Italian trade at the regional level around unification with a large bilateral trade data matrix. Relying on structural gravity equations, the estimated causal Rose Effect is large and significant, with a preferred estimate at 35%.

My results are markedly lower than the average point estimate in the literature and around 1/3 of recent estimates carried out with theory consistent gravity equations by Glick and Rose (2016) and Larch et al. (2018).

However, opposite to findings by Campbell (2013) and Campbell and Chentsov (2017), I argue that the Rose Effect is not completely driven by endogeneity. On the contrary, relying on a credibly causal quasi-experimental setting, my findings confirm the original policy implications of the Rose literature.

The paper is organised as follows. Section 2.2 surveys the literature on the Rose Effect, with a focus on the endogeneity issue; Section 2.3 focuses on the historical context of the Italian unification as an exogenous shock; Section 2.4 covers the identification strategy; Section 2.5 details the empirical specification; Section 2.6 describes the data; Section 2.7 provides baseline results, robustness checks and looks closely at potential threats to the identification strategy; Section 2.8 discusses the results with respect to external validity and potential channels and Section 2.9 concludes.

2.2. Trade Effect of Monetary Unions and Endogeneity Bias

The seminal contribution of Rose (2000) - finding that a currency union (CU) triples trade - sparked an intense academic debate. The magnitude of the effect appearing implausible[1], a subsequent literature attempted to "shrink" the CU effect, based on sample selection and data issues[2]. This prompted a response by Glick and Rose (2002) confirming a very substantial CU effect (doubling of trade). Baldwin (2006) provides an interesting methodological critique of this early literature as well as its own estimate of the Euro's trade effect at around 5-10%. In particular, early estimates were performed using gravity equations inconsistent with international trade theory, as they did not take into account unobserved bilateral heterogeneity as well as general equilibrium effects such as multilateral resistance (Anderson and Van Wincoop, 2003). Another issue with early results in the literature lied in the estimate of log-linear equations through OLS, which Silva and Tenreyro (2006) show to be biased in the presence of heteroskedasticity. In a subsequent paper, Silva and Tenreyro (2010) find no statistically significant effect of the Euro on trade through a gravity equation estimated through Poisson-Pseudo Maximum Likelihood (PPML).

Glick and Rose (2016) responded once again to the above criticism by performing the estimate on a larger dataset, confirming the overall message of their early findings: the overall CU effect is about 100% and of 50% in the case of the Euro. In a relatively recent meta-analysis

[1] Including to Rose himself.
[2] See Nitsch (2002), among others.

of the literature, Rose (2017) notes that the vast differences in the estimates of the Euro effect lie in sample size. If a large enough sample is considered, the results are consistent with a substantial pro-trade effect of currency unions. A recent response by Larch et al. (2018) has however once again highlighted that the estimated effect for the Euro can be highly sensitive to the econometric specification, while confirming an effect of 100% for non-EMU currency unions.

A more substantial critique to Glick and Rose's results and their policy implications is represented by endogeneity bias and self-selection into (or out of) currency unions. In this respect, instrumental variable approaches were attempted early on by Rose (2000) and Alesina et al. (2002) but were later abandoned due to unconvincing identification assumptions (Baldwin, 2006). More convincingly, Persson (2001) first implemented matching techniques to address systematic differences between countries that adopt common currencies and those that do not. Other attempts to partially overcome endogeneity include diff-in-diff-inspired approaches focusing on the selection of relevant control groups (Micco et al., 2003; Silva and Tenreyro, 2010), on controlling for "third factors", trends (Berger and Nitsch, 2008) and propensity to treatment and self-selection (Wolf and Ritschl, 2011).

A key motivation to the present paper lies in the findings by Campbell (2013) and Campbell and Chentsov (2017). They adopt an original critique to the Rose Effect literature, by focusing heavily on endogeneity bias. Short of having quasi-experimental evidence at their disposal, they take a close look at the context in which CU switches occur in Rose's dataset. They argue that the literature's results are systematically driven by endogeneity and coincident factors to CU switches, such as decolonisation, warfare, the fall of the Berlin wall or the wider European economic integration processes. They do not find any statistically significant Rose Effect once "intuitive" control groups are implemented and CU switches coterminous with war are excluded from the sample.

In this paper, I therefore fill a key gap in the literature and address the endogeneity bias issue by relying on a unique historical quasi-experiment. This is in line with previous attempts to provide causal evidence on the effect of the exchange rate regime, exploiting historical

exogenous shocks (Lopez-Cordova and Meissner, 2003; Mitchener and Voth, 2011). My approach is very close to the one adopted by Frankel (2008), who analyzes the fortuitous adoption of a Euro hard peg by the African countries formerly pegged to France[3]. To my knowledge, the present paper is however the first attempt to use a natural experiment to specifically investigate the causal effect of common currencies on trade using the original definition used by Rose (2000) of a 1-on-1 irrevocable exchange rate.

2.3. The French Franc Zone and the Italian Unification

Following the Italian unification in 1861, several formerly independent Italian states became part of a wider European currency union which, in many respects, represents the closest historical precedent to the Euro. This French franc area was originally formed by France and its neighboring states, Belgium, Switzerland and Piedmont-Sardinia.

I argue that this historical episode provides an ideal environment to estimate the causal effect of currency unions on trade. Section 2.3.1, describes the role of France as an international monetary anchor in the mid-19th century. Section 2.3.2 highlights how the 1861 Italian unification in-itself was a highly unpredictable exogenous shock. On the one hand, it was not driven endogenously by cultural, political or economic ties among Italian states. On the other hand, it unexpectedly materialised following a number of random political and military events.

My identification strategy is built around the unintended consequences of this exogenous shock on bilateral trade costs and is discussed later on in Section 2.4.

[3]Tenreyro (2010) however notes the paper's identification strategy does not necessarily comply with the parallel trend assumption.

2.3.1. France as an International Monetary Anchor in the 19th Century

The paper's quasi-experimental setting lies in the exogenous adoption of the French franc by several Italian pre-unitary states, following their annexation by the Kingdom of Piedmont-Sardinia, a long term adopter of the French franc standard.

Piedmont-Sardinia's currency had been intrinsically equivalent to the French franc since the beginning of the 19th century, when it had briefly become a French *département* under Napoleonic occupation. After the congress of Vienna and the demise of the First French Empire, both Belgium and Piedmont-Sardinia maintained the French monetary standard: the Sardinian lira, the Belgium franc and the French franc were equivalent to 4.5 grams of pure silver or a fixed equivalent in gold as part of a bimetallic standard. The currency of each country circulated widely in the three states, at times with legal tender status. Switzerland joined the "club" in 1850, when the Swiss franc was introduced as the monetary unit of the Helvetic Confederation. In fact, a *de facto* common currency among Francophone European states predates by a few decades the 1865 International Monetary Convention[4], better known as the Latin Monetary Union[5].

In many respects, the French franc currency area I examine in this paper represents the closest historical precedent to the Euro, given both its geographic spread and economic rationale.

The technocrats of the French Second Empire clearly understood monetary fragmentation as a cost to trade and international financial transactions. The key policy maker behind the international expansion of the Franc, Félix Esquirou de Parieu, was in many ways a European federalist *ante litteram*. Heading French monetary diplomacy, he wanted to achieve

[4]For a detailed discussion see among others Einaudi (2001) and Flandreau (1995).

[5]The Latin Union arose from the need to coordinate the intrinsic value of lower denomination coins following the change in the relative price of silver and gold, which prompted Switzerland to debase some of their lower denomination coins. The persistence of small variations in the intrinsic value of some denominations does not concern the policy treatment at hand here, as they did not meaningfully increased transaction costs. The fact that small denomination coins circulated across borders shows that they were accepted at face value. This therefore posed a fiscal problem for the French government which undergo Gresham Law-driven influxes of debased small denomination coins from its neighbours (Einaudi, 2001)

for international finance transaction costs what Michel Chevalier had achieved for tariff reduction with the 1860 Cobden-Chevalier treaty. He was determined to create a European, or even global, monetary standard around France. The extent of French monetary dominance throughout the 19th century is quantified in Chapter 4.

As noted by Flandreau (2000b), the key driver for the international spread of the French franc relates to French surging capital exports. Following the establishment of the Second French Empire and the economic reforms of Napoleon III, France became a major supplier of international capital, increasingly competing on equal footing with Great Britain. Even though Esquirou de Parieu's grand project of monetary diplomacy came to a halt following France's defeat in the war against Prussia in 1870, strong momentum built up in the 1860s in favor of harmonisation of the international monetary system around the French Franc. Several European and Latin American nations considered, and even made steps towards, the adoption of the French franc in the late 1860s, including Spain, Austria-Hungary and Romania, while the Papal States and Greece formally achieved membership of the Latin Union in 1866 and 1868 respectively.

2.3.2. The Italian Unification as an Exogenous Shock

Even though the Italian unification provides the catalyst for its quasi-experimental setting, the paper is not concerned with the reduction in trade costs between Italian pre-unitary polities. Indeed, it would be impossible to disentangle the common currency effect between, say, Tuscany and Sicily with other features of political unification. The Italian unification is only indirectly of interest here, to the extent it had important unintended consequences: the exogenous adoption of French institutions by the annexed Italian states. It is however crucial to analyze how the Italian unification as a centralised state *in-itself* was an highly unlikely outcome, brought about by random diplomatic and military events. This provides a first layer of exogeneity and the foundation for the paper's key identification assumptions detailed in Section 2.4.

Lack of Cultural, Political and Economic Ties among Pre-Unitary Italian States

In 1814, leading Austrian statesman the Prince of Metternich defined Italy as a mere *"geographical expression"*. This definition remained true in 1859, when the outburst of the Second Austro-Sardinian War paved the way, in the space of a few years, to the establishment of a full-fledged political, economic and monetary union as part of a centralised Italian state. This outcome was very much unexpected even a few months before it actually unfolded in 1861[6].

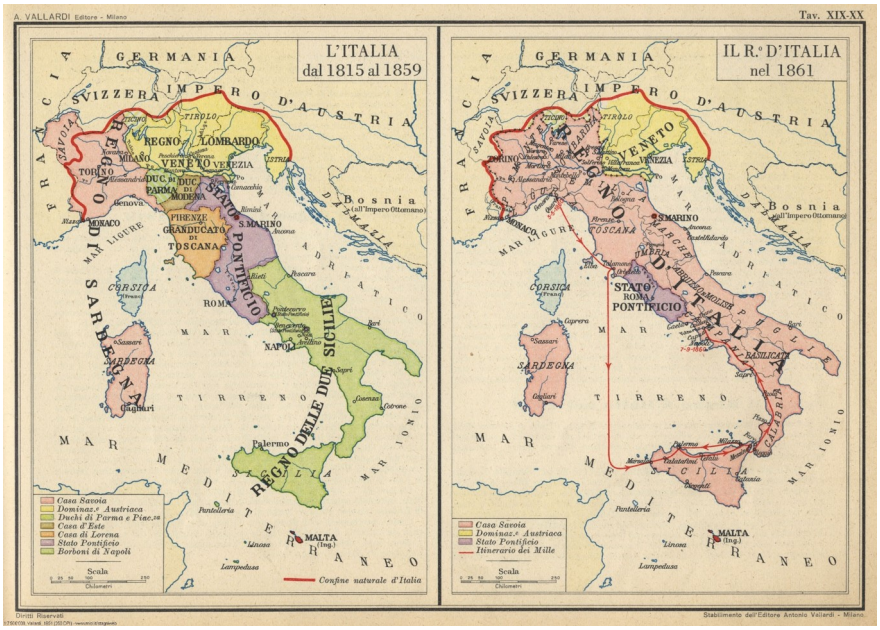
Prior to unification, Italian states had very loose, if any, cultural, political and, above all, economic ties. Culturally, the Italian language was essentially a literary language limited to a small minority. Prominent Italian linguist De Mauro (2017) estimated that at unification Italian speakers amounted to less than 2% of the population[7]. Piedmontese Prime Minister Cavour himself, often depicted as the hero of the Italian unification by popular history, had a at best a weak command of the Italian language, preferring to express himself in French or in the Piedmontese dialect. Despite extensive journeys across Europe, he had little interest for the Italian peninsula, and allegedly never traveled further South than Florence.

Politically, eight separate sovereign or semi-sovereign states existed (Figure 2.2), with no particular perception of a common belonging. A process of divergence in terms of political regimes started out in the 1840s, with Piedmont-Sardinia embracing constitutional monarchy and international integration while the rest of the peninsula remained under the absolutist regimes of direct or indirect Austrian rule, the Pope or, in the South, the Bourbon monarchy.

Economically, the lack of pre-unitary ties is also striking. In the 1850s, intra-Italian trade was 15-20% of the total international trade of the Italian states. However, trade across the borders of the Northern Po Valley between Piedmont and Lombardy-Venetia alone accounted for more than half of this figure (Federico and Tena-Junguito, 2014). Lack of regional trade is unsurprising when considering the absence of railways along the peninsula, the poor state of

[6]Chapter 1 of Barbagallo (2017) extensively reviews this "unforeseen union".
[7]With an upper bound estimate of 10% if the speakers of central-Italian dialects and the clergy are included.

Figure 2.2: Italy Before and After the 1861 Unification



the roads and widespread protectionism. Monetary standards differed in each pre-unitary state[8], alongside unit of measures and degrees of financial development. This contrasts with the experience of pre-unitary Germany, where gradual monetary integration pre-dates unification by a few decades.

Unintended Consequences of the Austro-Sardinian War of 1859

While there was no endogenous process behind the sudden unification of Italy, the historical literature also shows how random military and diplomatic events actually led to this outcome[9]. To be clear, I am not arguing that some sort of Italian integration process was unlikely to get under way by the mid-19th century. What, based on historical scholarship, was however highly unlikely, is the establishment of a fully centralised Italian state spanning the entire peninsula as soon as 1861.

A unification process like the one that would materialise in 1861 was neither expected nor desired by policy makers, both in Italy and abroad. While radical nationalist groups had

[8]And even within states, as two different monetary standards were in force in the Kingdom of the Two Sicilies, one for the continental part and one for the island of Sicily.

[9]Romeo (1984), Mack Smith (1958) and Hearder (2014) provide detailed accounts of the events. I provide in Appendix 2.B an historical summary as well as a timeline.

unsuccessfully attempted to foster unrest in the peninsula since the beginning of the century, the idea of a unified Italy was described as *"silly non-sense"* by the Prime Minister of Piedmont-Sardinia Cavour as late as 1856. The closest thing to unification the political mainstream had in mind before the war of 1859 was the creation of some sort of confederation of Italian states that would be better able to counter Austrian influence in the peninsula. This is in line with what Cavour and Napoléon III negotiated in 1858 as part of a military pact against Austria. They agreed on territorial expansion of Piedmont in Lombardy and Venetia and the creation of a loose Italian confederation. This remained the most likely outcome - following Austria's defeat in 1859 - as late as November 1859 when, at the Treaty of Zurich, France and Austria agreed on Piedmont's annexation of Lombardy but not Venetia and reiterated a commitment to an Italian confederation under the Presidency of the Pope.

The key factor explaining the turn of events which, between January 1860 and March 1861, led to the proclamation of the Kingdom of Italy is the threat of revolution in Central and Southern Italy. First, fears of geopolitical instability led France to accept Piedmont's annexation of Tuscany and Romagna by mid-1860. Second, the unexpected success of Garibaldi's militias against the army of the Bourbon's monarchy in the Two Sicilies made the establishment of a revolutionary government in Naples a distinct possibility. This pushed both Cavour and the Great Powers to support the annexation of the South by Piedmont in October 1860.

The unexpected character of the unification had important implications for its implementation, which provides the basis for my identification strategy.

2.4. Identification Strategy

The paper's identification strategy is based on two key assumptions. First, the way the Italian unification was implemented indirectly caused an unexpected, "accidental" reduction in bilateral trade costs between Francophone Europe and the Italian territories annexed by Piedmont (Section 2.4.1), as the latter exogenously adopted the French franc monetary

standard. Second, in a no-Italian unification counterfactual, those same annexed Italian regions would have been unlikely to endogenously choose to join the French franc standard in the 1860s in a no-unification counterfactual (Section 2.4.2).

Section 2.4.3 describes more in details the nature and dynamics of the policy treatment, including potential sources of heterogeneity. A discussion of potential threats to the identification strategy coming from coincident factors to the policy treatment is provided later on in Section 2.5.2.

2.4.1. Implementation of the Italian Unification

The *"Piedmontisation"* process through which the Italian unification was implemented is an important part of the identification strategy.

The possibility of a confederation among Italian states had long been part of the political discourse by the time the Italian unification occurred. High heterogeneity among pre-unitary Italian states would have however warranted a gradual approach and a federal setting, not unlike what Germany experienced in the first half of the 19^{th} century. Nevertheless, the unexpected outcome of the Austro-Sardinian War of 1859 meant that unification took the form of a fully centralised state established in less than five years. This reflected Piedmont-Sardinia's haste in consolidating a relatively weak position, where a tiny - if resourceful - buffer state was suddenly annexing territories with a population more than five times its own, with the looming threat of external aggression from Austria.

The only way this centralised state could be created in such a short time frame, was through a so-called process of *"Piedmontisation"*. Instead of creating new institutions, by 1865 Piedmont-Sardinia's administrative structures and laws were fully transposed - without any amendment of substance - to the rest of the Italian peninsula. This included the adoption of a common Italian currency intrinsically equivalent to the French franc as the sole legal tender in 1863.

Crucially for the identification strategy, this blanket, automatic extension of Piedmontese institutions to the rest of Italy ensures that the preferences of the annexed states, particularly in terms of monetary standard, could not have been endogenised.

Table 2.1: Implementation of the Italian Unification

Date	Event
1859-1860	The annexed territories are ruled by revolutionary "provisional governments", sovereignty is progressively transferred through plebiscites; the Piedmontese tariff system is swiftly extended to the new territories with few temporary exceptions.
1st of January 1861	The *laissez-faire* tariffs of Piedmont-Sardinia are applied uniformly in all the annexed territories.
1860-62	The National Bank opens branches in the annexed territories, multiple currencies circulate as legal tender.
1st of January 1863	The French-Franc based Piedmontese Lira, now renamed Italian Lira, becomes the only legal tender. The metric system becomes the official system of measurement for all annexed territories.
2nd of April 1865	A unified Civil Code, based on the Piedmontese code, comes into force in all annexed territories.

Source: Romeo (1984).

Of course, *"Piedmontisation"* implied a number of policy shocks. In particular trade policy changed dramatically in some annexed states, as the tariffs of Piedmont-Sardinia were fully applied in all territories by end of 1860. However, I will show that this is not a concern (Section 2.5.2) for the purpose of identification. First, the timing of the different steps of *"Piedmontisation"* helps disentangle the trade policy shock from the monetary unification one. While intra-Italian trade barriers were abolished as soon as 1859-1860, as part of an Italian custom union aligned to the Piedmontese tariffs, a more gradual approach was adopted as far as monetary unification was concerned (Table 2.1). Second, and more importantly, the trade policy shock is multilateral in nature, as tariffs are reduced equally across all main partners, making the adoption of the French franc standard the only factor to bilaterally affect transaction costs between treated pairs.

2.4.2. OCA Criteria and "No-Unification" Counterfactual

Despite the fact that their adoption of the French franc standard was "accidental" and their own preferences could not have been endogeneised, the identification strategy would still be endangered if the Italian states annexed by Piedmont were more likely to endogenously self-select into a common currency with France. It is therefore important to consider what might have happened in a no-Italian unification counterfactual scenario.

As shown in Chapter 3, where I analyze the determinants of exchange-rate regime choice in the 19th century, it would have been highly unlikely that the annexed Italian states would have self-selected into the French franc zone in a no-unification counterfactual. Optimum Currency Area (OCA) criteria - and in particular shock symmetry - are good predictors, up to two decades in advance, of the key monetary arrangements of the 19th century, such as the Gold Standard or the German unification. However, Italy is a clear outlier in this respect. In Table 2.2, I report a summary of key OCA variables for selected Italian regions. Sicily, the continental Italian South and, to a lesser degree, Tuscany, had both more volatile nominal shocks and traded substantially less with France compared to Piedmont-Sardinia and other polities in the French sphere of influence.

Table 2.2: Selected Italian Polities and OCA Criteria

	Piedmont-Sardinia	Tuscany	Romagna	Two Sicilies
	Bilateral Trade per Capita in 1854-1858 (GBP)			
France	1750.63	804.11	168.28	562.48
Great Britain	441.26	753.78	184.29	625.93
Ratio FR/UK	3.97	1.07	0.91	0.90
	Foreign-Exchange Bills Characteristics (1852-1858)[a]			
Volatility[a]	0.13%	0.18%	-	0.44%
Bid-Ask Spread[b]	23bp	24pb	-	56bp

[a] Average standard deviation of weekly returns vs. GBP.
[b] Average basis points spread between highest and lowest London quote.

2.4.3. Nature and Dynamics of the Policy Treatment

The policy treatment I examine is fully consistent with the original definition of a currency union in the Rose literature. The Italian monetary unification effectively introduced an irrevocable 1-on-1 exchange rate on metallic currency between the annexed regions and other adopters of the French monetary standard.

Section 2.8 will provide more details on the possible channels through which the policy treatment could have reduced bilateral trade costs, as well as more perspective on the external validity of the estimate. It is for now important to stress that commodity-based monetary systems like the ones in use in the mid-19th century are better thought of as currency band regimes fluctuating within a floor and a ceiling, rather than pegs: volatility in the exchange rate exists to the extent that there are transaction costs to the shipping of metal across countries. Commonly considered theoretical channels in the Rose Effect literature include a reduction in transaction costs, increase in price transparency and competition, as well as lower exchange rate volatility and trade finance costs (Baldwin, 2006). The adoption of the French monetary standard could have, in principle, resulted in lower trade costs *vis-á-vis* other members of the standard through all those channels.

A recent study of the trade effect of the Latin Monetary Union (Timini, 2018), focusing on the post-1860 period and relying on RICardo data at the national level only, highlighted how the looseness of the arrangements in place to coordinate the currency area and solve conflicts among members meant that its effect might have been heterogeneous over time and geography. This might particularly apply to the present paper's analysis in the latter part of the treatment period I consider, from 1866 to 1869.

A potential source of heterogeneity in the policy effect is represented by the establishment of the Latin Union in 1865. The Union provided for further harmonisation of smaller denomination "fractional" currency, which were until then characterised by equal face values but might have differed in actual metal content across the zone. An increase in the treatment effect coming from this further step in the harmonisation of the monetary standard should

however not be necessarily expected. The Latin Union arose precisely from the already wide circulation of debased non-harmonised lower denomination coins from the smaller members, which posed a fiscal problem for France.

A second potential source of heterogeneity lies in the impact of the 1866 financial crisis on Italy. Following another war with Austria and a fiscal crisis, the Italian government introduced some capital controls and a parallel paper currency, in-convertible into and trading at a discount with respect to the metallic Lira and its Latin Union equivalents. This implied substantial monetary instability but not necessarily a weakening of the treatment effect. The disruption to trade finance during the crisis meant that international transactions were likely - at least in the period this paper is concerned with - to be invoiced and settled in metallic currency, possibly increasing the relative transaction cost of trading with non-Latin countries with respect to Latin ones.

Finally, recent research by Chen and Novy (2019) has highlighted the underlying heterogeneity to the estimates of the Rose Effect in the literature. While data availability prevents me from adopting their theory-consistent framework to investigate variable trade cost elasticity, I discuss heterogeneity in my results with respect to their findings in Section 2.7.3.

2.5. Empirical Strategy

2.5.1. Gravity Equation Specification

I estimate a theory consistent structural gravity equation, accounting for multilateral resistance terms (Anderson and Van Wincoop, 2003) and time-invariant unobservables

$$ln\, X_{ijt} = \lambda_{it} + \psi_{jt} + \mu_{ij} + \beta \mathbf{z}_{ijt} + \gamma Franc_{ijt} + \epsilon_{ijt} \tag{2.1}$$

where X_{ijt} denotes flows to importer i from exporter j at time t; λ_{it} and ψ_{jt} denote time-

varying importer-time and exporter-time fixed effect respectively, controlling for time-varying exporter (importer) specific factors, including relative price changes; μ_{ij} is a pair fixed-effects absorbing any time-invariant pair-specific factor; $\mathbf{z}_{ijt}$ and $\mathbf{w}_{ij}$ denote respectively time-varying and time-unvarying pair specific factors; $Franc_{ijt}$ is a dummy variable taking value of 1 once both i and j share the franc as a common currency and η_{ijt} is a residual error.

The same equation can be written in multiplicative form and estimated using PPML, which is shown to be preferable to estimate log-linear elasticities (Silva and Tenreyro, 2006)

$$X_{ijt} = exp\left(\lambda_{it} + \psi_{jt} + \mu_{ij} + \beta \mathbf{z}_{ijt} + \gamma Franc_{ijt}\right) + \epsilon_{ijt} \tag{2.2}$$

Consistently with the literature Larch et al. (2018) I rely on Equation 2.2 as my preferred specification and report multi-way clustering standard errors at the exporter, importer, and year levels. In some specifications, I allow for bilateral pairs μ_{ij} to trend, following Campbell (2013) and Campbell and Chentsov (2017).

2.5.2. Coincident and Confounding Factors

Third factors correlated with switches into or out of common currencies have been shown to represent a potentially important bias in the estimation of the Rose Effect (Campbell, 2013). As outlined above, the Italian unification shock implied a number of policy changes that could potentially bias my estimate of the common currency effect. Despite the low ex-ante probability of treated regions to self-select into the French Franc, other confounding factors could also have been at play. I provide a preliminary discussion of those potential threats below and address each of those threats in Section 2.7.2.

Trade Policy

The period at hand witnessed to a general trend of liberalisation of trade, which has been traditionally understood to take effect following the signature of the Cobden-Chevalier treaty by Britain and France in 1860, a few years before the start of my treatment period. There

is disagreement in the literature over whether Cobden-Chevalier actually had pro-trade effects (Becuwe et al., 2018), it occurred once trade liberalisation was already well under way (Tena-Junguito et al., 2012) or actually put a stop to the deepening of trade liberalisation (Accominotti and Flandreau, 2008). What is however a clear feature of trade liberalisation in the 1860s is its multilateral character, as Most Favoured Nation (MFN) clauses became widespread. This means that as long as one controls for the presence of a FTAs, changes in trade liberalisation should be absorbed by importer-year fixed effects.

This is also true for the trade policy shock implied by the Italian unification. While the adoption of a French franc standard led to a bilateral reduction in trade cost, the extension of Piedmont's tariff implied a multilateral, symmetric reduction of trade costs across all partners at the same time. I provide evidence that the assumption of multilateral tariff changes is verified in the data, by computing effective post-unification tariff changes for the annexed Italian states for France and Great Britain.

I also run several robustness checks, exploiting the lag between the extension of the tariff system and monetary unification and testing for an heterogeneous effect of the trade treaties coming into force in the Italian states following annexation.

French Capital Exports

A major development throughout the period is the rise of France as a capital exporter. In this respect, one might be worried that the estimated common currency trade effect could simply reflect a recycling of capital exports from France, regardless of the adoption of a common currency. I make sure this is not the driver of my results by running a French franc "placebo" on peripheral countries that made formal steps towards but did not eventually adopt a French franc standard in the 1860s.

Adoption of the Metric System

An unintended consequence of the Italian unification which might bias the common currency effect estimate is represented by the adoption of the metric system's units of measure by the annexed Italian territories. I address this potential bias by testing whether I can detect any

effect between Italian states and non-French franc adopters of the metric system.

Napoleonic Occupation

Finally, French occupation during the Napoleonic period could represent a potential confounder, as most of the Italian French franc adopters were at some point directly or indirectly part of the French Empire before 1812, with common "French institutions" possibly being correlated with trade. It is important to note that path-dependency and self-selection into French institutions driven by the Napoleonic period, which can explain the behavior of the original, partly French speaking, members of the French franc zone, had very likely subsided by the 1850s. Among the countries that endogenously made formal steps towards adoption of the French monetary standard in the 1860s, only the Papal States experienced a significant period of Napoleonic occupation. At the same time, within-Italy experiences under Napoleonic occupation varied substantially in terms of length and institutional legacies. Even though, time-invariant confounders are absorbed by high-dimensional fixed effects in my preferred specification I run two distinct robustness check to ensure my results are not confounded. First, I explicitly control for the duration of Napoleonic occupation in some specifications, excluding pair-specific fixed-effects. As a further robustness check, I show that balancing the duration of Napoleonic occupation across treated and control pairs using a propensity score also confirm my baseline results.

2.6. Data

2.6.1. Trade Data

Reconstructing Coherent Pre and Post-Unification Italian Trade Data

A key contribution of this paper is to provide a first reconstruction of coherent trade data for each major pre-unitary Italian states by destination before and after unification, between 1852 and 1869. While official statistics on trade by pre-unitary state exist and were recently

surveyed by Federico and Tena-Junguito (2014), they rarely provide flows by destination. More importantly, no official statistics on international trade at the pre-unitary state level were collected post-unification by the Kingdom of Italy.

I get around this problem by relying on statistics compiled by foreign consulates in Italy, drawn from archival and printed sources. French consulates around the world collected an impressive amount of data since the beginning of the 19th century. In 1841, a ministerial circular by Foreign Affairs minister Guizot required French consuls abroad to compile standardised tables on the *Etats de Commerce et de Navigation* of their catchment area, to be sent to Paris annually. The standardised tables included a matrix of trade value by destination/provenance and - even if inconsistently - product. Crucially, recording of detailed trade statistics at the pre-unitary Italian state level continued well into the unification period. British consulates performed a similar statistical exercise, albeit with little consistency across different diplomatic representations.

I am therefore able to construct a bilateral trade matrix for four major pre-unification regions, Tuscany, Naples, Sicily[10], Romagna[11] as well as for Piedmont for most years between 1852 and 1869.

Appendix 2.C discusses in more details the sources of the data as well as their shortcomings and how I address them. It is however important to stress three features of the data.

First, I stop observing trade between Italian pre-unitary states post-unification. As discussed above, this is of largely irrelevant to identification as it would have been in any case impossible to disentangle an intra-Italian common currency effect from the different aspects of political unification occurring at the same time.

Second, I do not observe overland trade for pre-unitary Italian states. This is in any case of little relevance to the trade of Central-Southern Italy in this period, as the vast majority of its trade occurs by sea. Also this implies, if anything, a downward bias on the treatment

[10] While part of the same polity, the continental South and Sicily had two different custom administrations.
[11] The Eastern part of the Papal States annexed by Piedmont-Sardinia in 1860.

effect. Consider the case of a relative increase of overland trade vs. trade by sea: this would cause a spurious decrease in trade in my data that is very likely to disproportionately affect French franc bordering countries such as France and Switzerland. I however test in some specifications whether excluding other likely affected countries - Austria and the Zollverein - changes my results.

Third, I address missing reporting in some years and measurement error by estimating gravity equations both on a yearly dataset and on a "collapsed" dataset, where I average bilateral trade over eight periods of three or two years, so that all pre-unitary states are reporting within each period.

Other Trade Data

The estimation is carried out on a relatively large bilateral trade matrix for nineteen polities. The matrix is obtained by merging my newly collected data at the Italian regional level with the bilateral trade data of the RICardo project database (Dedinger and Girard, 2017) for fourteen countries: Great Britain, France, Belgium, the Netherlands, the United States, Sweden, Russia, Spain, the German Zollverein[12], Portugal, Austria, Turkey, the Papal States[13] and Greece[14].

2.6.2. Common Currency Treatment Dummy

- **Franc:** The treatment dummy variable is coded to be equal to 1 when the importer (exporter) is an Italian state adopting Piedmont-Sardinia's currency following annexation and the exporter (importer) is one of France, Belgium or Switzerland. While the common currency started *de jure* on the 1st of January 1863, I conservatively code the dummy to switch to 1 when The Economist magazine[15] begins to quote trade finance

[12] When not reported at the Zollverein level, I sum the trade of all the reported members of the custom union.
[13] To which I subtract the trade flows of the Eastern region of Romagna in the pre-unification period.
[14] All of these polities are reporters in the dataset with the exception of Austria, Turkey, the Papal States and Switzerland, which means that the bilateral trade among those pairs is not observed in the dataset.
[15] Or Schneider et al. (1992) in the case of Romagna.

instruments on a given pre-unitary state in Sardinian or Italian Lire. This occurs in 1861 for Tuscany, in 1862 for Romagna and on the 1st of January 1863 for the continental South and Sicily. In some specifications, I also estimate the franc effect including trade flows between annexed Italian states and the endogenous new-comers to the franc area in the 1860s, Greece and the Papal States.

- **Franc (Endogenous):** In some specifications I also estimate a common currency effect for pairs that endogenously adopted the French franc with a dummy that is coded to be equal to 1 for pairs formed by France, Belgium, Switzerland, Piedmont, Greece and the Papal States. Only the addition of the latter two makes the estimate possible as the other pairs are time-invariant.

In some specifications, I code both Franc dummies so as to include trade flows with incoming adopters of the French Franc, the Papal States after 1866 and Greece after 1868. Figure 2.1 provides a visual summary of the nature of French franc adoption per polity/region.

2.6.3. Time-Varying Pair-Specific Controls

Given the high definition fixed-effects specification of my preferred gravity equation, only time-varying pair-specific trade costs can be estimated.

- **FTA** is a dummy that takes value of 1 once a country pair signs a treaty explicity providing for a reduction in tariffs, according to the extensive Trade Agreements Database by Pahre (2012).
- **War (Allied)** are dummy variables that takes value of 1 in the years where a country pair is at war with each other (allied with each other and actively engaged in a war), according to the Correlates of War dataset by Sarkees and Wayman (2010).
- **Metric System** is a dummy that takes value of 1 once if both trade partners have adopted the French Metric System of measurements.

2.6.4. Pair Time-Unvarying and Multilateral Time-varying Variables

Pair time-unvarying as well as multilateral time-varying variables, including bilateral distance, common language and border dummies and population size are not included in the gravity equation as they are fully absorbed by fixed effects. However, I report them in order to assess observable differences between French franc adopters and non-adopters and look at potential time-invariant confounders. In this respect, Napoleon is a variable equal to the product of the respective years of Napoleonic occupation experienced by the country pair, based on Boudon (2003). Polity2 is the sum of the Polity2 score of political authocracy vs. liberty, according to the Polity (2012) project, for a country pair. A higher score means a higher combined level of political liberty[16]. Using the sum of the years of occupation or dichotomous variables equal to 1 if both countries have been occupied does not meaningfully alter the results. Population data are from Mitchell (1998).

2.7. Results

2.7.1. Baseline Results

Table 2.3 shows baseline results, estimating Equations 2.1 and 2.2 using the whole dataset or a "collapsed" sample. The estimated common currency effect is large and precisely estimated, with OLS producing higher and less precise estimates compared to PPML. My preferred specification, PPML with bidirectional pair, exporter-year and importer-year fixed-effects and multi-way clustering in column (3) and (4), point to a Rose Effect between 35% and 45%. Reset tests (Silva and Tenreyro, 2006) confirm PPML should be preferred, as misspecification is rejected. Results are also robust to the bias correction procedure for three-way PPML gravity equations developed by Weidner and Zylkin (2021).

[16]Technically, this variable is time-variant at the pair level. However, low time variation means it is most of the time collinear with the gravity equation's fixed effects and thus discarded from regressions.

Table 2.3: Baseline Results

	(1) OLS	(2) OLS	(3) PPML	(4) PPML
Franc	**0.414***	**0.379****	**0.355*****	**0.302*****
	(0.204)	**(0.147)**	**(0.0756)**	**(0.0772)**
FTA	0.116	0.0177	0.0288	**-0.0691***
	(0.0749)	(0.108)	(0.0305)	**(0.0192)**
Observations	3,801	1,882	4,350	2,074
R-squared	0.932	0.985	0.938	0.988
Sample	All Years	Collapsed	All Years	Collapsed
Implied Effect	0.513	0.427	0.460	0.353
RESET Test (P-Value)	-	-	0.0245	0.108
Bias Correction	-	-	0.348**	0.283*

Bidirectional pair, importer-time and exporter-time fixed effects, war and allied dummies included in all specifications but not shown. Multi-way clustered standard errors reported in parenthesis. ***, ** and * denote statistical significance at the 0.01, 0.05 and 0.1 levels respectively. Bias correction reports point estimates and level of statistical significance according to the PPML bias correction procedure designed by Weidner and Zylkin (2021) with pair-level clustering standard errors

Table 2.A.2 tests the robustness of my preferred estimate to variations in the specification of the gravity equation[17]. As shown by Campbell (2013) and the literature he surveys, positively estimated effects on trade policy variables can hide secular trends at the pair level. Column 1 in Table 2.A.2 allows for pair-specific trends in the gravity equation and yields again an estimate close to 35%. The same is true in Columns 2 and 3, introducing unidirectional pair-fixed effects, with and without a pair-specific trend, and in Columns 5 and 6 looking at the sensitivity to the treatment of missing data.

In Table 2.A.3 I test the sensitivity of my baseline results to changes in the "control" trade flows. As shown by Rose (2017) this can widely affect the estimates of the common currency effect. Excluding large non-European countries (USA, Russia, Turkey) from the sample as they might be less comparable to treated countries. This tends to lower somewhat the estimated effect to 25%. I also try excluding from the sample non-French franc countries that are more likely to trade with Italy overland (Austria-Hungary and the Zollverein), as given

[17]The same estimates performed on the complete dataset as opposed to the "collapsed" one yield similar results.

the nature of my trade data this might be a source of bias in the effect[18]. There is no sign of such bias as estimates are substantially higher, between 45% and 55%.

I also verify that my results are not driven by any specific country. As in Micco et al. (2003), I drop in turn every country in the sample. Coefficients estimated while dropping one country at a time are plotted in Table 2.A.4. The estimated coefficient remains precisely estimated and mostly close to 0.3. This exercise however highlights patterns of heterogeneity that will be examined more closely below.

Table 2.4: Adding New Joiners and Endogenous Franc Pairs

	(1) PPML	(2) PPML	(3) PPML	(4) PPML
Franc (Exog. incl. New Members)	**0.305*** **	**0.309*** **		
	(0.0784)	**(0.119)**		
Franc (Exog. excl. New Members)			**0.304*** **	**0.314** **
			(0.0752)	**(0.137)**
Franc (Italy-New Members)			**0.338***	0.206
			(0.192)	(0.192)
Franc (Endogenous)	**0.301*** **	-0.0791	**0.309*** **	-0.0964
	(0.116)	(0.171)	**(0.119)**	(0.151)
FTA	**-0.0685*** **	-0.0280	**-0.0685*** **	-0.0279
	(0.0200)	(0.0458)	**(0.0206)**	(0.0693)
Observations	2,074	2,074	2,074	2,074
R-squared	0.988	0.993	0.988	0.993
Sample	Collapsed	Collapsed	Collapsed	Collapsed
Pair-specific Trend	NO	YES	NO	YES
Implied Effects:				
Exogenous incl. New Members	0.356	0.362	-	-
Exogenous excl. New Members	-	-	0.355	0.369
Annexed Italy and New Members	-	-	0.402	0.228
Endogenous	0.351	-0.0761	0.362	-0.0919

Bidirectional pair, importer-time and exporter-time fixed effects, war and allied dummies included in all specifications but not reported. Columns 2 and 4 allow for a pair-specific trend. Multi-way clustered standard errors reported in parenthesis. ***, ** and * denote statistical significance at the 0.01, 0.05 and 0.1 levels respectively.

Table 2.4 introduces a Franc dummy for pairs that endogenously selected into the French

[18]Even though, as noted in Section 2.6, if there is a bias, its sign is very likely to be negative overall, as most of Italian overland trade is likely to have French franc countries as destination.

franc area. This is only possible when coding the dummy including the 1860s newcomers to the franc area, the Papal States and Greece, making the variable time-variant and non collinear with pair fixed-effects[19]. The estimated coefficient for the endogenous franc effect is remarkably similar to the exogenous one, when using my preferred specification in columns 1 and 3. However, the effect turns negative and statistically insignificant once I introduce pair-specific trends in columns 2 and 4. This suggests progressive integration with the French bloc as a possibly important source of endogeneity bias, comforting the identification strategy.

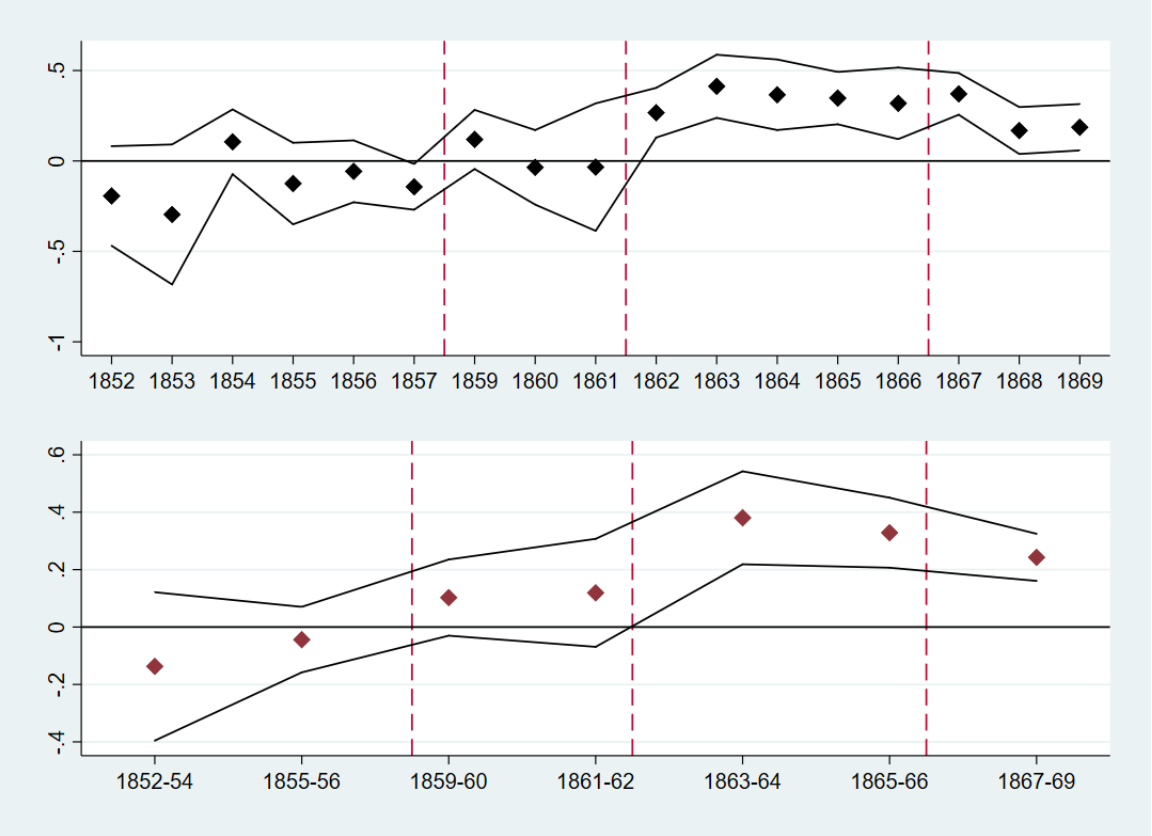
Adding new-comers to the exogenous Franc dummy yields similar results to the baseline. Separating out the effect between annexed Italian states and new-comers in columns 3 and 4 however signals an interesting difference with respect to the endogenous Franc dummy. While the introduction of pair-specific trends in column 4 makes the estimate statistically insignificant the coefficient remains large. This might be related to the reduction in trade costs between the annexed Italian states and the new-comers being more exogenous compared to the larger members of the French franc area.

2.7.2. Parallel Trends

It is crucial to my identification strategy that the parallel trends assumptions between treated and control trade flows is fulfilled. Figure 2.3 provides reassuring evidence that this is the case by plotting leads and lags of the estimated coefficient. No common currency effect can be detected prior to the start of actual circulation of the French franc monetary standard in the annexed Italian territories. It might also be reassuring for the identification strategy that no change in the estimated effect can be detected between 1859 and 1861 when the new currency is still to be circulated but new trade tariffs are already in full operation in the annexed territories. I will turn more closely to the issue of the coincident shock to trade policy below.

[19]This is because legacy members of the franc area, Belgium, Piedmont-Sardinia and Switzerland, entered into a common currency with France years before the start of my sample period.

Figure 2.3: Leads and Lags of the Franc Effect



Lead and lags of the Franc effects estimated with PPML bidirectional pair, exporter-year and importer-year fixed-effects, using the whole sample (Top Panel, equivalent to Column 3 in Table 2.7.1) and the collapsed sample (Bottom panel, equivalent to Column 4 in Table 2.7.1). The first dotted line denotes the beginning of the Austro-Sardinian War and the military events that will lead to the Italian unification. The second dotted line denotes the Italian unification in 1861. The third dotted line denotes the Italian fiscal crisis of 1866.

2.7.3. Heterogeneity

Figure 2.3 also allows to explore heterogeneity in the estimated effect along the time dimension. As highlighted above, two sources of potential heterogeneity might be at play after 1866, with further harmonisation of coinage with the Latin Union convention on the one hand, and the Italian fiscal crisis of 1866 introducing a parallel in-convertible currency on the other hand. It is crucial to note that only the bottom panel in Figure 2.3 should be analyzed in this view[20]. The slight decline observed in the coefficient for 1867-1869 might signal an increase in relative trade costs related to the payment-system implications of the Italian fiscal crisis. However, this is not clearly backed by contemporaneous evidence in the consular reports I rely on to build my dataset. While the disruption is clearly mentioned as an increase in trade costs, it seem to be qualitatively portrayed as decreasing the trade costs between Italy and the French franc area relative to non-French franc countries. I find several references to shipment of physical currency to France as part of Consulates' trade reports in Italy after 1866[21].

Heterogeneity in the Rose Effect along the cross-sectional dimension plays an important role in the most recent reassessment[22] of the Latin Monetary Union trade effect by Timini (2018). He finds the Latin Monetary Union effect to be driven by hub-to-spoke flows between France and the other members, with no role for spoke-to-spoke flows. Table 2.5 shows this is not the case when looking at the exogenous French franc pairs, as, if anything, estimated effects are significantly stronger for trade flows between Belgium and Switzerland on one side and the annexed Italian states on the other side.

Asymmetric effects are also shown to be a crucial feature of the Rose Effect in recent work by Chen and Novy (2019). Relying on a theoretical framework allowing for variable trade cost elasticity, they find the common currency effect to be strongly heterogeneous across and

[20] The top panel does not accurately portray heterogeneity over time as it does not correct for missing reporting by treated Italian states, which are more frequent after 1865 (See Table 2.C.1).

[21] See various comments related to bullion and currency shipping in Ministère du Commerce (1878), "Royaume d'Italie".

[22] Which focuses on what I characterise in this paper as the "endogenous" members of the French franc area and relying on national level data.

Table 2.5: Heterogeneity by Trade Flow Direction

	(1) PPML	(2) PPML	(3) PPML	(4) PPML
Franc (France Imports)	**0.371*** **	**0.658*** **	**0.303*** **	**0.523*** **
	(0.123)	**(0.241)**	**(0.114)**	**(0.167)**
Franc (France Exports)	**0.269** **	0.0418	**0.215***	0.00520
	(0.132)	(0.139)	**(0.125)**	(0.132)
Franc (Belgium Imports)	**0.575*** **	**0.882** **	**0.460*** **	0.448
	(0.128)	**(0.358)**	**(0.157)**	(0.315)
Franc (Belgium Exports)	**0.800*** **	**0.869*** **	**0.792*** **	**0.866*** **
	(0.170)	**(0.186)**	**(0.140)**	**(0.175)**
Franc (Switzerland Imports)	-0.0321	**1.279*** **	-0.0665	**1.362*** **
	(0.334)	**(0.443)**	(0.232)	**(0.432)**
Franc (Switzerland Exports)	**1.316** **	**2.394*** **	0.671	**3.269*** **
	(0.519)	**(0.447)**	(0.443)	**(0.508)**
Observations	4,350	4,350	2,074	2,074
R-squared	0.985	0.990	0.988	0.993
Sample	All Years	All Years	Collapsed	Collapsed
Pair-specific trend	NO	YES	NO	YES

Bidirectional pair, importer-time and exporter-time fixed effects, FTA war and allied dummies included in all specifications but not reported. Multi-way clustered standard errors reported in parenthesis. ***, ** and * denote statistical significance at the 0.01, 0.05 and 0.1 levels respectively. The estimates separate out the estimated franc effect depending on the direction of trade flows of legacy members. As in the rest of the paper, only exogenous pairs involving a legacy member and an annexed Italian state are considered.

within country pairs, with higher effects found for smaller import shares. Both dis-aggregated estimates by the direction of flows in Table 2.5 and within pairs effects in Table 2.A.5 seem to be broadly consistent with their theoretical predictions, particularly when looking at France. The effect tends to be significantly higher for small import shares, or, in other words, trade flowing to France from the smaller treated countries, compared to large import shares.Chen and Novy (2019) show similar bilateral asymmetries can be found looking at Euro area members.

2.7.4. Trade Policy Shock

I now turn to potential coincident third factors that could be biasing my estimate of the trade effect of the exogenous adoption of the French Franc.

In principle, the adoption by the annexed Italian states of Piedmont-Sardinia's *laissez-faire* trade policy could represent a concern. However, as highlighted above, given the multilateral nature of trade liberalisation in the period I consider, changes in trade policy should be systematically absorbed by exporter-year and importer-year fixed effects, particularly after 1860 with the proliferation of MFNs clauses. This assumption is consistent with estimated effects of the FTA dummy in all the specifications shown so far, as no pro-trade effect of bilateral trade treaty can be found. Furthermore, looking at the leads and lags of the franc effect reassuringly suggests that no effect can be detected in the few years where the new tariff regime was already in place but the French monetary standard still had to be implemented.

I now further test the robustness of my assumption regarding the multilateral nature of the trade policy shock implied by the Italian unification.

First, I explicitly test whether the change in bilateral trade costs following the adoption of Piedmont-Sardinia's tariffs was the symmetric for France and Great Britain *vis-à-vis* all annexed Italian states individually. This is certainly true *de jure*. The diffusion of MFN clauses ensures that any bilateral change in tariff is applied to all partners conditional on them having a FTA treaty. However, it might still be the case that, given product-mix

differences across partners, the impact of a multilateral trade policy could yield a *de facto* asymmetric change in trade costs. For example, it would be a particular concern in case Piedmont's tariffs were already more favorable to Francophone countries' product mix or became so with new treaties being signed post-unification. I test whether the assumption of a symmetric multilateral trade shock holds by computing a measure of post-unification effective tariff change T between each annexed Italian region i a partner j for n products k as

$$T_{ij} = \sum_{k=1}^{n} W_{ijk} S_{ik} \tag{2.3}$$

where W_{ijk} is the share of product k in the the total export of partner j to Italian region i and S_{ik} is the post-unification percentage change in tariff for product k in Italian region i. I am able to calculate T for all Italian regions in my sample vis-à-vis France and Britain across 19 products, relying on the archival data sources discussed in Appendix 2.C and the data on pre and post-unification tariffs by product and region compiled by Stringher (1889).

Table 2.6: Product-Mix Weighted Post-Unification Change in Tariffs by Partner

	Tuscany	Romagna	Naples	Sicily
Weighted Tariff Change				
France	3%	-14%	-46%	-21%
Great Britain	-4%	-19%	-53%	-43%
Equal Mean T-Test (P-Value)	0.684	0.843	0.837	0.374
Imports Coverage	79%	70%	57%	51%

Source: Stringher (1889), Ministère du Commerce (1878).
The first two rows compute the change in tariffs brought by the adoption of Piedmont's tariff across 19 products, weighted by the share of each product in the total bilateral imports between each region and France/Great Britain. The third row reports the p-value of a equal mean T-test between weighted tariff reduction for France and Great Britain by region. Imports coverage denotes the share of imports covered by the 19 products considered.

As shown in Table 2.6, the difference in the post-unification effective change in tariffs vs. France and Great Britain is statistically insignificant for all Italian annexed regions. This confirms the assumption of a symmetric change in trade costs coming from the post-unification tariff shock, which should be therefore absorbed by fixed effects. If anything,

the computed weighted tariff changes would indicate a downward bias in my Rose Effect estimates. Indeed, the tariff shock seems to have marginally favored Britain, compared to France. As shown in Figure 2.A.1, this was driven by larger tariff reductions in products disproportionately exported to Italy by Britain relative to France, such as iron, wool and, to a lesser extent, cotton.

Second, Columns 5 and 6 of Table 2.7 further explore any differential effects coming from the FTA treaties exogenously extended to the annexed territories by Piedmont, compared to the average FTA effect. I estimate separately from the Treaty variable a Piedmont-treaties dummy turning to 1 when an annexed territory adopts a trade treaty as part of the Italian unification. No statistically significant effect can be detected, while the franc effect remains stable.

Table 2.7: Coincident Factors

	(1) PPML	(2) PPML	(3) PPML	(4) PPML	(5) PPML	(6) PPML
Placebo Franc	-0.0573	-0.0929				
	(0.124)	(0.138)				
Metric System			-0.0252	0.157		
			(0)	(0.166)		
Franc					0.350***	0.292***
					(0.0769)	(0.0774)
FTA Annexed					0.0823	0.0271
					(0.101)	(0.100)
FTA Excl. Annexed					0.0282	-0.0701***
					(0.0358)	(0.0239)
FTA	0.0253	-0.0744***	0.0243	-0.0763***		
	(0.0299)	(0.0188)	(0)	(0.0261)		
Observations	4,350	2,074	4,350	2,074	4,350	2,074
R-squared	0.985	0.988	0.985	0.988	0.985	0.988
Sample	All Years	Collapsed	All Years	Collapsed	All Years	Collapsed
Implied Effect	-	-	-	-	0.419	0.339

Bidirectional pair, importer-time and exporter-time fixed effects, war and allied dummies included in all specifications but not shown. Multi-way clustered standard errors reported in parenthesis. ***, ** and * denote statistical significance at the 0.01, 0.05 and 0.1 levels respectively. Columns 1 and 2 perform a placebo franc test using Austria and Spain as placebo-treated. Columns 3 and 4 test whether the franc effect could be actually driven by the adoption of the metric system. Columns 5 and 6 separate out the FTA dummy for FTAs extended to Italian annexed territories.

2.7.5. Other Coincident Factors

Other important coincident factors include the rise of France as a capital exporters and the adoption of the metric system by the annexed Italian states.

Regarding the former, one could speculate that my treatment effect is in fact related to France's rising role as a capital exporter, regardless of the adoption of the French franc monetary standard. I address this by running a "placebo French Franc" estimate, where I test whether I can detect an effect for trade flows between the original members of the French franc bloc and Spain and Austria after 1862. Those countries were peripheral capital importers and made formal steps towards the adoption of a French monetary standard and Latin Union membership, without ultimately joining. As can be seen in columns 1 and 2 in Table 2.7 no "placebo Franc" effect can be detected.

With respect to the metric system, I exploit the fact that several countries were metric system adopters but did not have a French franc monetary standard. I therefore test whether I can detect any trade effect during the treatment period between the annexed Italian states and the Netherlands, Portugal and Spain. Columns 2 and 3 in Table 2.7 show that such effect is either negative or not statistically significant.

2.7.6. Confounding Factors and Balancing

Finally, I address the possibility that confounding factors are biasing my results. Propensity score based methods are helpful in this respect, as they allow to build a control group with similar probability of treatment to the treatment group in observational studies. They were previously employed in the context of the Rose Effect literature by Chintrakarn (2008) and Wolf and Ritschl (2011). While the treatment is arguably exogenous, and is shown to be with respect to classical determinants of exchange rate choice the control group exhibits significantly different characteristics across several dimensions, including distance, degree of political autocracy, population size and, importantly, years of Napoleonic occupation, a

possible confounder. Column 1 in Table 2.8 controls directly for such time-invariant factors by estimating the gravity equation without pair fixed-effects. Furthermore, I implement an Inverse Probability of Treatment Weighting estimation to balance co-variates across these dimensions and provide a control group closer to the treatment one. To do so, I first intuitively drop from the control group, in order for it to become closer to the treated pairs' characteristics, non-European countries, bilateral flows that already shared the French franc before the beginning of the sample and biletaral flows among very large countries (the sample's top 5% in terms of product of population).

I then estimate a propensity score P as the fitted values of a probit model of French franc adoption

$$P(Franc_{ij} \mid Z_{ij}\theta) = 1 - \Phi(-Z'_{ij}\theta) \tag{2.4}$$

where Z is a set of potential confounders to be balanced, including distance, the quadratic distance, the minimum and maximum population in 1858 within the pair *i* and *j* and variables Polity2 and Napoleon. I then weight the sample by 1/P for treated pairs and 1/(1-P) for control pairs. The balancing of covariates obtained through this weighting procedure is shown in Figure 2.9: the standardised difference in most covariates is substantially reduced, particularly for the years of Napoleonic occupation, with the difference between treated and control groups becoming statistically insignificant.

Estimating the gravity equation on a sample balanced on key covariates, as shown in columns 2 and 3 of Table 2.8, provides treatment effects above the baseline estimate at around 40%.

Table 2.8: Estimates Controlling for Time-invariant Co-variates

	(1) No Pair FE PPML	(2) PPML - IPT Weighted	(3) PPML - IPT Weighted
Franc	**0.3427****	**0.402*****	**0.339***
	(0.162)	**(0.134)**	**(0.184)**
FTA	**-0.157***	**0.173****	**0.126***
	(0.942)	**(0.0769)**	**(0.0696)**
Napoleon	0.0249		
	(0.0368)		
Observations	2,323	1,101	1,091
R-squared	0.9084	0.9898	0.9898
Sample	Collapsed	Collapsed IPTW	Collapsed IPTW
Pair FE	NO	YES	YES
Pair-specific Trend	NO	NO	YES
Implied Effect	0.408	0.494	0.404
RESET	0.083	0.756	0.715

Importer-time and exporter-time fixed effects, war and allied dummies included in all specifications but not reported. Controls for distance, common language and border, population size, polity2 score included in column 1 but not reported. Column 2 and 3 are estimated on a reduced sample, balancing average Napoleonic occupation, distance, polity2 score and bilateral population size across treated and non-treated pairs. Multi-way clustered standard errors reported in parenthesis. ***, ** and * denote statistical significance at the 0.01, 0.05 and 0.1 levels respectively.

Table 2.9: Balancing of Co-Variates Before and After IPT Weighting

	Original Collapsed Dataset			Inverse Propensity Weighted Dataset			
	Franc	Non-Franc	P-Value	Franc	Non-Franc	P-Value	St. Diff.
Napoleon	242	59.34	0.000	101.41	91.08	0.489	0.076
Distance	1065.445	1966.106	0.000	1307.67	1259.79	0.257	0.099
Polity2	-4.023	-7.657	0.000	-9.13	-8.57	0.568	-0.075
Population	47,700	220,000	0.000	49,678	51,850	1	-0.035

The table report the average of selected co-variates across franc and non-franc bilateral pairs, before and after the sample is weighted as described in Section 2.7.6.

2.8. Discussion

I now turn to a short discussion on the relevance of the paper's results in the context of the wider literature on the Rose Effect. I also tentatively highlight some channels that could explain the common currency pro-trade effect I find.

2.8.1. Comparison with Existing Estimates

The historical setting of the analysis raises the issue of results' comparability with existing estimates of the Rose Effect. In particular, one might wonder about the external validity of the treatment effect I examine. Indeed, the latter occurs in a context of commodity-based currencies linked to a metallic parity, where the role of FX volatility - a key plausible mechanism for a pro-trade Rose Effect - might not come as intuitive. On the contrary, I will show below how transaction costs related to FX volatility in the period I examine are in line with those experienced during most of the common currency observations in the Rose literature.

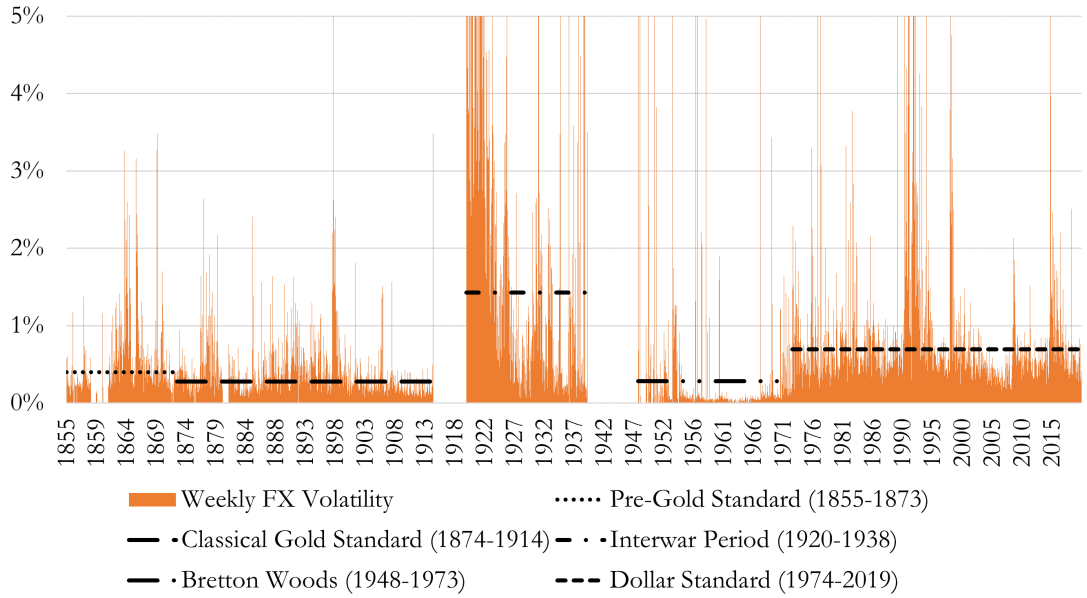
Far from suppressing volatility, the behavior of the FX market during this period closely resembled the one of "bands" exchange rate regimes[23]. Metallic currencies' exchange rates typically fluctuated between upper and lower bounds, represented by transaction costs to arbitraging[24], according to money demand conditions.

Figure 2.4 quantifies FX market volatility for key currencies over one and a half century, providing a snapshot of different volatility regimes. It notably shows how FX volatility in the pre-Gold Standard period is actually higher than during the Bretton Woods period, with a standard-deviation of weekly FX log-returns at around 0.4% vs. 0.28% for the 1945-1973 period. This analysis context in terms of trade cost stemming from FX volatility is

[23]Given technological obstacles to the existence of a spot market, FX transactions in the 19th century were carried using a short-term negotiable instrument, the "bill of exchange".

[24]If the metallic parity is credible, arbitrageurs would self-stabilise the exchange rate around the metallic parity, but arbitrage would only kick-in once the deviation from parity is close to the cost of physically shipping metals.

Figure 2.4: FX Volatility Now and Then



Source: The Economist, The Banker's Almanac, Bank for International Settlements, Global Financial Data and author's calculations. Annual average of the standard deviation of weekly log-returns for eleven European currencies against the British Pound until WWII and the US Dollar afterward.

then remarkably similar to the setting where the majority of currency unions observations considered by the literature occurs. Based on the computation of currency unions switches by De Sousa (2012), the Bretton Woods period represents 35% of the sample but 55% of currency union observations (65% excluding the Euro) in the dataset commonly employed by the Rose Effect literature.

Furthermore, it is important to stress how the spread of the French franc throughout Europe in the mid-19th century was well understood by its promoters as a mean to reduce international transaction costs in a context of trade globalisation and European integration (See Section 2.3.1), with striking parallels with the recent EMU process.

Table 2.10 provides some more elements of comparison between the present paper's results and the wider literature, as I replicate the key estimate by Glick and Rose (2016) for different sub-periods using PPML and high-definition fixed-effects[25]. Estimates of the Rose Effect in columns (1), (2) and (3) might be suggestive of heterogeneity in the effect related to different

[25]The estimate in column (3) therefore replicates column (5) in Table 1 of Larch et al. (2018).

regimes in FX transaction costs.

The estimated coefficient in the moderately volatile pre-Gold Standard and Bretton Woods periods are very similar at around 30%, while the effect is much higher (above 100%) once the more volatile post-1973 period is included. However, the picture is significantly more blurred once slight changes to the sample are made in columns (4) and (5).

Table 2.10: The Rose Effect Now and Then

	(1) Pre-GS	(2) Bretton Woods	(3) Post-WWII	(4) Post-1973	(5) Post-WWII
Period	1852-1869	1948-1972	1948-2013	1973-2013	1948-2013
CU Considered	French Franc	All	All - No EMU	All - No EMU	All
% of CU Dyads	3.2%	2.5%	1.6%	1.1%	1.6%
Sample	Collapsed	G&R (2016)	G&R (2016)	G&R (2016)	G&R (2016)
Estimated Effect	**0.302*****	**0.274*****	**0.716*****	**0.215***	**0.155*****
FX Volatility	0.4%	0.28%	0.5%	0.7%	0.5%

Column (1) reproduces the estimate in Table 1 Column 4. Estimates in Columns (2) to (5) are performed on the dataset by Glick and Rose (2016) using PPML, controlling for FTAs, colonial relationships and importer-year, exporter-year and importer-exporter fixed-effects and standard errors clustered at the exporter, importer and year levels. Source for average FX volatility is detailed below Figure 2.4.

A key reason to compare my results with the wider literature would be to gather some evidence on the size (and direction) of the endogeneity bias in the latter. It would be tempting to conclude, looking at meta-analyses as well as recent state-of-the-art estimates by Glick and Rose (2016) and Larch et al. (2018) - putting the Rose Effect at close to 100% - that this bias is sizable. Nevertheless, as shown in Table 2.10, estimates based on data by Glick and Rose (2016) can be fairly sensitive to slight changes in specification and dis-aggregation of various currency unions. This could indicate that the Rose Effect I obtain through a well identified quasi-experiment in the present paper might actually not be as low, in relative terms, as it might be suggested by a comparison with recent *preferred* estimates in the literature. As recalled above, Chen and Novy (2019) show the crucial role of heterogeneity driven by trade share in this respect.

2.8.2. Channels

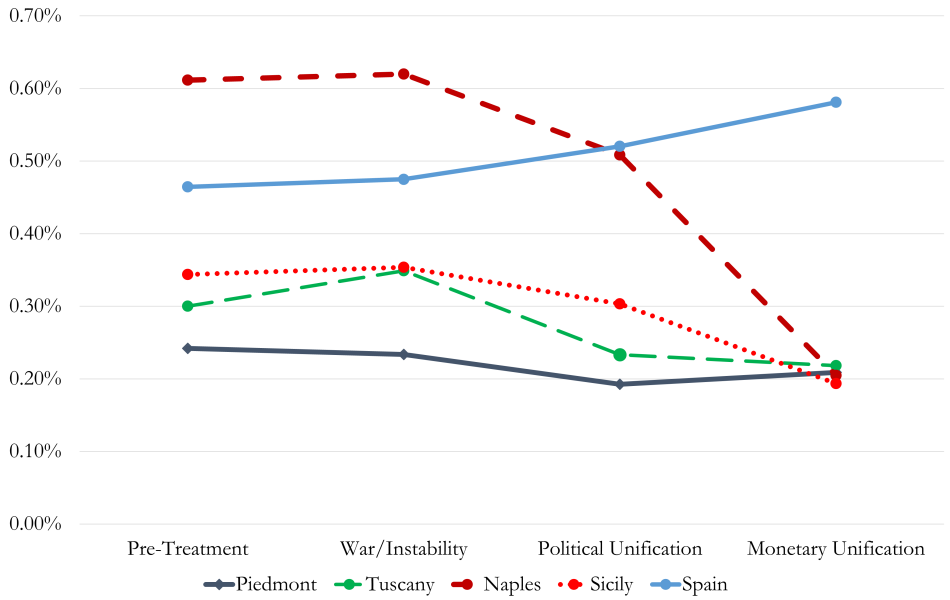
Channels commonly considered in the literature (Baldwin, 2006) include FX volatility, transaction costs related to the use of different currencies, as well as an increase in market transparency and efficiency. Thanks to new FX market data collected for pre-unitary Italian states that are further examined in both Chapters 3 and 4, I am able to provide some quantification for the first two factors for three of the treated Italian regions I consider: Tuscany, Naples and Sicily. I can compare their developments around the monetary unification shock with those of Piedmont, a longstanding member of the French franc zone, and Spain, a comparable peripheral country which does not adopt the French Franc.

Overall, the shock had a strong impact on both volatility and transaction costs but with some heterogeneity: it was significantly stronger in the more peripheral Southern regions of Italy compared to Tuscany. This is the mirror image of those regions having a much lower ex-ante probability of joining the French franc zone based on foreign-exchange regime determinants as discussed above. Figure 2.5, shows bid-ask spreads on trade-finance FX instruments quoted in London. Transaction costs for treated regions converged to the levels of Piedmont, but only after monetary unification and from different levels: while convergence for Tuscany and Sicily reflected a decrease of about 10bp in the spread, this figure was closer to 40bp for the continental South.

Data on FX and trade-finance instruments also show how the treatment specifically reduced transaction costs between the annexed Italian regions and the French franc area. Figure 2.6 shows how the correlation of returns of trade-finance instruments quoted in London between the same countries and France dramatically increased following their adoption of Piedmont's currency. The monetary unification shock is sizable for Tuscany, where co-movement with France increase by about 30pp following treatment, but dramatically larger for Southern Italian regions, where co-movement with France was orders of magnitude lower pre-treatment than post-treatment.

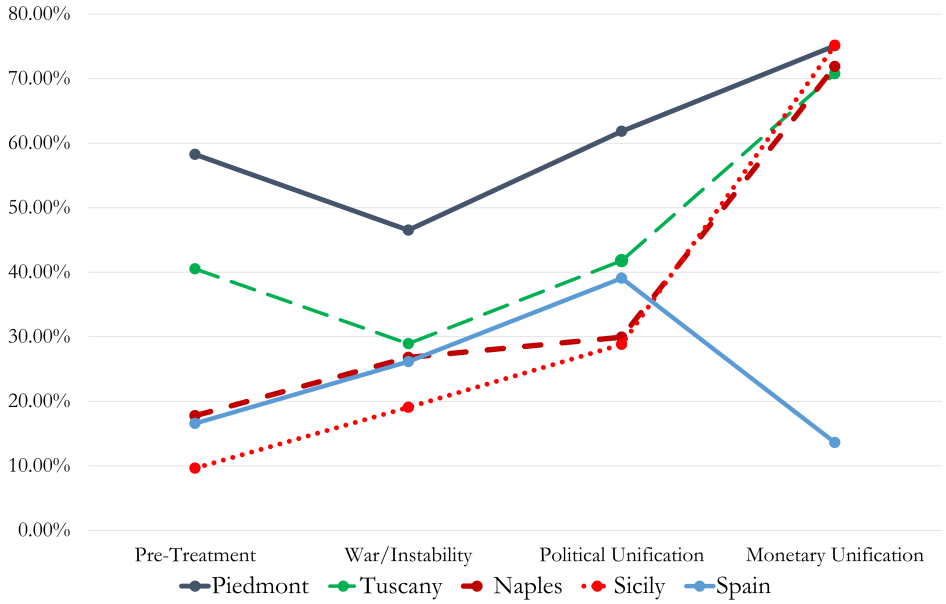
All in all, the above data can be interpreted as evidence of alternative channels through

Figure 2.5: Bid-Ask Spread on Trade-Finance Instruments Quoted in London



Source: The Economist, author's calculations. Bid-Ask Spread on 3-Months Bills of Exchange quoted in The Economist averaged across key periods. Pre-Treatment: 1952-1958. War/Instability: 1859-1860. Political Unification: 1861-1862. Monetary Unification: 1863-1865. Period definition for Tuscany reflects a slightly different timing of events described in Section 2.6.

Figure 2.6: Co-movement of Returns vs. France - Trade-Finance Instruments Quoted in London



Source: The Economist, author's calculations. Correlation of 3-Months Bills of Exchange's return vs. France as quoted in The Economist across key periods. Pre-Treatment: 1952-1958. War/Instability: 1859-1860. Political Unification: 1861-1862. Monetary Unification: 1863-1865. Period definition for Tuscany reflects a slightly different timing of events described in Section 2.6.

which a pro-trade Rose Effect might materialise, beside reduction in volatility and increase in market transparency. In particular, the Italian monetary unification shock allowed annexed regions to benefit from significantly easier access to French trade finance, as signaled by a marked increased of money market co-movement.

Furthermore, the pattern of heterogeneity in the magnitude of the monetary unification shock shown by financial data fits well with the heterogeneity in the estimated effect shown in Table 2.A.4. Tuscany experienced milder shifts in the currency and money markets following monetary unification and is shown to increase the treatment effect once dropped from the dataset.

2.9. Conclusion

This paper fills an important gap in the literature on the trade effect of common currency by providing for the first time a causal estimate of the Rose Effect relying on a quasi-experiment.

The estimated effect is large and significant, around 35%. The identification strategy, which relies on an exogenous variation in the membership of the 19^{th} century French franc monetary bloc, is resilient to a wide range of robustness checks. Importantly, coincident factors are shown not to be driving my findings.

The effect is significantly smaller than the average one found in the Rose Effect literature according to recent meta-analyses (Head and Mayer, 2014; Rose, 2017), suggesting that endogeneity bias might have been playing a role in previous work. Nevertheless, my results are relatively close to the lower bound of recent correctly specified estimates such as in Glick and Rose (2016).

All in all, my results seem to corroborate the broader policy implications of Rose's seminal paper. A common currency is found to have a causal pro-trade effect in the context of what is probably the closest historical precedent to the recent process of European monetary integration.

Appendix

2.A. Results Appendix

Table 2.A.1: Descriptive Statistics - Collapsed Sample

	Non-Treated Flows			Treated Flows			All Flows		
Variables	**N**	**Mean**	**S.D.**	**N**	**Mean**	**S.D.**	**N**	**Mean**	**S.D.**
Imports	4695	33,500	101,000	275	7,877	11,000	4970	32,100	98,600
Distance	6408	1,966.11	1,847.02	432	1,065.45	313.02	6840	1,909.22	1,802.83
Border	6408	0.06	0.23	432	-	-	6840	0.05	0.22
Language	6408	0.10	0.29	432	-	-	6840	0.09	0.29
Population_i	6408	15,679	16,725	432	9,046	12,753	6840	15,260	16,580
Franc	6408	-	-	432	0.43	0.50	6840	0.03	0.16
Franc (End.)	6408	0.03	0.18	432	-	-	6840	0.03	0.17
FTA	6408	0.22	0.41	432	0.50	0.50	6840	0.24	0.42
Napoleon	6408	59.34	111.99	432	242.00	161.73	6840	70.88	123.98
Polity2	6408	- 7.66	8.45	432	- 4.02	8.06	6840	- 7.43	8.47
War	6408	0.01	0.09	432	-	-	6840	0.01	0.08
Allied	6408	0.01	0.10	432	-	-	6840	0.01	0.09

Table 2.A.2: Robustness to Different Specifications

	(1) PPML	(2) PPML	(3) PPML
Franc	**0.316****	**0.291*****	**0.326*****
	(0.131)	**(0.0504)**	**(0.121)**
FTA	-0.0278	**-0.0781*****	-0.0409
	(0.0424)	**(0.0172)**	(0.0267)
Observations	2,071	2,088	2,088
Estimator	PPML	PPML	PPML
Sample	Collapsed	Collapsed	Collapsed
Pair-specific Trend	YES	NO	YES
Symmetric Pair FE	NO	YES	YES
Implied Effect	0.371	0.337	0.385
RESET Test (P-Value)	0.000	0.00215	0.000
R-squared	0.9877	0.972	0.977

Importer-time and exporter-time fixed effects, war and allied dummies included in all specifications but not reported. Columns 1 include bidirectional pair fixed-effects. Columns 1 and 2 include unidirectional (symmetric) pair fixed-effects. Columns 1 and 3 allow for a pair-specific trend. Multi-way clustered standard errors reported in parenthesis. ***, ** and * denote statistical significance at the 0.01, 0.05 and 0.1 levels respectively.

Table 2.A.3: Estimates Across Different Control Groups

	(1) Only Europe	(2) No Overland	(3) Both	(4) Only Europe	(5) No Overland	(6) Both
Franc	**0.220****	**0.449*****	**0.327****	**0.204****	**0.369*****	**0.272****
	(0.106)	**(0.0782)**	**(0.136)**	**(0.101)**	**(0.0901)**	**(0.127)**
FTA	-0.0137	0.0155	0.0823	-0.0678	**-0.0818***	0.0117
	(0.0671)	(0.0307)	(0.0738)	(0.0854)	**(0.0489)**	(0.0739)
Observations	2,944	3,484	2,248	1,422	1,654	1,082
R-squared	0.990	0.993	0.996	0.992	0.994	0.996
Sample	All Years	All Years	All Years	Collapsed	Collapsed	Collapsed
Implied Effect	0.246	0.567	0.387	0.226	0.446	0.312
RESET	0.0104	0.395	0.0398	0.0157	0.483	0.499

Bidirectional pair, importer-time and exporter-time fixed effects, war and allied dummies included in all specifications but not reported. Multi-way clustered standard errors reported in parenthesis. ***, ** and * denote statistical significance at the 0.01, 0.05 and 0.1 levels respectively. Columns 1, 3, 4 and 6 exclude non European partners (USA, Russia, Turkey) from the control group. Columns 2, 3, 5 and 6 exclude partners more exposed to overland trade with Italy (Austria, Zollverein) from the control group.

Table 2.A.4: Estimates Obtained Dropping One Country at a Time

Country	Franc	Country	Franc
Austria	0.291***	Russia	0.357***
Belgium	0.254**	Sardinia	0.326***
Britain	0.282**	Sicily	0.294***
France	0.640***	Spain	0.285***
Greece	0.302***	Sweden and Norway	0.311***
Naples	0.290***	Switzerland	0.310***
Netherlands	0.337***	Turkey	0.277***
Portugal	0.306***	Tuscany	0.392***
Romagna	0.260***	USA	0.202**
Papal States	0.296***	Zollwerein	0.352***

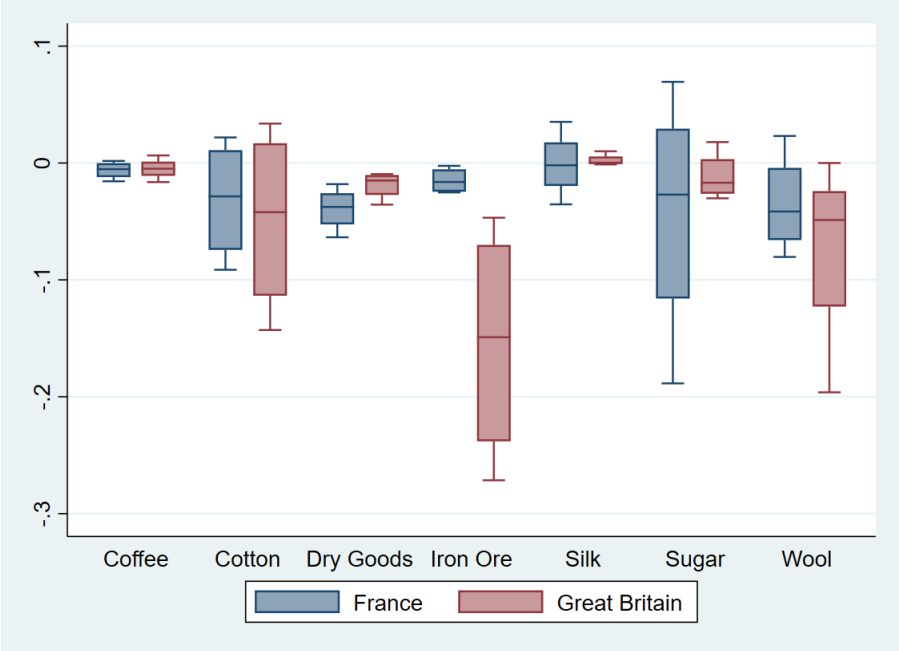
Bidirectional pair, importer-time and exporter-time fixed effects, FTA, war and allied dummies included in all specifications but not reported. Multi-way clustered standard errors reported in parenthesis. ***, ** and * denote statistical significance at the 0.01, 0.05 and 0.1 levels respectively. The coefficients shown correspond to estimates obtained dropping one country at a time from the sample and can be compared to the overall coefficient obtained in column 4, Table 2.3.

Table 2.A.5: Bilateral Asymmetries

Exporter-Importer	Franc Estimate	Exporter-Importer	Franc Estimate
France-Tuscany	0.0538	Tuscany-France	0.229
	(0.148)		(0.153)
France-Romagna	**1.576*****	Romagna-France	**2.680*****
	(0.266)		(0.318)
France-Naples	0.0978	Naples-France	**0.718*****
	(0.199)		(0.233)
France-Sicily	0.298	Sicily-France	**0.566*****
	(0.183)		(0.136)
Belgium-Tuscany	**1.266*****	Tuscany-Belgium	0.0631
	(0.158)		(0.232)
Belgium-Naples	**1.255*****	Naples-Belgium	**0.500****
	(0.296)		(0.226)
Belgium-Sicily	**0.252***	Sicily-Belgium	**0.707*****
	(0.139)		(0.119)
Switzerland-Naples	-0.450	Naples-Switzerland	**1.625*****
	(0.299)		(0.215)

Bidirectional pair, importer-time and exporter-time fixed effects, FTA war and allied dummies included in all specifications but not reported. Multi-way clustered standard errors reported in parenthesis. ***, ** and * denote statistical significance at the 0.01, 0.05 and 0.1 levels respectively. The table compares bilateral asymmetries in the estimated effect when separate coefficients can be estimated without incurring in colinearity issues.

Figure 2.A.1: Weighted Tariff Reduction Across Italian Regions by Major Product and Partner



Source: Stringher (1889), Ministère du Commerce (1878).
The chart plots the range of the reduction achieved by the annexed regions for the seven main import products weighted by their importance in the import share of France and Britain in each region.

2.B. Time Line

Table 2.B.1: Timeline of the Italian Unification

Date	Event
July 1858	Secret French-Piedmontese pact negotiated by Napoléon III and Prime Minister Cavour, supporting Piedmont's expansion into Lombardy and Venetia against Austria.
April 1859	French-Piedmontese war on Austria.
May 1859	Anti-Austrian unrest in central Italy; pro-Piedmont revolutionary governments take power in Tuscany and Romagna.
June 1859	Austria evacuates Milan.
July 1859	Peace of Villafranca: France partially reneges on its promises. Lombardy is to be annexed by Piedmont but not Venetia. Tuscany and Romagna should remain under Austrian influence. An Italian confederation presided by the Pope is to be created. Cavour resigns in protestation to the missed annexation of Venetia.
November 1859	Treaty of Zurich: France and Austria reiterates their commitment to the principles of the Peace of Villafranca, while Piedmont is largely excluded from the negotiation table. Lombardy is nominally ceded to France and transferred to Piedmont.
December 1859	Diplomatic crisis, as pro-Piedmont governments in central Italy refuse to hand power back to Austria. Cavour is recalled to head the cabinet. He exploits French-British rivalries to overrule the Peace of Villafranca and obtains the annexation of Tuscany and Romagna through plebiscites, in exchange for French annexation of Savoy and Nice.
May 1860	Revolutionary militias led by Garibaldi land in Sicily. Cavour opposes the expedition.
August 1860	The unexpected collapse of the Two Sicilies Kingdom against Garibaldi forces Cavour to adapt; the threat of a revolutionary republic in Naples is defused by the annexation of the South by Piedmont.
March 1861	The Kingdom of Italy is proclaimed.

Source: Romeo (1984).

2.C. Data Appendix

Sources

As the most detailed original source compiled by French diplomats is sometimes missing from the Archives of the French Foreign Office, I rely on three distinct sources:

1. Where available, I employ the original *Etats de Commerce et de Navigation*'s statistical tables from the French Foreign Ministry Archives in Paris. Most of them are filed in the *Affaires Diverses Commerciales* series of the French *Archives Diplomatiques*, under "Varia", *Cartons* 654-660. Others are filed with the *Correspondance Consulaire et Commerciale* series, within each Consulate's correspondence. The original tables offer the highest level of details but were filed inconsistently and are missing for various years/countries.

2. Fortunately, a high number of the trade reports received by the Foreign Ministry were later published by the Ministère du Commerce (1878) as part of the *Annales du Commerce Extérieur*, a printed publication aimed at a business audience. The statistical tables contained in the *Annales* were at times condensed and provided less details in terms of trade partners but, combined with the original tables, they still allow to build a bilateral trade matrix for most of the years and partners I consider.

3. Finally, I employ equivalent reports from the British consulates in Italy to fill some of the reporting gaps in the dataset. Those reports were very similar in nature to the French ones, likely relying on the same local sources, and were published inconsistently in the Parliamentary Papers[26].

Shortcomings of the data

My dataset has, by construction, two key limitations. First, intra-Italian trade stops being recorded post-unification and is therefore discarded from the dataset. In any case, this is of

[26]For a detailed survey of the British consular reports on Italian trade see Marks (1959).

little relevance for the paper's objective, as it would have been difficult to disentangle an intra-Italian common currency effect from the reduction in trade costs coming from other aspects of unification.

Second, Italian trade data in my dataset only refer to trade by sea. This is due to the nature of the consular trade data, which were recorded at the ports. This could potentially introduce a bias in my estimates, as the development of a national railway system starting in 1861 is likely to have increased overland international trade: I could then see trade with some partners spuriously declining as it shifts from maritime to overland transportation. However, this is likely to be only marginally relevant for the Central-Southern regions of Italy I consider. Overland trade was non-existent pre-unification. Post-unification, the Italian railway system was developed with a military, rather than economic, rationale. It remained substantially costlier than sea shipping and is normally considered to have been unable to foster the rise of an integrated national market in the first decades of unification (Fenoaltea, 2011). In any case, an increase in overland international trade is likely to imply a downward bias to the estimate of the common currency effect. Indeed, France and Switzerland being bordering countries, they should be proportionally more affected by this potential shift from sea to overland trade compared to the majority of "control" trade partners in the sample. As a robustness check, in some specifications I exclude from the sample non-treated countries, such as Austria and Germany, that are more exposed to an increase in overland trade from Italy and could bias the estimated effect upward.

Missing Observations and Data Aggregation

I address missing reporting of trade and measurement errors in my original data aggregating up trade flows in a "collapsed" dataset. The latter is sampled by averaging trade at the *ij* level over two or three years periods. This not only ensures that within each period every treated Italian state reports at least once but also likely reduce measurement errors that are bound to exist in historical sources. This sample leaves me with three pre-treatment periods between 1852-1858, one period corresponding to the wars and annexation process (1859-1860), one

period post-unification but before monetary unification, and three post-unification treatment periods.

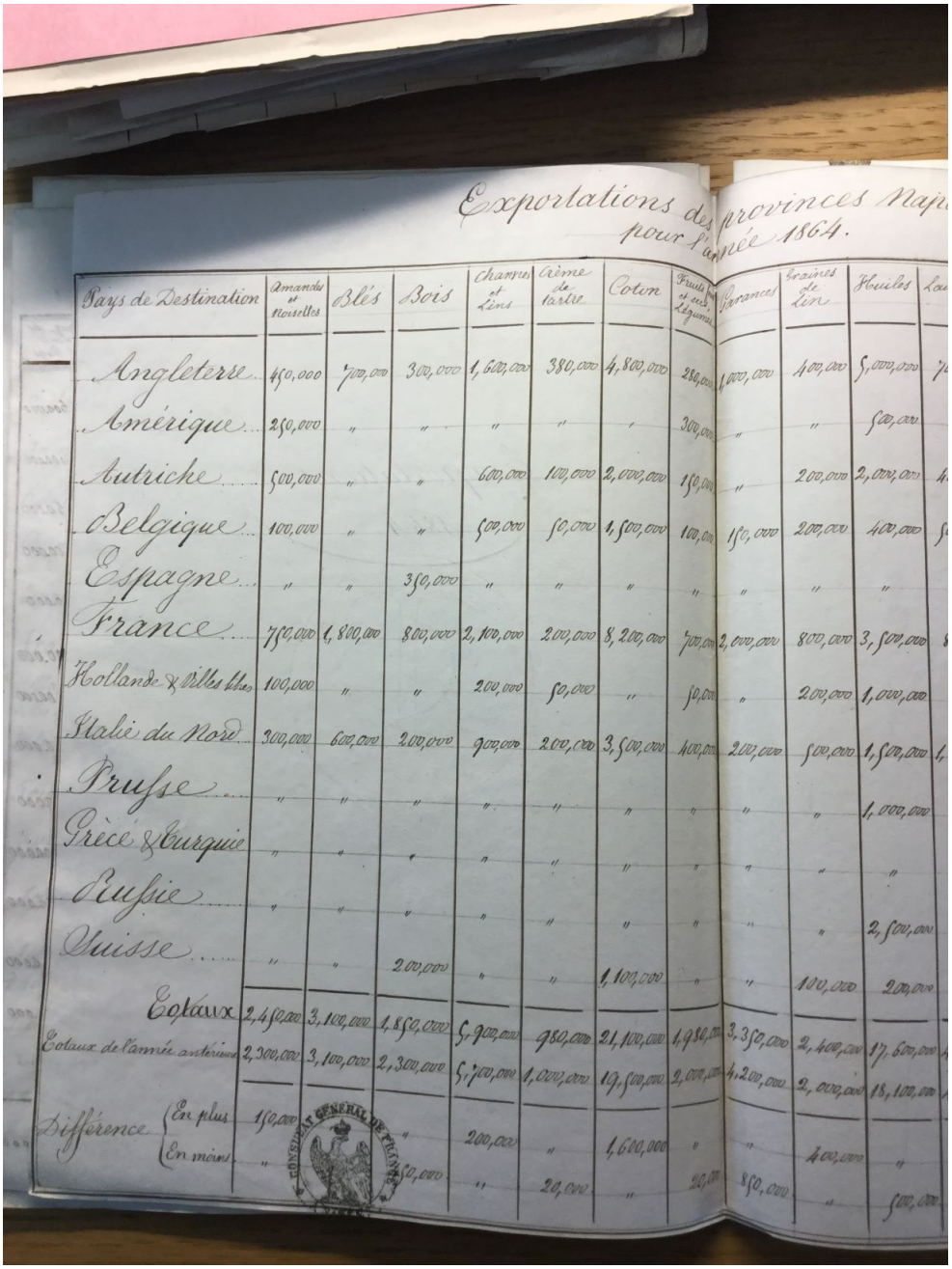
Truncated reporting in my Italian sources (the smallest partners are not always reported) means that some of the missing values in the trade matrix are not actually zero. Furthermore, some bilateral flows are not observed by construction, either because they concern intra-Italian flows post-unification or pairs of countries that are both not reporting trade (eg. Turkey and the Papal States). When this is the case, I follow Glick and Rose (2002) and exclude missing values from the sample. In the full sample, this leads to 4970 actually recorded flows out of 6840 theoretical trade flows.

Table 2.C.1: Sampling and Missing Reporters by Year

Year	Period	All Italian States Reporting[a]	Collapsed Sample[b]
1852	Pre-Unification	NO (Naples)	1852-1854
1853	Pre-Unification	YES	
1854	Pre-Unification	YES	
1855	Pre-Unification	YES	1855-1856
1856	Pre-Unification	YES	
1857	Pre-Unification	YES	1857-1858
1858	Pre-Unification	YES	
1859	Annexation (North)	NO (Sicily)	1859-1860
1860	Annexation (South)	NO (Naples)	
1861	Unification	YES	1861-1862
1862	Unification	NO (Naples)	
1863	Monetary Unification	YES	1863-1864
1864	Monetary Unification	YES	
1865	Monetary Unification	YES	1865-1866
1866	Monetary Unification	NO (Romagna)	
1867	Monetary Unification	NO (Tuscany)	1867-1869
1868	Monetary Unification	NO (Sicily)	
1869	Monetary Unification	NO (Sicily)	

[a] Missing State reported in parenthesis.
[b] Trade data are collapsed over three or two years period so that in every period all annexed Italian states report at least once.

Figure 2.C.1: Statistical Tables - *Etats de Commerce et de Navigation*



Exportations des provinces Napl
pour l'année 1864.

Pays de Destination	Amandes et Noisettes	Blés	Bois	Chanvre et Lins	Crème de tartre	Coton	Fruits secs et Légumes	Garances	Graines de Lin	Huiles	Lai
Angleterre	450,000	700,000	300,000	1,600,000	380,000	4,800,000	280,000	1,000,000	400,000	5,000,000	7
Amérique	250,000	"	"	"	"	"	300,000	"	"	500,000	
Autriche	500,000	"	"	600,000	100,000	2,000,000	150,000	"	200,000	2,000,000	4
Belgique	100,000	"	"	500,000	50,000	1,500,000	100,000	150,000	200,000	400,000	5
Espagne	"	"	350,000	"	"	"	"	"	"	"	
France	750,000	1,800,000	800,000	2,100,000	200,000	8,200,000	700,000	2,000,000	800,000	3,500,000	8
Hollande & villes libres	100,000	"	"	200,000	50,000	"	50,000	"	200,000	1,000,000	
Italie du Nord	300,000	600,000	200,000	900,000	200,000	3,500,000	400,000	200,000	500,000	1,500,000	4
Prusse	"	"	"	"	"	"	"	"	"	1,000,000	
Grèce & Turquie	"	"	"	"	"	"	"	"	"	"	
Russie	"	"	"	"	"	"	"	"	"	"	
Suisse	"	"	200,000	"	"	1,100,000	"	"	100,000	200,000	
Totaux	2,450,000	3,100,000	1,850,000	5,900,000	980,000	21,100,000	1,930,000	3,350,000	2,400,000	17,600,000	4
Totaux de l'année antérieure	2,300,000	3,100,000	2,300,000	5,700,000	1,000,000	19,500,000	2,000,000	4,200,000	2,000,000	18,100,000	
Différence En plus	150,000			200,000		1,600,000			400,000		
Différence En moins	"		50,000	"	20,000	"	70,000	850,000	"	500,000	

CONSULAT GENERAL DE FRANCE

Chapter 3

Are Optimum Currency Areas Endogenous? Lessons from European Monetary Integration in the 19th Century

3.1. Introduction

The creation of the Euro Area as well as the crisis that the common currency recently experienced have inspired renewed research interest in international monetary integration and the optimum currency areas (OCA) framework.

Particularly, the relationship between business cycles synchronisation and the optimal boundaries of currency areas has featured prominently in the European policy debate. Even before the Maastricht treaty came into force in 1992, a number of empirical studies doubted whether the soon to be EMU was an OCA (Bayoumi and Eichengreen, 1992; De Grauwe and Vanhaverbeke, 1991). They generally found evidence of a core-periphery dichotomy in the European economy (Eichengreen, 1991) and advised for a cautious approach to EMU membership, favoring a "multi-speed" monetary integration (Von Hagen and Neumann, 1994). More recently, as the choice of letting Greece and other peripheral countries in the "Club" was

widely blamed for the common currency existential crisis, new evidence of core-periphery divergence emerged (Bayoumi and Eichengreen, 2020; Belke et al., 2017), together with radical proposals favoring a split of the EMU along revised boundaries (Bootle, 2012; Stiglitz, 2016).

Interestingly, Mongelli (2008) notes how small the input from the OCA theory had been in the official EMU preparatory works (such as the Delors Report) and the mechanisms to determine EMU membership. While the Maastricht treaty defined "convergence criteria" to comply with before EMU accession, those criteria were neither fully enforced nor necessarily derived from the OCA framework. European officials' lack of interest towards determining optimal membership obviously reflected political factors. Nevertheless, it also was symptomatic of the then prevailing consensus (Commission, 1990) over the endogenous effects of monetary integration. There are indeed two conflicting theories regarding the effect of economic integration on business cycles synchronisation. On the one hand, the "European Commission view", also known as the OCA endogeneity theory following Frankel and Rose (1998), holds that monetary integration would endogenously lead to greater cyclical synchronisation and the fulfillment of the OCA criteria. On the other end, the "Krugman view" (Krugman, 2001) holds that a reduction in transaction costs, such as a common currency, leads to greater specialisation and differentiation among regions within a currency area. The individual regions then run higher risks of asymmetric shocks, cyclical divergence and income hysteresis. Krugman pointed to the regional decline of Massachussets and New England at the end of the 1980s to advance his argument of caution with respect to European integration.

The two views imply dramatically different policy prescriptions. The Krugman view cautions against forming a monetary union when cyclical synchronisation is low. The latter is indeed likely to worsen endogenously once further integration kicks in. On the contrary, according to the OCA endogeneity view, ex-ante optimality is of little concern as the OCA framework has little or no ex-ante predictive power: the borders of new monetary areas should actually be drawn *larger*, in the expectation that integration and synchronisation will increase ex-post.

This paper contributes to this debate by looking at past examples of international monetary

integration. In particular, the paper investigates the wave of European monetary integration occurring in the third quarter of the 19th century. This period witnessed to the rise of Britain, France and Germany as international monetary anchors and saw the formation of "national" monetary unions lasting to this day, in Italy and Germany. The Italian case is the focus of the paper given the exogeneity of the Italian monetary unification, achieved following random military events, and Italy's longstanding history of regional divergence and North-South economic, cultural and political divide. The German experience of monetary unification provides an interesting point of comparison, as it followed a long period of institutional and economic integration dating back centuries.

The paper provides an empirical contribution on two levels.

First, it tests the predictive power of the OCA framework, by estimating OCA-derived ex-ante optimal monetary boundaries of Europe in the period at hand. I make the empirical analysis of OCA tractable relying on an anchor-client framework of monetary integration and, in particular, the symmetry of nominal shocks with respect to anchors, following work by Alesina and Barro (2002) and Bayoumi and Eichengreen (1997). To this end, I exploit a newly compiled dataset of foreign exchange prices at the weekly and monthly frequency, including currencies of pre-unitary Italian and German polities, as well as new trade data at the pre-unitary Italian states level.

My findings provide support for the predictive power of the OCA framework. synchronisation of shocks is found to correctly predict the main patterns of European monetary integration in the period at hand. The key exception to this finding is Italy, which exhibited asymmetric shocks amongst some of its regions pre-unification. On the contrary, shocks across future German regions were largely symmetrical, suggesting substantially lower costs of monetary integration.

Second, I investigate the endogenous effects of monetary integration, testing for evidence of a Krugman-view style wave of specialisation in the decades following monetary integration. In particular, I try to identify whether pairs of provinces that suddenly started to integrated

following the unexpected unification shock experienced more divergence in their economic structure compared to pairs of provinces that were already part of the same common market.

I argue that it is likely that post-unification Italy saw Krugman-type endogenous effects dominating over Frankel-Rose OCA ones. Controlling for a number of characteristics relevant for economic specialisation, pairs of provinces belonging to two distinct Italian pre-unitary states are found to experience a significant increase in their economic structure's dissimilarity post economic integration, compared to a control group of already integrated provinces. This could potentially point to a role for monetary integration in the arising of the country's "Southern Question". As economic structures differed markedly between the North and the South, the deflationary shock to global agricultural prices from the 1880s is likely to have been asymmetric in nature and might have contributed to the widening of regional inequality in Italy. I argue that, in a no-unification counterfactual, the Italian South would have likely pursued a looser monetary policy with respect to gold parity than a highly indebted unified Italy, consistent with findings on currency risk premia and export prices in the classical gold standard by Mitchener and Pina (2020). Within the Italian monetary union, the South absorbed asymmetric shocks through factor migration. This is consistent with an increase in regional inequality between Italian regions through the mechanisms put forward by Krugman (2001) and recently developed theoretically by Farhi and Werning (2014).

Overall, the paper's findings caution against the long standing policy consensus that OCA criteria are likely to be filled endogenously following monetary unification, as integration deepens.

Section 3.2 provides a discussion of the literature on currency areas and the history of European monetary integration in the 19^{th} century; Section 3.3 provides a test of the predictive power of the OCA framework and quantifies the ex-ante optimality of various 19^{th} monetary arrangements; Section 3.4 focuses directly on the endogeneity of OCA providing descriptive evidence on cyclical convergence as well as an empirical test of Krugman-type endogenous effects of monetary integration looking at post-unification Italy; Section 3.5 discusses the implications of my results.

3.2. International Monetary Integration: OCA Theory, Practice and History

This section provides a literature review, focusing on some theoretical and empirical aspects of the OCA framework (Section 3.2.1) and the relevance of the pre-Gold Standard historical context for the debate on international monetary integration (Section 3.2.2).

3.2.1. Anchor Currencies, Optimum Currency Areas and the Dynamics of Monetary Integration

The question of the optimal number of currencies globally was first analyzed by the pioneering work of Mundell (1961). The OCA framework still remains the main theoretical prism through which international monetary integration is analyzed[1]. Mundell's original insight stresses two opposing forces shaping the microeconomic benefits and macroeconomic costs of monetary integration and, consequently, defining an OCA. On the benefits side, sharing a common currency reduces transactions costs for trade and financial transactions. On the costs side, monetary integration implies a loss in monetary policy independence for the regions taking part in it. This means that regions within a monetary union are vulnerable to shocks that are asymmetric to the ones experienced by the currency area as a whole. In line with most of the empirical literature on OCA, the paper focuses on the cost side of the framework[2].

Decades after Mundell's seminal insights, a profound redefinition of the underpinnings of the OCA framework took place alongside Barro and Gordon (1983)'s critique of discretionary monetary policy. Alesina and Barro (2002) notably introduce the notion of an "anchor-client relationship" as a key driver of international monetary integration. Indeed, currency area

[1] De Grauwe (2016) and Mongelli (2008) provide an extensive literature review on the evolution of the framework.

[2] An in depth treatment of the key benefit expected from a currency union, namely a reduction in trade transaction costs, is provided within a quasi-experimental framework in Chapter 2.

arrangements around the world mostly involve a large and stable "anchor" country whose currency is adopted by smaller, less credible "clients". Alesina and Barro argue, on the one hand, that there is then a major benefit to monetary integration which was overlooked by the original OCA framework: adopting the currency of an anchor country "buys" credibility for the client country. It also provides a commitment to stability that is harder to disown (it is costly to reintroduce your own currency once you adopt a new one). Conversely, they underline how the benefits of independent monetary policy for most countries are likely to be low due to the time inconsistency problem of monetary policy.

This not only means that the costs to monetary integration are on average lower than assumed by the original OCA framework. It also follows that the costs of international monetary integration essentially depend on the extent of relative price shocks and the differences in economic disturbances with respect to a potential anchor.

While Alesina and Barro do not go as far as discussing the Euro Area as part of their "anchor-client" framework, the so-called "German dominance hypothesis" was a recurrent theme of the policy debate prior to the introduction of the Euro. It was first argued empirically by Giavazzi and Giovannini (1988) that pre-Maastricht Europe essentially was a "Deutsche-Mark" zone with Germany in the role of the anchor country setting monetary policy for the whole region. Their results were disputed, notably emphasizing German monetary "independence" rather than "dominance" (Fratianni and von Hagen, 1992). Nevertheless, it is well accepted that François Mitterand's initiative to accelerate European monetary integration, in exchange for a French green light to the German reunification, was predicated on the basis that it would have helped dilute German monetary "dominance", and re-equilibrate the balance of economic power within the Franco-German "couple" (Vernet, 2003).

The haste of the French authorities to lock in a common currency agreement only partially explains the little attention paid by European officials to the OCA framework and the issue of the "optimal boundaries" of the EMU (Mongelli, 2008). The "convergence criteria" defined at Maastricht had indeed at best a weak theoretical justification and were in any case loosely enforced. This contrasted with the British authorities' approach, with the "Five Tests" report

(Treasury, 2003) compiled by HM Treasury featuring the lack of cyclical convergence as one of the key obstacles to EMU accession. The "optimism" of the European monetary authorities also reflected their beliefs regarding the endogenous effects of monetary integration[3]. As it has been argued in a seminal paper by Frankel and Rose (1998), the OCA criteria might well be endogenously self-fulfilling. The so-called "European Commission view" then implied that, regardless of the ex-ante fulfillment of the OCA criteria, economic integration was likely to foster convergence and cyclical synchronisation over time. An initially sub-optimal area would turn into an optimal one down the road. It follows that one should draw the borders of a currency area larger than what economic analysis would suggest ex-ante.

An alternative approach to the question of the endogenous effects of currency areas is the one put forward by Krugman (2001). It draws on the theoretical insights of the New Economic Geography (NEG) framework and the experience of regional business cycles within the United States. Krugman argues that reductions in transaction costs across regions in the presence of economies of scale are likely to foster regional specialisation and dissimilarity in regional economic structures and business cycles. The intuition behind Krugman's seminal arguments is consistent with more recent theoretical and empirical treatment of the link between specialisation patterns, business cycles and risk-sharing in monetary unions surveyed in Mongelli et al. (2016). Studying the complex interactions of trade, financial integration, specialisation and business cycle synchronisation Imbs (2004) underlines specialisation patterns as crucial in defining OCAs.

Within Krugman's "Massachusset" framework, monetary integration is therefore likely to increase the risk of asymmetric shocks and the costs of a "one size fits all" monetary policy. Furthermore, changes in the mobility of factors are also likely to have important implications in terms of adjustment to region-specific shocks. Consider a region experiencing an asymmetric adverse shock to the demand for its export industries. With immobile factors, relative prices in the region would adjust downward. This would attract new industries, limiting regional divergence and favoring, at least to some extent, "mean reversion" of

[3]See De Grauwe and Mongelli (2005) for a summary of the debate on the latter.

regional output levels. On the contrary, perfect factor mobility would encourage factors to move away from the affected regions, with the adjustment taking place through quantities. This implies that in the absence of cyclical stabilisation policies, economic integration and factor mobility would make regional outputs look more like a random walk. In other words, not only economic integration might make asymmetric shocks more likely. It might also worsen the nature of their effect through an hysteresis phenomenon, permanently lowering the factor endowment of the adversely affected region.

The original empirical claim of Frankel and Rose (1998) certainly provided support to the policy choices made by European countries in the run up to the Euro. Overall, the empirical evidence on the endogenous effects of monetary integration is however mixed. Alesina et al. (2002) found a positive common currency effect on relative price synchronisation but a negative one on output synchronisation in a broad sample of currency arrangements. In more historical settings, Flandreau and Maurel (2005) find 19^{th} century currency arrangements to increase shock asymmetry in a context of inter-industry trade, while Mathy and Meissner (2011) find currency arrangement and trade to be associated with high business cycle synchronisation in the run up to the Great Depression. Looking at the initial experience of the Euro Area, Böwer and Guillemineau (2006) argue that the first ten years of EMU confirmed the predictions of Frankel and Rose, with specialisation actually having a positive influence on EMU cyclical synchronisation, given the prevalence of intra-industry trade. On the other hand, Giannone and Reichlin (2006) do not find any evidence of a Euro effect on European business cycle synchronisation. Calderon et al. (2007) show the relationship between trade integration and cycle synchronisation to be substantially weaker in developing countries compared to developed ones. This heterogeneity is explained by specialisation patterns.

More caution over Frankel-Rose OCA endogeneity within the Euro Area and beyond has been expressed since the European crisis. Monnet and Puy (2019) question the widely held stylised fact that globalisation increased cyclical synchronisation, extending data series to the Bretton Woods period. Bayoumi and Eichengreen (2020) and Belke et al. (2017) revisit cyclical synchronisation since the creation of the Euro Area, arguing it applies only to certain parts

of the EMU and has somewhat reversed after the euro crisis. Franks et al. (2018) highlight divergence in the amplitude of Euro Area business cycles, while according to Mongelli et al. (2016) evidence of increased dissimilarity in the EMU's regions economic structure calls for new empirical research into possible Krugman-type effects. As those effects are by definition long run in nature and only apply to areas where levels of integration and factor mobility are higher than in the typical international monetary arrangement[4], the analysis of past examples of national monetary integration provides a relevant empirical framework.

3.2.2. Monetary Integration at the Eve of the First Globalisation (1848-1870)

The second half of the 19th century brought about a wave of monetary integration in Europe. An unprecedented rise of international trade and financial linkages increased incentives to pursue international monetary integration. On the one hand, the *laissez-faire* policies of Napoléon III led to widespread trade liberalisation following the signature of the Cobden-Chevalier treaty in 1860. On the other hand, capital exports from both England and France started to increase markedly in the 1850s (Lévy-Leboyer, 1977). Second, a technocratic ideology, on the rise in France and across Europe, emphasizing the need for international norm harmonisation, from unit of measures to currencies, is also likely to have contributed to the shift to further international monetary integration (Einaudi, 2001). Finally, the French Emperor approach to the nationality issue, as well as the rise of Prussia and Piedmont, allowed for a radical process of political (and therefore monetary) unification to take place in both Italy and Germany. A number of sovereign states disappeared in the process each with their own monetary standards.

At the international level, France attempted to shape the global monetary system around the French Franc, starting with the 1865 monetary convention[5], commonly referred to as

[4]Making empirical settings based on cross country analysis of little relevance.

[5]The participants to the convention were France, Belgium, Italy and Switzerland. Greece would join later on in 1868.

the Latin Monetary Union. The monetary geography of Europe prior to the convention already showed widespread diffusion of France's bimetallic monetary standard. Belgium and Piedmont adopted the Franc Germinal system following their annexation as *départements* during the First Empire and adopted it as their own after 1815, with Switzerland joining them in 1850. A number of other countries, from Europe to South America, informally took steps towards conforming their monetary standard to the one of the Convention, never however officially joining it. Einaudi (2001) and Flandreau (2000a) have emphasised the economic rationale of monetary integration around France. Indeed, the main impetus to the initiative came from the free-trade technocratic party inside the *Conseil d'Etat*, headed by Félix Esquirou de Parieu.

The expansion of French international trade and finance provided strong economic incentives for France to promote the initiative and other countries to join it. Flandreau argues that the 1865 monetary convention was predicated on the willingness of France to compete with London, on the back of rising external surpluses, as a global capital exporting center. Indeed, the French authorities were aware that London's financial role allowed Britain to gain a double advantage, in terms of dividend and interest payments as well as in furthering trade relations (as capital exports were mostly employed to buy goods from core countries). A number of countries, including Spain and Austria-Hungary in the late 1860s, agreed to take steps towards a French monetary standard as part of a wider package of trade liberalisation and provision of loans from Paris. This highlights the relevance of Alesina and Barro (2002)'s "anchor-client" framework in the context of 19^{th} century international monetary integration. The Italian authorities explicitly referred to their country's dependence on French trade and finance when justifying their choice of post-unification monetary standard in 1862 (Roccas and Sannucci, 1990). In the end, however, wider international monetary integration occurred around the British gold standard, following the French defeat in the 1870 Franco-Prussian war and the decision of the German Reich to adopt a gold standard. While war reparations temporarily put a stop to French capital exports, undermining the country's monetary dominance, the German switch to gold [6] tipped the balance of monetary "network

[6] As well as the lack of monetary cooperation between France and Germany (Flandreau, 1996).

externalities" in favor of the British monetary standard (Eichengreen, 1998).

A separate international initiative of regional monetary integration occurred among Scandinavian countries, with Sweden, Norway and Denmark forming a currency union in 1873 Bergman et al. (1993). This Union remained stably on the gold standard till the interwar period.

3.2.3. Monetary Unification: Italy vs. Germany

While the international level is relevant to the "anchor-client" framework behind my empirical strategy, the main contribution of this paper is on "national" monetary integration. The period at hand saw the formation of two large and long lasting national monetary unions, Italy and Germany.

Both the Italian and German monetary unifications have received little attention from the perspective of the OCA framework. A comparison is however of interest, given the striking difference in terms of pre-unification path towards integration, post-unification monetary policy credibility, as well as their relative trajectory in terms of regional divergence.

The Italian monetary union is a peculiar instance of a newly formed currency arrangement that has managed to survive to this date despite persistently divergent regional patterns. It also provides a rare example of "random" monetary integration on the back of military events, which does not suffer from the endogeneity issue that characterises economic integration processes. In this respect, Federico and Tena-Junguito (2014) highlight the weak intra-Italian trade integration pre-unification, which suggests no compelling endogenous reason to form a currency area. A detailed discussion of the sudden transition of the Italian peninsula from a "geographical expression" to a centralised, unified state with a common currency is examined in details as part of the quasi-experimental setting of Chapter 2. Unified Italy did experience early on fiscal and monetary issues, not in small part related to the debt incurred by Piedmont-Sardinia as part of the "independence" wars against Austria. A parallel paper Lira was introduced in 1866 alongside the metallic Lira. Even though this step

was initially perceived as temporary, in-convertibility of the paper Lira persisted on and off throughout the 19th century. During the classical gold standard period, Italy pursued a policy of "gold shadowing"(Tattara, 2003), with minimal discount of the paper Lira vs. the Gold par. This means that unified Italy adopted an intermediate policy between peripheral and core countries, limiting exchange rate variability but falling short of sustained convertibility (Cesarano et al., 2012). Foreman-Peck (2005) first put forward many of the arguments I develop in a, more in-depth, empirically formalised fashion in this paper, both regarding OCA status at unification and the endogenous effects of monetary integration in Italy.

On the other hand, German institutional and economic integration dates back to the Holy Roman Empire. Chilosi et al. (2018) find that, as far back as the 16th century, financial market integration amongst German cities of the Empire was substantially higher than amongst Northern Italian ones. A formal process of political and economic integration started at the beginning of the 19th century with the creation of the Zollverein, together with progressive steps towards harmonisation of monetary standards (James, 1997; Holtfrerich, 1993). This process culminated with the establishment of the German Empire and the Gold Mark in 1873. As outlined above, the choice of the German Imperial authorities to shift the Mark to a Gold Standard provided a strong catalyst towards convergence towards the British monetary standard, with all the major economies following suit between 1873 and 1881. Post-unification Germany became a major capital exporter and formed, alongside France and, above all, Britain, the core of the classical gold standard international monetary system.

Contrasting the Italian and German experiences if also of interest given their very different outcomes in terms of post-unification regional inequality. Comparative data in Iuzzolino et al. (2013) shows that regional inequality - measured as the mean log deviation of GDP per capita - in Italy was in line with other major European economies in 1871. By 1911, however, Italian regional inequality was two times higher than in the UK and Austria and almost three times higher than in Germany. A similar relative order of magnitude persists to this day.

Even though many different channels contributed to this extreme phenomenon of regional

divergence[7], the regional impact of the monetary integration shock and of a common monetary regime has received little attention. The role of agglomeration effects has long been emphasised in the literature on the Southern Question. Spatial economics patterns changed dramatically from the pre-unification starting point of a typical *ancien régime* pattern of agglomeration around the local capital (A'Hearn and Venables, 2011). The introduction of the Piedmontese tariff as soon as 1861, as well as national market integration, later in the 19th century, ignited a process of sectoral specialisation and spatial change. Missiaia (2016) and Basile and Ciccarelli (2018) find evidence of regional divergence in income to be driven by natural resources endowments and New Economic Geography mechanisms of agglomeration according to domestic market access.

The latter are likely to represent the main explanation to the "Southern Question". That said, adverse effects stemming from monetary integration could also have played a role. This could be the case if "OCA costs" of monetary integration were already high ex-ante due to shock asymmetry among Italian states but also if the endogenous effects of the Italian monetary union were of the Krugman rather than of the Frankel-Rose type.

The paper's empirical analysis is divided in two parts. First, I quantify whether the Italian and German unifications, the Latin Monetary Union, the Scandinavian Monetary Union and membership of the Gold Standard can be predicted based on OCA factors in the decades preceding their formation.

Second, I turn directly to the endogenous effects of monetary integration looking at the Italian case. I provide both descriptive evidence on the extent of endogenous Frankel-Rose cyclical convergence and an empirical test of the Krugman hypothesis looking at specialisation patterns.

[7] Felice (2013) provides a very comprehensive review.

3.3. A Test of OCA Predictive Power

Empirical Strategy

Both the debate on endogeneity and the somewhat contradictory character of some of the OCA criteria have made it difficult to provide a simple test for the optimal boundaries of currency areas, pointing to a problem of inconclusiveness of the OCA framework (Tavlas, 1993). Nevertheless, a number of authors have put forward empirical tests for OCA properties[8].

I operationalise the OCA framework empirically following the reinterpretation of OCAs by Alesina and Barro (2001) and Alesina et al. (2002), where alternative pay-offs from the degree (and nature) of monetary standard anchoring determine the anchoring choice.

I assess whether contemporary OCA-inspired variables, can predict future monetary integration using binary response probit models at the pair-period level. The analysis encompasses twenty European polities (Listed in Table 3.A.1) and eight four-years non-overlapping periods from 1846 to 1878. It therefore captures at least three periods prior to the establishment of the new currency arrangements of interest[9], with pair-period observations being excluded from the estimating sample after they enter a monetary arrangement[10]. The United Kingdom is excluded from the sample as bilateral measures of symmetry between pairs are computed with respect to the British economy, as the key anchor of the period (Eichengreen, 1987)[11].

My main specification, closely related to Barro and Tenreyro (2007), writes

$$P(CU_{ijt} \mid X_{ijt}\theta) = 1 - \Phi(-X'_{ijt}\theta) \tag{3.1}$$

[8] See Silva and Tenreyro (2010) for a discussion.

[9] The western part of Lombardy-Venetia is the first formerly independent polity to join the Italian monetary union in 1858.

[10] In some cases they stop being observed in the exchange rate data.

[11] Although, as examined in Chapter 4, the IMS of the period was multi-polar, with France and Germany playing an important role of alternative anchors, this is consistent with the main overarching core-periphery dichotomy of the 19th century gold standard (Eichengreen and Flandreau, 1994).

where CU_{ijt} is a dummy variable equal to 1 when countries i and j will be at any point jointly part of one of the monetary arrangements considered, Φ is the cumulative distribution function of the normal distribution and X_{ijt} is a vector of potential determinants of monetary integration.

A key issue I try to explore is whether the politically driven monetary integration processes of Italy, Germany and, to some degree, Scandinavia and the Latin Union[12], exhibit similar determinants to the economically driven Gold Standard. In addition to estimating the model with all future pairs of monetary arrangements, I also restrict the target pairs to the Gold Standard core only. The latter are more likely to endogenously arise following OCA-type cost-benefits calculations[13]. I then compare fitted values of the binary model across the monetary arrangements I consider, to obtain an intuitive measure of the ex-ante optimality of their boundaries. This approach bears similarities to the "OCA Index" developed in Bayoumi and Eichengreen (1997).

I follow the existing literature in focusing on similarity of shocks as a "catch-all" criteria, capturing the interaction between several OCA properties (Mongelli, 2008), and summarizing the cost of giving up policy autonomy.

Typical symmetry of shocks proxies include output co-movements between candidate clients as in Eichengreen (1991), Meissner and Oomes (2009) and Fischer (2016), but also similarity in export structure (Bayoumi and Eichengreen, 1998) and terms of trade shocks (Yeyati et al., 2010).

Unfortunately, both output data and detailed breakdown of export-mix are unavailable for most countries in my sample for the period at hand. I therefore turn to the approach of Bayoumi and Eichengreen (1997) and Bayoumi and Eichengreen (1998), using observed nominal exchange rate variability as a proxy for idiosyncrasy of shocks and the cost of forgoing policy autonomy. Bayoumi and Eichengreen (1997) intuitively argue that the costs

[12]The case of the Latin Union is of course ambiguous, partly because of the exogenous variation in its membership brought about by the Italian unification, which is closely examined in Chapter 2.

[13]A country is coded as part of the gold standard core if it joined the Gold Standard by 1880 and did not leave it before 1914.

stemming from fixing the exchange rate are best approximated by the ex-ante variability of this same exchange rate with respect to potential currency union partners, showing bilateral exchange-rate variability to be highly related to other OCA-type variables.

My main independent variable of interest therefore proxies bilateral **symmetry of shocks** by computing the negative of the squared difference in the standard-deviation of bills of exchange prices in London for countries i and j in period t

$$-1\left(\sigma_{it}^{GBP}-\sigma_{jt}^{GBP}\right)^2 \tag{3.2}$$

As bills of exchange include an interest rate component, this measure of symmetry encompasses both exchange rate and money market synchronisation with respect to the main anchor country[14].

In line with Barro and Tenreyro (2007) and Yeyati et al. (2010), I also include, alongside geographic controls for distance, common borders and common languages, as OCA relevant variables:

- **Size**: in the absence of GDP data for all the polities in my sample, particularly for Italian and German pre-unitary polities, I proxy size as the log of population from Mitchell (1998),
- **FTAs**: a dummy variable that takes value of one if the pair has entered treaty explicitly providing for a reduction in tariffs, according to the extensive Trade Agreements Database by Pahre (2012). In the absence of data for bilateral trade at the pair level, this variable, alongside geographic controls, should approximate the degree of economic integration.
- **Openness**: I proxy openness as trade with the United Kingdom per capita. Trade data sources are either Dedinger and Girard (2017) or original data discussed in Chapter 2. It is important to note that this variable is unavailable for Lombardy-Venetia, as well as

[14]The London bills of exchange data are discussed in details in Chapter 4.

for pre-unification German polities and the Sweden and Norway custom union, which reported aggregated trade only. I therefore rely on a specification omitting the openness variable to analyze fitted values of the model.

My empirical operationalisation of OCAs can be summarised as testing whether future monetary arrangements are composed of polities experiencing similar levels of synchronisation with respect to the main anchor. Fitted values of the probit model can be used as a "scoring" mechanism of ex-ante optimality similarly to Bayoumi and Eichengreen (1997).

Results

Table 3.3.1 shows probit standardised coefficients estimated for Equation 3.1 for all currency union/peg arrangement pairs. All statistically significant variables have the expected sign, with the likelihood of entering a currency arrangement decreasing with distance and the size of the smaller polity in the pair, and increasing if the pair has already entered a free trade agreement and experience higher shock symmetry. The magnitude of the shock symmetry variable is sizeable, with one standard-deviation in shock symmetry increasing the likelihood of entering a currency arrangement by close to 0.8 standard deviations, confirming the choice of this variable as a catch-all OCA criteria.

Table 3.3.2 show the same specifications but having only Gold Standard core pairs as the target variable on the left hand side. The magnitude of the shock symmetry is meaningfully higher than when targeting all currency arrangement pairs, possibly confirming non-core Gold Standard monetary arose for somewhat different reasons, including political considerations. The openness variable also comes as significant now, albeit with a small magnitude. Additionally, while prediction sensitivity remains broadly stable at about 2/3, specificity approaches 100%, with the model performing very effectively in discriminating non-Gold Standard Core pairs of polities.

The significance of shock symmetry in FX and money markets in predicting 19^{th} century exchange-rate regime choice membership is *prima facie* at odds with findings by Meissner

Table 3.3.1: Predictive Power of OCA Criteria - Gold and Currency Union Pairs

	(1)	Std-XY	(2)	Std-XY
Distance	-0.383**	-0.132	-0.427***	-0.155
	(0.155)		(0.166)	
Shock Symmetry	2,590***	0.849	2,308***	0.816
	(713.6)		(726.5)	
FTA	1.057***	0.119	0.939***	0.113
	(0.334)		(0.321)	
Common Border	0.367	0.055	0.374	0.059
	(0.327)		(0.353)	
Common Language	0.163	0.017	0.354	0.036
	(0.409)		(0.444)	
Min (Log Population)	-0.356***	-0.146	-0.329**	-0.141
	(0.130)		(0.132)	
Max (Log Population)	0.148	0.07	0.143	0.073
	(0.101)		(0.108)	
Min (Openess)			1.59e-05	0.013
			(5.86e-05)	
Max (Openess)			-8.28e-06	-0.009
			(4.20e-05)	
Constant	4.289***		4.437***	
	(1.477)		(1.515)	
Observations	1,088		990	
Dep. Variable:	All CU		All CU	
Sensitivity	70.53		71.17	
Specificity	72.84		73.08	

The dependent variable is made up of all currency unions pairs in the sample, periods after 1870 are excluded from the estimating sample. Period fixed effects included in all specifications. On the right hand side of each coefficient a full standardised coefficient is reported. Cut-off for correct prediction set at 0.5. Standard errors in parentheses clustered at the country-pair level. ***, ** and * denote statistical significance at the 1%, 5% and 10% level respectively.

(2005). In his duration analysis of Gold Standard adoption, he finds trade-channel network externalities to be the main explanatory factor of variation in timing of adoption, with FX volatility having no statistically significant effect. My results can however be reconciled with this finding, observing that I am relating Gold Standard adoption to exchange-rate variability in an earlier period, up to two decades before the actual establishment of the international Gold Standard. In the pre-1870 era, FX and money market synchronisation was markedly lower across the board, and therefore a better potential proxy for shock symmetry and a more significant core-periphery discriminating factor. On the other hand, the above findings are broadly aligned with the analysis of exchange-rate variability and OCA criteria since the 1960s by Bayoumi and Eichengreen (1998).

I now turn to comparing the fitted values estimated through the model in Column 1 of Table 3.3.2. In a similar approach to the OCA Index computed ten years before the establishment of the Euro Area by Bayoumi and Eichengreen (1997), I rely on those fitted value to contrast the ex-ante optimality of the various arrangements I examine[15].

Table 3.A.3 summarises predicted probabilities estimated for each monetary arrangement. Their distributions by period and arrangements are shown in Figures 3.3.1 and 3.3.2. The difference in the predicted probability for the German and Italian unions pairs is striking. While the fitted value of the model is close to 1 for German polities as soon as the 1840s, the average value for Italian ones is significantly lower, and approaching zero for pairs formed by Northern and Southern Italian states. Only one Italian pair-period observation surpasses the 0.5 prediction threshold[16].

Looking at international arrangements in Figure 3.3.2, I also find high variability in my *sui generis* OCA Index between and within arrangements. Most of the Gold Core pairs are already above the 0.5 prediction threshold as soon as the 1850s. Interestingly, after 1870, when the model estimates are out-of-sample, fitted values are consistent with events in

[15]Relying on fitted values from Table 3.3.2 or from estimating the model leaving non-Gold Standard core pairs out-of-sample produces similar results. I do not employ models including trade data to compute fitted values as it would exclude some of the pairs of interest which do not report trade or only do at the custom union level.

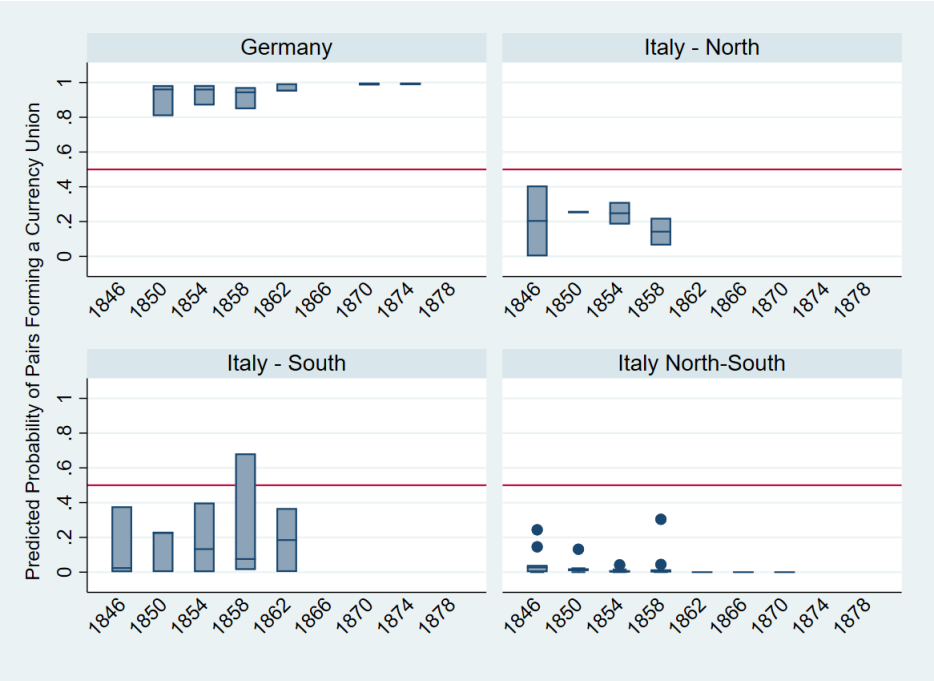
[16]Naples and the Papal States between 1858 and 1862.

Table 3.3.2: Predictive Power of OCA Criteria - Gold Standard Core

	(1)	Std-XY	(2)	Std-XY
Distance	-1.810***	-0.072	-2.165***	-0.065
	(0.405)		(0.450)	
Shock Symmetry	26,272***	0.986	33,749***	0.989
	(9,967)		(12,426)	
FTA	0.499	0.006	0.468	0.005
	(0.368)		(0.408)	
Common Border	0.442	0.008	0.802*	0.011
	(0.435)		(0.476)	
Common Language	-0.435	-0.005	-0.514	-0.004
	(0.516)		(0.528)	
Min (Log Population)	0.413**	0.019	0.603***	0.021
	(0.200)		(0.223)	
Max (Log Population)	0.524**	0.028	0.218	0.009
	(0.264)		(0.253)	
Min (Openess)			-0.000171**	-0.012
			(8.60e-05)	
Max (Openess)			0.000256***	0.024
			(8.16e-05)	
Constant	2.082		5.687**	
	(2.384)		(2.610)	
Observations	1,088		990	
Dep. Variable:	Gold Core		Gold Core	
Sensitivity	64.99		74	
Specificity	96.99		97.68	

The dependent variable is made up of Gold Standard core pairs, periods after 1870 are excluded from the estimating sample. Period fixed effects included in all specifications. On the right hand side of each coefficient a full standardised coefficient is reported. Cut-off for correct prediction set at 0.5. Standard errors in parentheses clustered at the country-pair level. ***, ** and * denote statistical significance at the 1%, 5% and 10% level respectively.

Figure 3.3.1: Fitted Values - National Monetary Unions



Distribution of fitted values predicted by the model in Column 1 of Table 3.3.2. Italian pairs are separated depending on their geography.

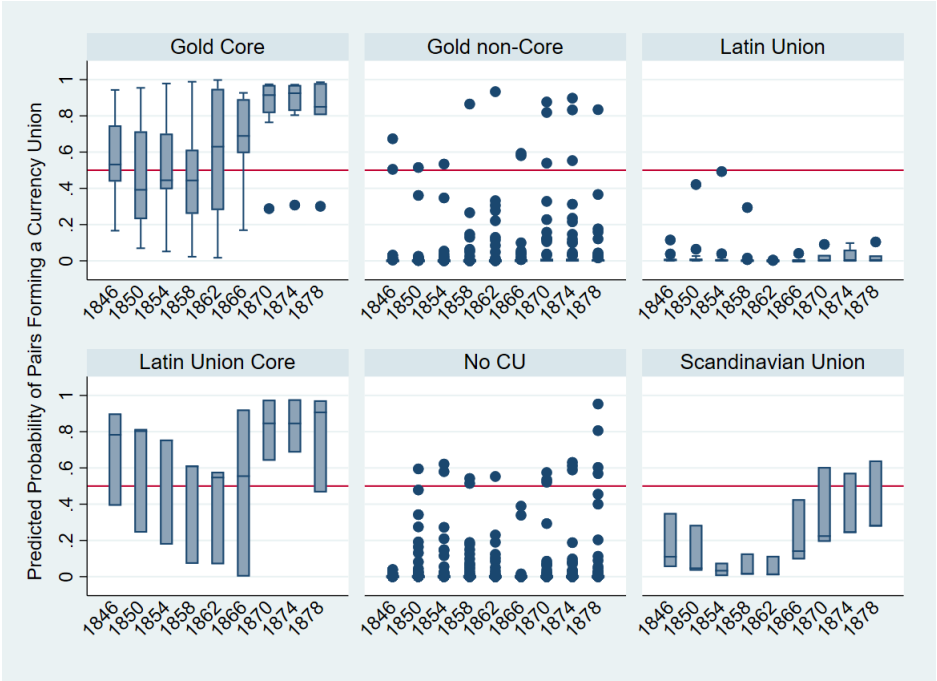
predicting a higher likelihood of monetary integration among Gold Core pairs[17]. A similar pattern starting from 1866 is observed for Scandinavian Union pairs. Looking at the Latin Union, its core pairs, made up by pairs between France and its neighboring satellites[18], tend to exhibit - with the exception of Switzerland - values above 0.5 from the 1850s as well. On the other hand, Latin Union pairs arising as part of the Italian unification, record fitted values very close to zero, in line with the Italian unification itself. This is in line with the quasi-experimental setting developed in Chapter 2. Interestingly, half of the pairs that are incorrectly predicted as entering a monetary arrangement even though they eventually will not do so are made up of Southern Germany and the two Northern Italian polities of Piedmont-Sardinia and Lombardy[19]. This could be interpreted as suggesting that, in a no-Italian unification counterfactual, Northern Italy might have had an easier time complying with the Gold Standard rules of the game than it had as a unified country.

[17]The only pair that remains incorrectly predicted as non-Gold Standard core is Belgium-Northern Germany (Hamburg).

[18]Belgium, Piedmont-Sardinia and Switzerland.

[19]The other incorrectly predicted currency arrangements pairs involve Spain and Portugal and France and Spain.

Figure 3.3.2: Fitted Values - International Monetary Arrangements



Distribution of fitted values predicted by the model in Column 1 of Table 3.3.2. Latin Union Core is defined as pairs between France and its three long standing monetary satellite, Belgium, Piedmont-Sardinia and Switzerland.

All in all, the above results support the predictive power of the OCA framework. The two "endogenous" monetary arrangements occurring over the period at hand, the German union and the Gold Standard core, can be detected as consistent with OCA criteria as early as two decades before their formation[20]. On the other hand, the results highlight the exogenous nature of the Italian monetary unification, driven by a series of random military events, and to an extent, the Latin Monetary Union: they are both characterised by significantly lower and more dispersed estimated probabilites. One could argue that, in line with the OCA framework, both arrangements that are found to be more sub-optimal ex-ante featured worse ex-post economic performance in terms of sustainability (Latin Union) and regional divergence (Italy) compared to the Gold Standard and the German union.

It is then tempting to argue that the predictive power of the OCA framework is not limited to membership but also relates to the ex-post performance of currency arrangements. While the Gold Standard marked a long period of monetary stability within the European core until

[20]This is true even when estimating fitted values for the German Union pairs out-of-sample.

WWI, the Latin Union proved much less sustainable given its heterogeneous membership and was progressively voided of concrete implications starting in the mid-1870s. Looking at national monetary unions, while political factors made both arrangements sustainable in the long run, the ex-ante sub-optimal Italian union experienced remarkably higher ex-post relative regional divergence compared to Germany (Iuzzolino et al., 2013). Indirectly, this leaves little room for any Frankel-Rose mechanism of ex-post OCA endogeneity: the more optimal arrangements are indeed found to be already optimal ex-ante.

The next section explores more closely the endogenous effects of monetary integration looking at post-unification Italy, the clear outlier of the OCA prediction exercise.

3.4. The Endogeneity of OCA: Lessons from Post-Unification Italy

This section investigates the endogenous effects of monetary integration, focusing on the Italian case in the five decades following unification. I begin by providing some descriptive evidence regarding cyclical convergence and the potential for Frankel-Rose endogenous mechanisms[21]. Then, I implement a simple differences in differences empirical strategy in order to test whether a Krugman-type process of endogenous increase of the costs of monetary integration can be detected in post-unification Italy.

Descriptive Evidence on Frankel-Rose Endogeneity in Post-Unification Italy

Data limitations for regional business cycles and covariates in post-unification Italy prevent me from performing a formal test of Frankel and Rose OCA endogeneity in line with their seminal paper and the literature reviewed in Section 3.2.1. However, the availability of regional industrial production time series for some sectors allows for the computation of

[21] I rely on the same data used by Ciccarelli et al. (2010), who find no evidence of post-unification regional cyclical convergence.

some descriptive evidence on post-unification cyclical synchronisation patterns. In particular, the construction sector series estimated by Ciccarelli and Fenoaltea (2009) at the annual level for all Italian regions might be seen as a relatively good proxy of the cyclical component of GDP[22].

I notably compute correlation and concordance statistics (Harding and Pagan, 2002) for the construction series[23] between every pair of pre-unitary states over different sub-periods between 1861 and 1914. Concordance statistics measure the fraction of time that two series are in the same phase (expansion vs. recession) of their respective cycles: they are bounded between 1 (perfect synchronisation) and 0 (no synchronisation).

Table 3.4.1: Cyclical Convergence in Post-Unification Italy: Concordance and Correlation Statistics

1861-1890	Piedmont	Lombardy-Venetia	Papal	Tuscany	Two Sicilies
Piedmont		-0.1	0.03	0.1	0.17
Lombardy-Venetia	0.44		**0.73*****	**0.38****	**0.31***
Papal	0.51	**0.86*****		**0.37****	0.3
Tuscany	0.55	**0.68****	**0.68*****		-0.17
Two Sicilies	0.58	0.65	0.65	0.41	
1890-1914	Piedmont	Lombardy-Venetia	Papal	Tuscany	Two Sicilies
Piedmont		0.12	0.13	0.03	0.04
Lombardy-Venetia	0.57		**-0.38***	**0.56*****	-0.3
Papal	0.57	0.30		0.06	0.21
Tuscany	0.52	**0.78*****	0.52		-0.21
Two Sicilies	0.52	**0.34****	0.61	**0.39***	

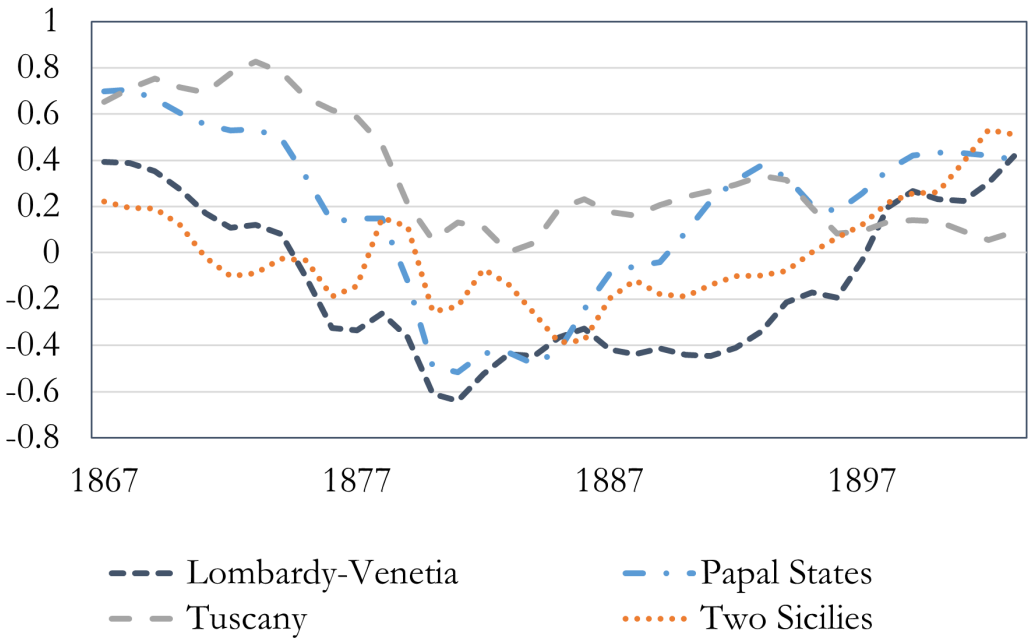
Concordance statistics for pairs of industrial production series Ciccarelli and Fenoaltea (2009) of the construction sector are shown on the lower diagonal. Significance levels of concordance statistics at the 0.01, 0.05 and 0.1 levels are denoted by ***, **, and * and computed following Harding and Pagan (2002) to account for the average position in the business cycle. Pair-wise correlations are shown on the upper diagonal.

Table 3.4.1 shows cyclical synchronisation concordance statistics on the lower diagonal and pair-wise correlations on the upper diagonal. In order to take into account the average position in the business cycle, significance levels for the concordance statistics are provided

[22] Ciccarelli et al. (2010) perform a more formal analysis of the same data showing no evidence of unification-induced cyclical synchronisation.

[23] I isolate their cyclical component using Christiano and Fitzgerald (2003) band-pass filter.

Figure 3.4.1: Pair-Wise Cyclical Correlation with Respect to Piedmont-Sardinia



Rolling 15-years correlation of the cyclical component of the regional construction production series by Ciccarelli and Fenoaltea (2009).

following Harding and Pagan (2002). Two results can be highlighted. First, levels of both correlation and concordance are relatively low throughout the period, with only Lombardy-Venetia, Tuscany and the Papal States showing some evidence of concordance of business cycle. Second, if anything, cyclical concordance and correlation seems to be decreasing over time, opposite to what Frankel-Rose endogeneity would suggest.

Looking at rolling pair-wise correlation with respect to Piedmont-Sardinia in Figure 3.4.1 a very similar picture emerges, with a sharp decrease in cyclical correlation over the first twenty years of unification, followed by generally negative correlation during the crisis years of 1880s and 1890s and a period of relative cyclical convergence alongside the growth take off of the early 20th century.

All in all, the above descriptive evidence provide further indication, on the top of the ex-ante analysis performed above, that there is little evidence of Frankel-Rose endogeneity looking at the 19th century wave of European monetary integration, and the Italian monetary unification in particular. If anything, it is fair to assume from the evidence presented so far that over the

first decades of unification Italian shocks became more asymmetric than they already were pre-unification.

A Test of Krugman-Type Endogeneity: Empirical Strategy

As described in Section 3.2.1, Krugman (2001) cautioned against the endogenous effects of integration and describes a possible channel through which monetary integration might negatively affect regional inequality. As the latter reduces transaction costs across regions, it might provide incentive for regional specialisation, which would increase the likelihood as well as the negative impact of asymmetric shocks and increase the cost of forgoing an independent monetary policy.

I empirically test for this mechanism in the context of the Italian unification by computing an economic structure dissimilarity measured with a Krugman Index (Krugman, 1991)

$$k_{wz} = \sum_{s=1}^{S} | i_w - j_z | \tag{3.3}$$

for each possible pairs w and z of provinces across 15 industrial sectors and four census years using data from Ciccarelli and Fenoaltea (2013). I then estimate the effect of economic and monetary integration on dissimilarity through a differences in differences approach. I exclude the agricultural sector from the analysis, given the extreme geographical concentration of industrialisation in late 19$^{\text{th}}$ century Italy, and focus on dissimilarity within the industrial sector. If anything, this might produce a bias against any positive findings in line with the Krugman view of integration-induced specialisation, as I look at a much narrower scope for specialisation. It might also imply that the estimated effect is a lower bound one. The treatment group is composed of pairs of provinces which were not part of the same polity[24] before unification: those are the pairs that should experience a new wave of specialisation after unification. The pairs of provinces which were already part of the same polity before 1861 form a control group. The intuition behind that is that "treated" pairs of provinces

[24]I now consider all the pre-unitary Italian states: Piedmont-Sardinia, Lombardy-Venice, the Duchy of Parma, the Duchy of Modena, Tuscany, the Papal States and the Two Sicilies.

experience additional integration with one another, as opposed to "control" ones.

I estimate a model of the type

$$k_{wzt} = \alpha + \beta D_{Integration_{wzt}} + \gamma' \mathbf{\Lambda}_{wzt} + \delta_i j + \zeta_t + \theta_{wzt} + \epsilon_{wzt} \tag{3.4}$$

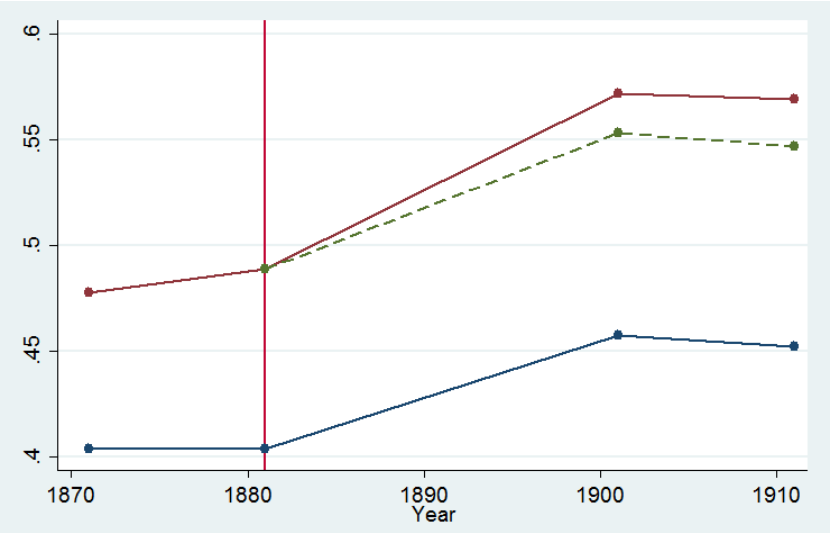
where k_{wzt} is the log of the Krugman index for province pair wz in census year t, $D_{Integration}$ is a dummy equal to one if the pair was not part of the same polity before unification, $\mathbf{\Lambda}_{wzt}$ is a vector of control variables and $\delta_w z$, ζ_t and θ_{st} are respectively a province pair fixed effect, a year fixed effect and a time-varying effect for every pre-unitary polity pair yz. Agglomeration goes from an *ancien régime* pattern of concentration around the ancient capital to one where specialisation takes place across the national market in line with endowments and comparative advantages (A'Hearn and Venables, 2011). I include as control variables the absolute difference between the province pair in literacy rate, population density , share of active population, share of agricultural workers as a percentage of active population and domestic market access[25] (DMA) to capture determinants of specialisation that might occur regardless of economic and monetary integration. Table 3.B.1 provides descriptive statistics and source for all variables by treatment status and census year.

A test of Krugman-type Endogeneity: Results

As I cannot measure the change in the treatment intensity over the census years, I estimate Equation 3.4 using the two extreme census years, 1871 and 1911. This also reflects the fact that the process of national market integration in Italy is a slow one, as internal ways of transportation were non-existent at unification and were progressively built with a militarily, rather than commercial, rationale. (Federico, 2010) estimates that levels of national market integration in line with those of other national markets are not to be felt before the 1880s, twenty years after unification. The same can be said for financial integration (Toniolo et al.,

[25]Measured as the sum of the population of all Italian provinces weighted by their distance from the centroid of the province of interest. The population of the province of interest is assigned an arbitrary weight of 30km.

Figure 3.4.2: Average Krugman-Index of Economic Structure Dissimilarity Amongst Pairs of Italian Provinces



The red line shows average Krugman Indices for "Treated" pairs of provinces that did not belong to the same polity pre-unification across census years. The blue line shows average Krugman Indices for "Control" pairs of provinces that did belong to the same polity pre-unification. The green dashed line shows a "naive" no-unification counterfactual for the treatment pairs.

2003).

We should in any case expect any effect of integration on specialisation to take time to materialise, and very low transactions costs are required for the endogenous effects described by Krugman to occur. The profile over time of average Krugman Indices for the treatment and control groups can be observed in Figure 3.4.2: dissimilarity in economic structure was higher across pre-unification borders from the start, but treated pairs experience an even higher increase in dissimilarity from the 1880s, compared to the control pairs.

The estimated effect of economic integration on regional economic structure dissimilarity is, consistent with the prevalence of Krugman-type OCA endogeneity, significant and positive (Table 3.4.2). I find integration to increase the Krugman index of dissimilarity by around 15% more in newly unified province pairs compared to the control group, once pre-unitary polity pair fixed-effects are included.

The point estimate is lower when I only include more comparable pairs of provinces with bilateral distance lower than 500km or exclude the "Industrial Triangle" (Turin, Milan and

Genoa) from the estimating sample. They remain however stable when excluding provinces formerly belonging to the Kingdom of the Two Sicilies. As a further robustness check, I provide an estimate of leads and lags of the treatment effect for the four census years. As it is shown in Figure 3.B.1, no statistically significant difference can be found between the treatment and the control groups before market integration actually kicks in the 1880s. Additionally, I run cross-section versions of Equation 3.4. In columns (1) and (2) of Table 3.B.2 I address a possible simultaneity bias between specialisation and population movements by regressing the log of the Krugman indices in 1911 on 1871 levels of the controls. In columns (3) and (4) I provide results from a first difference specification. The estimated effect of integration on dissimilarity is broadly in line with the differences-in-differences estimate.

All in all, the above results highlight how, in line with Krugman (2001), the reduction in transaction costs brought about by the economic and monetary unification of Italy induced an important wave of specialisation across the pre-unitary borders. This further increased the already high dissimilarity in the economic structure of Italy's regions, endogenously boosting the risk of asymmetric shocks and therefore the costs of forgoing monetary independence. The possible implications for the economic history of the "Southern Question" are discussed in Section 3.5.2.

Table 3.4.2: Integration Effect on Economic Structure Dissimilarity

Sample	(1) All	(2) All	(3) All	(4) Max 500km Dist.	(5) No Two Sicilies	(6) No Industrial Triangle
D_Integration	**0.0263*****	**0.0291*****	**0.145*****	**0.0642****	**0.140*****	**0.0746*****
	(0.00522)	(0.00593)	(0.0228)	(0.0291)	(0.0227)	(0.0225)
Act. Pop.		0.000367	**0.000917****	-0.000521	0.000823	**0.000695***
		(0.000402)	(0.000376)	(0.000468)	(0.000633)	(0.000382)
Agr. Pop.		**0.00130*****	**0.00113*****	**0.00130*****	**0.00174*****	**0.000873*****
		(0.000196)	(0.000187)	(0.000284)	(0.000346)	(0.000211)
Literacy		**-0.000596****	**-0.00166*****	**-0.00176*****	**-0.00226*****	**-0.00133*****
		(0.000293)	(0.000343)	(0.000430)	(0.000486)	(0.000364)
Density		0.0119	**0.0359*****	0.00990	**0.0616****	**0.0409*****
		(0.0145)	(0.0134)	(0.0175)	(0.0257)	(0.0144)
DMA		-3.53e-05	**0.00178*****	-0.000549	**-0.00286*****	**0.00183*****
		(0.000491)	(0.000523)	(0.000714)	(0.000727)	(0.000646)
1901	**0.0353*****	**0.0362*****	0.000475	-0.00254	0.00317	**0.0699*****
	(0.00450)	(0.00471)	(0.00173)	(0.00224)	(0.00288)	(0.00240)
Constant	**0.371*****	**0.354*****	**0.323*****	**0.379*****	**0.345*****	**0.295*****
	(0.00115)	(0.0108)	(0.0155)	(0.0209)	(0.0190)	(0.0178)
Fixed Effects	YES	YES	YES	YES	YES	YES
Time Varying Polity Pair FE	NO	NO	YES	YES	YES	YES
Observations	4,692	4,692	4,692	3,838	3,381	4,491
R-squared	0.208	0.228	0.343	0.384	0.356	0.339

The table shows estimated coefficients of regressions of province-pair levels of the Krugman Index of dissimilarity on the Integration dummy, equal to one if a pair of province was not part of the same polity pre-unification, and several controls. Standard errors in parentheses clustered at the province-pair level. ***, ** and * denote statistical significance at the 1%, 5% and 10% level respectively.

3.5. Discussion

3.5.1. What Lessons for the OCA Framework?

Two main implications on the dynamics of monetary unions can be drawn from the paper results on the endogeneity of the OCA criteria and the endogenous effects of monetary integration.

First, the paper finds the OCA framework to have predictive power in terms of currency arrangements membership. It could also be argued that my findings are consistent with OCA criteria being ex-ante predictors of future performance of currency arrangements. The arrangements which are found to have a higher ex-ante probability of occurrence based on OCA criteria are also the ones experiencing better ex-post outcomes in terms of sustainability (Gold Standard Core vs. Latin Union) and convergence (Germany vs. Italy). This is at odds with the OCA endogeneity view of Frankel and Rose (1998), which underpinned the policy process towards a European Monetary Union since its foundation. Based on the experience of the mid-19th century wave of European monetary integration, there is little reason to expect that OCA status is more likely to arise ex-post than ex-ante. This somewhat vindicates the "five tests" British approach towards European monetary integration (Treasury, 2003).

Second, the paper finds evidence in favor of the Krugman-type endogenous effects of monetary integration, with the costs of monetary union endogenously increasing ex-post. In particular, it shows that pairs of Italian regions that became integrated following unification became much more dissimilar to one another compared to pairs of regions that already shared a common currency and market. This confirms Krugman (2001)'s worries regarding the adverse effects of monetary and economic integration with respect to monetary policy and the idea that specialisation patterns should be considered a key component of OCA criteria (Imbs, 2004). It also cautions against the prevalent consensus that OCA endogeneity effects dominate over the "Krugman effects". Evidence on OCA endogeneity is indeed largely drawn from either large cross-sections of countries with different degrees of trade and monetary

integration intensity or the relatively short lived experience of the EMU. This is problematic as the "Krugman view" effects might materialise only at very low levels of transactions cost, in line with those of a "national" market. This might be of concern for the EMU as integration continues. In particular, the potential transition from national business cycles, where shocks are transitory, to regional business cycles, where shocks are persistent or even permanent (Blanchard et al., 1992), and GDP levels might bear a closer relationship to shocks (Cerra et al., 2020) should receive further research attention.

3.5.2. The Italian Southern Question through the Prism of the OCA Literature

My work provides a new perspectives on two issues at the core of the economic history of the Italian "Southern Question": the relative conditions of the Italian regions pre-unification and the drivers of regional divergence post-unification.

This paper highlighted how the North and the South of Italy were part of two different OCAs prior to the unification. An important debate has opposed Italian economic historians on whether GDP per capita across the peninsula was relatively uniform at unification (Malanima and Daniele, 2007) or, on the contrary, the South was already lagging behind (Felice, 2013) in 1861. The paper's findings might be interpreted as indirectly supporting the second thesis. Indeed, judging by the levels of monetary independence and the symmetry of shocks, the South seems to belong to the poorer European periphery, while the North experienced monetary shocks more in line with core countries. Nevertheless, this could reflect potential for growth rather than an already realised level of economic development.

More importantly, the paper makes the case that the economic and monetary integration of Italy - *in itself* - might have contributed to the early Southern Question. The argument goes behind the important points classically raised by the New Economic Geography framework and recently put forward in the Italian unification context by A'Hearn and Venables (2011), Basile and Ciccarelli (2018), Missiaia (2014) and Missiaia (2016). Of course, spatial

agglomeration and economies of scale are a major explanatory factor for the Italian regional divergence experience.

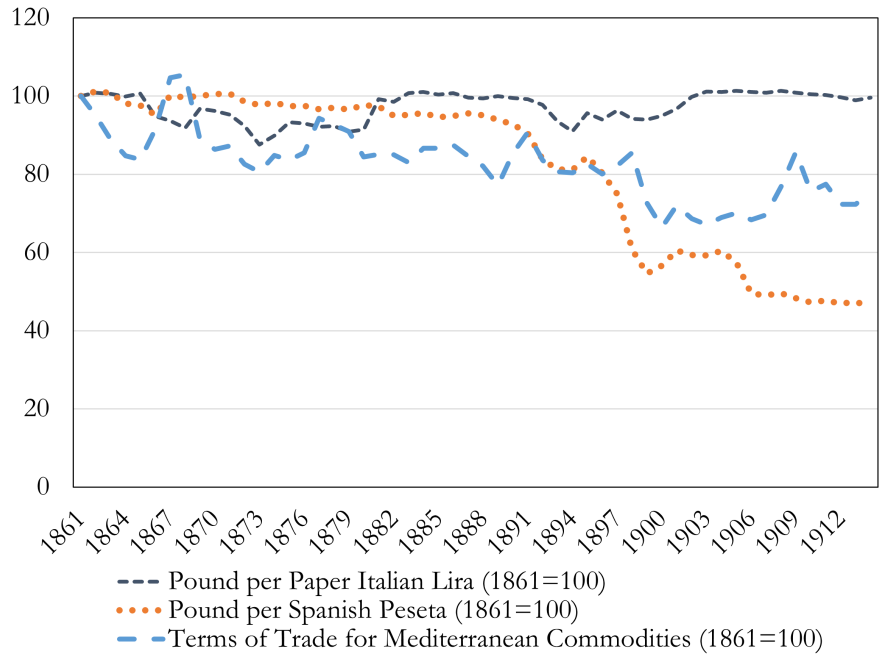
Nevertheless, there is a more subtle point to be made, looking at the interaction between supply and demand shocks and output hysteresis (Blanchard and Summers, 1987). The latter has long been underlined as a key stylised fact of regional business cycles compared to national ones (Blanchard et al., 1992) and has received more empirical attention after the recent crises (Cerra et al., 2020).

To the extent that regions do not possess macroeconomic adjustment tools and factors are mobile within national markets, regional business cycles could be characterised as stochastic processes. When idiosyncratic demand shocks adversely impact a region's production mix, factors of production migrate out of the affected region, preventing the adjustment mechanisms that would see the regions acquiring new industries to take hold. In other words, temporary demand shocks might well turn into permanent supply potential losses. This is broadly consistent with the ambiguous effect of factor mobility on welfare in a currency union with nominal rigidities highlighted by Farhi and Werning (2014). Depending on the source of the demand shock, adjustment through factor movements in a currency union might not necessarily be overall welfare improving, increasing the dispersion of output levels within the union.

In this context, the deflationary shock to agricultural prices occurring at the end of the 19^{th} century is of particular interest. By the 1880s, the Italian national market was increasingly integrated, with high factor mobility within Italy, as well as internationally.

Against this backdrop it is interesting to contrast the experience of the Italian South to that of Spain. While the Two Sicilies and Spain were both part of the European monetary periphery pre-unification, their exchange rate policies diverged markedly following the Italian unification (See Figure 3.5.1). The unified Kingdom of Italy, inheriting the high war debts of Piedmont, pursued a "gold shadowing" policy (Tattara, 2003) aimed at maintaining access to foreign financial markets. As shown in Figure 3.5.1, as the terms of trade for the

Figure 3.5.1: Exchange Rates and Mediterranean Terms of Trade vs. the United Kingdom



Foreign-exchange data sources are discussed in Chapter 4. The terms of trade are calculated as the ratio of British Wholesale Prices (Thomas et al., 2010) and the average international price index of wheat, olive oil and oranges (Federico and Tena-Junguito, 2016).

agricultural Mediterranean regions deteriorated markedly, Spain cushioned the external shock letting the Peseta depreciate. On the contrary, Southern Italian commodity exporters were hit by the "grain invasion" crisis in the late 19th century (O'Rourke, 1997) at the same time as the monetary authorities stabilised the paper Lira around parity[26]. I argue that in a no-unification counterfactual, the Italian South would have likely adopted a floating exchange rate regime similar to Spain. This argument is very much consistent with recent findings by Mitchener and Pina (2020). They find a negative causal relationship between terms of trade shocks and currency risk-premia in the classical gold standard, with negative export price shocks increasing the likelihood of abandoning gold convertibility. Their results imply that in a no-unification counterfactual Southern Italy would have experienced significant "pegxit" pressure in case it had attempted to anchor the monetary standard on gold.

In the absence of a "pegxit" option, and with wages already likely close to subsistence level, a nominal adjustment was not an option for the Italian South. The shock had to be absorbed

[26]From a political economy standpoint this might have been partially compensated by a moderate increases in protection for agricultural products (Federico and Tena-Junguito, 1998)

via factor movements. Migration clearly was a key channel of external adjustment in the Gold Standard period for peripheral countries (Esteves and Khoudour-Castéras, 2009), and the New World "grain invasion" indeed coincides with the beginning of the mass migration phenomenon in Italy. Interestingly, Sánchez-Alonso (2000) estimates that without the devaluation of the Peseta, migration from Spain would have been up to 40% higher during the 1890s, in line with the Italian levels of the period. Again, Spain provides a good reference point of what migration in Southern Italy might have looked like with an independent monetary policy in the 1880s and 1890s.

The possible link between the Italian monetary union and Italian regional inequality is broadly consistent with the theoretical and empirical treatments of the effects of factor mobility as an adjustment mechanism to asymmetric shocks in a currency unions by Farhi and Werning (2014) and House et al. (2018). They find the welfare effect of migration to be ambiguous on the "stayers" of the currency union region affected by an asymmetric shock. This might actually be particularly true in the case of unified Italy, as labor from the South largely migrated outside of Italy, preventing higher demand from workers in Northern markets compensating for workers leaving the South. In the absence of nominal adjustment to face a large asymmetric demand shock, factors of production permanently left the Italian South potentially leaving a permanent "scar" on its growth potential.

To be clear, I am not arguing this to be the main cause of the Southern Question. In the absence of quantification, it is safe to assume that different starting levels in endowments, institutions and NEG agglomeration mechanisms explain the lion share of Italian regional divergence.

However, the evidence presented above is consistent with part of the widening of the early Italian North-South divide being potentially related to adjustments to an adverse asymmetric shock within a currency union.

3.6. Conclusion

In this paper, I have empirically analyzed the patterns of European monetary integration occurring in the third quarter of the 19th century, focusing on the Italian and German unifications.

Overall, my findings confirm the predictive power of the OCA framework, both in terms of currency areas membership and ex-post performance. The optimal monetary boundaries I estimate in the 1850s and 1860s, broadly predict the members of the 1870s gold standard core. I also show the costs of monetary integration for pre-unification Italian polities to be far higher than for German ones, as North and Southern Italy clearly belonged to different monetary clusters. From an OCA standpoint, this is consistent with the ex-post performance of Italy and Germany in terms of regional divergence in the first decades of unification and to this day.

My results also contribute to the key debate on the endogeneity of the OCA criteria. The paper cautions against the Frankel-Rose view of OCA endogeneity, for which there is no clear evidence looking at an important episode of European-wide monetary integration. Arrangements that turned out more sustainable and long lasting, such as the Gold Standard core or the German union, were ex-ante associated with better OCA fundamentals. On the other hand, I find evidence in favor of the "Krugman view" of endogenously increasing costs of monetary integration, looking at the Italian post-unification experience. This implies that more attention should be paid to the adverse effects of monetary integration on cyclical synchronisation and the relationship between specialisation, monetary policy and the persistence of output shocks.

Finally, my findings suggest it is important to distinguish between the optimality and the sustainability of currency areas. Previous research highlighted the relationship between political integration and currency areas sustainability as the main take away to be drawn from historical experiences of monetary integration (Bordo and Jonung, 1999). Indeed, despite

persisting divergence, the Italian monetary union has managed to persist for one and a half century, through the establishment of a political union and, in recent times, a de facto transfer union between its regions. Nevertheless, the mere fact that the Italian monetary area has proved sustainable does not mean it did not imply economic costs for its regions, consistent with Mundell's original intuition. This bears reflections for the current predicament of the European integration process.

Appendix

3.A. Results Appendix: A Test OCA of Predictive Power

Table 3.A.1: List of Countries and Year of Entry into a Monetary Arrangement

Polity	Italy	LMU	Germany	SMU	GS	GS Core
Austria-Hungary					1892	NO
Belgium		1865			1878	YES
Denmark				1873	1876	YES
France		1865			1878	NO
Lombardy-Venetia	1858	1865			1884	NO
Naples	1863	1865			1884	NO
Netherlands					1875	YES
Northern Germany (Hamburg)			1871		1871	YES
Norway				1873	1873	YES
Papal States	1870	1866			1884	NO
Piedmont-Sardinia (Italy)	1858	1865			1884	NO
Portugal					1855	NO
Prussia (Berlin)			1871		1871	YES
Russia					1897	NO
Sicily	1863	1865			1884	NO
Southern Germany (Frankfurt)			1871		1871	YES
Spain					-	NO
Sweden				1873	1873	YES
Switzerland		1865			1878	YES
Tuscany	1861				1884	NO

LMU: Latin Monetary Union; SMU: Scandinavian Monetary Union; GS: Gold Standard. Year of joining the Gold Standard is taken from Reinhart and Rogoff (2011). A country is coded as part of the gold standard core if it joined the Gold Standard by 1880 and did not leave it before 1914.

Table 3.A.2: OCA Predicitve Power Regressions Summary Statistics

	Obs.	Mean	StD	Min	Max
Currency Union	2,079	0.45	0.50	0	1
Gold Core	2,079	0.30	0.46	0	1
Shock Symmetry	1,613	- 0.10	1.17	-37.72	0
Distance	2,079	7.27	0.99	4.83486	9.69533
Population_i	1,370	17,340.89	24,655.22	1357	257422.5
Population_j	1,386	6,541.42	8,284.83	1357	43231.25
FTA	2,079	0.10	0.30	0	1
Common Border	2,079	0.16	0.36	0	1
Common Language	2,079	0.07	0.26	0	1
Openess_j	922	7.86	1.27	3.334157	10.25894
Openess_k	906	7.27	1.13	5.106838	10.25894

Table 3.A.3: Average Predicted Probability by Arrangement

	Predicted Probability					
	1846-1858		1859-1870		1871-1878	
	Mean	StD	Mean	StD	Mean	StD
Gold Core	0.500	0.257	0.643	0.274	0.839	0.206
Gold non-Core	0.018	0.088	0.029	0.116	0.043	0.145
Latin Union Core	0.625	0.275	0.445	0.349	0.813	0.180
Latin Union non-Core	0.028	0.093	0.003	0.011	0.025	0.039
Scandinavian Union	0.110	0.123	0.133	0.154	0.364	0.184
Italy (North-North)	0.235	0.137	.	.	.	.
Italy (South-South)	0.155	0.162	0.185	0.260	.	.
Italy (North-South)	0.030	0.056	0.000	0.000	0.000	.
Germany	0.927	0.073	0.966	0.026	0.991	0.006
No Currency Union	0.007	0.052	0.005	0.039	0.012	0.079

Summary statistics of fitted values predicted by the model in Column 1 of Table 3.3.2. Italian pairs are separated depending on their geography. Latin Union Core is defined as pairs between France and its three long standing monetary satellite, Belgium, Piedmont-Sardinia and Switzerland.

3.B. Results Appendix: Frankel-Rose vs. Krugman OCA Endogeneity

Table 3.B.1: Krugman Index Regressions Summary Statistics by Census Year

1871						
	Same Polity Pairs <1871			Different Polity Pairs <1871		
	Obs.	Mean	StD	Obs.	Mean	StD
Krugman Index	400	0.40023	0.190737	1,946	0.4738838	0.19914
Distance	400	174,637	119,975.9	1,946	481,898.1	256,061
Active Population	400	7.7575	5.851007	1,946	8.666495	6.57379
Agricultural Population	400	12.76	11.23735	1,946	13.87873	11.4774
Literacy	400	10.7525	10.65764	1,946	19.28109	13.9303
Population density	400	0.58158	0.584072	1,946	0.5784631	0.53813
Domestic Market Access	400	1.69901	1.436349	1,946	2.537302	1.71266
1911						
	Same Polity Pairs <1871			Different Polity Pairs <1871		
	Obs.	Mean	StD	Obs.	Mean	StD
Krugman Index	400	0.45257	0.166341	1,946	0.562132	0.1914
Distance	400	174,637	119,975.9	1,946	481,898.1	256,061
Active Population	400	5.335	4.322556	1,946	6.538541	4.88172
Agricultural Population	400	13.355	12.54242	1,946	14.63309	12.2562
Literacy	400	11.695	10.04686	1,946	25.88592	16.5238
Population density	400	0.61287	0.620193	1,946	0.6085012	0.55786
Domestic Market Access	400	6.06574	5.700015	1,946	9.930656	6.83693

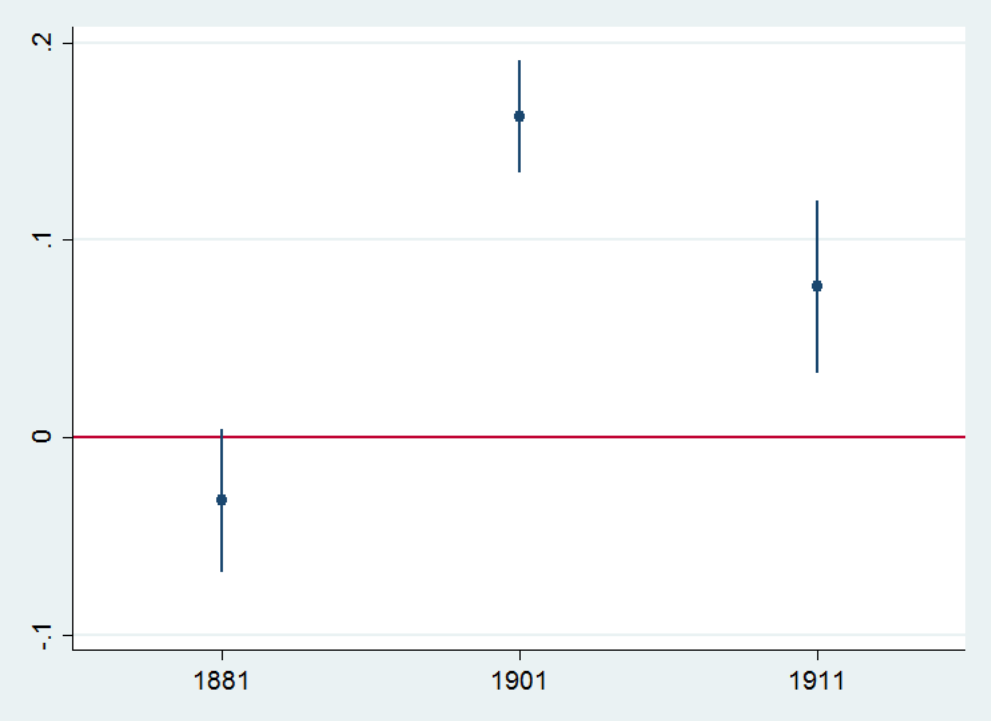
The panel summarises data by treatment status and census year. Data are taken from Ciccarelli and Fenoaltea (2013) and Missiaia (2014). See text for the computation of the Krugman-Index. All variables except distance are expressed as the province-pair absolute difference.

Table 3.B.2: Further Krugman Index Regressions

	Log of Krugman Index		First Diff. of the Krugman Index	
	(1)	(2)	(3)	(4)
D_Integration	**0.0698*****	**0.0755*****	**0.0373*****	**0.119*****
	(0.00801)	(0.0283)	(0.00813)	(0.0167)
Distance	**-1.03e-07*****	**1.41e-07*****		
	(1.89e-08)	(4.07e-08)		
Capital_both	**-0.0622*****	**-0.0889*****		
	(0.0126)	(0.0197)		
Island_one	**0.0880*****	**0.111*****		
	(0.00969)	(0.0159)		
Act. Pop.71	**-0.00184*****	**-0.00157****		
	(0.000484)	(0.000735)		
Agr. Pop.71	0.000112	**-0.00110*****		
	(0.000272)	(0.000395)		
Literacy71	**0.00293*****	**0.00308*****		
	(0.000249)	(0.000465)		
Density71	**0.0385*****	**0.0479*****		
	(0.00567)	(0.00830)		
DMA71	**0.00389***	-0.00140		
	(0.00215)	(0.00356)		
d_Active. Pop.			**0.00166*****	**0.00189*****
			(0.000642)	(0.000590)
d_Agr. Pop.			**0.00174*****	**0.00155*****
			(0.000320)	(0.000307)
d_Literacy			0.000453	4.62e-05
			(0.000300)	(0.000298)
d_Density			**-0.103*****	**-0.0642*****
			(0.0260)	(0.0244)
d_DMA			-0.000390	**0.00501*****
			(0.00162)	(0.00177)
Constant	**0.326*****	**0.438*****	**0.0582*****	**0.0581*****
	(0.00841)	(0.0198)	(0.00663)	(0.0123)
Polity-Pair Fixed Effect	NO	YES	NO	YES
Observations	2,346	2,346	2,346	2,346
R-squared	0.164	0.259	0.031	0.162

The table shows estimated coefficients of regressions of province-pair levels of the Krugman Index of dissimilarity on the Integration dummy, equal to one if a pair of provinces was not part of the same polity pre-unification. Columns 1 and 2 replace fixed effects with time invariant pair controls. Columns 3 and 4 estimate the model in first differences. Standard errors in parentheses clustered at the province-pair level. ***, ** and * denote statistical significance at the 1%, 5% and 10% level respectively.

Figure 3.B.1: Estimated Leads and Lags of the Treatment Effect



Leads and lags of the coefficient estimated in column 4 of Table 3.4.2 for the Integration dummy across all census years.

Chapter 4

The Rise and Fall of Global Currencies over Two Centuries

4.1. Introduction

This paper measures the rise and fall of global currencies and the competitive structure of the international monetary system since 1825. A key motivation of this work is to assess to what degree the current dollar hegemony is a historical anomaly from a two centuries perspective. Furthermore, I am able to observe and quantify several new historical episodes of global currency competition. This directly speaks to the literature on the costs and benefits of a multi-polar international monetary system and the outlook for dollar hegemony, in light of the ongoing policy debate (Carney, 2019) and a nascent theoretical literature (Farhi and Maggiori, 2018). The background literature which ultimately motivates this paper - on dollar hegemony, the fundamental asymmetry of the IMS and the debate on whether a multipolar IMS is both possible and desirable has been examined in some detail in the introduction of the thesis (Section 1.3).

I offer two main empirical contributions. First, I provide a (peace-time) continuous measure, over two centuries, of the relative influence of global currencies, comparable over time, for

a sample of polities representing at least 80% of world GDP and 90% of global trade. This allows for a systematic analysis of historical episodes of competition among international currencies. Second, I provide a continuous measure of the overall level of multi-polarity of the international monetary system over time.

To do so I rely on a large historical dataset of foreign-exchange returns, mostly at weekly frequency, based on an extensive effort of digitization of original printed sources. My work therefore follows an established practice of classifying countries in currency blocs based on exchange-rate behavior. A prominent contribution in this vein, covering the period 1946 to 2016 at a monthly frequency, is the work of Ilzetzki et al. (2019), updating earlier work by Reinhart and Rogoff (2004). In this paper I depart from their methodology, which is chiefly concerned with accurately describing exchange-rate regimes at the individual country-level, rather than measuring international monetary system discontinuities and global currency competition. They assign each currency, if consistent with its exchange-rate behavior, to a single monetary bloc. They therefore adopt, by construction, a "winner takes-all" approach to global currency blocs. However, monetary dominance might well be a fuzzy concept, with a single country potentially experiencing the influence of several global currencies at the same time[1]. In this paper I follow a more flexible approach[2], relying on foreign-exchange co-movements and the Frankel and Wei (1994) factor model, to estimate the relative weight of global currencies over two centuries of data, allowing for the same polity to experience dominance from more than one global currency.

I find the current dollar hegemony to be, from a two centuries perspective, an anomaly. No currency has ever maintained such a prolonged and large lead over global currency rivals in my sample. I find the international monetary system to have historically been largely multipolar. The previous global currency hegemon, the pound sterling, experienced frequent challenges to its primacy by close competitors, including the French franc in the 1860s, the

[1] I hope, in future work, to be able to extend their "exchange arrangements" dataset further back in the past, relying on and complementing the data collected for this paper. This would require however an even more extensive data collection effort than the one I present below.

[2] Recent work with a similar approach include Fratzscher and Mehl (2014), Tovar and Nor (2018) and Ito and McCauley (2019).

mark after the German unification in the 1870s, and again the franc in the 1930s. The pound was overtook by the dollar a first time in the early 1920s and a second, final, time at the eve of WWII. I also document a positive correlation between the degree of competition in the international monetary system and the prevalence of financial crises over two centuries. The latter is however dependent on specific sub-periods.

The paper is organised as follows. Section 4.2 briefly presents my original dataset of foreign-exchange returns since the 19th century, which is further detailed in Appendix 4.B. Section 4.3 presents the procedure to compute the relative weight of global currencies, based on foreign-exchange co-movements factor models. Section 4.3 describes the rise and fall of global currencies from a chronological perspective, as well my aggregate measurement of IMS competition over two centuries. Further results, including sensitivity analyses and a synthetic map chronology, are contained in Appendices 4.A.1 and 4.A.2.

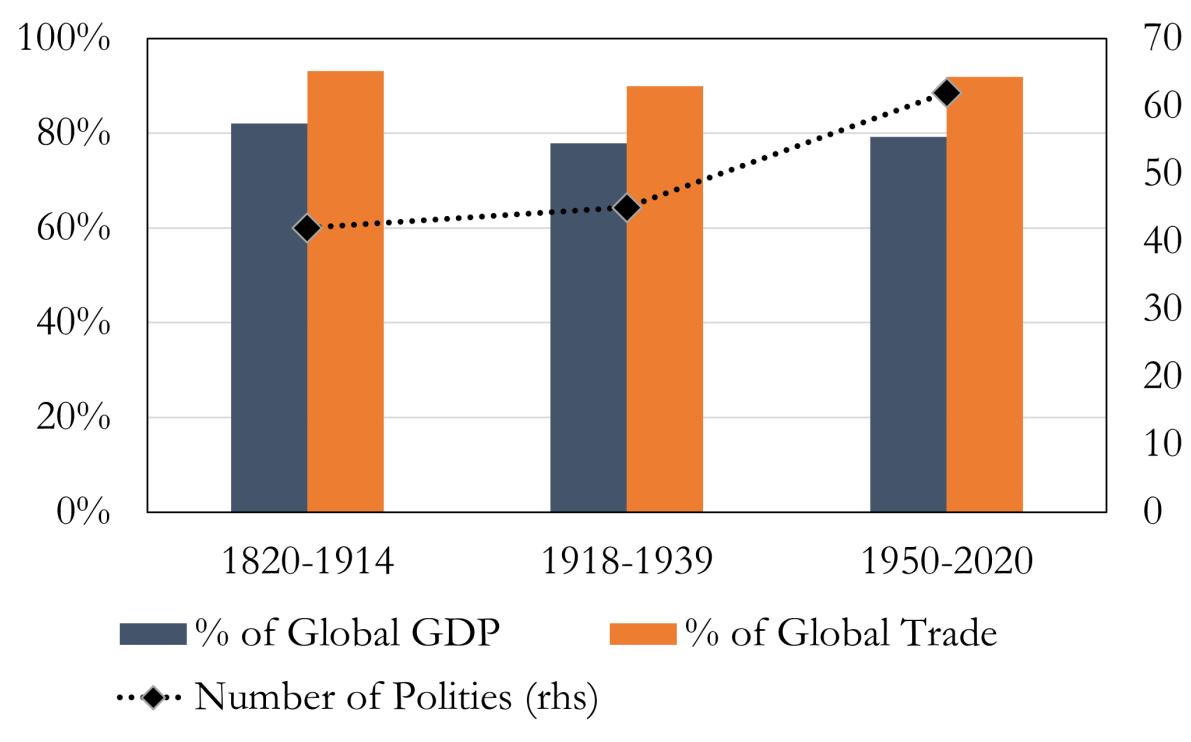
4.2. Data

The present paper is the first result of an extensive effort of data collection of exchange-rate prices since the 19th century. Data on foreign-exchange quotes from original printed sources were digitized at weekly frequency from 1846 to 1939 for the entirety of the London currency market. I therefore provide, to my knowledge, the most comprehensive original dataset of historical exchange-rates prices at weekly frequency[3]. Among previous efforts, weekly frequency data for exchange-rates were collected by Boyer-Xambeu et al. (1994) for the three pairs of currencies in three financial centers between 1812 and 1870. Neal et al. (2003) collected weekly exchange-rate for a panel of ten currencies between 1880 and 1914. Looking at the post-WWI period, Accominotti et al. (2019) collected a dataset of nineteen currency returns at daily frequency over a century.

My original data collection yields a weekly panel of up to twenty-one currencies between

[3]See Section 4.B for a comparison with the aggregate dataset of commercial data provider GFD, which I also rely on in this paper.

Figure 4.2.1: Global Coverage of the Sample



The figure shows the share of global GDP and trade covered by the polities included in each sub-period. GDP refers to years 1914, 1929 and 2010. Global trade refers to the sub-period averages.

1846 and 1914 and forty-five currencies between 1918 and 1939. In this paper, I merge this dataset with other original and commercial sources (See Section 4.B) to obtain a total coverage of a minimum of twenty-eight currencies since 1820[4]. Monthly frequency data are used for all currencies between 1825 and 1846 and, when weekly frequency data are unavailable, between 1846 and 1914 for a minority of currencies. The way I handle the transition between monthly and weekly data is detailed in Section 4.B. In terms of geographic coverage, I try as much as possible to include, throughout the 1825-2020 sample period, currencies that are traded at any point during 1846-1939 in the London market, as well as countries that represent more than 1% in global trade on average during each sub-period. Whenever possible, I rely on originally collected data or BIS data after 1945. Global Financial Data is used when the former two are not an option. Periods of, among others, capital controls, political instability or communist rule mean that some countries experience missing reporting for a number of years.

[4]Over each sub-period and with the exclusion of world wars years.

Figure 4.2.1 shows the global coverage of my sample, which remains broadly stable over two centuries at about 80% of global GDP and 90% of global trade.

The increase in the number of currencies in the sample over time reflects an upward trend in both political fragmentation and globalisation over the last two centuries. Both factors are relevant in quantifying the changing structure of the IMS. Therefore, I favor including in the analysis exchange-rate data as they start to be reported in the sources I digitise[5] rather than taking a continuous sample approach. Data sources and coverage are detailed in Section 4.B.

4.3. Foreign-Exchange Co-Movements and Global Currency Competition

4.3.1. Overview

My quantification of the relative dominance of global currencies over two centuries is based on foreign-exchange co-movements.

The channels relating foreign-exchange co-movements to global currency anchors are both heterogeneous in contemporary data (McCauley and Shu, 2019), and likely to evolve over the time-span covered by the paper. In the early years of the dataset, currencies are either on a commodity standard, and therefore - similar to target zones - move within transaction costs bands related to the shipping costs of precious metals, or are in-convertible floats. In both cases, co-movements with key currencies are likely to reflect spillovers of nominal shocks or trading relations, a stylised fact that persists in contemporary data (Fratzscher and Mehl, 2014). Starting from the mid to late 19th century, monetary authorities are more likely to have played a direct role, with co-movements also reflecting monetary policy reaction functions.

To estimate the relative weight of global currencies I rely on the method first introduced by Haldane and Hall (1991) and Frankel and Wei (1994), respectively looking at the empirics of

[5]Or become available in GFD for non-European currencies in the 19th century.

"Dollar-Deutschemark polarisation"[6] and the rise of the Yen as an international currency. It consists in estimating, for each currency of interest, a factor model of the type

$$\Delta \frac{e_t}{Numéraire_t} = \alpha + \sum_h \beta_h \Delta \frac{GlobalCurrency_{h,t}}{Numéraire_t} + \epsilon_t \tag{4.1}$$

where the log of the exchange-rate returns e of every currency of interest, expressed in a *numéraire* unit at time t, is regressed on the log exchange-rate returns of one or more global anchor currencies at time t, again expressed in terms of a common *numéraire* unit. α is a constant capturing a possible drift in returns and ϵ a residual of idiosyncratic movements. The model is akin to an "horse race" among "candidate" global currencies, yielding intuitive β_h weights representing the relative influence of each global currency h.

Numéraire

The choice of a particular *numéraire* unit can influence the point estimates of Frankel-Wei factor models. *Numéraires* typically favored by the literature are freely floating currencies, usually from small countries with an open capital account, such as the New Zealand dollar or the Swiss franc. A common alternative is represented by international units of account such as the SDR or Gold[7] (Frankel and Xie, 2010).

No single currency consistently fulfills the above criteria for the entirety of the sample. As such, I turn to precious metals and use the London price of a Silver Ounce as my preferred *numéraire*[8]. The choice of a commodity price as *numéraire* has two main advantages. It is consistently available over two centuries and allows to avoid the exclusion of any available country from the analysis.

[6] See Giavazzi and Giovannini (1985).

[7] Ito and McCauley (2019) also estimate Frankel-Wei factor models relying on one of the anchors as *numéraire*. This approach presents a number of issue in a long-run sample with higher competition and transitions among global currencies.

[8] The price of Gold is unsuitable for such purposes in a historical setting as its key monetary role in large financial centers allows for very little variability of its price in terms of global currencies before 1971.

As a robustness check, I also select for each main sub-period a small open economy currency that, over each sub-period, has close to no missing values, is not strictly pegged at any point to a global currency and does not experience a currency black-market. This leaves me with the Dutch Guilder as the alternative *numéraire* for the pre-WWI estimating sample, the Hong Kong dollar for the inter-war period and the Swiss franc for the post-WWII era.

Global Currency Candidates

The choice of global currencies to be included as factors for each sub-period is a prior reflecting the historical literature.

For the 1820-1914 period I include as global currency factors the British sterling, the French franc and the German mark, as identified by Lindert (1967). Those currencies made up more than 90% of official reserves holdings between 1899 and 1913, with about half of those being denominated in British sterling (Lindert, 1969). While the United Kingdom and France had been the main global monetary and financial powers since the beginning of the century, the role of Germany as a capital exporter and safe asset issuer only goes back to the country's unification in 1871. Before then I however include the Hamburg mark banco as the German factor since 1820. First, the Hamburg mark banco had long played a role as an international currency issued in the main silver-based financial center of Europe. Second, estimating a German factor for the whole sub-period makes it easier to evaluate the shift in the IMS brought about by the German unification. There would be no historical justification to include the US dollar in the pre-1914 global currency horse-race. The United States were a catching up capital importer for most of the period, with dollar reserves only being held in neighboring Canada, and a lower share of global reserves than Dutch guilders and Scandinavian currencies (Lindert, 1969). This choice of candidate global currencies for the period is also largely confirmed by the IMS centrality indices computed by Flandreau and Jobst (2005) for the classical Gold Standard period. I therefore estimate a preferred specification, using the London price of a Silver Ounce (XAG) as *numéraire*, that writes:

$$\Delta e_t^{i/XAG} = \alpha + \beta_{it}^{GBP}\Delta e_t^{GBP/XAG} + \beta_{it}^{FFR}\Delta e_t^{FFR/XAG} + \beta_{it}^{DEM}\Delta e_t^{DEM/XAG} + \epsilon_t \quad (4.2)$$

In the inter-war period (1918-1939) the British sterling, the US dollar and the French franc are considered as candidate global currency factors. This follows findings by Eichengreen and Flandreau (2009). They describe the interwar IMS as a shift from the sterling-franc-mark oligopoly of the pre-WWI period to a sterling-dollar duopoly. They also highlight the case of France as an "aspiring" distant third. The German mark is excluded from the global currency factors in the inter-war sub-period. After WWI, Germany experienced deep political and economic instability, hyperinflation and the "transfer problem" related to war indemnities (Ritschl, 2012) as well as strict capital controls after the 1931 banking crisis. For the inter-war sample, I therefore estimate the following equation:

$$\Delta e_t^{i/XAG} = \alpha + \beta_{it}^{USD}\Delta e_t^{USD/XAG} + \beta_{it}^{GBP}\Delta e_t^{GBP/XAG} + \beta_{it}^{FFR}\Delta e_t^{FFR/XAG} + \epsilon_t \quad (4.3)$$

In the last sub-period between 1948 and 2020, I consider as global currency factors the US dollar, the German mark - replaced by the euro from 1999 onward, the British pound sterling and the Japanese Yen. Whether to exclude the pound sterling as a factor from the 1970s onward - when the Sterling Area eventually collapsed (Avaro, 2020), is a matter of debate. I prefer to include a British factor till the end of the sample instead of artificially setting it to zero[9]. The inclusion of the French franc as a global currency factor has little merit after WWII, in light of the successive adjustments of the franc's parity before 1973 and the "German Dominance" on the European Monetary System afterward (Giavazzi and Giovannini, 1988) and it is therefore excluded. The rise of the Japanese Yen has, on the other hand, been a recurrent topic in international monetary debates over the last decades. I

[9]If the British factor is excluded from 1976 onward, its weight tends to be equally redistributed among the dollar and mark/euro factor.

include a Yen factor from 1968 onward, as before then the Yen co-moves almost perfectly with the US dollar. Finally, I choose to exclude the Chinese Renminbi from the global currency factors. The topic of whether a renminbi bloc has started to emerge in the last few years has prompted several empirical contributions with contrasting results, including Fratzscher and Mehl (2014), Kawai and Pontines (2016), Tovar and Nor (2018) and McCauley and Shu (2019). They notably highlighted the econometric issues of including the renminbi - given its high levels of collinearity with the US dollar - in a Frankel-Wei factor model. While I believe the present work and, particularly, its future extensions, will help shed lights on the future outlook for the renminbi as an international currency, I consider the estimation of recent co-movements with respect to the Chinese currency to be outside of the scope of the paper. The preferred Frankel-Wei factor model for the last sub-period is therefore:

$$\begin{aligned}\Delta e_t^{i/XAG} = \alpha \; + \; \beta_{it}^{USD}\Delta e_t^{USD/XAG} \; + \beta_{it}^{GBP}\Delta e_t^{GBP/XAG} \; + \; \beta_{it}^{DEM}\Delta e_t^{DEM/XAG} \; + \\ + \; \beta_{it}^{JPY}\Delta e_t^{JPY/XAG} \; + \epsilon_t\end{aligned} \tag{4.4}$$

4.3.2. Yearly Global Currency Weights

The key empirical contribution of this paper is to divide the world economy into global currency zones for every year since 1825. To do so, I take a bottom-up approach similar to Ito and McCauley (2019), estimating weights for each polity in my sample and aggregating up. The procedure that leads from weekly-exchange rate co-movements to yearly global currency weights at the world economy level can be summarised by the following three steps:

1. Equations 4.2, 4.3 and 4.4 are estimated at the highest frequency available for each individual polity, over rolling windows of six years[10], trimming foreign-exchange movements and excluding any weekly absolute change greater than 10%. For every polity i and every candidate global currency h, I obtain a coefficient $\widehat{\beta_{it}^{h}}$ that varies at

[10] With a minimum of 52 observations. The window is set at seven years and a minimum of 36 observations for monthly series.

the weekly[11] frequency. To be clear, my approach implies that a polity can experience monetary dominance from several global currencies at the same time.

2. I then calculate yearly anchor currency weights for each global currency at the polity level. I first set all the negative estimated coefficients to zero, partially following the adjustments carried by Ito and McCauley (2019). Then, for every polity and every year, I compute an inverse-variance weighted-average of each weekly (monthly) $\widehat{\beta_{it}^{h}}$, using robust standard errors estimated in the first step, ensuring my synthetic measures gives more weight to more precise higher frequency estimates[12]. Yearly global currency weights at the polity level are normalised so that $\sum_{h=1}^{H} \widehat{\beta_{iht}}$ sums up to 1. Also, the polity issuing a global currency is assigned a weight of 1 for that currency and zero for all other global currencies.

3. Yearly currency weights at the polity level for each global currency are then aggregated up at the world level[13]. For each global currency, I compute the world-level yearly weight as the average of the available polity-level weights for the year, weighted by the share of each polity in either the sample's total GDP or international trade. For this measure to capture as much as possible relevant changes in the relative importance of global currencies, I make two choices. First, GDP or trade-weights are held fixed for each sub-period[14] so that my quantification is not overly influenced by GDP and trade movements. Second, the global average include any polity as soon as data availability allows for its annual scores to be estimated, rather than trying to achieve a continuous sample. This is because the fact that foreign-exchange data become available *in itself* is likely to be endogenous to a change in the way a certain polity participates in the IMS, and therefore reflects a shift in the structure that is of interest to the analysis.

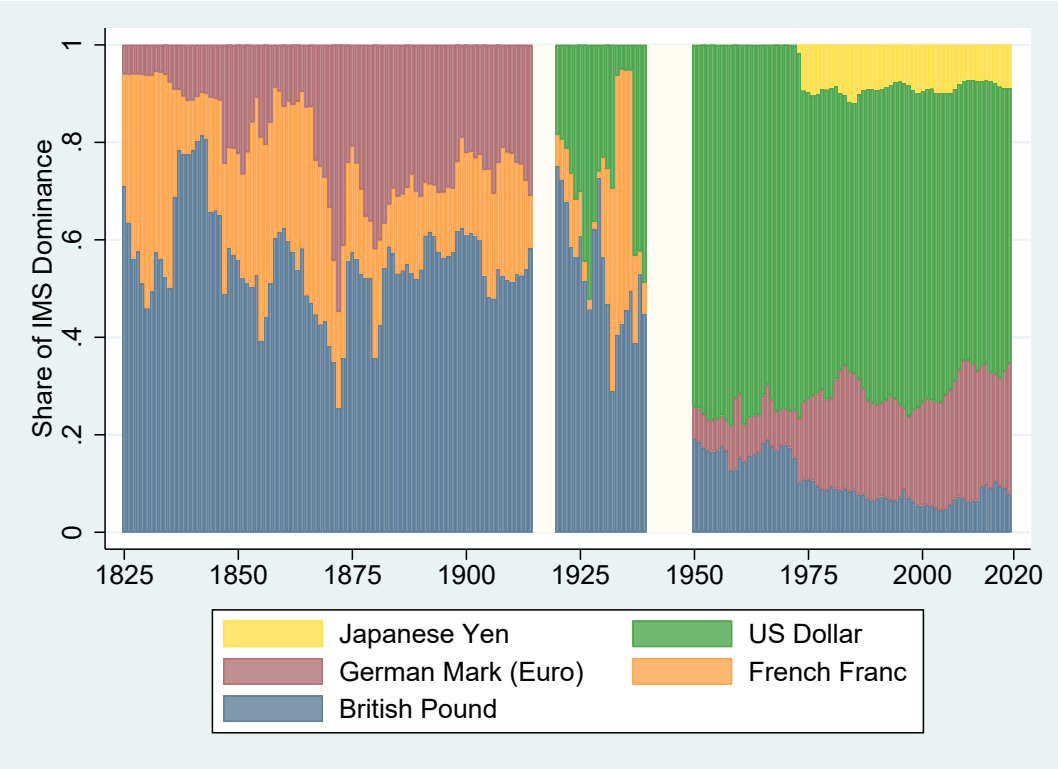
[11] Monthly for some estimates of Equation 4.2.

[12] In the period 1820-1914, for the first five years after weekly data become available I further average the values of the inverse-variance weighted-average of the monthly and weekly weights to compute the yearly average.

[13] Defined as the total available sample, which fairly consistently accounts for more than 80% of GDP and 90% of international trade.

[14] See Section 4.B for details.

Figure 4.4.1: The Rise and Fall of Global Currencies over Two Centuries



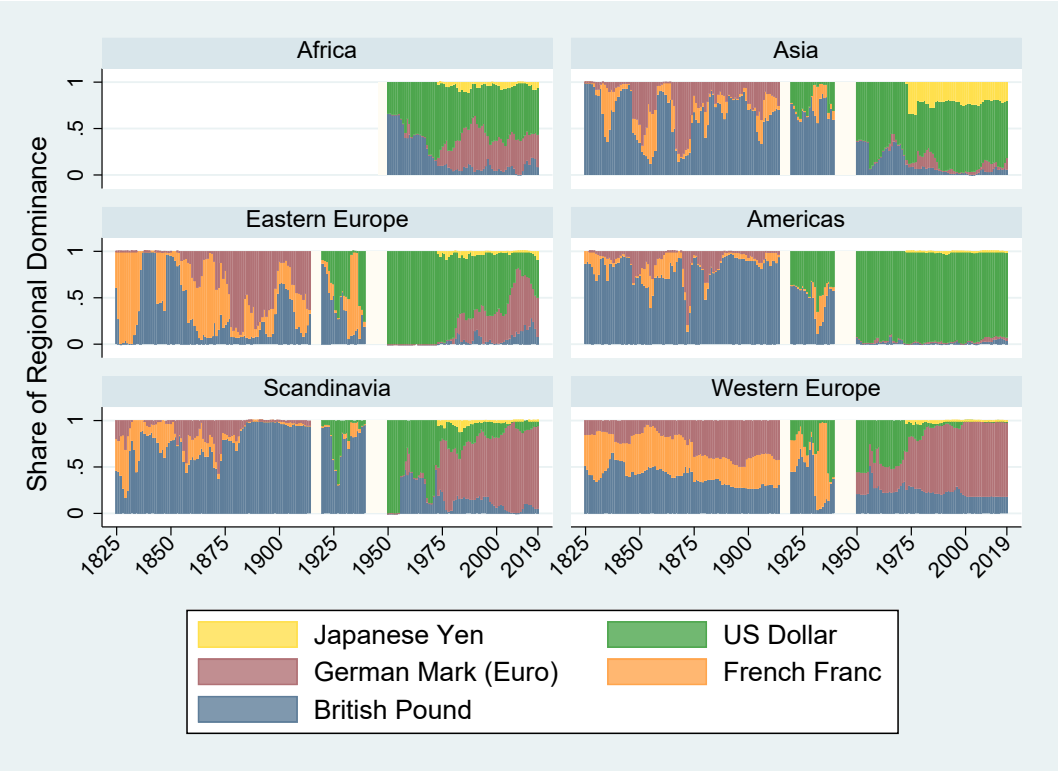
The chart depicts, for every global currency, the GDP-weighted average of the currency's weight for all polities in the sample, estimated using Silver as *numéraire*.

4.4. The Rise and Fall of Global Currencies Over Two Centuries

I now turn to the results of the bottom-up classification of the IMS into global currency areas. The discussion is chronological and attempts to compare my findings to the existing literature on the rise and fall of global currencies. I also provide some tentative, descriptive, evidence the IMS structure and its implications for financial stability (Farhi and Maggiori, 2018). A large amount of material is left to the Appendix, including pooled regressions, results of the bottom-up classifications under different specifications for each global currency (Section 4.A.1), and maps depicting polity-level results over the course of the two centuries sample (Section 4.A.2).

Figure 4.4.1 summarises the paper's contribution in one chart, showing the relative weights

Figure 4.4.2: Regional Monetary Systems and Global Currency Competition over Two Centuries



The chart depicts, for every global currency, the GDP-weighted average of the currency's weight for all polities in a particular region, estimated using Silver as *numéraire*.

computed for each global currency over two centuries. Looking at the broader picture three findings emerge. First, the post-WWII era of dollar dominance indeed appears as an historical anomaly. Except for a very brief interval of very high sterling influence in the 1840s, never in the last two centuries a global currency has registered levels of dominance comparable to the US during the Bretton Woods period, or, to a lesser extent, in recent decades. A partial qualification to this anomaly is however apparent when looking at regional aggregations of global currency weights in Figure 4.4.2. On the one hand, the continental European monetary system has been characterised by significantly higher than average multipolarity, at least until the creation of the euro[15]. On the other hand, other regional monetary systems were often fairly unipolar. These include Scandinavian, Asian and the American sterling hegemony throughout the 19th century but also a prolonged period of franc and then mark hegemony in Eastern Europe respectively before and after 1870.

[15] And the notable exception of the brief interval of French dominance in the 1930s.

Second, the current IMS era seems to be characterised by a higher level of stability and inertia in the global currency dominance weights, compared with the - at times - dramatic shifts observable both in the interwar and pre-WWI period. This can be observed in all regional monetary systems but is particularly apparent in the extra-European regions.

Third, the patterns I quantify are broadly consistent with existing narratives and partial quantification of IMS history (Eichengreen et al., 2017). The sterling was the former hegemon of the IMS, but coexisted with other global currencies which represented a large share of IMS dominance throughout the 19th century. Its decline started in the interwar period and was completed before the end of Bretton Woods. The rise of the dollar was well under way since the early 1920s, experienced a temporary retreat after 1929, but took hold by the late 1930s.

However, I also uncover new patterns and discontinuities overlooked in the existing literature. One example is the episode of strong French dominance I observe after the sterling devaluation of 1931, which is inconsistent with the characterisation of the interwar French attempt to gain monetary influence as a failed one Eichengreen and Flandreau (2009). Another example is the slight decline of dollar dominance observable over the last fifty years. This is at odds with the fairly marked increase in the share of the dollar zone documented by Ilzetzki et al. (2019) or the statement by Gourinchas (2021) that *"since 1971 the centrality and dominance of the dollar has increased in all dimensions"*.

I now turn to a chronological summary of the results.

4.4.1. 1825-1914

The architecture of the IMS in the first part of the 19th century is, at least quantitatively speaking, to a fair extent uncharted territory. My quantification of global currency competition in the 19th century is summarised in Figure 4.4.3. It begins with a duopoly of the sterling and the franc for the first 10 years of the sample. As shown in the maps in Figure 4.A.6, at the start of the sample the franc dominates in continental Europe, while the pound is the dominant currency outside of Europe. A sharp correction of monetary dominance in

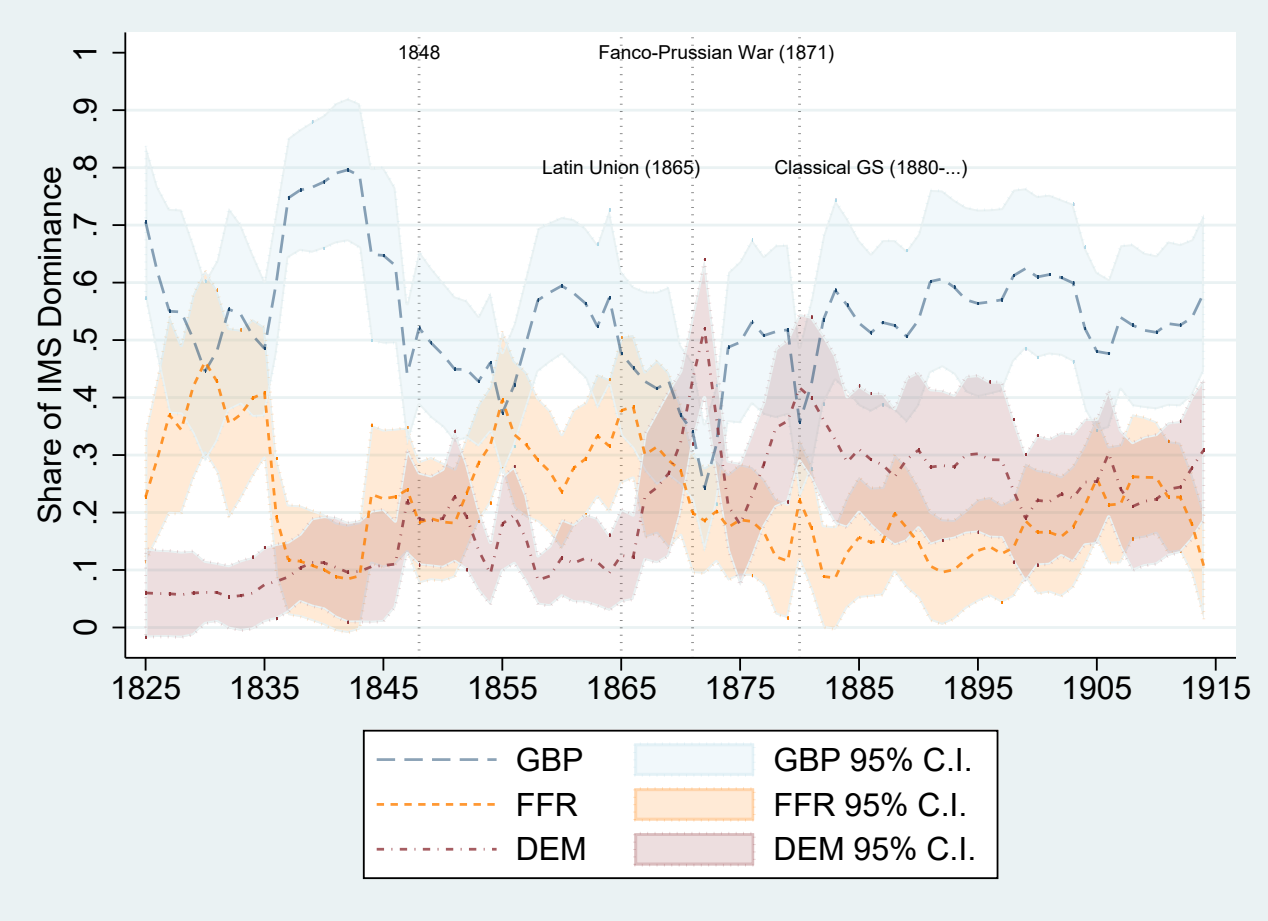
favor of the sterling is observable from 1836. This is likely to correspond to an acut episode of financial instability in Paris. Although, (Reinhart and Rogoff, 2009) only date the crisis linked to the failure of the Bank of Belgium starting in 1838-1839, the analysis of turning points in the bankruptcy rate by Bignon (2011) dates a French crisis episode in 1836-1839, consistent with timing of the decline in franc dominance I observe.

A notable exception to the lack of quantification of the IMS structure before the late 19th century is, between 1844 and 1870, Ugolini (2010). His analysis of money and bullion markets integration points to increased multipolarity in the IMS before 1870, particularly driven by the rise of Paris. This is supported by my estimates, with some qualifications. I observe a clear increase in the dominance of the franc that coincides with the regime change of 1852. The French Second Empire was characterised from the start by financial deepening, driven by new investment in the railways. This led to a tripling of foreign stocks quoted in Paris (Dupont-Ferrier, 1925) and to France competing on equal footing with Britain as a capital exporter (Lévy-Leboyer, 1977). The franc's weight briefly matches the sterling one in 1855, then retreats somewhat coinciding with the global crisis of 1857[16], only to return back to close to 0.4 by 1865. This is the year the Latin Union, formalizing a pan-European franc zone, is established. 1865-1869 is a period of intense French monetary diplomacy to encourage the establishment of a global monetary standard around the franc (Einaudi, 2000). It is often argued (Ugolini, 2010) that if the French emperor had not declared war against Prussia, leading to a military disaster, this effort might have eventually succeeded. While it does not necessarily disprove this argument, I however observe a declining trend for the franc weight that starts before 1870.

Conversely, the rise of the German mark weight[17] is apparent as soon as 1866, at the expense of both the sterling and the pound. Both capital flights from London following the Overend Gurney bankruptcy and further German integration following the Austro-Prussian war of 1866 could explain this inital rise of the mark.

[16] When the Bank of England was *"the only source of discount"* (Reinhart and Rogoff, 2009).
[17] Which until 1873 is represented by the Hamburg mark.

Figure 4.4.3: Global Currencies Competition in the Long 19th Century



The chart depicts, for every global currency, the GDP-weighted average of the currency's weight for all polities in the sample, estimated using Silver as *numéraire*.

1870 is found, unsurprisingly, to be a watershed year in the history of the IMS. The mark significantly overtakes the sterling in conjunction with the formation of the Empire and the transition to gold. Part of this movement might be related to the significant transfer of French foreign holdings as part of the war indemnity and the following purchase of gold bullion by the German monetary authorities (Wiegand, 2019). The gains of the mark vs. sterling are interrupted in conjunction with the 1873 central European financial crash but resume again to peak in 1881, when again the mark briefly overtakes sterling[18].

The picture emerging from my results between 1880 and 1914 is one of an oligopolistic IMS with fairly stable "market shares". The system is dominated by the sterling, particularly outside Europe. However, both the franc and the mark play an important role. This is fairly consistent with the existing quantification by Lindert (1969), based on foreign reserves. However, I find the mark to have a slightly higher weight than the franc. This is sometimes true even for countries part of the Latin Union (Italy in the 1880s and part of the 1990s for example), or that received substantial French capital before WWI such as Russia[19]. The gain in prominence, by the turn of the century, for franc and mark reserves vs. sterling found in Lindert (1969) is also consistent with my results.

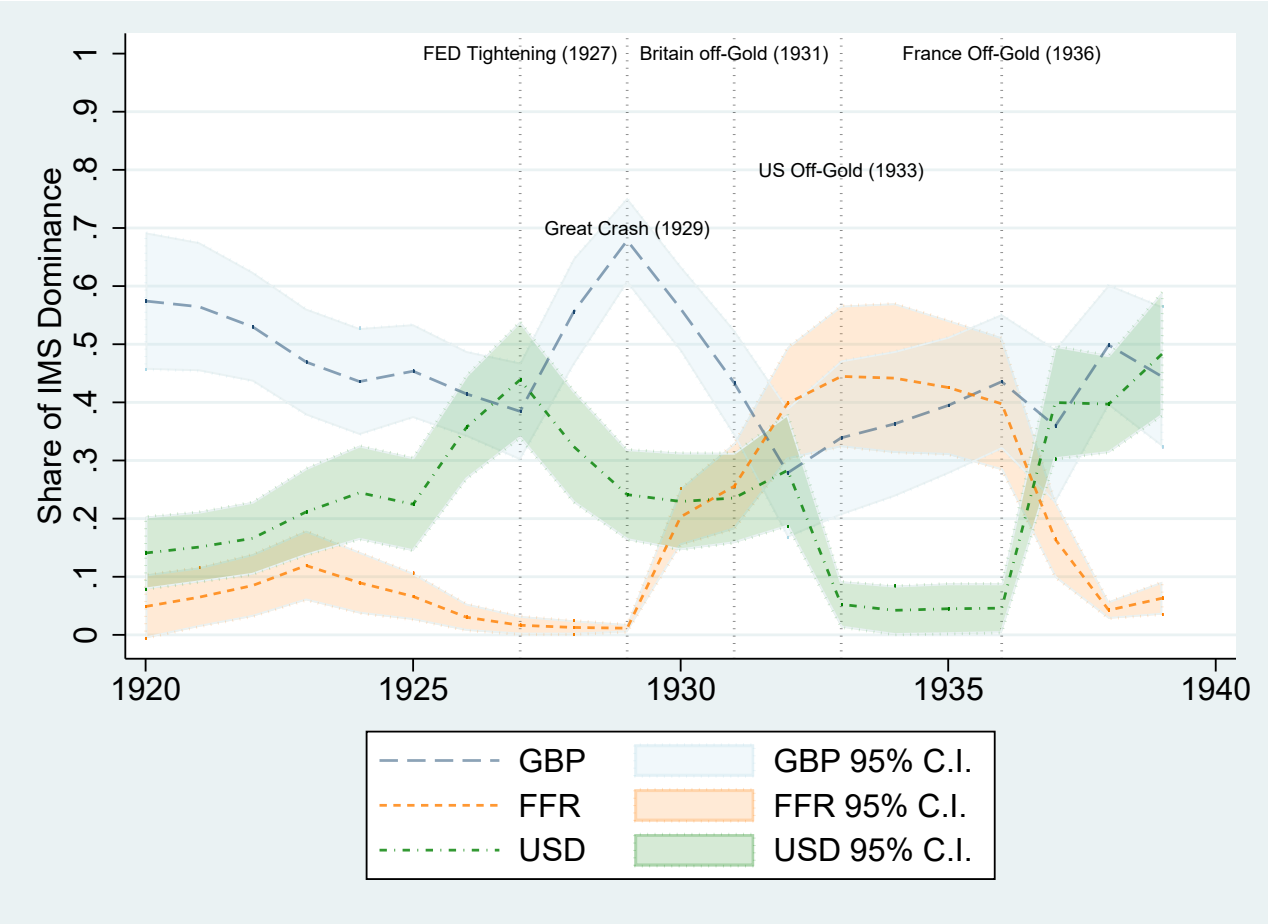
4.4.2. 1920-1939

As I have summarised in Section 1.3, the interwar period has been crucial in shaping policy views and theories of the international monetary system. A prominent example is the model developed by Farhi and Maggiori (2018) outlining the risk of instability of increased competition in global safe assets supply. The latter view is consistent with and motivated by negative assessment of competition among global currencies in the interwar years by Nurkse (1944). The interwar period has also been at the core of recent efforts to quantify the dynamics of the IMS in historical perspective. A longstanding view, going back to Triffin (1960) and Chinn and Frankel (2005) described the transition from sterling to dollar hegemony as a

[18]The 1880s are a period of strong international expansions of German banks (Wiegand, 2019).

[19]In the case of Russia, the weight is large and positive for the franc as well but, as shown in Figure 4.A.8 still higher for the mark in both 1895 and 1913.

Figure 4.4.4: Global Currencies Competition in the Interwar Period



The chart depicts, for every global currency, the GDP-weighted average of the currency's weight for all polities in the sample, estimated using Silver as *numéraire*.

slow moving winner-take all process, lagging several decades the economic prevalence of the incoming hegemonic power. Work by Eichengreen and Flandreau (2009), Eichengreen and Flandreau (2012) and Chiţu et al. (2014) has convincingly shown how, on the contrary, a protracted period of competition between the British pound and the US dollar occurred as soon as the interwar period, with the US dollar occupying a prominent role since the end of WWI.

My quantification of the rise and fall of global currencies during the interwar period is summarised in Figure 4.4.4. My characterisation of the dollar-pound competition is broadly consistent with the quantitative evidence brought forward by Eichengreen and co-authors on the timing of the dollar gaining prominence. Dollar dominance is fairly strong since the

beginning of my interwar sample, particularly outside Europe. The dollar makes substantial gains in the first half of the 1920s, particularly in Italy, Germany, Eastern Europe, Scandinavia and Latin America (Figure 4.A.9): it overtakes the sterling immediately thereafter, in 1927. I also observe a pattern similar to the one described in Eichengreen et al. (2017), with the dollar retreating towards the middle of the sample and making a come back at the eve of WWII. However, some differences need to be highlighted.

First, I find the retreat of the dollar starts earlier than 1929, with a peak of dollar dominance reached in 1927. Several factors could explain this retreat. An abrupt change in US monetary policy stance is underway by the end of 1927. According to Eichengreen (1995b), by increasing the opportunity cost of investment abroad, tighter monetary policy *"choked off US foreign lending"* in the middle of 1928, with portfolio lending declining by more than 30% year-on-year and likely turning to a deficit in the summer of that year. Another, related, potential factor is the stabilisation of the French franc at an under-valued gold parity, spurring substantial outflows of gold from the US in 1927-1928, a development studied by Irwin (2010). Johnson (1997) notes that the redistribution of gold reserves was consistent with policy objectives both in France and the United States, as the New York Fed saw excessive accumulation of gold by the US as undermining monetary policy discretion, while the French were determined to promote Paris as an international financial center. According to my estimates, the sterling regains the lost ground on the dollar by 1929, with the dollar weight remaining higher than the sterling one in Germany, Austria, Finland and Portugal only (Figure 4.A.9). The come-back of the sterling is however short-lived as Britain suspends convertibility in 1931. It is interesting to note that the decline of sterling dominance precedes the devaluation, with decreases in the estimated sterling weight particularly strong in Germany, Italy, Turkey and Argentina in 1930.

Second, I find the claim, by Eichengreen and Flandreau (2009) and Eichengreen et al. (2017), that *"efforts to restore the franc as international currency of the first rank made little progress"* to be overly harsh. Co-movement with the franc started to markedly rise across the globe as soon as doubts about the stability of the sterling arose in 1930. By 1931, and between then and 1936,

I find the IMS to be overwhelmingly franc-hegemonic, with a peak in 1933 spanning Europe, Asia (excluding the Sterling Area and Japan) and even Latin America[20]. The difference in assessing the rise of the franc after 1931 between this work and previous quantification by Eichengreen and co-authors - looking at reserves data - can however be partially reconciled, based on several observations. First, foreign-balance holdings decreased across the board after 1929, giving little opportunity for franc reserves accumulation. Second, looking at the change in reserves holdings in the data compiled by Eichengreen and Flandreau (2009), the franc is shown to gain grounds[21] after 1931 in the Gold Bloc, central Europe and in Spain. For the former two, the share of the franc in reserves holding is also high. Third, it is conceivable that, in a context of high uncertainty following the collapse of two global currencies, the rise of the franc as a unit of account was not immediately matched by gains in the franc role as a store of value. This is an interesting finding in itself that warrants further investigation on the interaction across the different dimensions of global currency status. My results are in line with the attention paid by contemporary observers to the French authorities' efforts to promote the international role of the franc (Myers, 1936).

As the franc in turn devalued in 1936, following the electoral victory of the left-wing *"Front Populaire"*, this led to a final shake-up of the interwar IMS. I observe a re-composition of the IMS around roughly equally sized pound and dollar blocs at the eve of WWII, with the British currency retaining strong grounds only in Scandinavia, the Commonwealth, Japan and Latin America.

4.4.3. 1950-2020

The rise and fall of global currencies after 1950 is depicted in Figure 4.4.5.

The years following WWII witnessed to the last vestiges of sterling dominance. A large

[20] I test the robustness of this novel result by including, in the pooled regression in Table 4.A.4, a Gold factor in the Frankel-Wei factor model. Although it reduces the franc weight, the franc coefficient remains high and significant, showing that my results do not reflect the fact that some countries remained on gold, but picks up specific co-movements with the franc.

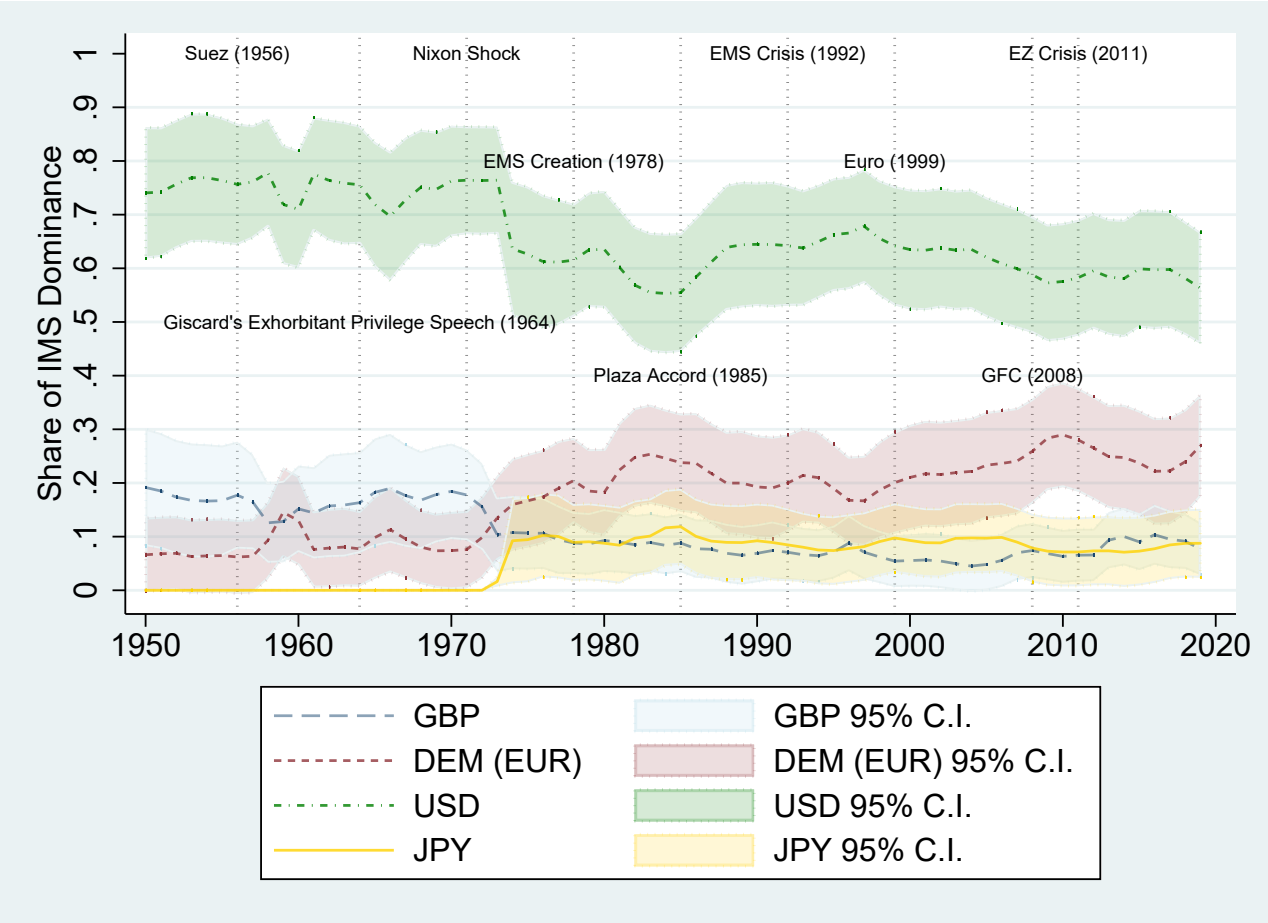
[21] Albeit from a lower base.

amount of sterling balances existed in the 1950s, owing to the role played by Sterling Area countries during the war. Eichengreen et al. (2017) document how reserves steadily re-balanced towards the dollar, with the experience of Sterling Area between 1950 and the 1970s being described as the one of a "zombie" international currency by Avaro (2020). My estimate of the sterling weight identifies two legs in the decline of the sterling. A first one occurs after 1956, as the Suez crisis ignites speculations on the British currency. The second and final leg of the decline of the pound sterling is observed following the 1967 devaluation, with an acceleration in conjunction with the Nixon shock.

My quantification of the weight of the yen in the IMS since the currency started to move away from a strict dollar parity at the end of the 1960s is largely consistent with the view that the yen never managed to take a prominent role as an international anchor (Eichengreen et al., 2017). I observe a global peak in the weight of the yen at the end of the 1970s, with no major evolution throughout the post-WWII period. This reflects an initial spike of the yen weight in Asia in the early 1970s, gradually receding over the course of the decade.

The key story of international currency competition in the post-WWII period is the one between the dollar hegemon on one side and the German mark, and then the euro, on the other side. The estimated weight for the two currencies remains stable for the whole Bretton Woods period, with the dollar stably approaching a 80% share of IMS dominance and the mark remaining broadly below a 10% threshold. The situation starts to change in 1970. Over the 1970s, Eichengreen et al. (2017) notes how several measures are enacted by German authorities to potentially encourage the international use of the mark, including a (limited) liberalisation of the capital account, the 1969 revaluation, the final decision to float the currency in 1973 and the creation of the EMS in 1979. Over the 1970s the mark roughly doubled its IMS weight. A further increase of about 5 percentage points can be observed after the successive re-evaluations of the mark in the first half of the 1980s, but this is soon reversed in the second half of the decade, coinciding with the Plaza and Louvre monetary accords in 1985 and 1987. Interestingly, the "talking down" of the dollar by Treasury Secretary Baker ahead of the Plaza meeting corresponds to, and does not precedes, the trough of dollar

Figure 4.4.5: Global Currencies Competition since 1950



The chart depicts, for every global currency, the GDP-weighted average of the currency's weight for all polities in the sample, estimated using Silver a s *numéraire*.

dominance over the period, with the global weight of the dollar stabilizing since above or close to 60%. The establishment of the euro marked a slight gain in dominance for the European currency, compared to the German mark. However, this was reversed with the European debt crisis of 2010-2011. This finding is consistent with the recent ECB assessment of the role of the euro along multiple dimensions (ECB, 2021).

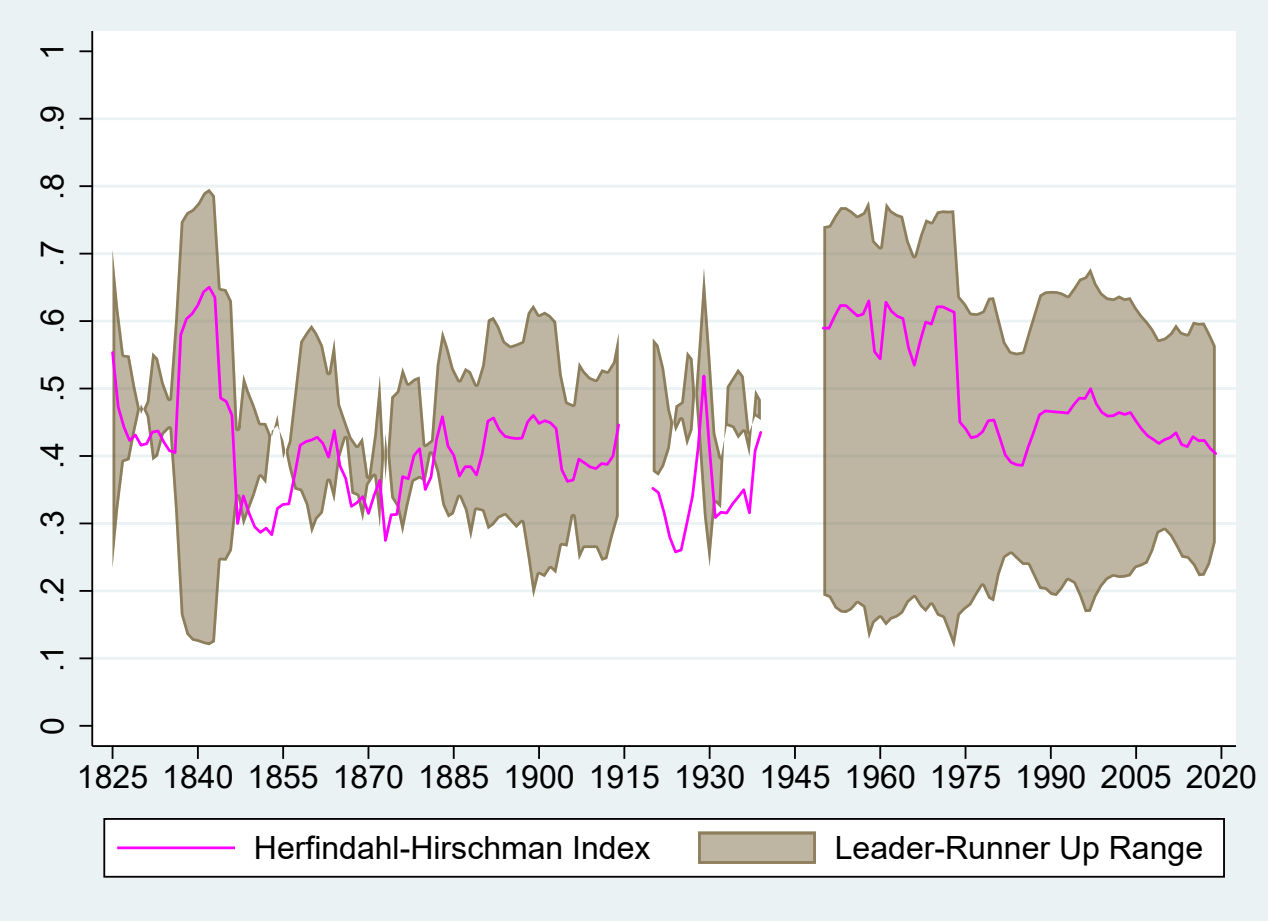
Looking at individual polity results since the end of Bretton Woods (Figures 4.A.12) it is clear that the *"German dominance hypothesis"* (Giavazzi and Giovannini, 1988) seemed particularly reasonable by the end of 1980s. However, it is interesting to note how both the dollar and sterling weights increase at the expense of the mark in the European periphery, and particularly Italy, around the 1992 EMS crisis. More recently (Figure 4.A.13), the IMS appears as strongly regionalised, with the euro being hegemonic in Europe. However, it is to be noted, consistent with results by Ito and McCauley (2019), that euro influence is felt in a number of commodity currency countries.

4.4.4. The Structure of the IMS over Two Centuries

I end the discussion of my quantification by providing a synthetic measure of the structure of IMS competition over two centuries. Figure 4.4.6 provides and adjusted Herfindahl-Hirschman Index for the baseline global currency weights I estimate, while the shaded area represents the difference between the highest and the second highest global currency weight.

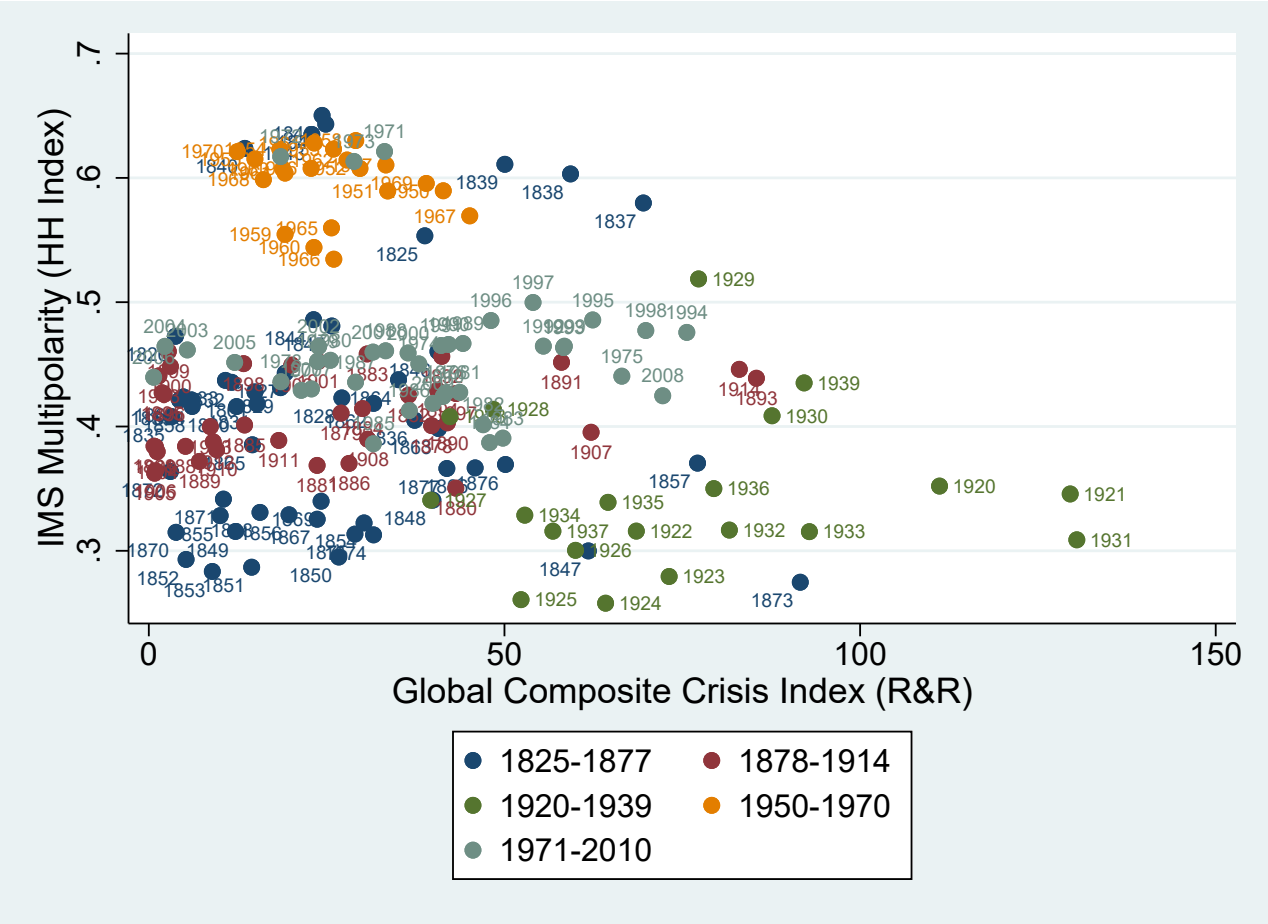
Several considerations can be made. First, the period between 1950 and 1973 is a clear anomaly, with an unprecedented degree of uni-polarity, only previously matched in a brief interval of British hegemony around 1835-1840. Second, the whole of the post-WWII period could be characterised as an historical anomaly looking at the prominence of the IMS leader vs. the "runner up". Such a large distance in influence between the first and the second global currencies has never been sustained for such a prolonged period of time over the last two centuries. Third, it is true that the interwar period is notable for its multi-polarity. However the average levels of IMS competition experienced before WW1 are fairly comparable. This

Figure 4.4.6: The Structure of Global Currency Competition over Two Centuries



The line depicts the Herfindahl-Hirschman Index of competition intensity computed from the yearly world GDP-weighted average weight for each global currency (Silver *numéraire*). The shaded area marks the range between the currency with the highest weight and the "runner up".

Figure 4.4.7: IMS Competition and Financial Stability



The vertical axis represents the Herfindahl-Hirschman Index of competition intensity computed from the yearly world GDP-weighted average weight for each global currency (Silver *numéraire*). The horizontal axis is the Banking, Currency, Debt and Inflation Composite Crisis Index computed by Reinhart and Rogoff (2008).

comforts the parallel between the two periods that is often made by proponents of a more multi-polar IMS, highlighting that instability is not necessarily associated with multi-polarity. Nevertheless, the interwar periods stands out for a record low distance between the IMS leader and the "runner up", with levels only observed before at major turning points in IMS competition such as the early 1850s and 1870.

Figure 4.4.7 relates my index of IMS competition to the global composite index of crises compiled by Reinhart and Rogoff (2008), providing some descriptive evidence regarding the relationship between IMS structure and financial stability studied by Farhi and Maggiori (2018). The correlation over the entire period is clearly negative, with higher competition

being associated with higher prevalence of financial instability. However, the relationship is driven by the high IMS competition, crisis prone, interwar period and the low IMS competition, very stable, Bretton Woods period. Taking a closer look at the correlations, 1837-1839, 1893, 1913 and, to a lesser extent the 1990s can be singled out as years with fairly low levels of IMS multi-polarity and high levels of global financial instability. The opposite is true for the high IMS competition period between 1850 and 1870, which was associated with few crises at the global level.

Overall, these preliminary, highly descriptive, evidence support the contingency of the relationship between the structure of IMS competition and global financial stability as argued by Eichengreen (2019).

4.5. Conclusion

This paper has presented a quantification of the rise and fall of global currencies over two centuries, providing a continuous measure of their relative influence and of the overall competition structure of the IMS at annual frequency since 1825.

I document that, while the sterling has been the dominant global currency for the period spanning 1825 to 1914, this leadership has been challenged and was not as extreme as current dollar dominance. Local dominance as well as regional monetary integration are recurrent features of challengers to the IMS hegemon. It was the case with the rise of the franc amid active French monetary diplomacy after 1852. It was again the case with the rise of the mark after 1866, coincident with the process of German unification. It occurred a second time for the mark starting in the 1970s, as European integration was underway.

My analysis also complements the studies of the interwar IMS carried out by Eichengreen and co-authors. I find the dollar to be a key player in the IMS as soon as the early 1920s, briefly overtaking the sterling in 1927 and then again at the eve of WWII. I also uncover a new, so far overlooked, important discontinuity in the IMS, with an episode of French franc

IMS leadership between 1931 and 1936. Further study of this - admittedly brief - episode of successful challenge to the IMS leader should be of interest to policymakers intending to promote the international role of their currency.

Current levels of uni-polarity are found to be a historical anomaly. This is particularly true for the distance in the relative importance between the current dollar hegemon and the "runner up", the euro, which is largely unprecedented in the last two centuries. An interpretation of this fact consistent with Gopinath and Stein (2018) and the "Harvard view" is that changes in financial and monetary technologies have brought about a structural shift in the way the IMS work. Looking at the model of Farhi and Maggiori (2018) one could also see this as evidence of a stable outlook for dollar hegemony, as a closer "gap" between the hegemon and any competitor is more likely to spur multiple equilibria. An alternative, more pessimistic, interpretation is that, given the unprecedented hegemony of the dollar, when the constraint on its fiscal capacity to issue safe assets will start to bind, the adverse consequences might also be larger in magnitude than in previous IMS discontinuities (Farhi et al., 2011).

The correlation between the degree of competition in the IMS and the level of global financial stress is found to be largely positive over the last two centuries. One has however to recognise that this could well be endogenous and that the correlation is highly dependent on observations drawn from the interwar and Bretton Woods periods. Several episodes of high IMS competition can be observed without any rise in the prevalence of financial crises.

All in all, the paper provides a new framework to look at the IMS over a period of time long enough to observe several episodes of discontinuities. Building on this measurement framework, future research will hopefully shed new lights on the determinants of global currency status, the characteristics and consequences of episodes of IMS discontinuity as well as the relationship between IMS competition and financial stability.

Appendix

4.A. Results Appendix

4.A.1. Robustness Checks

Table 4.A.1: Pooled Regressions - 1820-1914

	(1)	(2)	(3)	(4)	(5)	(6)
GBP	0.608***	0.589***	0.738***	0.678***	0.673***	0.477***
	(0.0623)	(0.0609)	(0.0815)	(0.0382)	(0.0384)	(0.0570)
FFR	0.271***	0.304***	0.331***	0.0573**	0.0604**	0.0208
	(0.0620)	(0.0631)	(0.0884)	(0.0257)	(0.0269)	(0.0341)
DEM	-0.0197	-0.0325	-0.0199	0.213***	0.214***	0.278***
	(0.0326)	(0.0331)	(0.0661)	(0.0365)	(0.0364)	(0.0576)
Controls	NO	YES	NO	NO	YES	NO
Numéraire	XAG	XAG	NLG	XAG	XAG	NLG
Period	1820-1870	1820-1870	1820-1870	1871-1914	1871-1914	1871-1914
Observations	13,646	13,646	14,678	36,887	36,887	39,862
R-squared	0.058	0.058	0.018	0.73	0.73	0.017

Robust standard errors reported in parenthesis. ***, ** and * denote statistical significance at the 0.01, 0.05 and 0.1 levels respectively. Controls include first-differences of proxies for liquidity and risk-premium, as well as weekly log-changes of commodity prices, see Section 4.B for details. Pooled regression using Silver as *numéraire* exclude the Netherlands for comparability.

Table 4.A.2: Pooled Regressions - 1918-1939

	(1)	(2)	(3)	(4)	(5)	(6)
GBP	0.685***	0.685***	0.637***	0.499***	0.498***	0.479***
	(0.0275)	(0.0276)	(0.0293)	(0.0226)	(0.0226)	(0.0232)
FFR	0.0467***	0.0471***	0.0492***	0.269***	0.266***	0.320***
	(0.00752)	(0.00757)	(0.00745)	(0.0163)	(0.0164)	(0.0179)
USD	0.139***	0.142***	0.144***	0.161***	0.168***	0.114***
	(0.0263)	(0.0265)	(0.0281)	(0.0171)	(0.0173)	(0.0139)
Controls	NO	YES	NO	NO	YES	NO
Numéraire	XAG	XAG	HKD	XAG	XAG	HKD
Period	1918-1930	1918-1930	1918-1930	1931-1939	1931-1939	1931-1939
Observations	19,712	19,712	20,695	15,624	15,624	15,390
R-squared	0.404	0.404	0.367	0.708	0.708	0.672

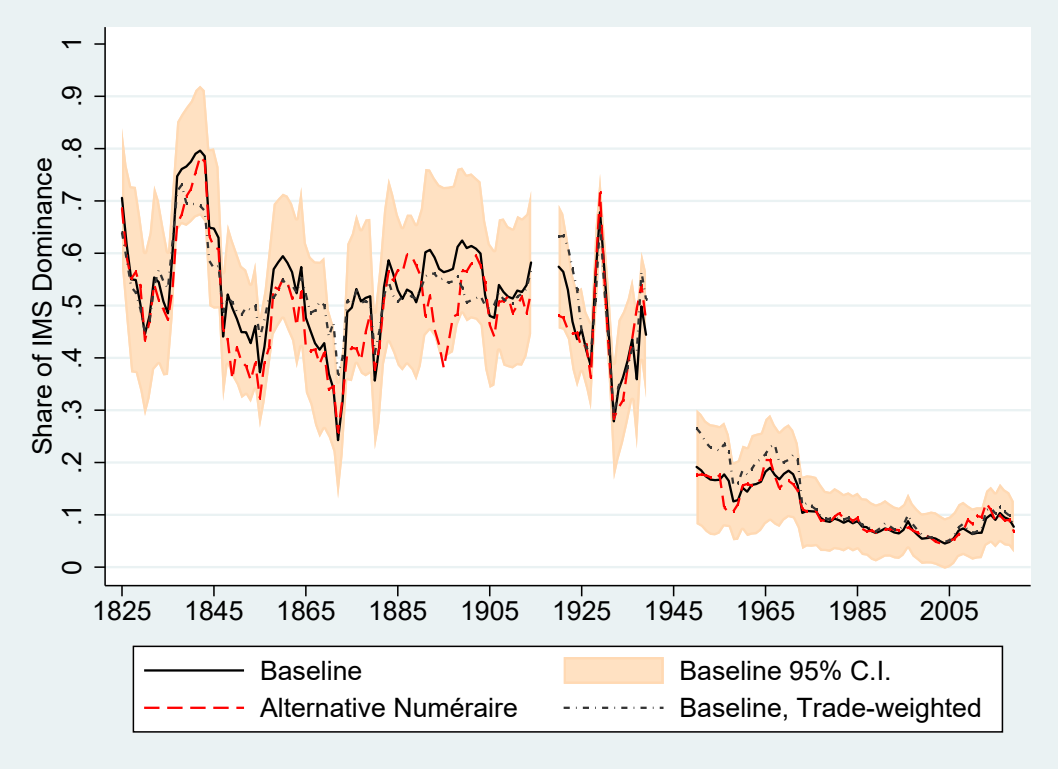
Robust standard errors reported in parenthesis. ***, ** and * denote statistical significance at the 0.01, 0.05 and 0.1 levels respectively. Controls include first-differences of proxies for liquidity and risk-premium, as well as weekly log-changes of commodity prices, see Section 4.B for details. Pooled regressions using Silver as *numéraire* exclude Hong Kong for comparability.

Table 4.A.3: Pooled Regressions - 1948-2020

	(1)	(2)	(3)	(4)	(5)	(6)
GBP	0.327***	0.329***	0.333***	0.0556***	0.0517***	0.0684***
	(0.0150)	(0.0150)	(0.0160)	(0.00423)	(0.00424)	(0.00418)
DEM	-0.00276	-0.00304	-0.000934	0.404***	0.401***	0.411***
	(0.00690)	(0.00695)	(0.00834)	(0.00445)	(0.00444)	(0.00728)
USD	0.669***	0.668***	0.626***	0.553***	0.551***	0.497***
	(0.0165)	(0.0165)	(0.0212)	(0.00486)	(0.00485)	(0.00414)
JPY	-	-	-	-0.00647**	-0.0100***	-0.00580*
				(0.00324)	(0.00343)	(0.00341)
Controls	NO	YES	NO	NO	YES	NO
Numéraire	XAG	XAG	CHF	XAG	XAG	CHF
Period	1948-1973	1948-1973	1948-1973	1974-2020	1974-2020	1974-2020
Observations	57,799	57,799	56,241	110,326	110,152	101,182
R-squared	0.833	0.833	0.04	0.859	0.859	0.341

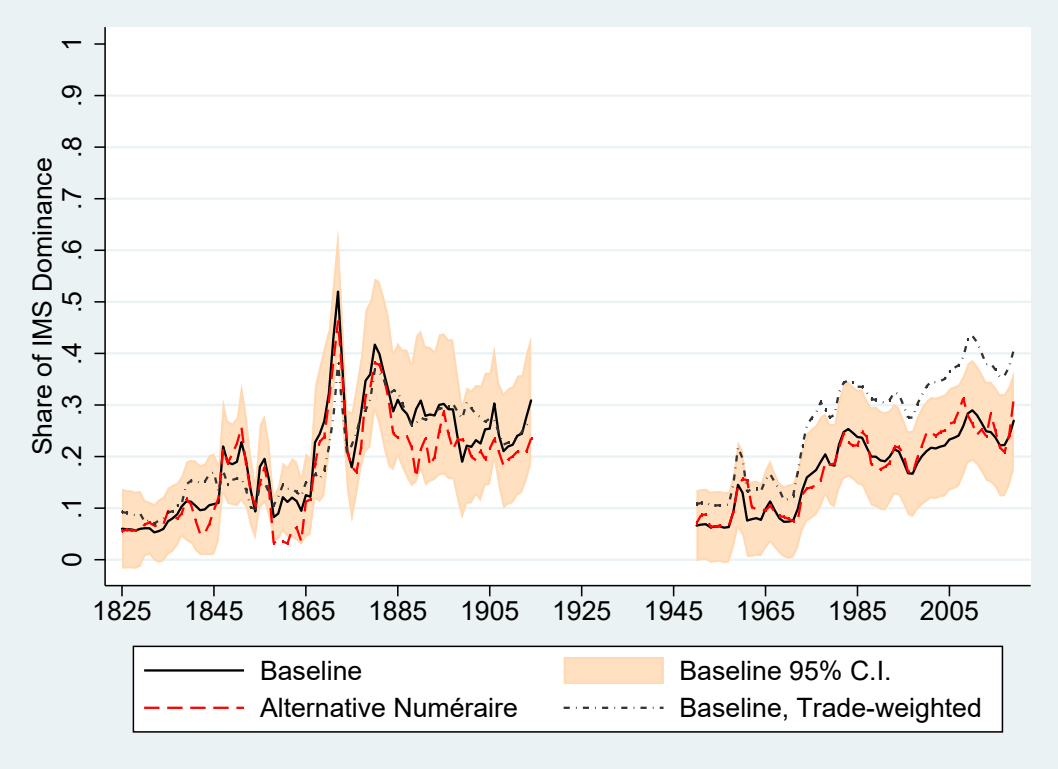
Robust standard errors reported in parenthesis. ***, ** and * denote statistical significance at the 0.01, 0.05 and 0.1 levels respectively. Controls include first-differences of proxies for liquidity and risk-premium, as well as weekly log-changes of commodity prices, see Section 4.B for details. Pooled regressions using Silver as *numéraire* exclude Switzerland for comparability.

Figure 4.A.1: British pound sterling - Baseline and Alternative IMS Dominance Weights



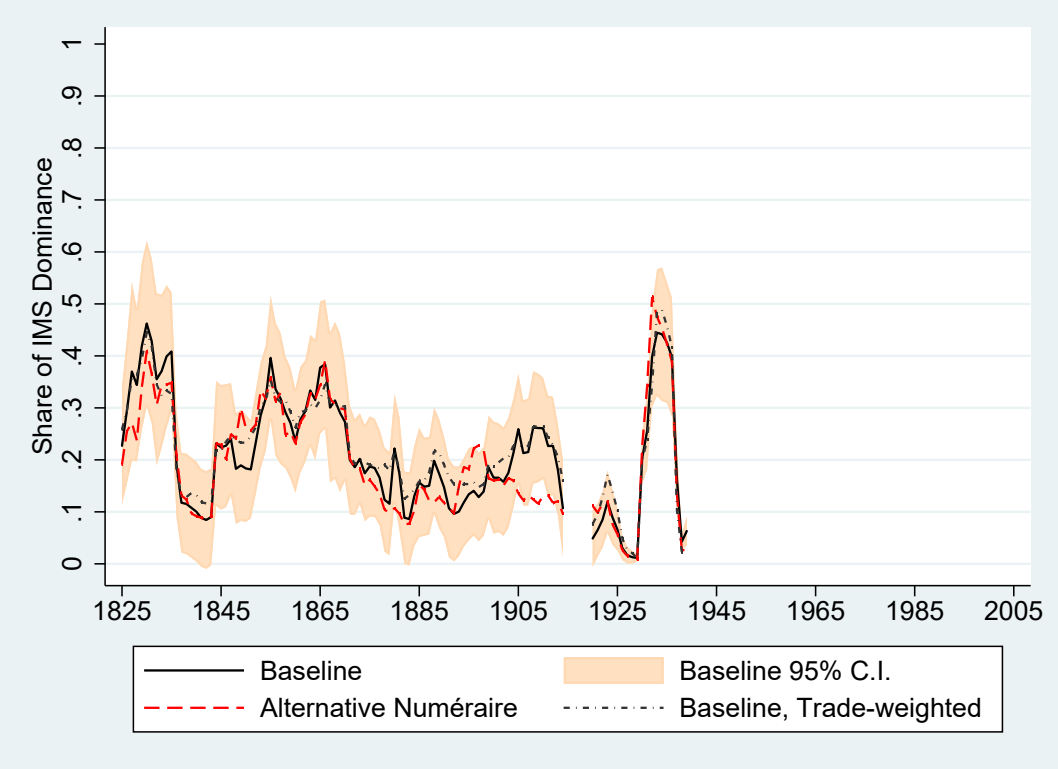
Baseline indicates the global IMS dominance weight computed as the GDP-weighted average of individual weights estimated with silver as the *numéraire*. Alternative *numéraire* indicates the IMS dominance weight computed as the GDP-weighted average of individual weights estimated, depending on the sub-period, with NLG, HKD or CHF as *numéraire*. The baseline IMS dominance weight computed using a trade-weighted global average is also reported.

Figure 4.A.2: German Mark/Euro - Baseline and Alternative IMS Dominance Weights



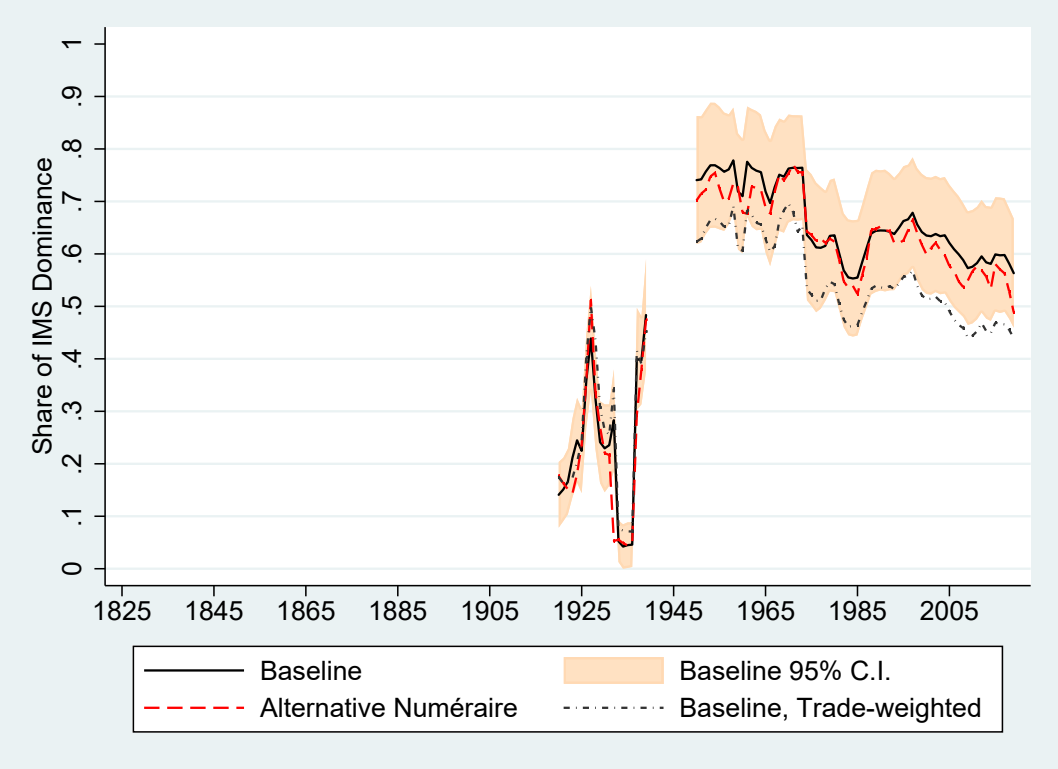
Baseline indicates the global IMS dominance weight computed as the GDP-weighted average of individual weights estimated with silver as the *numéraire*. Alternative *numéraire* indicates the IMS dominance weight computed as the GDP-weighted average of individual weights estimated, depending on the sub-period, with NLG, HKD or CHF as *numéraire*. The baseline IMS dominance weight computed using a trade-weighted global average is also reported.

Figure 4.A.3: French franc - Baseline and Alternative IMS Dominance Weights



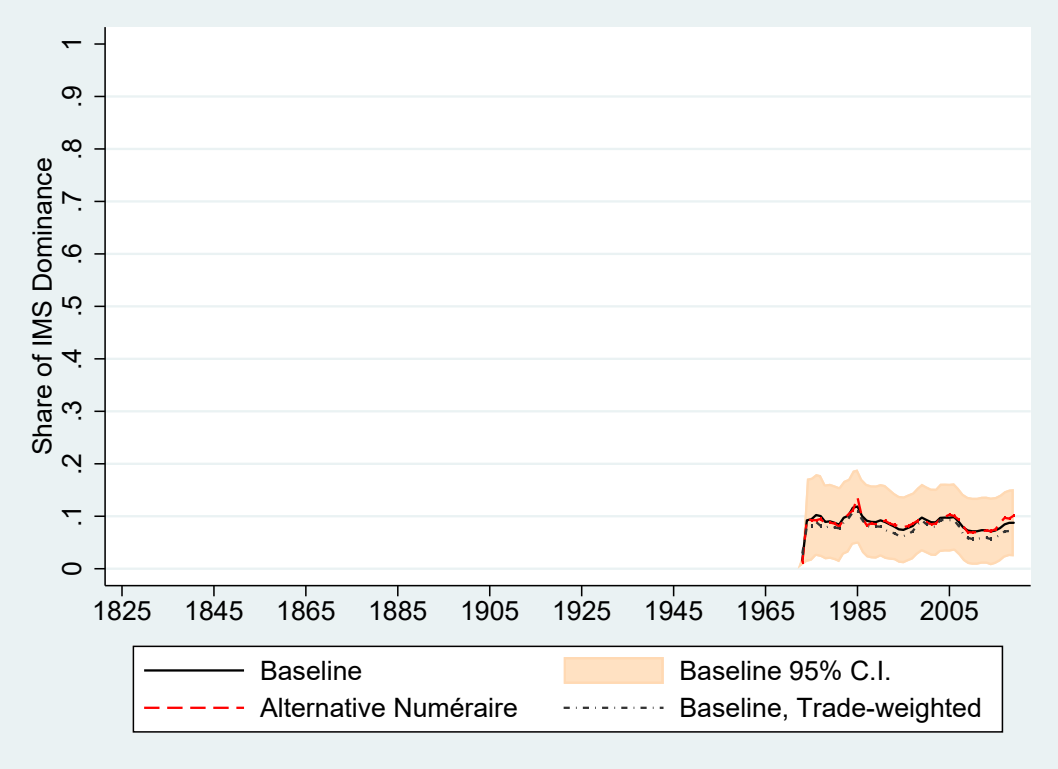
Baseline indicates the global IMS dominance weight computed as the GDP-weighted average of individual weights estimated with silver as the *numéraire*. Alternative *numéraire* indicates the IMS dominance weight computed as the GDP-weighted average of individual weights estimated, depending on the sub-period, with NLG, HKD or CHF as *numéraire*. The baseline IMS dominance weight computed using a trade-weighted global average is also reported.

Figure 4.A.4: US dollar - Baseline and Alternative IMS Dominance Weights



Baseline indicates the global IMS dominance weight computed as the GDP-weighted average of individual weights estimated with silver as the *numéraire*. Alternative *numéraire* indicates the IMS dominance weight computed as the GDP-weighted average of individual weights estimated, depending on the sub-period, with NLG, HKD or CHF as *numéraire*. The baseline IMS dominance weight computed using a trade-weighted global average is also reported.

Figure 4.A.5: Japanese Yen - Baseline and Alternative IMS Dominance Weights



Baseline indicates the global IMS dominance weight computed as the GDP-weighted average of individual weights estimated with silver as the *numéraire*. Alternative *numéraire* the IMS dominance weight computed as the GDP-weighted average of individual weights estimated, depending on the sub-period, with NLG, HKD or CHF as *numéraire*. The baseline IMS dominance weight computed using a trade-weighted global average is also reported.

Table 4.A.4: Controlling for a Gold Factor During the Interwar Episode of French franc Dominance

	(1)	(2)	(3)	(4)
GBP	0.452***	0.436***	0.473***	0.455***
	(0.0199)	(0.0201)	(0.0200)	(0.0204)
FFR	0.409***	0.214***	0.417***	0.245***
	(0.0186)	(0.0282)	(0.0197)	(0.0288)
USD	0.0640***	0.0648***	0.0542***	0.0549***
	(0.0142)	(0.0141)	(0.0132)	(0.0132)
XAU		0.211***		0.193***
		(0.0271)		(0.0273)
Numéraire	XAG	XAG	HKD	HKD
Controls	NO	NO	NO	NO
Period	1931-1936	1931-1936	1931-1936	1931-1936
Observations	9,198	9,198	9,061	8,984
R-squared	0.669	0.672	0.666	0.664

Robust standard errors reported in parenthesis. ***, ** and * denote statistical significance at the 0.01, 0.05 and 0.1 levels respectively.

4.A.2. Individual Global Currency Weights

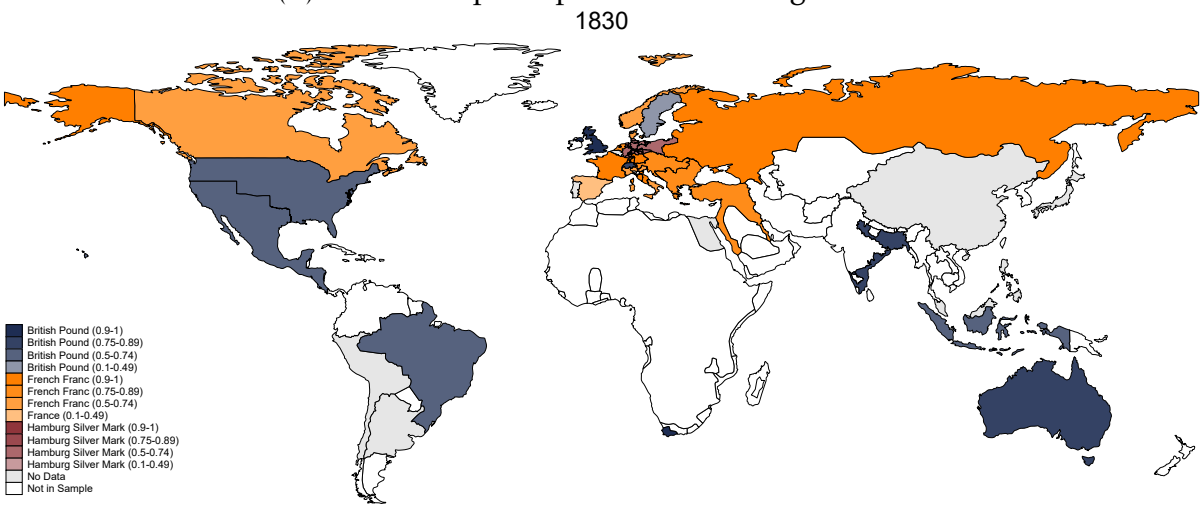
The maps below depicts the weight level for the highest global currency weight for each polity in the sample. This reflects the currency that is estimated to exert more dominance on a particular polity but does not imply other global currencies do not have a positive weight.

A white coloring denotes a polity that is not included in the sample at any point for the sub-period. A grey coloring denotes that the polity has no available data for that particular year but is included in the sub-period's sample.

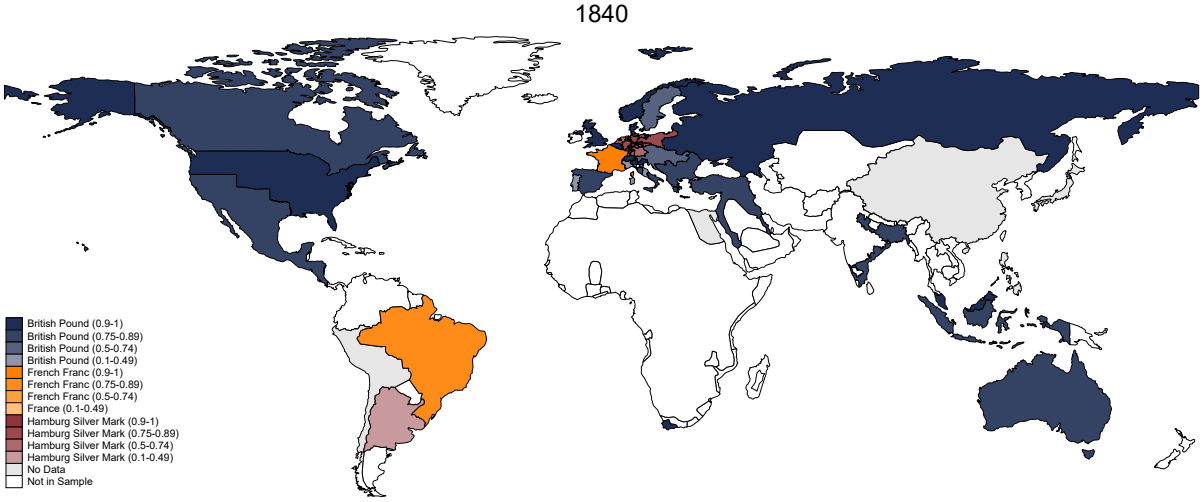
Maps are at 1812 borders until 1870, 1914 borders between 1870 and 1914, 1938 borders between 1918 and 1939, 1945 borders between 1950 and 1988 and 1994 borders thereafter.

Figure 4.A.6: The Rise of the Sterling in the Early 19th Century - Dominant Currency By Country, Selected Years 1830-1849

(b) 1830: A Bipolar post-Vienna Congress IMS



(b) 1840: Large GBP Gains in Dominance in the 1830s



(c) 1848: GBP Dominance Unscathed by the People's Spring

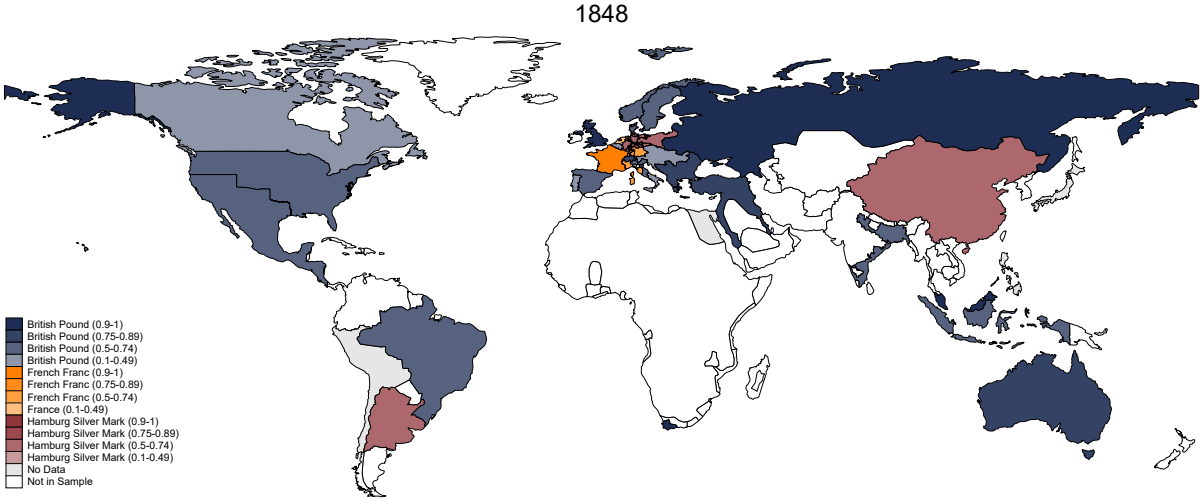
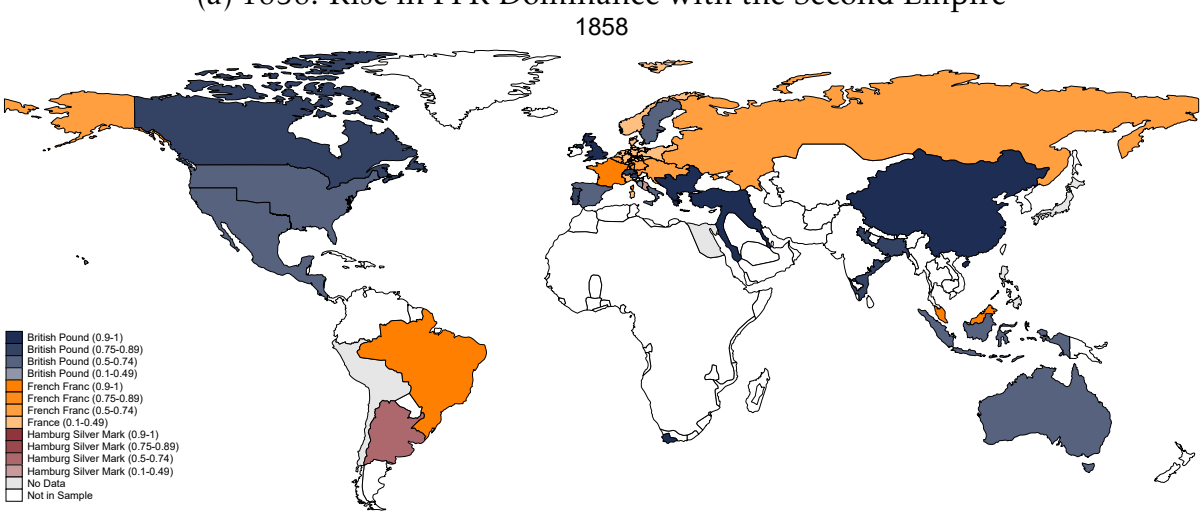
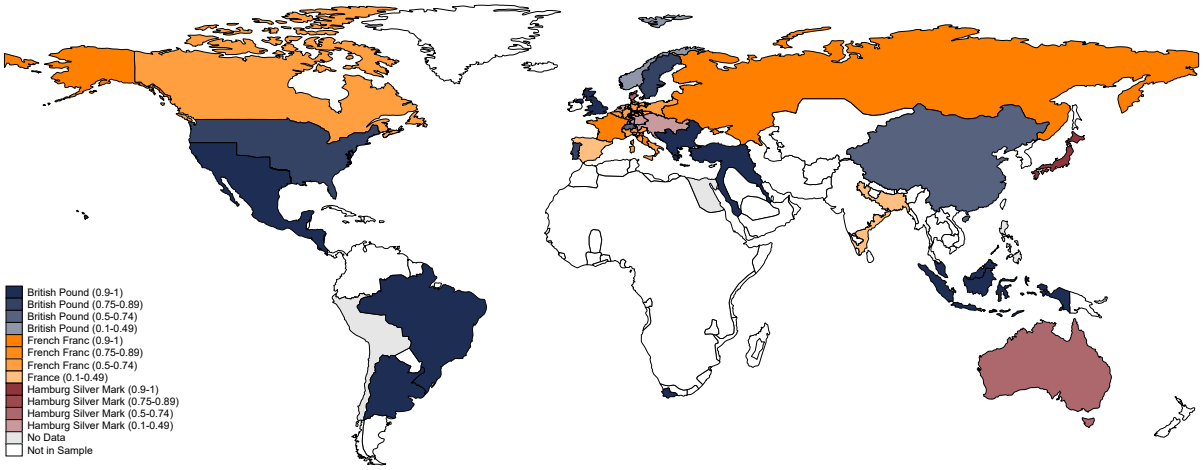


Figure 4.A.7: The Rise and Fall of French Monetary Diplomacy - Dominant Currency By Country, Selected Years 1850-1879

(a) 1858: Rise in FFR Dominance with the Second Empire



(b) 1866: Peak of FFR Dominance as Paris Hosts the 1st International Monetary Conference



(c) 1873: Major IMS Discontinuity with the German Unification

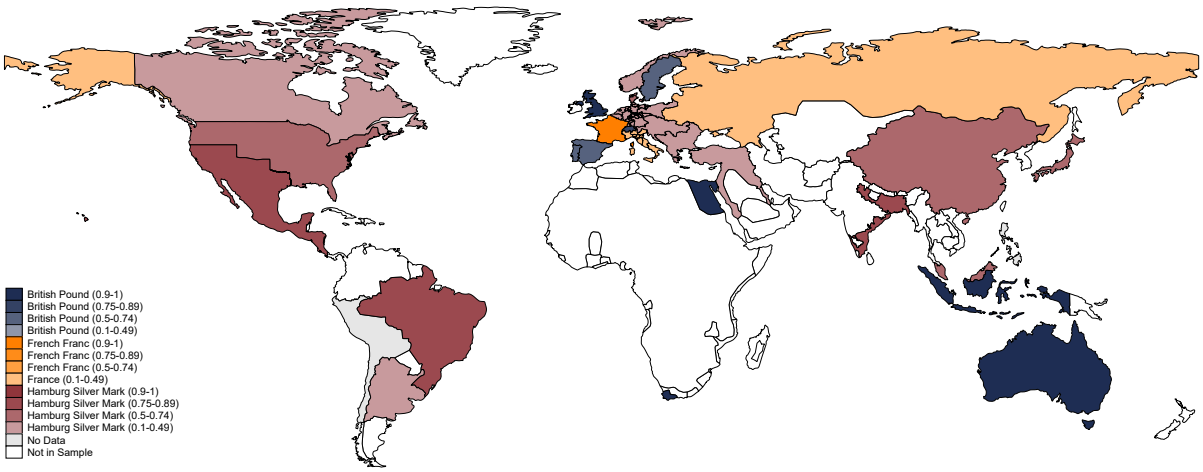
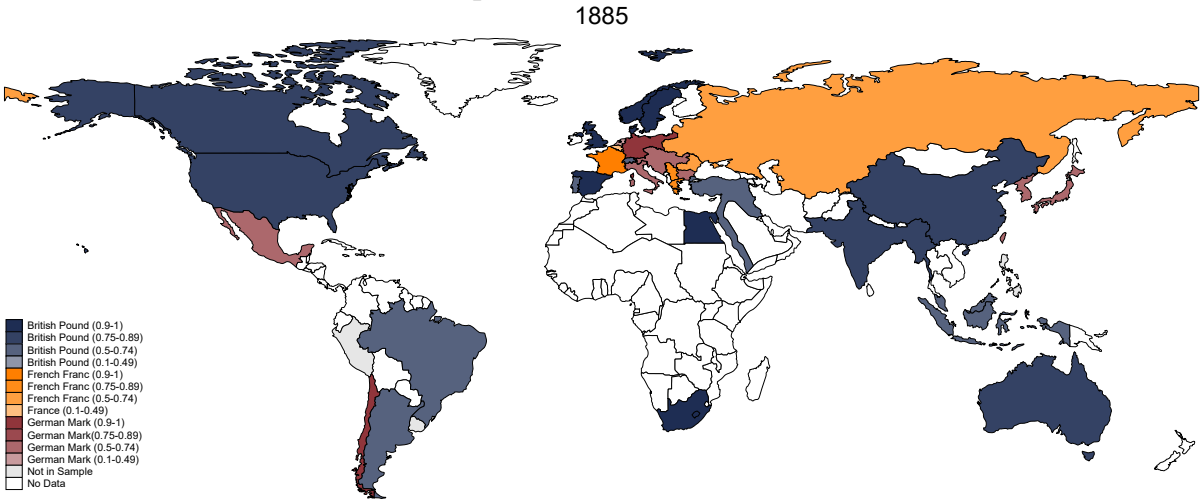
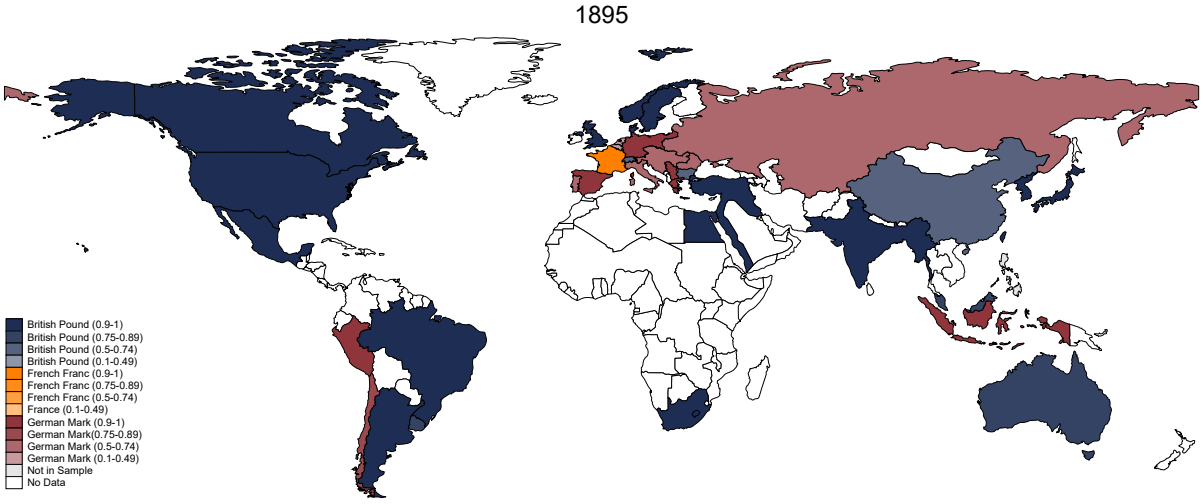


Figure 4.A.8: A Tripolar Classical Gold Standard - Dominant Currency By Country, Selected Years 1880-1910

(a) 1885: A Tripolar Classical Gold Standard (I)



(b) 1895: A Tripolar Classical Gold Standard (II)



(c) 1913: A Tripolar Classical Gold Standard (III)

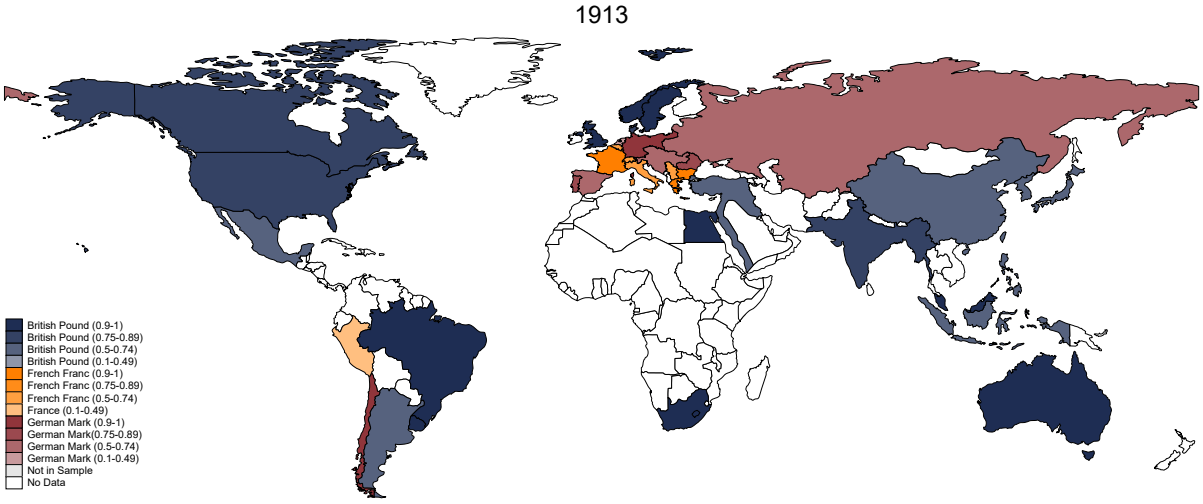
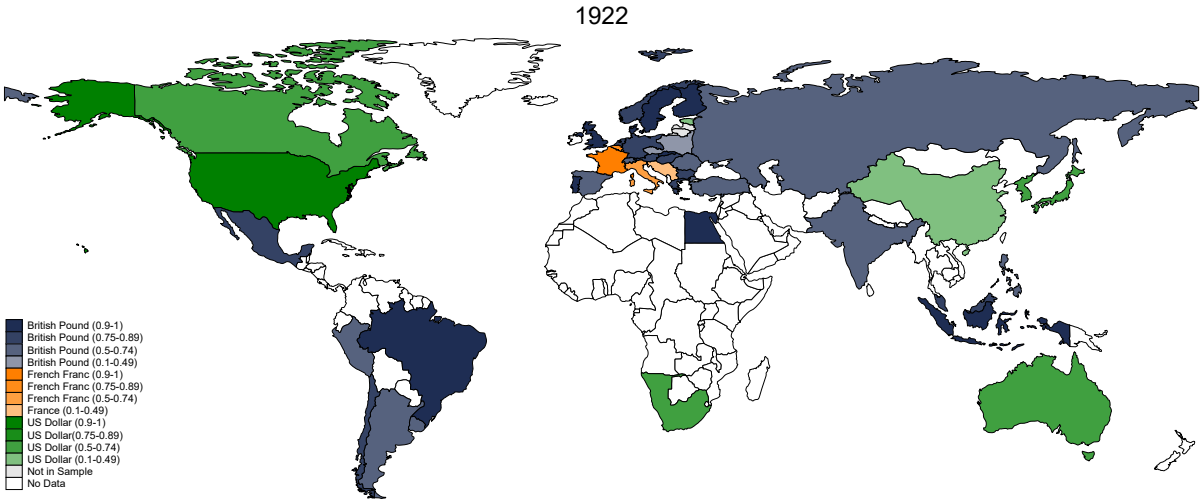
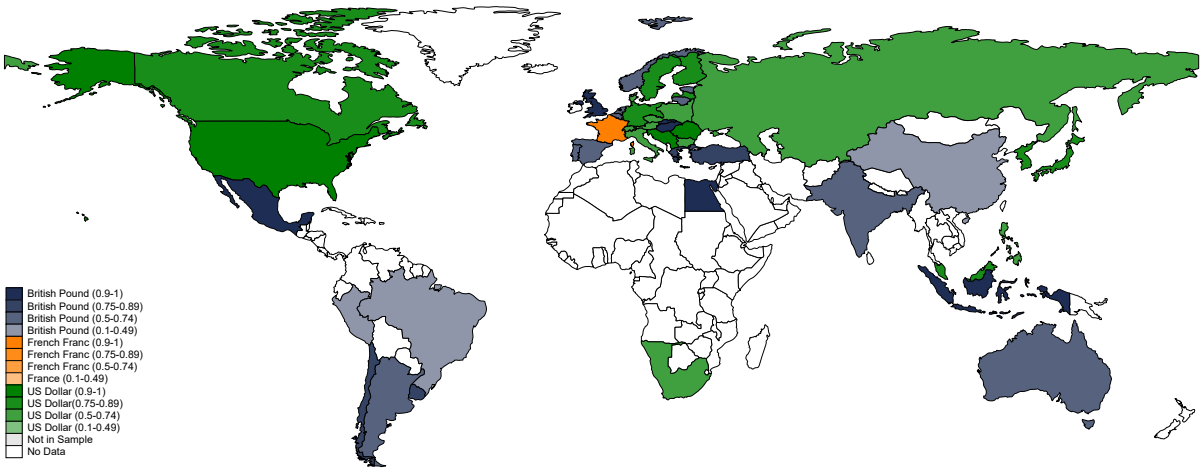


Figure 4.A.9: The Rise and Fall of the Interwar USD - Dominant Currency By Country, Selected Years 1918-1930

(a) 1922: Rise of the USD after WW1



(b) 1927: Peak of USD Dominance in the Interwar



(c) 1929: A Shortlived Comeback of the GBP in 1929

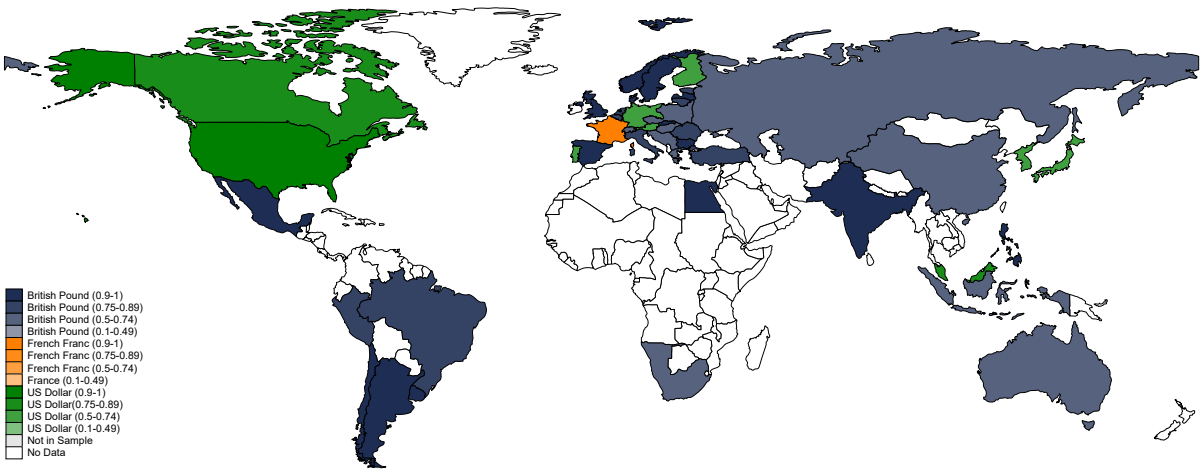
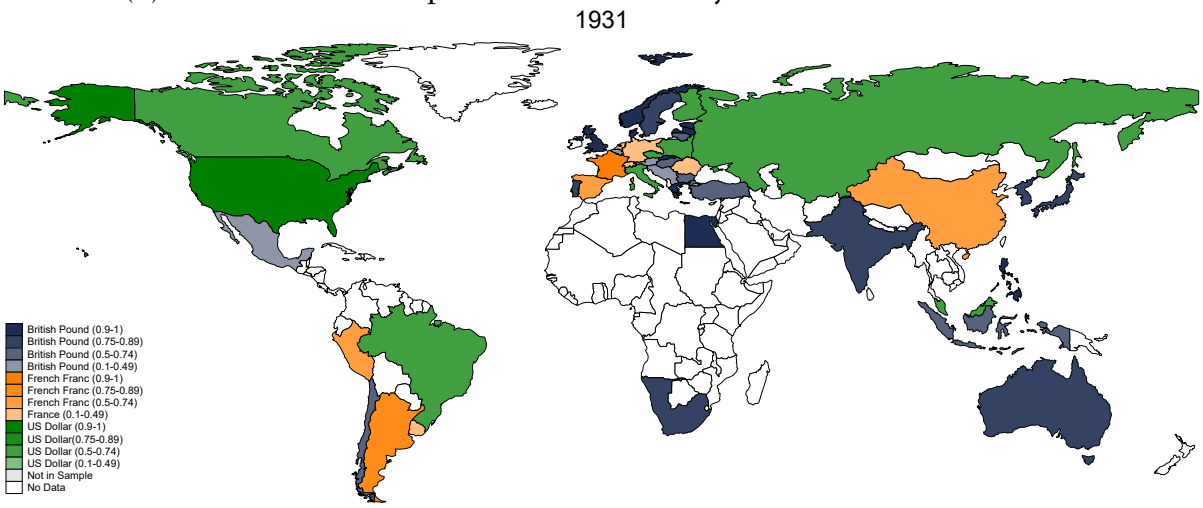
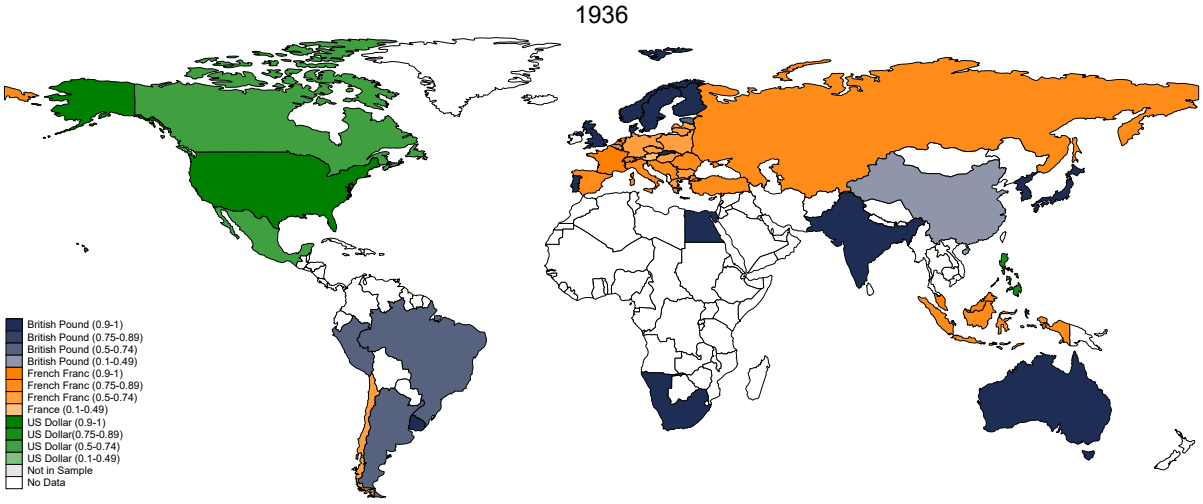


Figure 4.A.10: The Rise and Fall of the Interwar FFR - Dominant Currency By Country, Selected Years 1931-1939

(a) 1931: The FFR Steps into the Instability of the GBP and the USD



(b) 1936: A FFR Dominated IMS Before the 1936 French Election



(c) 1939: GBP and USD Bipolarity at the Eve of WWII

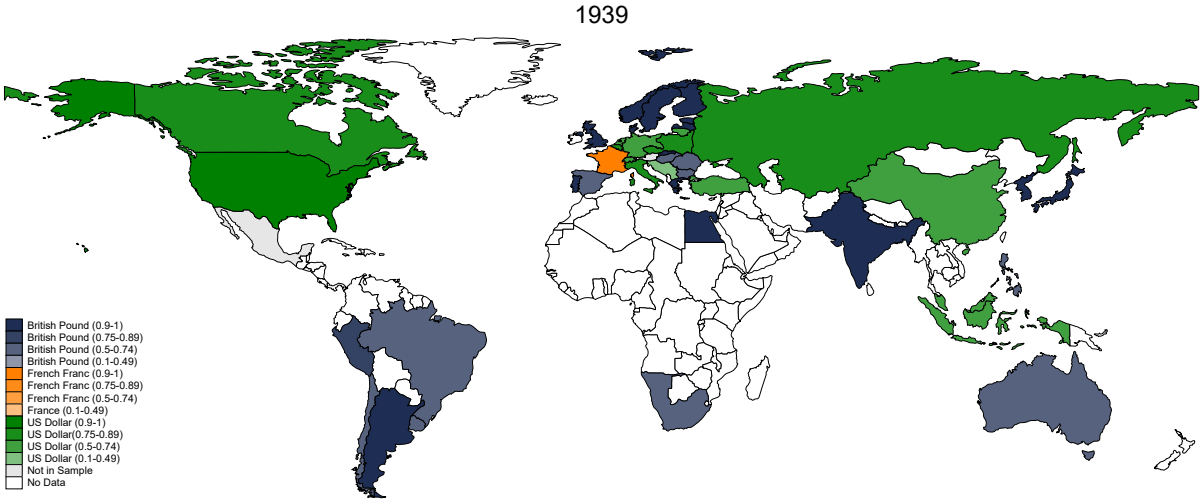
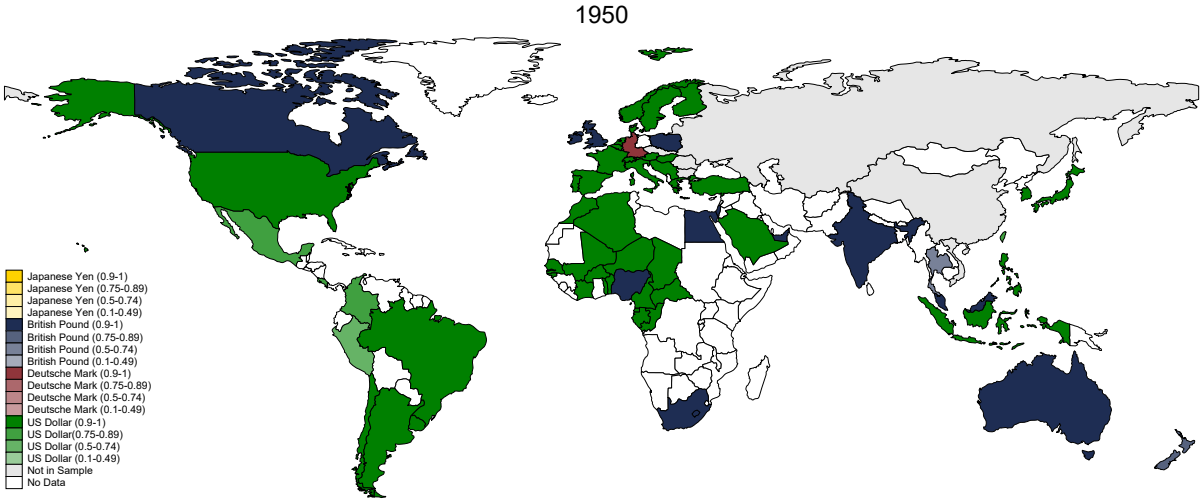


Figure 4.A.11: A USD Dominated Bretton Woods IMS - Dominant Currency By Country, Selected Years 1950-1973

(a) 1950: USD Dominance after WWII



(b) 1964: *"Privilège Exhorbitant"*

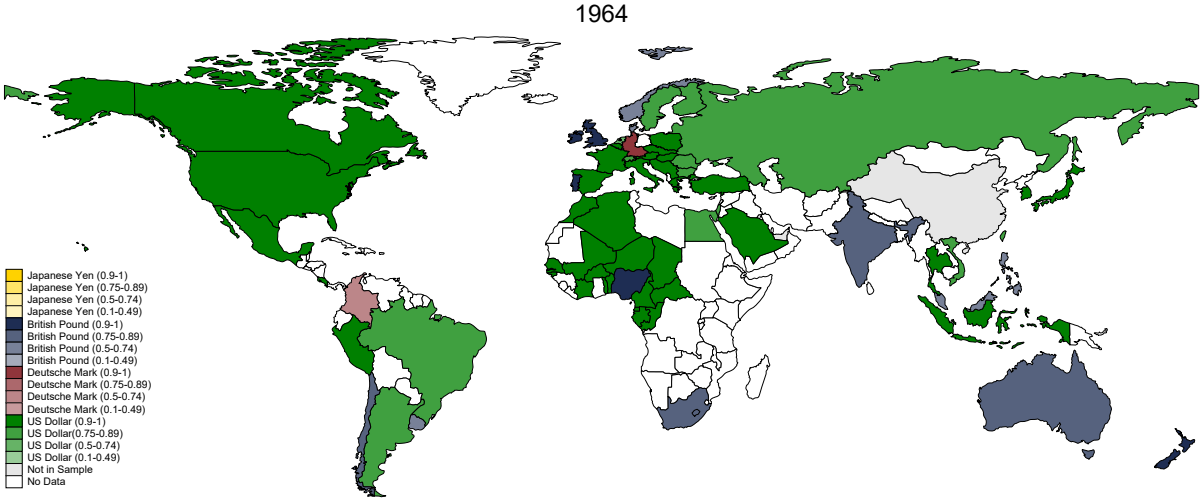
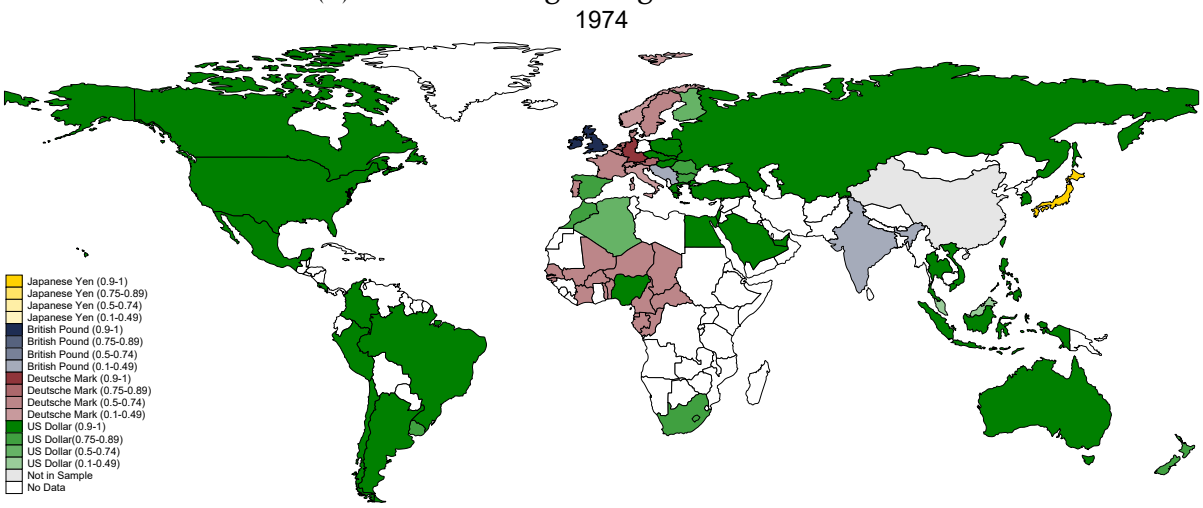
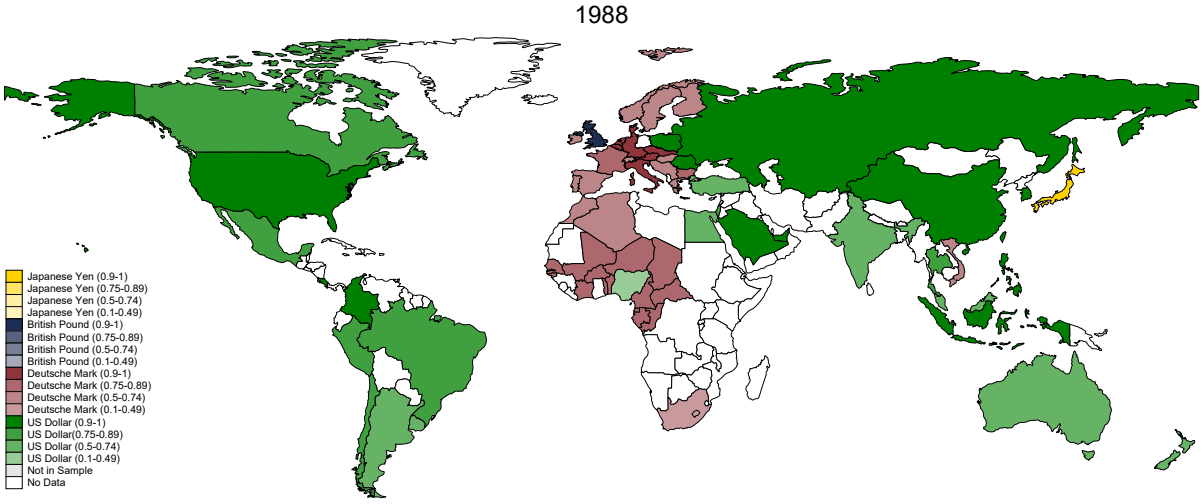


Figure 4.A.12: The Rise of the DEM -
Dominant Currency By Country, Selected Years 1931-1939

(a) 1974: The Beginnings of a DEM Zone



(b) 1988: *"German Dominance Hypothesis"*



(c) 1996: Limited Fall of DEM Influence after the EMS Crisis

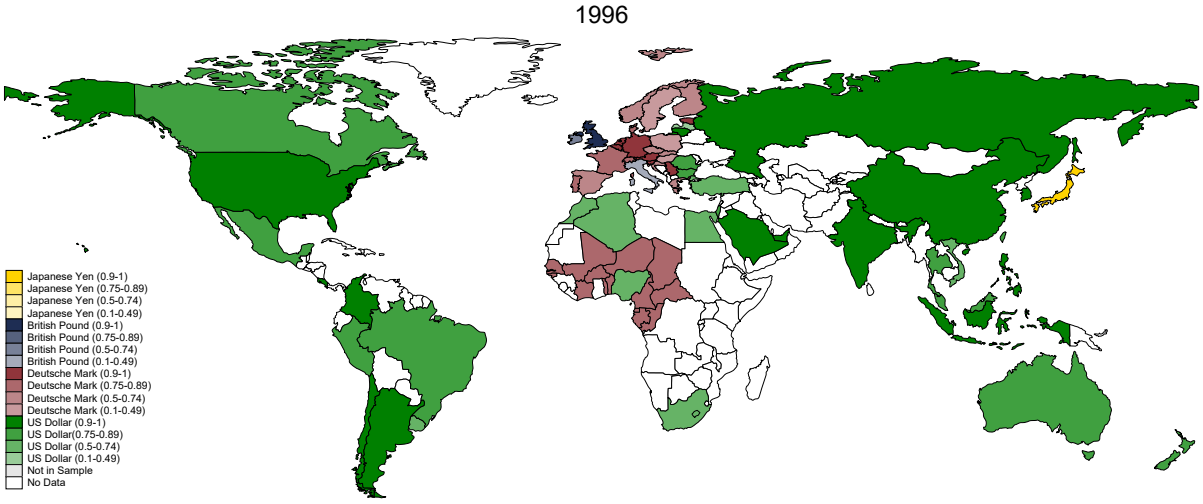
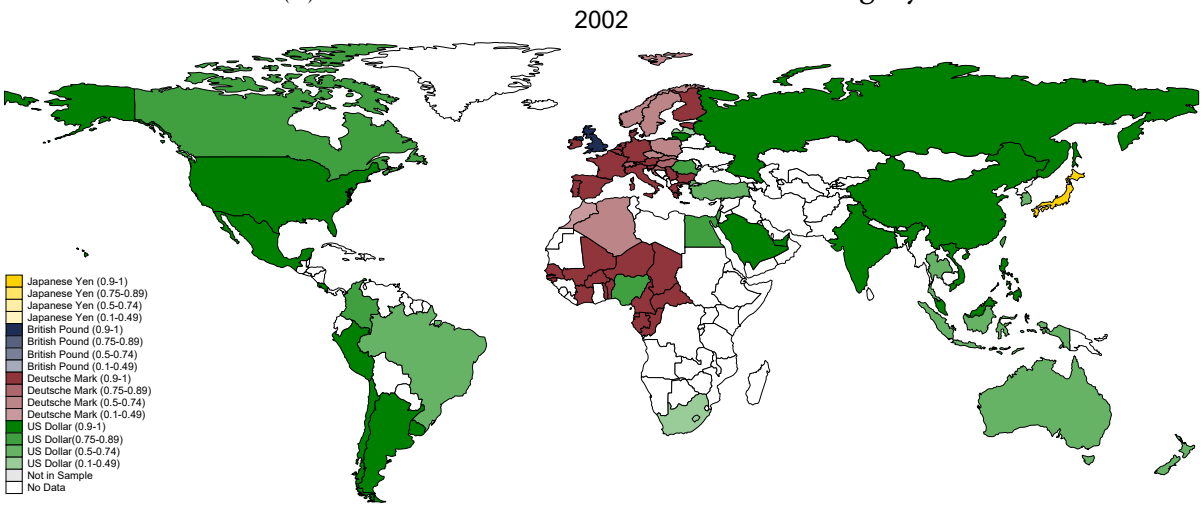
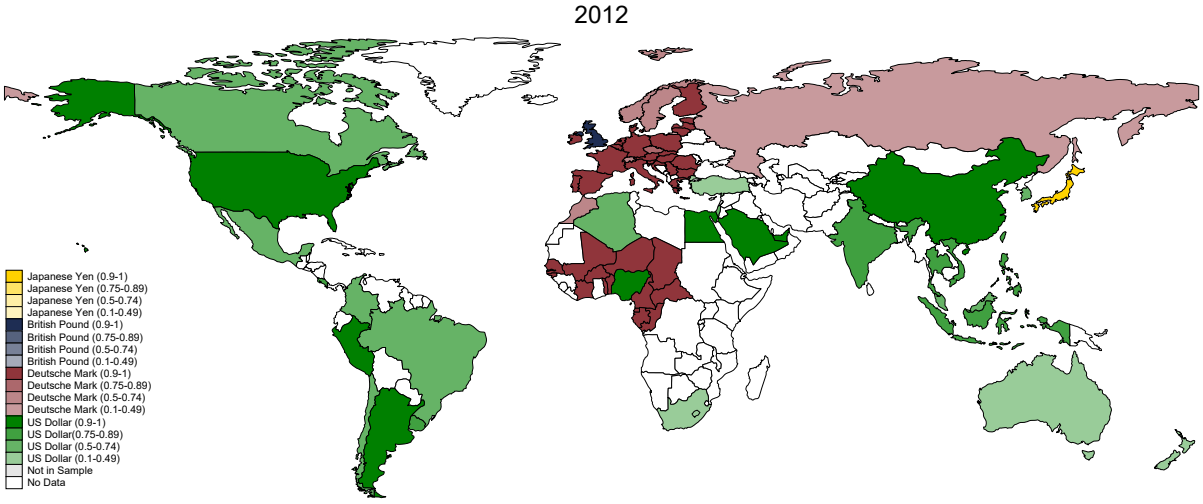


Figure 4.A.13: USD Dominance, EUR Stability - Dominant Currency By Country, Selected Years 1931-1939

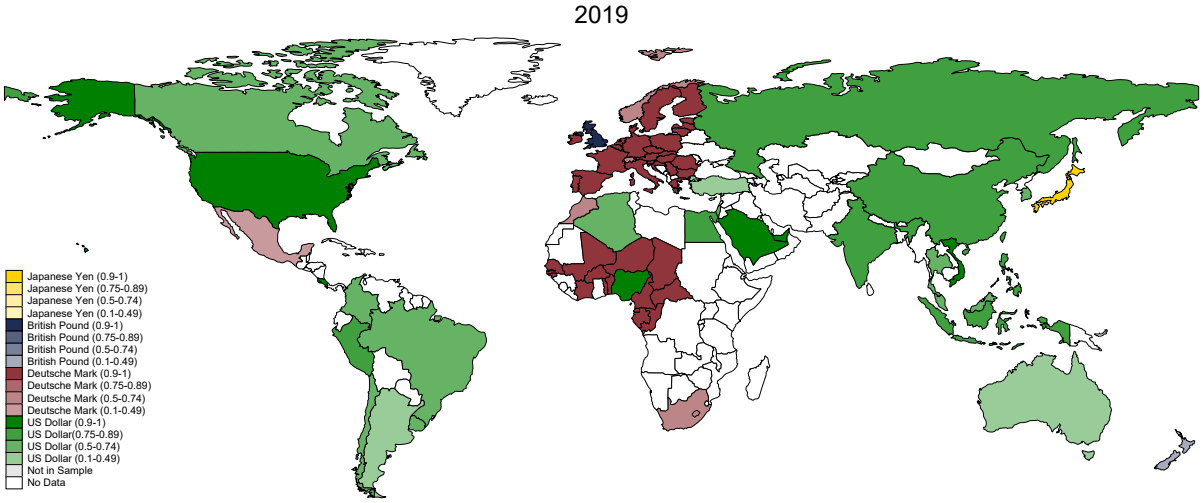
(a) 2002: The EUR Builds on the DEM Legacy



(b) 2012: EUR Influence Resists Despite the Crisis



(c) 2019: IMS Remains USD Dominated



4.B. Data Appendix

Foreign-exchange data for the pre-1948 period employed in this paper are largely the result of an extensive original data collection effort. For the early 19th century and for some currencies I however rely on Global Financial Data (GFD), a commercial financial data provider. GFD reunited in their portal a large collection of historical financial data from various third party academic and printed sources. GFD typically provides foreign-exchange monthly frequencies since the early 19th century and daily frequencies for some countries since the late 19th century or early 20th century. However, they do not always provide transparency on the sources employed and the consistency of their data. Furthermore, I provide exchange-rate for a number of currencies absent in their coverage or that they only cover with large gaps. The dataset is organised in three main sub-periods, reflecting large discontinuities in the IMS - and consequently the reporting of foreign-exchange data - after each world war.

The extent of country coverage is related to data availability, quality and economic intuition. First, I try as much as possible to cover countries that are reported at any point between 1846 and 1939 in either The Economist magazine or The Bankers' Almanac for the whole sample, so as to have continuous coverage. This is not always possible as new countries arise from annexations or separatism. Second, when I am unable to originally collect a continuous series for the whole period I rely on GFD. I however only include GFD data if there is evidence the series is not merely imputed from an official parity. Third, I include, in all sub-periods, all countries that represent more than 1% of global trade on average during each sub-period.

4.B.1. 1820-1914: Foreign-Exchange Data

Monthly Frequency

In order to extend coverage to the beginning of the 19th century and to non-European countries in the 19th century, I selectively employ monthly foreign-exchange series from

GFD expressed in terms of sterling or US dollars depending on availability. For some polities unavailable from GFD, I manually digitise monthly series from Schneider et al. (1992). I plan to continue this digitisation effort in the future in order to further expand coverage for the 19th century and overcome the limitations of GFD. Detailed breakdown and starting date of coverage is detailed in Table 4.B.1.

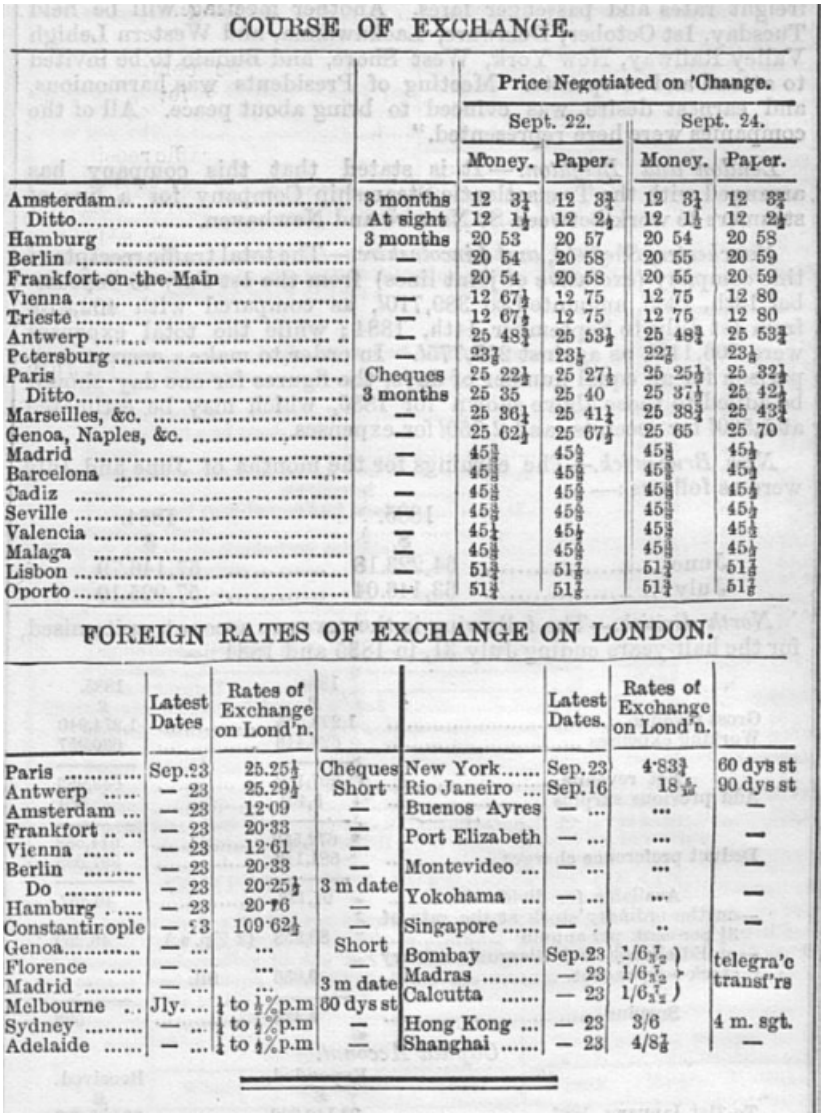
Weekly Frequency

I hand-collect and digitise weekly exchange-rates data from 1846, the first year The Economist magazine in London started to consistently publish a weekly table of the London *"Course of Exchange"* (Figure 4.B.1). Prices employed in this analysis are for bills of exchange with 3 months maturity[22]. Bills of exchange were short-term negotiable trade finance instrument that constituted the most common form of foreign-exchange market between the early-modern period and WW1. I collect the "high" and "low" quotes of the Tuesday and Thursday prices reported in the *"Course of Exchange"* table for each currency of interest[23] and average them over each week. In terms of geographic coverage, the "Course of Exchange" table included only the main European financial centers. A separate table of *"Foreign Rates of Exchange on London"* reported non-European bills of exchange prices. However, its format and coverage were inconsistent over time, making any data collection extremely complex, particularly for early years. In particular, quotes from different financial centers were published with different and varying lags. This is why, for now, I complement my weekly data for the 19th century with series from GFD for countries that were not reported in the *"Course of Exchange"*. The exception to this is the exchange-rate for the US dollar, which I digitise from the Bank of England's Daily Accounts of Books. Detailed sources are described in Table 4.B.1.

[22]Only the French franc and the Dutch Guilders are quoted both at 3 months and "at sight" in the 19th century.

[23]With the exception of Italian and German financial centers, I only collect one price per country.

Figure 4.B.1: Example of the Course of Exchange Table from The Economist Magazine



COURSE OF EXCHANGE.

		Price Negotiated on 'Change. Sept. 22. Money.	Sept. 22. Paper.	Sept. 24. Money.	Sept. 24. Paper.
Amsterdam	3 months	12 3½	12 3¾	12 3½	12 3¾
Ditto	At sight	12 1½	12 2½	12 1½	12 2½
Hamburg	3 months	20 53	20 57	20 54	20 58
Berlin	—	20 54	20 58	20 55	20 59
Frankfort-on-the-Main	—	20 54	20 58	20 55	20 59
Vienna	—	12 67½	12 75	12 75	12 80
Trieste	—	12 67½	12 75	12 75	12 80
Antwerp	—	25 48¾	25 53½	25 48¾	25 53¾
Petersburg	—	23⅞	23½	22⅞	23⅛
Paris	Cheques	25 22½	25 27½	25 25½	25 32½
Ditto	3 months	25 35	25 40	25 37½	25 42½
Marseilles, &c.	—	25 36½	25 41½	25 38¾	25 43¾
Genoa, Naples, &c.	—	25 62½	25 67½	25 65	25 70
Madrid	—	45⅜	45½	45⅜	45½
Barcelona	—	45⅜	45½	45⅜	45½
Cadiz	—	45⅜	45½	45⅜	45½
Seville	—	45⅜	45½	45⅜	45½
Valencia	—	45¼	45½	45⅜	45½
Malaga	—	45⅜	45½	45⅜	45½
Lisbon	—	51¾	51⅞	51¾	51⅞
Oporto	—	51¾	51⅞	51¾	51⅞

FOREIGN RATES OF EXCHANGE ON LONDON.

	Latest Dates	Rates of Exchange on Lond'n.			Latest Dates.	Rates of Exchange on Lond'n.	
Paris	Sep.23	25.25½	Cheques	New York	Sep.23	4·83¾	60 dys st
Antwerp	— 23	25.29½	Short	Rio Janeiro	Sep.16	18 5/16	90 dys st
Amsterdam	— 23	12·09	—	Buenos Ayres	—	...	—
Frankfort	— 23	20·33	—	Port Elizabeth	—	...	—
Vienna	— 23	12·61	—	Montevideo	—	...	—
Berlin	— 23	20·33	—	Yokohama	—	...	—
Do	— 23	20·25½	3 m date	Singapore	—	..	—
Hamburg	— 23	20·76	—	Bombay	Sep.23	1/6 3/32	telegra'c
Constantinople	— 13	109·62½	—	Madras	— 23	1/6 3/32	transf'rs
Genoa	— ...	...	Short	Calcutta	— 23	1/6 3/32	
Florence	— ...	...	—	Hong Kong	— 23	3/6	4 m. sgt.
Madrid	— ...	...	3 m date	Shanghai	— 23	4/8⅞	—
Melbourne	Jly. ...	¼ to ½% p.m	60 dys st				
Sydney	— ...	¼ to ½% p.m	—				
Adelaide	— ...	¼ to ½% p.m	—				

Table 4.B.1: Foreign-Exchange Data Coverage and Sources 1820-1914

		Monthly		Weekly	
Polity	Region	Coverage starts	Source	Coverage starts	Source
Argentina	Americas	1827	GFD	1862	GFD
Australia	Asia and Africa	1822	GFD	-	-
Austria-Hungary	Eastern Europe	1820	GFD	1846	CoE
Belgium	Western Europe	1830	GFD	1846	CoE
Brazil	Americas	1820	GFD	1862	GFD
Bulgaria	Eastern Europe	1879	GFD	-	-
Canada	Americas	1820	GFD	1869	GFD
Cape Colony	Asia and Africa	1820	GFD	1869	GFD
Chile	Americas	1850	GFD	-	-
China	Asia and Africa	1844	GFD	1869	GFD
Denmark	Scandinavia	1820	GFD	1879	GFD
Dutch East Indies	Asia and Africa	1820	GFD	-	-
Egypt	Asia and Africa	1869	GFD	1869	GFD
France	Western Europe	1820	GFD	1846	CoE
Greece	Western Europe	1877	GFD	-	-
India	Asia and Africa	1822	GFD	1869	GFD
Italy (Piedmont-Sardinia)	Western Europe	1820	WdW	1846	CoE
Japan	Asia and Africa	1862	GFD	1869	GFD
Lombardy-Venetia	Western Europe	1820	WdW	-	-
Mexico	Americas	1820	GFD	1862	GFD
Netherlands	Western Europe	1820	GFD	1846	CoE
Germany (Hamburg)	Western Europe	1820	GFD	1865	CoE
Norway	Scandinavia	1820	GFD	1862	GFD
Ottoman Empire	Eastern Europe	1826	GFD	1869	GFD
Papal States	Western Europe	1820	WdW	-	-
Peru	Americas	1883	GFD	-	-
Philippines	Asia and Africa	1894	GFD	-	-
Portugal	Western Europe	1820	GFD	1846	CoE
Romania	Eastern Europe	1867	GFD	-	-
Russia	Eastern Europe	1820	GFD	1848	CoE
Serbia	Eastern Europe	1863	GFD	-	-
Two Sicilies (Sicily)	Western Europe	1820	WdW	1846	CoE
Southern Germany	Western Europe	1820	GFD	1846	CoE
Spain	Western Europe	1820	GFD	1846	CoE
Straits Settlements	Asia and Africa	1834	GFD	1862	GFD
Sweden	Scandinavia	1820	GFD	1846	GFD
Switzerland	Western Europe	1820	WdW	1893	CoE
Tuscany	Western Europe	1820	WdW	1846	CoE
Two Sicilies (Naples)	Western Europe	1820	WdW	1846	CoE
United Kingdom	Western Europe	1820	GFD	1846	CoE
United States	Americas	1820	GFD	1855	BoE
Uruguay	Americas	1885	GFD	-	-

CoE: The Economist Magazine's Course of Exchange. BoE: Bank of England's Daily Accounts. GFD: Global Financial Data. WdW: Schneider et al. (1992).

4.B.2. 1918-1939: Foreign-Exchange Data

Foreign-exchange data from 1918 onward are at weekly frequency only. Between 1918 and 1920, I continue to rely on The Economist magazine. The tables used for those years are the "Neutral Rates of Exchange" Amsterdam price for the exchange-rate of the Germanmarkand either the "London Course of Exchange" or the "Foreign Rates of Exchange on London" cable or sight (spot) quotes for other currencies.

Between 1921 and 1939 I hand collect and digitise the weekly averages of "telegraphic" (spot) exchange-rate prices from The Bankers' Almanac publication (Figure 4.B.2). Capital controls are enforced at various points in Germany, Hungary, Argentina, Brazil, Uruguay, Chile. In these cases, I collect both official and unofficial prices and use the latter in the present paper analysis. GFD series are used for South Africa and Australia only.

Detailed coverage is presented in Table 4.B.2.

4.B.3. 1948-2020: Foreign-Exchange Data

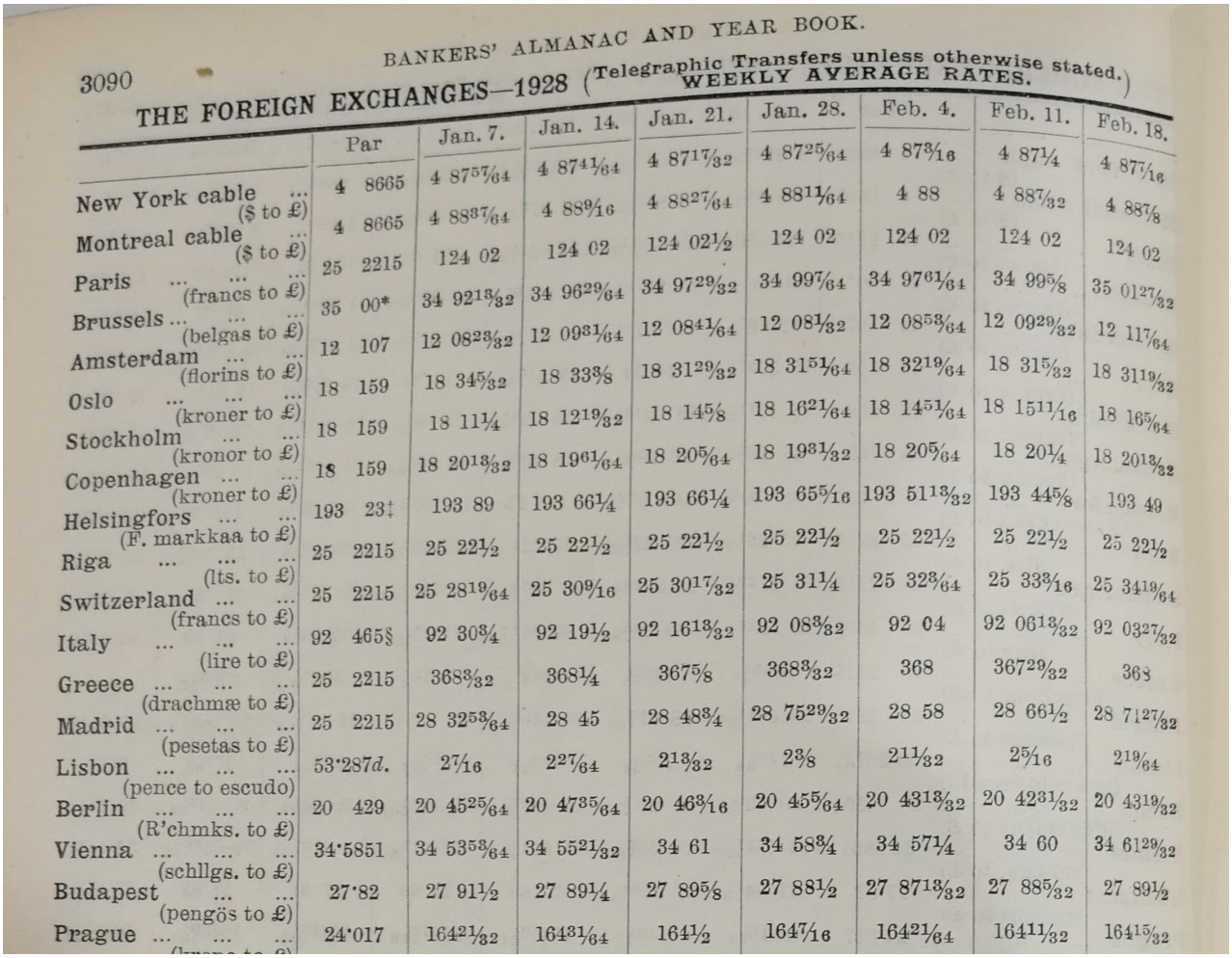
For the contemporary period, weekly foreign-exchange data in US dollars are retrieved from GFD for the whole sample period or until data from the Banks for International Settlements become available for each currency. As Global Financial Data rarely reports missing data[24], foreign-exchange prices for the communist block countries start to be included in the dataset only when there is evidence of foreign-exchange price variation in line with the rest of the dataset.

4.B.4. Bullion Prices and Other Data

Silver and gold prices are taken from Boyer-Xambeu et al. (1994) between 1820 and 1870 and from GFD between 1948 and 2020. I hand collect and digitise gold and silver prices in

[24]Preferring to impute with a "par" price.

Figure 4.B.2: Example of the Weekly Foreign-Exchange Tables from The Bankers' Almanac



BANKERS' ALMANAC AND YEAR BOOK.

3090

THE FOREIGN EXCHANGES—1928 (Telegraphic Transfers unless otherwise stated.) WEEKLY AVERAGE RATES.

	Par	Jan. 7.	Jan. 14.	Jan. 21.	Jan. 28.	Feb. 4.	Feb. 11.	Feb. 18.
New York cable ... ($ to £)	4 8665	4 87 57/64	4 87 41/64	4 87 17/32	4 87 25/64	4 87 3/16	4 87 1/4	4 87 1/16
Montreal cable ... ($ to £)	4 8665	4 88 37/64	4 88 9/16	4 88 27/64	4 88 11/64	4 88	4 88 7/32	4 88 1/8
Paris ... ... (francs to £)	25 2215	124 02	124 02	124 02 1/2	124 02	124 02	124 02	124 02
Brussels ... ... (belgas to £)	35 00*	34 92 13/32	34 96 29/64	34 97 29/32	34 99 7/64	34 97 61/64	34 99 5/8	35 01 27/32
Amsterdam ... (florins to £)	12 107	12 08 23/32	12 09 31/64	12 08 41/64	12 08 1/32	12 08 53/64	12 09 29/32	12 11 7/64
Oslo ... ... (kroner to £)	18 159	18 34 5/32	18 33 3/8	18 31 29/32	18 31 51/64	18 32 19/64	18 31 5/32	18 31 19/32
Stockholm ... ... (kronor to £)	18 159	18 11 1/4	18 12 19/32	18 14 5/8	18 16 21/64	18 14 51/64	18 15 11/16	18 16 5/64
Copenhagen ... ... (kroner to £)	18 159	18 20 13/32	18 19 61/64	18 20 5/64	18 19 31/32	18 20 5/64	18 20 1/4	18 20 13/32
Helsingfors ... ... (F. markkaa to £)	193 23‡	193 89	193 66 1/4	193 66 1/4	193 65 5/16	193 51 13/32	193 44 5/8	193 49
Riga ... ... (lts. to £)	25 2215	25 22 1/2	25 22 1/2	25 22 1/2	25 22 1/2	25 22 1/2	25 22 1/2	25 22 1/2
Switzerland ... ... (francs to £)	25 2215	25 28 19/64	25 30 9/16	25 30 17/32	25 31 1/4	25 32 3/64	25 33 3/16	25 34 19/64
Italy ... ... (lire to £)	92 465§	92 30 3/4	92 19 1/2	92 16 13/32	92 08 3/32	92 04	92 06 13/32	92 03 27/32
Greece ... ... (drachmæ to £)	25 2215	368 3/32	368 1/4	367 5/8	368 3/32	368	367 29/32	368
Madrid ... ... (pesetas to £)	25 2215	28 32 53/64	28 45	28 48 3/4	28 75 29/32	28 58	28 66 1/2	28 71 27/32
Lisbon ... ... (pence to escudo)	53·287*d.*	27/16	22 7/64	21 3/32	2 3/8	21 1/32	2 5/16	21 9/64
Berlin ... ... (R'chmks. to £)	20 429	20 45 25/64	20 47 35/64	20 46 9/16	20 45 5/64	20 43 13/32	20 42 31/32	20 43 19/32
Vienna ... ... (schllgs. to £)	34·5851	34 53 53/64	34 55 21/32	34 61	34 58 3/4	34 57 1/4	34 60	34 61 29/32
Budapest ... ... (pengös to £)	27·82	27 91 1/2	27 89 1/4	27 89 5/8	27 88 1/2	27 87 13/32	27 88 5/32	27 89 1/2
Prague	24·017	164 21/32	164 31/64	164 1/2	164 7/16	164 21/64	164 11/32	164 15/32

Table 4.B.2: Foreign-Exchange Data Coverage and Sources 1918-1939

Polity	Region	Coverage starts	Source
Argentina	Americas	1918	BA
Australia	Asia and Africa	1918	GFD
Austria	Eastern Europe	1920	BA
Belgium	Western Europe	1919	BA
Brazil	Americas	1918	BA
Bulgaria	Eastern Europe	1920	BA
Canada	Americas	1918	BA
Chile	Americas	1918	BA
China	Asia and Africa	1918	BA
Czechoslovakia	Eastern Europe	1919	BA
Free City of Danzig	Eastern Europe	1923	BA
Denmark	Scandinavia	1918	BA
Dutch East Indies	Asia and Africa	1918	BA
Egypt	Asia and Africa	1918	BA
Estonia	Scandinavia	1921	BA
Finland	Scandinavia	1918	BA
France	Western Europe	1918	BA
Germany	Western Europe	1918	BA
Greece	Eastern Europe	1918	BA
Hong Kong	Asia and Africa	1918	BA
Hungary	Eastern Europe	1921	BA
India	Asia and Africa	1918	BA
Italy	Western Europe	1918	BA
Japan	Asia and Africa	1918	BA
Latvia	Scandinavia	1921	BA
Lithuania	Scandinavia	1924	BA
Mexico	Americas	1919	BA
Netherlands	Western Europe	1918	BA
Norway	Scandinavia	1918	BA
Peru	Americas	1918	BA
Philippines	Asia and Africa	1919	BA
Poland	Eastern Europe	1918	BA
Portugal	Western Europe	1918	BA
Romania	Eastern Europe	1920	BA
Russia	Eastern Europe	1919	BA
South Africa	Asia and Africa	1918	GFD
Spain	Western Europe	1918	BA
Straits Settlements	Asia and Africa	1918	BA
Sweden	Scandinavia	1918	BA
Switzerland	Western Europe	1918	BA
Turkey	Eastern Europe	1919	BA
United Kingdom	Western Europe	1918	BA
United States	Americas	1918	BA
Uruguay	Americas	1918	BA
Yugoslavia	Eastern Europe	1920	BA

BA: The Bankers' Almanac. Data between 1918 and 1920 are from The Economist magazine for all currencies.
GFD: Global Financial Data.

Table 4.B.3: Foreign-Exchange Data Coverage and Sources 1948-2020

Polity	Region	Coverage starts	Polity	Region	Coverage starts
Algeria	Africa	1948	Lithuania	Scandinavia	1992
Argentina	Americas	1948	Malaysia	Asia	1948
Australia	Asia	1948	Mexico	Americas	1948
Austria	Western Europe	1948	Morocco	Africa	1948
Belgium	Western Europe	1948	Netherlands	Western Europe	1948
Brazil	Americas	1948	New Zealand	Asia	1948
Bulgaria	Eastern Europe	1990	Nigeria	Africa	1948
Canada	Americas	1948	Norway	Scandinavia	1948
CFA Zone	Africa	1948	Peru	Americas	1948
Chile	Americas	1948	Philippines	Asia	1948
China	Asia	1978	Poland	Eastern Europe	1986
Colombia	Americas	1948	Portugal	Western Europe	1948
Costa Rica	Americas	1948	Romania	Eastern Europe	1972
Croatia	Eastern Europe	1993	Russia	Eastern Europe	1992
Czech Republic	Eastern Europe	1990	Saudi Arabia	Asia	1948
Denmark	Scandinavia	1948	Singapore	Asia	1948
Egypt	Africa	1948	Slovakia	Eastern Europe	1993
Estonia	Scandinavia	1993	Slovenia	Eastern Europe	1993
Finland	Scandinavia	1948	South Africa	Africa	1948
France	Western Europe	1948	Spain	Western Europe	1948
Greece	Western Europe	1948	Sweden	Scandinavia	1948
Hong Kong	Asia	1948	Switzerland	Western Europe	1948
Hungary	Eastern Europe	1982	Taiwan	Asia	1948
India	Asia	1948	Thailand	Asia	1948
Indonesia	Asia	1948	Turkey	Eastern Europe	1948
Ireland	Western Europe	1948	UAE	Asia	1948
Israel	Asia	1948	United Kingdom	Western Europe	1980
Italy	Western Europe	1948	United States	Americas	1948
Japan	Asia	1948	Uruguay	Americas	1948
Korea	Asia	1948	Vietnam	Asia	1976
Latvia	Scandinavia	1992	Yugoslavia (Serbia)	Eastern Europe	1948

Data are taken for each polity from Global Financial Data until they become available from the Bank for International Settlements.

London from the Bank of England's Daily Accounts of Books between 1870 and 1914 and from The Bankers' Almanac between 1918 and 1939.

To control for commodity prices in some specification I employ weekly wheat prices from Brunt and Cannon (2013) between 1820 and 1914, the US Bureau of Labor Statistics Commodity Index between 1918 and 1939 and the Bloomberg Commodity Index after 1948.

Controls for overall risk and volatility are either original data from The Economist magazine or taken from GFD.

- 1846-1914: average term spread between 3-months and sight bills on Amsterdam and Paris; average bid-ask spread on bills of exchange on Paris and Amsterdam.
- 1918-2020: term spread between high-quality corporate bonds and overnight interbank rate; average daily volume of the NYSE.

GDP-weights are calculated from Bolt and van Zanden (2020), while trade-weights are taken from Dedinger and Girard (2017) before 1948 and the IMF-DOTS database afterward.

Chapter 5

Concluding Remarks and Research Agenda

This thesis has presented three essays on currency unions and the international monetary system in historical perspective.

In Chapter 2, I presented a historical natural experiment, exploiting the geopolitical shock of the Italian unification. I provide for the first time a causal estimate of the common currency effect on international trade. I find this effect to be both large, confirming in a quasi-experimental setting the initial policy implications of Rose (2000), and significantly smaller than the average effect found in the literature. I provide evidence that the study bears at least some external validity. I show that transactions costs related to exchange-rates, approximated by exchange-rate volatility, were remarkably similar in the period I examine and the years where currency union variations occur in the dataset traditionally employed by the literature. I also find my estimates to be consistent with the heterogeneous effects of trade policies uncovered by Chen and Novy (2019).

The paper is based on an original dataset of bilateral trade for the pre-unitary Italian states, spanning the years immediately before and after the unification. While, so far, I only exploited the aggregate nominal bilateral flow dimension of the data, I was able to collect,

for a smaller sample of years and ports, data on bilateral flows by merchandise, as well as local prices.

This could open two avenues of future research. On the one hand, other dimensions of the exogenous shock to transactions costs, including tariffs, could be explored in a similar quasi-experimental set-up to the one I have presented. On the other hand, this dataset could shed more lights on the welfare effects of the exogenous opening of the Southern Italian states after 1861. In a similar vein to the work of Bernhofen and Brown (2005) on Japan opening after the Meiji restoration, my data could investigate potential links between the unification opening and the process of Italian regional divergence.

In Chapter 3, I revisited the optimum currency areas framework and its endogeneity, looking at a wave of European monetary integration occurring in the third quarter of the 19th century and encompassing the Italian and German unifications, the Latin and Scandinavian Unions and the gold standard. I show that a simple empirical model, based on the operationalisation of optimum currency areas criteria around symmetry of shocks with respect to anchor countries, can predict well in advance the pairs of countries that will undergo protracted monetary integration. The key exception is represented by the monetary arrangements brought about by purely political processes, such as the Italian unification. I argue that the results are consistent with the predictive power of the optimum currency area framework and at odds with their endogeneity hypothesis put forward by Frankel and Rose (1998).

I then explore whether the endogenous adverse effects of monetary integration proposed by Krugman (2001) are consistent with the patterns of regional divergence observed in Italy after the unification. I find that pairs of Italian provinces experiencing an integration shock observed a marked increase in the heterogeneity of their economic structure, compared to already integrated pairs of provinces. I relate these findings to the asymmetric shock experienced by Italian regions following the "grain invasion" crisis in the late 19th century. I argue that, in a no-unification counterfactual, the Italian South would have likely adopted a looser exchange-rate regime during the agrarian crisis, similar to other Mediterranean peripherals. The mechanisms of adjustment to such an asymmetric shock available within the

Italian unions, might however have contributed to regional divergence in line with Krugman (2001).

The paper offers some relevant historical analogies in the view of the current debates on European monetary integration. First, it seems to vindicate the optimum currency area driven approach to monetary integration of the British "five tests" (Treasury, 2003), as opposed to the hopes of ex-post optimality that underpinned the EMU process in the 1990s.

Second, my results imply that more attention should be paid to the endogenous effects of integration on economic structures and, consequently, optimal monetary policy. The lessons of Krugman (2001) are likely more relevant for levels of integration observable in national markets, something the European integration process aspires to in the future. This warrants further research on the evolving patterns of European specialisation from a monetary policy perspective (Mongelli et al., 2016).

Third, I confirm the key lesson of historical monetary unions drawn by Bordo and Jonung (1999), with political commitment being a key determinant of lasting currency arrangements. Based on the long run patterns of Italian integration I would however qualify this lesson, by noting that, while political integration can ensure the sustainability of a monetary union, it is far from being a sufficient condition for its optimality.

Chapter 4 has quantified the rise and falls of global currencies and the changing structure of the international monetary system over two centuries, focusing on foreign-exchange co-movements. I show that the current dollar hegemony is a historical anomaly, particularly in terms of the size and the persistence of its lead on any potential challengers. This contrasts with the experience of the previous hegemon, the British sterling, which was regularly challenged and, according to my findings, briefly overtaken several times during its tenure. I document that, consistent with the research of Eichengreen et al. (2017), the dollar became the dominant currency in the interwar period. Although its first overtaking of the sterling was reversed in 1927, possibly owing to the concurrent Fed tightening, it overtook it again at the eve of WWI. I also uncover a, previously overlooked, brief episode of French franc

dominance that should be of interest as a historical analogy to current challengers of the dollar primacy.

Overall, I find the level of competition in the international monetary system to be positively correlated with global financial instability. The nature of this correlation is however unclear, and several periods of high competition, particularly in the 19th century, are associated with low levels of financial turbulence.

The new extensive dataset of long-run foreign-exchange returns I have compiled as part of this work should open new research avenues on the economics of the international monetary system and foreign-exchange market. First, I so far haven't exploited the full potential offered by the weekly frequency of the data. Future work should look at the exact timings of the global currency discontinuities I uncover, focusing on the precise events surrounding them and relating them to high-frequency correlates.

Second, the estimated annual weights I compiled in this work could provide the basis for an empirical assessment of the correlates and determinants of anchor currency status. This could directly inform the debate on currency internationalisation that has long been ongoing in Europe (Portes and Rey, 1998; Pisani-Ferry and Posen, 2009; ECB, 2021) and has more recently gained momentum in China (Eichengreen and Kawai, 2015; Eichengreen and Xia, 2019).

Third, future research should explore the correlation between global currency competition and global financial instability I document, in light of recent theoretical work on the new Triffin dilemma (Farhi and Maggiori, 2018) and the claim by Eichengreen (2019) that the sign of this relationship is contingent on international policy cooperation.

Finally, the dataset could be exploited to study the long run characteristics of foreign-exchange markets and, potentially, the long run patterns of some of the well-known international finance "puzzles", following a recent literature inaugurated by Accominotti et al. (2019).

Bibliography

Accominotti, Olivier and Marc Flandreau, "Bilateral treaties and the most-favored-nation clause: the myth of trade liberalization in the nineteenth century," *World Politics*, 2008, *60* (2), 147–188.

_ **, Jason Cen, David Chambers, and Ian W Marsh**, "Currency regimes and the carry trade," *Journal of Financial and Quantitative Analysis*, 2019, *54* (5), 2233–2260.

A'Hearn, Brian and Anthony J Venables, "Internal geography and external trade: regional disparities in Italy, 1861-2011," *Bank of Italy Economic History Working Paper*, 2011, (12).

Alesina, Alberto and Enrico Spolaore, *The size of nations*, Mit Press, 2005.

_ **and Robert J Barro**, "Dollarization," *American Economic Review*, 2001, *91* (2), 381–385.

_ **and** _ , "Currency Unions," *The Quarterly journal of economics*, 2002, *117* (2), 409–436.

_ **,** _ **, and Silvana Tenreyro**, "Optimal currency areas," *NBER macroeconomics annual*, 2002, *17*, 301–345.

Almunia, Miguel, Agustin Benetrix, Barry Eichengreen, Kevin H O'Rourke, and Gisela Rua, "From great depression to great credit crisis: similarities, differences and lessons," *Economic Policy*, 2010, *25* (62), 219–265.

Anderson, James E and Eric Van Wincoop, "Gravity with gravitas: a solution to the border puzzle," *American Economic Review*, 2003, *93* (1), 170–192.

Antipa, Pamfili and Vincent Bignon, "Whither economic history? Between narratives and quantification," *Revue de l'OFCE*, 2018, (3), 17–36.

Asdrubali, Pierfederico, Bent E Sørensen, and Oved Yosha, "Channels of interstate risk sharing: United States 1963–1990," *The Quarterly Journal of Economics*, 1996, *111* (4), 1081–1110.

Avaro, Maylis, "Zombie International Currency: The Pound Sterling 1945-1973," Technical Report, Graduate Institute of International and Development Studies Working Paper 2020.

Balassa, Bela, *The theory of economic integration (routledge revivals)*, Routledge, 1963.

Baldwin, Richard E, "The euro's trade effects," *ECB Working Paper*, 2006.

Banfield, Edward C, "The moral basis of a backward society," 1967.

Banti, Alberto Mario, *Il risorgimento italiano*, Gius. Laterza & Figli Spa, 2013.

Barbagallo, Francesco, *La questione italiana: il Nord e il Sud dal 1860 a oggi*, Gius. Laterza & Figli Spa, 2017.

Barro, Robert J and David B Gordon, "Rules, discretion and reputation in a model of monetary policy," *Journal of Monetary Economics*, 1983, *12* (1), 101–121.

_ **and Silvana Tenreyro**, "Economic effects of currency unions," *Economic Inquiry*, 2007, *45* (1), 1–23.

Basile, Roberto and Carlo Ciccarelli, "The location of the Italian manufacturing industry, 1871–1911: a sectoral analysis," *Journal of Economic Geography*, 2018, *18* (3), 627–661.

Bayoumi, Tamim and Barry Eichengreen, "Shocking Aspects of European Monetary Unification," NBER Working Papers 3949, National Bureau of Economic Research January 1992.

_ **and** _ , "Ever closer to heaven? An optimum-currency-area index for European countries," *European Economic Review*, 1997, *41* (3), 761–770.

_ **and** _ , "Exchange rate volatility and intervention: implications of the theory of optimum currency areas," *Journal of International Economics*, 1998, *45* (2), 191–209.

_ **and** _ , "Aftershocks of monetary unification: Hysteresis with a financial twist," *Journal of Banking & Finance*, 2020, *113*, 105365.

Becuwe, Stéphane, Bertrand Blancheton, and Christopher M Meissner, "International Competition and Adjustment: Evidence from the First Great Liberalization," Technical Report, National Bureau of Economic Research 2018.

Belke, Ansgar, Clemens Domnick, and Daniel Gros, "Business Cycle Synchronization in the EMU: Core vs. Periphery," *Open Economies Review*, 2017, pp. 1–30.

Benini, Rodolfo, "L'azione dello stato sul corso dei cambi ed i criteri dell'amministrazione italiana," *Giornale degli economisti*, 1894, pp. 299–322.

Berger, Helge and Volker Nitsch, "Zooming out: The trade effect of the euro in historical perspective," *Journal of International Money and Finance*, 2008, *27* (8), 1244–1260.

Bergman, Michael, "Do monetary unions make economic sense? Evidence from the Scandinavian Currency Union, 1873–1913," *Scandinavian Journal of Economics*, 1999, *101* (3), 363–377.

_ **, Stefan Gerlach, and Lars Jonung**, "The rise and fall of the Scandinavian Currency Union 1873–1920," *European Economic Review*, 1993, *37* (2-3), 507–517.

Bernanke, Ben S and Kevin Carey, "Nominal wage stickiness and aggregate supply in the Great Depression," *The Quarterly Journal of Economics*, 1996, *111* (3), 853–883.

Bernhofen, Daniel M and John C Brown, "A direct test of the theory of comparative advantage: the case of Japan," *Journal of Political Economy*, 2004, *112* (1), 48–67.

_ **and** _ , "An empirical assessment of the comparative advantage gains from trade: evidence from Japan," *American Economic Review*, 2005, *95* (1), 208–225.

Bignon, Vincent, "Financial crises, Business cycles, and Bankruptcies in the Very Long Run: France during the 19th Century," in "Past, Present and Policy 4th International Conference Graduate Institute, Geneva" 2011, pp. 3–4.

_ , **Marc Flandreau, and Stefano Ugolini**, "Bagehot for beginners: the making of lender-of-last-resort operations in the mid-nineteenth century 1," *The Economic History Review*, 2012, *65* (2), 580–608.

Bigoni, Maria, Stefania Bortolotti, Marco Casari, Diego Gambetta, and Francesca Pancotto, "Amoral familism, social capital, or trust? The behavioural foundations of the Italian North–South divide," *The Economic Journal*, 2016, *126* (594), 1318–1341.

Bisin, Alberto and Giovanni Federico, *The Handbook of Historical Economics*, Academic Press, 2021.

Blanchard, Olivier J and Lawrence H Summers, "Hysteresis in unemployment," *European Economic Review*, 1987, *31* (1-2), 288–295.

Blanchard, Olivier Jean, Lawrence F Katz, Robert E Hall, and Barry Eichengreen, "Regional evolutions," *Brookings papers on economic activity*, 1992, *1992* (1), 1–75.

Bolt, Jutta and Jan Luiten van Zanden, "Maddison style estimates of the evolution of the world economy. A new 2020 update," *Maddison-Project Working Paper WP-15, University of Groningen, Groningen, The Netherlands*, 2020.

Bootle, Roger, "Leaving the Euro: A practical guide," *Revised resubmission for the Wolfson Prize, June*, 2012, *4*.

Bordo, Michael D and Lars Jonung, "The future of EMU: what does the history of monetary unions tell us?," Technical Report, National Bureau of Economic Research 1999.

_ , **Christopher M Meissner, and Marc D Weidenmier**, "Identifying the effects of an exchange rate depreciation on country risk: Evidence from a natural experiment," *Journal of International Money and Finance*, 2009, *28* (6), 1022–1044.

Boudon, Jacques-Olivier, *Histoire du Consulat et de l'Empire: 1799-1815*, Perrin, 2003.

Böwer, Uwe and Catherine Guillemineau, "Determinants of business cycle synchronisation across euro area countries," Technical Report, European Central Bank 2006.

Boyer-Xambeu, Marie-Thérèse, Ghislain Deleplace, and Lucien Gillard, "Régimes monétaires, points d'or et" serpent bimétallique" de 1770 à 1870," *Revue économique*, 1994, pp. 1139–1174.

Boz, Emine, Camila Casas, Georgios Georgiadis, Gita Gopinath, Helena Le Mezo, Arnaud Mehl, and Tra Nguyen, "Patterns in invoicing currency in global trade," 2020.

Brennan, Geoffrey, James M Buchanan et al., *The power to tax: Analytic foundations of a fiscal constitution*, Cambridge University Press, 1980.

Bromhead, Alan De, Barry Eichengreen, and Kevin H O'Rourke, "Political extremism in the 1920s and 1930s: Do German lessons generalize?," *The Journal of Economic History*, 2013, *73* (2), 371–406.

Brunt, Liam and Edmund Cannon, "The truth, the whole truth, and nothing but the truth: the English Corn Returns as a data source in economic history, 1770–1914," *European Review of Economic History*, 2013, *17* (3), 318–339.

Cacciatore, Matteo and Fabio Ghironi, "Trade, unemployment, and monetary policy," *Journal of International Economics*, 2021, p. 103488.

Cafagna, Luciano, *Dualismo e sviluppo nella storia d'Italia*, Marsilio, 1989.

Calderon, Cesar, Alberto Chong, and Ernesto Stein, "Trade intensity and business cycle synchronization: Are developing countries any different?," *Journal of International Economics*, 2007, *71* (1), 2–21.

Campbell, Douglas L, "Estimating the impact of currency unions on trade: solving the glick and rose puzzle," *World Economy*, 2013, *36* (10), 1278–1293.

_ **and Aleksandr Chentsov**, "Breaking Badly: The Currency Union Effect on Trade," 2017.

Cantoni, Davide and Noam Yuchtman, "Historical natural experiments: Bridging economics and economic history," in "The Handbook of Historical Economics," Elsevier, 2021, pp. 213–241.

Carney, Mark, "The growing challenges for monetary policy in the current international monetary and financial system," in "Remarks at the Jackson Hole Symposium," Vol. 23 2019.

Cerra, Valerie, Antonio Fatás, and Sweta Chaman Saxena, *Hysteresis and business cycles*, International Monetary Fund, 2020.

Cesarano, Filippo, Giulio Cifarelli, and Gianni Toniolo, "Exchange Rate Regimes and Reserve Policy: The Italian Lira, 1883–1911," *Open Economies Review*, 2012, *23* (2), 253–275.

Chen, Natalie and Dennis Novy, "The currency union effect on trade: early evidence from EMU," *CEPR Discussion Paper*, 2019, (12954).

Chen, Yao, Nuno Palma, and Felix Ward, "Reconstruction of the Spanish money supply, 1492–1810," *Explorations in Economic History*, 2021, p. 101401.

Chiaruttini, Maria Stella, "Woe to the vanquished? State,'foreign'banking and financial development in Southern Italy in the nineteenth century," *Financial History Review*, 2020, *27* (3), 340–360.

Chilosi, David, Max-Stephan Schulze, and Oliver Volckart, "Benefits of empire? Capital market integration North and south of the Alps, 1350–1800," *The Journal of Economic History*, 2018, *78* (3), 637–672.

Chinn, Menzie D and Jeffrey A Frankel, "Will the euro eventually surpass the dollar as leading international reserve currency?," 2005.

Chintrakarn, Pandej, "Estimating the euro effects on trade with propensity score matching," *Review of International Economics*, 2008, *16* (1), 186–198.

Chiţu, Livia, Barry Eichengreen, and Arnaud Mehl, "When did the dollar overtake sterling as the leading international currency? Evidence from the bond markets," *Journal of Development Economics*, 2014, *111*, 225–245.

Christiano, Lawrence J and Terry J Fitzgerald, "The band pass filter," *International Economic Review*, 2003, *44* (2), 435–465.

Ciccarelli, Carlo and Stefano Fenoaltea, "La produzione industriale delle regioni d'Italia, 1861-1913: una ricostruzione quantitativa. 1. Le industrie non-manifatturiere," 2009.

_ **and** _ , "Through the magnifying glass: provincial aspects of industrial growth in post-Unification Italy," *The Economic History Review*, 2013, *66* (1), 57–85.

_ , _ , **and Tommaso Proietti**, "The effects of unification: markets, policy, and cyclical convergence in Italy, 1861–1913," *Cliometrica*, 2010, *4* (3), 269–292.

Ciocca, Pierluigi, *Ricchi per sempre?: una storia economica d'Italia, 1796-2005*, Vol. 167, Bollati Boringhieri, 2007.

_ **and Adalberto Ulizzi**, "I tassi di cambio nominali e 'reali'dell'Italia dall'unità nazionale al Sistema monetario europeo (1861-1979)," *Ricerche per la storia della Banca d'Italia*, 1990, *1*, 341–68.

Collet, Stéphanie, "A Unified Italy?-Sovereign Debt and Investor Scepticism," *Mimeo, Available at SSRN*, 2013.

Commission, European, "One market, one money," *European Economy*, 1990, *44*, 68.

Daniele, Vittorio, Paolo Malanima et al., "Il prodotto delle regioni e il divario Nord-Sud in Italia (1861-2004)," *Rivista di politica economica*, 2007, *97* (2), 267–316.

Davis, John A, "Mutamenti di prospettiva sul cammino dell'Italia verso il XX secolo," *Storia economica d'Italia*, 1999, *1*, 197–259.

Dedinger, Béatrice and Paul Girard, "Exploring trade globalization in the long run: The RICardo project," *Historical Methods: A Journal of Quantitative and Interdisciplinary History*, 2017, *50* (1), 30–48.

Dellas, Harris and George S Tavlas, "An optimum-currency-area odyssey," *Journal of International Money and Finance*, 2009, *28* (7), 1117–1137.

di Meana, Andrea Ripa and Mario Sarcinelli, "Il credito di ultima istanza e l'evoluzione dell'attività bancaria," *Giornale degli economisti e annali di economia*, 1990, pp. 331–351.

Dupont-Ferrier, Pierre, *Le marché financier de Paris sous le Second Empire*, Les Presses universitaires de France, 1925.

ECB, "The International Role of the Euro, June 2021," Technical Report, European Central Bank 2021.

Eckaus, Richard S, "The North-South differential in Italian economic development," *The Journal of Economic History*, 1961, *21* (3), 285–317.

Egorov, Konstantin and Dmitry Mukhin, "Optimal Policy under Dollar Pricing," *Available at SSRN 3404660*, 2020.

Eichengreen, Barry, "Conducting the international orchestra: Bank of England leadership under the classical gold standard," *Journal of international Money and Finance*, 1987, *6* (1), 5–29.

_ , "One money for Europe? Lessons from the US currency union," *Economic Policy*, 1990, *5* (10), 117–187.

_ , "Is Europe an Optimum Currency Area?," Technical Report, National Bureau of Economic Research 1991.

_ , "International Monetary Arrangements for the 21st Century. Washington, DC: The Brookings Institution," *Financing Infrastructure in Developing Countries: Lessons from the Railway Age."In Ashoka Mody (ed.), Infrastructure Delivery: Private Initiative and the Public Good*, 1994, pp. 107–128.

_ , "Déjà Vu All over again: Lessons from the gold standard for European Monetary Unification," in Tamim Bayoumi, Barry Eichengreen, and Alan M Taylor, eds., *Modern Perspectives on the Gold Standard, Cambridge: Cambridge University Press*, Cambridge: Cambridge University Press, 1995.

_ , *Golden fetters: the gold standard and the Great Depression, 1919-1939*, NBER series on long-term factors in economic development, 1995.

_ , *Globalizing capital: a history of the international monetary system*, Princeton University Press, 1998.

_ , "Economic history and economic policy," *The Journal of Economic History*, 2012, *72* (2), 289–307.

_ , "Two Views of the International Monetary System," *Intereconomics*, 2019, *54* (4), 233–236.

_ **and Douglas A Irwin**, "Trade blocs, currency blocs and the reorientation of world trade in the 1930s," *Journal of International economics*, 1995, *38* (1-2), 1–24.

_ **and Guangtao Xia**, "China and the SDR: financial liberalization through the back door," *Quarterly Journal of Finance*, 2019, *9* (03), 1950007.

_ **and Jeffrey Sachs**, "Exchange rates and economic recovery in the 1930s," *The Journal of Economic History*, 1985, *45* (4), 925–946.

_ **and Marc Flandreau**, "The Geography of the Gold Standard," Technical Report, CEPR Discussion Papers 1994.

_ **and** _ , "The rise and fall of the dollar (or when did the dollar replace sterling as the leading reserve currency?)," *European Review of Economic History*, 2009, *13* (3), 377–411.

_ **and** _ , "The Federal Reserve, the Bank of England, and the rise of the dollar as an international currency, 1914–1939," *Open Economies Review*, 2012, *23* (1), 57–87.

_ **and Masahiro Kawai**, "Renminbi Internationalization: Achievements," *Prospects, and Challenges, Tokyo/Washington: Asian Development Bank Institute and Brookings Institution Press*, 2015.

_ **and Peter Temin**, "Fetters of gold and paper," *Oxford Review of Economic Policy*, 2010, *26* (3), 370–384.

_ **, Arnaud Mehl, and Livia Chitu**, *How global currencies work*, Princeton University Press, 2017.

_ **, Michael Haines, Matthew Jaremski, and David Leblang**, "Populists at the polls: Economic factors in the US presidential election of 1896," in "Research in Economic History," Emerald Publishing Limited, 2019.

Einaudi, Luca, "From the franc to the'Europe': the attempted transformation of the Latin Monetary Union into a European Monetary Union, 1865-1873," *Economic History Review*, 2000, pp. 284–308.

_ , *Money and politics: European monetary unification and the international gold standard (1865-1873)*, Oxford University Press, 2001.

Estevadeordal, Antoni, Brian Frantz, and Alan M Taylor, "The rise and fall of world trade, 1870–1939," *The Quarterly Journal of Economics*, 2003, *118* (2), 359–407.

Esteves, Rui and David Khoudour-Castéras, "A fantastic rain of gold: European migrants' remittances and balance of payments adjustment during the gold standard period," *The Journal of Economic History*, 2009, *69* (4), 951–985.

Farhi, Emmanuel and Iván Werning, "Labor mobility within currency unions," Technical Report, National Bureau of Economic Research 2014.

_ **and Matteo Maggiori**, "A model of the international monetary system," *The Quarterly Journal of Economics*, 2018, *133* (1), 295–355.

_ **and** _ , "China versus the United States: IMS meets IPS," in "AEA Papers and Proceedings," Vol. 109 2019, pp. 476–81.

_ **, Gita Gopinath, and Oleg Itskhoki**, "Fiscal devaluations," *Review of Economic Studies*, 2014, *81* (2), 725–760.

_ **, Pierre-Olivier Gourinchas, and Hélène Rey**, *Reforming the international monetary system*, CEPR, 2011.

Federico, Giovanni, "Market integration and market efficiency: the case of 19th century Italy," *Explorations in Economic History*, 2007, *44* (2), 293–316.

_ , "When did European markets integrate?," *European Review of Economic History*, 2010, *15* (1), 93–126.

_ **, Alessandro Nuvolari, and Michelangelo Vasta**, "The origins of the Italian regional divide: evidence from real wages, 1861–1913," *The Journal of Economic History*, 2019, *79* (1), 63–98.

_ **and Antonio Tena-Junguito**, "Was Italy a protectionist country?," *European Review of Economic History*, 1998, *2* (1), 73–97.

_ **and** _ , "The ripples of the industrial revolution: exports, economic growth, and regional integration in Italy in the early nineteenth century," *European Review of Economic History*, 2014, p. heu007.

_ **and** _ , "World trade, 1800-1938: a new data-set," 2016.

_ **and Kevin O'Rourke**, "A social accounting matrix for Italy, 1911," *Rivista di Storia Economica*, 2000, *16* (1), 3–36.

Felice, Emanuele, *Divari regionali e intervento pubblico: per una rilettura dello sviluppo in Italia*, il Mulino, 2007.

_ , *Perché il Sud è rimasto indietro*, Il Mulino, 2013.

_ **and Giovanni Vecchi**, "Italy's modern economic growth, 1861–2011," *Enterprise & Society*, 2015, *16* (2), 225–248.

Fenoaltea, Stefano, *The reinterpretation of Italian economic history: From unification to the Great War*, Cambridge University Press, 2011.

_ **et al.**, "I due fallimenti della storia economica: il periodo post-unitario," *Rivista di Politica Economica*, 2007, *97* (3/4), 341.

Feyrer, James, "Distance, trade, and income—The 1967 to 1975 closing of the Suez canal as a natural experiment," *Journal of Development Economics*, 2021, *153*, 102708.

Fischer, Christoph, "Determining global currency bloc equilibria: An empirical strategy based on estimates of anchor currency choice," *Journal of International Money and Finance*, 2016, *64*, 214–238.

Fisher, Irving, "The debt-deflation theory of great depressions," *Econometrica: Journal of the Econometric Society*, 1933, pp. 337–357.

Flandreau, Marc, "On the inflationary bias of common currencies: The Latin Union puzzle," *European Economic Review*, 1993, *37* (2-3), 501–506.

_ , "Was the Latin Monetary Union a Franc Zone?," in "International monetary systems in historical perspective," Springer, 1995, pp. 71–89.

_ , "The French Crime of 1873: An Essay on the Emergence of the International Gold Standard, 1870–1880," *The Journal of Economic History*, 1996, *56* (4), 862–897.

_ , "The economics and politics of monetary unions: a reassessment of the Latin Monetary Union, 1865–71," *Financial History Review*, 2000, *7* (01), 25–44.

_ , "The economics and politics of monetary unions: a reassessment of the Latin Monetary Union, 1865–71," *Financial History Review*, 2000, *7* (1), 25–44.

_ , *The bank, the states, and the market: an Austro-Hungarian tale for Euroland, 1867–1914*, Routledge, 2003.

_ , "The logic of compromise: monetary bargaining in Austria-Hungary, 1867–1913," *European Review of Economic History*, 2006, *10* (1), 3–33.

_ **and Clemens Jobst**, "The ties that divide: a network analysis of the international monetary system, 1890–1910," *The Journal of Economic History*, 2005, *65* (4), 977–1007.

_ **and Mathilde Maurel**, "Monetary union, trade integration, and business cycles in 19th century Europe," *Open Economies Review*, 2005, *16* (2), 135–152.

_ **, Jacques Le Cacheux, and Frédéric Zumer**, "Stability without a pact? Lessons from the European gold standard, 1880—1914," *Economic Policy*, 1998, *13* (26), 116–162.

Foreman-Peck, James, "Lessons from Italian Monetary Unification," Technical Report, Oesterrichische Nationalbank Working Paper n. 113 2005.

Fornaro, Luca, "A theory of monetary union and financial integration," *The Review of Economic Studies*, 2021, *Forthcoming*.

Fortunato, G, "La questione meridionale e la riforma tributaria [1904]," *Id., Il Mezzogiorno e lo stato italiano. Firenze*, 1904.

Fortunato, Giustino, *Il Mezzogiorno e lo Stato italiano*, Vol. 2, Vallecchi, 1973.

Franchetti, Leopoldo and Sidney Sonnino, *La Sicilia nel 1876*, Vol. 1, G. Barbèra, 1877.

Frankel, Jeffrey A, "The estimated effects of the euro on trade: why are they below historical effects of monetary unions among smaller countries?," Technical Report, National Bureau of Economic Research 2008.

_ **and Andrew K Rose**, "The endogeneity of the optimum currency area criteria," *The Economic Journal*, 1998, *108* (449), 1009–1025.

_ **and Andrew Rose**, "An estimate of the effect of common currencies on trade and income," *The Quarterly Journal of Economics*, 2002, *117* (2), 437–466.

_ **and Daniel Xie**, "Estimation of de facto flexibility parameter and basket weights in evolving exchange rate regimes," *American Economic Review*, 2010, *100* (2), 568–72.

_ **and Shang-Jin Wei**, "Yen Bloc or Dollar Bloc? Exchange Rate Policies of the East Asian Economies," in "Macroeconomic Linkage: Savings, Exchange Rates, and Capital Flows," University of Chicago Press, 1994, pp. 295–333.

Franks, Jeffrey R, Bergljot B Barkbu, Rodolphe Blavy, William Oman, and Hanni Schoelermann, *Economic convergence in the euro area: coming together or drifting apart?*, International Monetary Fund, 2018.

Fratianni, Michele and Franco Spinelli, *A monetary history of Italy*, Cambridge University Press, 2005.

_ **and Juergen von Hagen**, "German dominance in the EMS: The empirical evidence," *Open Economies Review*, 1992, *3* (1), 127–128.

Fratzscher, Marcel and Arnaud Mehl, "China's dominance hypothesis and the emergence of a tri-polar global currency system," *The Economic Journal*, 2014, *124* (581), 1343–1370.

Frieden, Jeffry, *Lessons for the euro from early American monetary and financial history*, Bruegel, 2016.

Friedman, Milton, "The methodology of positive economics," 1953.

_ , "The crime of 1873," *Journal of Political Economy*, 1990, *98* (6), 1159–1194.

Galí, Jordi and Tommaso Monacelli, "Understanding the gains from wage flexibility: the exchange rate connection," *American Economic Review*, 2016, *106* (12), 3829–68.

Gerko, Elena and Hélene Rey, "Monetary policy in the capitals of capital," *Journal of the European Economic Association*, 2017, *15* (4), 721–745.

Gerschenkron, Alexander, "Notes on the rate of industrial growth in Italy, 1881–1913," *The Journal of Economic History*, 1955, *15* (4), 360–375.

Giannone, Domenico and Lucrezia Reichlin, "Trends and cycles in the euro area: how much heterogeneity and should we worry about it?," Technical Report, European Central Bank 2006.

Giavazzi, Francesco and Alberto Giovannini, "Asymmetries in Europe, the Dollar and the European Monetary System," *Istituto Bancario San Paolo di Torino, Europe and the Dollar, Torino*, 1985.

_ **and** _ , "Modèles du SME: l'Europe n'est-elle qu'une zone deutsche mark?," *Revue économique*, 1988, pp. 641–666.

Gioberti, Vincenzo, *Del primato morale e civile degli italiani*, Vol. 9, Stab. tip. e calc. di C. Batelli e comp., 1848.

Glick, Reuven and Andrew K Rose, "Does a currency union affect trade? The time-series evidence," *European Economic Review*, 2002, *46* (6), 1125–1151.

_ **and** _ , "Currency unions and trade: A post-EMU reassessment," *European Economic Review*, 2016, *87*, 78–91.

Goldberg, Linda S and Cédric Tille, "Vehicle currency use in international trade," *Journal of International Economics*, 2008, *76* (2), 177–192.

Gopinath, Gita, "The International Price System," *Harvard University and NBER*, 2015.

_ **and Jeremy C Stein**, "Trade invoicing, bank funding, and central bank reserve holdings," in "AEA Papers and Proceedings," Vol. 108 2018, pp. 542–46.

_ **and** _ , "Banking, trade, and the making of a dominant currency," *The Quarterly Journal of Economics*, 2021, *136* (2), 783–830.

_ **, Emine Boz, Camila Casas, Federico J Díez, Pierre-Olivier Gourinchas, and Mikkel Plagborg-Møller**, "Dominant currency paradigm," *American Economic Review*, 2020, *110* (3), 677–719.

Gourinchas, Pierre-Olivier, "The Fundamental Structure of the International Monetary System," *Rules for International Monetary Stability: Past, Present and Future*, 2017, pp. 169–203.

_ , "The Dollar Hegemon? Evidence and Implications for Policymakers," in "THE ASIAN MONETARY POLICY FORUM: Insights for Central Banking" World Scientific 2021, pp. 264–300.

_ **and Hélène Rey**, *From World Banker to World Venture Capitalist*, University of Chicago Press, 2007.

_ **and** _ , "International financial adjustment," *Journal of political economy*, 2007, *115* (4), 665–703.

_ **and Maurice Obstfeld**, "Stories of the twentieth century for the twenty-first," *American Economic Journal: Macroeconomics*, 2012, *4* (1), 226–65.

_ **, Hélène Rey, and Nicolas Govillot**, "Exorbitant Privilege and Exorbitant Duty," 2018.

Grauwe, Paul De, *Economics of monetary union*, Oxford University Press, 2016.

_ **and F Mongelli**, "Endogeneities of optimal currency areas: What brings countries sharing a single currency closer together?," *ECB Working paper*, 2005, *468*, 1–40.

_ **and Wim Vanhaverbeke**, "Is Europe an Optimum Currency Area? Evidence from Regional Data," Technical Report, CEPR Discussion Papers 1991.

Guiso, Luigi, Paola Sapienza, and Luigi Zingales, "The role of social capital in financial development," *American Economic Review*, 2004, *94* (3), 526–556.

Hagen, Jürgen Von and Manfred JM Neumann, "Real exchange rates within and between currency areas: how far away is EMU?," *The Review of Economics and Statistics*, 1994, pp. 236–244.

Haldane, Andrew G and Stephen G Hall, "Sterling's Relationship with the Dollar and the Deutschemark: 1976-89," *The Economic Journal*, 1991, *101* (406), 436–443.

Harding, Don and Adrian Pagan, "Dissecting the cycle: a methodological investigation," *Journal of Monetary Economics*, 2002, *49* (2), 365–381.

Head, Keith and Thierry Mayer, "Gravity equations: Workhorse, toolkit, and cookbook," in "Handbook of International Economics," Vol. 4, Elsevier, 2014, pp. 131–195.

Hearder, Harry, *Italy in the Age of the Risorgimento 1790-1870*, Routledge, 2014.

Holtfrerich, Carl-Ludwig, "Did monetary unification precede or follow political unification of Germany in the 19th century?," *European Economic Review*, 1993, *37* (2-3), 518–524.

Hombeeck, Carlos Eduardo Van, "An exorbitant privilege in the first age of international financial integration?," *Journal of International Money and Finance*, 2020, *101*, 102092.

House, Christopher L, Christian Proebsting, and Linda L Tesar, "Quantifying the benefits of labor mobility in a currency union," Technical Report, National Bureau of Economic Research 2018.

i Martin, Xavier Sala and Jeffrey D Sachs, "Fiscal federalism and optimum currency areas: evidence for Europe from the United States," 1991.

Ilzetzki, Ethan, Carmen M Reinhart, and Kenneth S Rogoff, "Exchange arrangements entering the twenty-first century: Which anchor will hold?," *The Quarterly Journal of Economics*, 2019, *134* (2), 599–646.

Imbs, Jean, "Trade, finance, specialization, and synchronization," *The Review of Economics and Statistics*, 2004, *86* (3), 723–734.

Irwin, Douglas A, "Did France cause the great depression?," Technical Report, National Bureau of Economic Research 2010.

Ito, Hiro and Robert N McCauley, "A key currency view of global imbalances," *Journal of International Money and Finance*, 2019, *94*, 97–115.

Iuzzolino, Giovanni, Guido Pellegrini, and Gianfranco Viesti, "Regional convergence," in "The Oxford Handbook of the Italian Economy Since Unification," Oxford University Press, 2013.

James, Harold, "Monetary and Fiscal Unification in Nineteenth-Centuray Germany: What Can Kohl Learn from Bismarck?," Technical Report, International Economics Section, Departement of Economics Princeton University 1997.

_ **and Kevin H O'Rourke**, "Italy and the first age of Globalization, 1861-1940," *Bank of Italy economic history working paper*, 2011, (16).

Johnson, H Clark, *Gold, France, and the Great Depression, 1919-1932*, Yale University Press, 1997.

Jordà, Òscar, Katharina Knoll, Dmitry Kuvshinov, Moritz Schularick, and Alan M Taylor, "The rate of return on everything, 1870–2015," *The Quarterly Journal of Economics*, 2019, *134* (3), 1225–1298.

_ **, Moritz Schularick, and Alan M Taylor**, "Macrofinancial history and the new business cycle facts," *NBER macroeconomics annual*, 2017, *31* (1), 213–263.

Juhász, Réka, "Temporary protection and technology adoption: Evidence from the napoleonic blockade," *American Economic Review*, 2018, *108* (11), 3339–76.

Kalemli-Ozcan, Sebnem, Bent E Sørensen, and Oved Yosha, "Risk sharing and industrial specialization: Regional and international evidence," *American Economic Review*, 2003, *93* (3), 903–918.

_ **, Elias Papaioannou, and Jose-Luis Peydro**, "Financial regulation, financial globalization, and the synchronization of economic activity," *The Journal of Finance*, 2013, *68* (3), 1179–1228.

Kawai, Masahiro and Victor Pontines, "Is there really a renminbi bloc in Asia?: A modified Frankel–Wei approach," *Journal of International Money and Finance*, 2016, *62*, 72–97.

Kenen, Peter, "The theory of optimum currency areas: an eclectic view," *Monetary problems of the international economy*, 1969, *45* (3), 41–60.

Kenen, Peter B, *The role of the dollar as an international currency*, Vol. 13, Group of Thirty, 1983.

Keynes, John Maynard, "Treatise on money: The Applied Theory of Money Vol. II," 1930.

Khoudour-Casteras, David, "International Adjustment under the Classical Gold Standard: The Migration Nexus," *Financial History Review*, 2003.

Kirkegaard, Jacob Funk and Adam S Posen, "Lessons for EU integration from US history," *European Commission [online]. Accessed October*, 2018, *5*, 2019.

Krugman, Paul, "Lessons of Massachusetts for EMU," *International Library of Critical Writings in Economics*, 2001, *134*, 41–61.

Krugman, Paul R, *Geography and trade*, MIT press, 1991.

Lane, Philip R, "The real effects of European monetary union," *Journal of Economic Perspectives*, 2006, *20* (4), 47–66.

Larch, Mario, Joschka Wanner, Yoto V Yotov, and Thomas Zylkin, "Currency Unions and Trade: A PPML Re-assessment with High-dimensional Fixed Effects," *Oxford Bulletin of Economics and Statistics*, 2018.

Lévy-Leboyer, Maurice, *La position internationale de la France. Aspects économiques et financiers, 19e–20e siècles*, Paris: Editions de l'Ecole des Hautes Etudes en Sciences Sociales, 1977.

Lindert, Peter H, *Key currencies and gold, 1900-1913* number 24, International Finance Section, Princeton University, 1969.

Lindert, Peter Harrison, *Key currencies and the gold exchange standard, 1900-1913*, Cornell University, 1967.

Lopez-Cordova, J. Ernesto and Christopher M Meissner, "Exchange-rate regimes and international trade: Evidence from the classical gold standard era," *American Economic Review*, 2003, *93* (1), 344–353.

Maggiori, Matteo, Brent Neiman, and Jesse Schreger, "International currencies and capital allocation," Technical Report, National Bureau of Economic Research 2018.

Malanima, P and V Daniele, "Il prodotto delle regioni e il divario Nord-Sud in Italia (1861-2004)," *Rivista di Politica Economica*, 2007.

Mandeng, Ousmène Jacques, "Central bank reform, spatial diversity and monetary policy in Germany, 1876-1890." PhD dissertation, The London School of Economics and Political Science (LSE) 2019.

Marks, L. F., "Rapporti di Consolati e Legazioni Inglesi in Italia dal 1830 al 1870 sulle Condizioni Economiche e Sociali," *Archivio Economico dell'Unificazione Italiana*, 1959, *I* (IX, 3), 1–31.

Mathy, Gabriel P and Christopher M Meissner, "Business cycle co-movement: evidence from the great depression," *Journal of Monetary Economics*, 2011, *58* (4), 362–372.

Mattia, Renato De, *L'unificazione monetaria italiana*, Vol. 2, Industria libraria tipografica editrice, 1959.

Mauro, Tullio De, *Storia linguistica dell'Italia unita-Storia linguistica dell'Italia Repubblicana*, Gius. Laterza & Figli Spa, 2017.

McCauley, Robert N and Chang Shu, "Recent renminbi policy and currency co-movements," *Journal of International Money and Finance*, 2019, *95*, 444–456.

McKinnon, Ronald I, "Optimum currency areas," *The American Economic Review*, 1963, *53* (4), 717–725.

Meissner, Christopher M, "A new world order: explaining the international diffusion of the gold standard, 1870–1913," *Journal of International Economics*, 2005, *66* (2), 385–406.

_ **and Alan M Taylor**, "Losing our marbles in the new century? The great rebalancing in historical perspective," 2006.

_ **and Nienke Oomes**, "Why do countries peg the way they peg? The determinants of anchor currency choice," *Journal of International Money and Finance*, 2009, *28* (3), 522–547.

Melis, Guido, "Fare lo Stato per fare gli italiani," *Bologna, il Mulino*, 2014.

Micco, Alejandro, Ernesto Stein, and Guillermo Ordoñez, "The currency union effect on trade: early evidence from EMU," *Economic Policy*, 2003, *18* (37), 315–356.

Ministère du Commerce, "Faits Commerciaux," *Annales du Commerce Extérieur*, 1878.

Miranda-Agrippino, Silvia and Hélene Rey, "US monetary policy and the global financial cycle," *The Review of Economic Studies*, 2020, *87* (6), 2754–2776.

Missiaia, Anna, "Industrial location, market access and economic development: regional patterns in post-unification Italy." PhD dissertation, The London School of Economics and Political Science (LSE) 2014.

_ , "Where do we go from here? Market access and regional development in Italy (1871–1911)," *European Review of Economic History*, 2016, *20* (2), 215–241.

_ , "Market versus endowment: explaining early industrial location in Italy (1871–1911)," *Cliometrica*, 2019, *13* (1), 127–161.

Mitchell, Brian, *International historical statistics: Europe 1750-1993*, Springer, 1998.

Mitchener, Kris James and Gonçalo Pina, "Pegxit pressure," *Journal of International Money and Finance*, 2020, *107*, 102191.

_ **and Hans-Joachim Voth**, "Trading Silver for Gold: Nineteenth Century Asian Exports and the Political Economy of Currency Unions," *Costs and Benefits of Economic Integration in Asia*, 2011, pp. 126–48.

Mongelli, Francesco Paolo, "European economic and monetary integration, and the optimum currency area theory," Technical Report, Directorate General Economic and Financial Affairs (DG ECFIN), European Commission 2008.

_ **, Elisa Reinhold, and Georgios Papadopoulos**, "What's so Special About Specialisation in the Euro Area?," Technical Report, European Central Bank 2016.

Monnet, Eric and Damien Puy, *One ring to rule them all? New evidence on world cycles*, International Monetary Fund, 2019.

Mundell, Robert A, "A theory of optimum currency areas," *The American Economic Review*, 1961, *51* (4), 657–665.

Myers, Margaret Good, *Paris as a financial centre*, PS King, 1936.

Nannicini, Tommaso, Andrea Stella, Guido Tabellini, and Ugo Troiano, "Social capital and political accountability," *American Economic Journal: Economic Policy*, 2013, *5* (2), 222–50.

Nardi, Giuseppe Di, *Le banche di emissione in Italia nel secolo XIX*, Unione Tipografico-editrice torinese, 1953.

Neal, Larry D, Marc D Weidenmier et al., "Crises in the global economy from tulips to today," *Globalization in historical perspective*, 2003, *473*, 514.

Nitsch, Volker, "Honey, I shrunk the currency union effect on trade," *World Economy*, 2002, *25* (4), 457–474.

Nitti, Francesco Saverio, *Nord e Sud: prime linee di una inchiesta sulla ripartizione territoriale delle entrate e delle spese dello stato in Italia...*, Vol. 30, Roux e Viarengo, 1900.

Nurkse, Ragnar, *International currency experience: lessons of the interwar period*, Vol. 2, League of Nations, 1944.

O'Rourke, Kevin H, "The European grain invasion, 1870–1913," *The Journal of Economic History*, 1997, *57* (4), 775–801.

_ **and Alan M Taylor**, "Cross of euros," *Journal of Economic Perspectives*, 2013, *27* (3), 167–92.

Pahre, Robert, "Politics and trade cooperation in the nineteenth century," *Cambridge Books*, 2012.

Palma, Nuno, "Reconstruction of money supply over the long run: the case of England, 1270–1870," *The Economic History Review*, 2018, *71* (2), 373–392.

_ , "The real effects of monetary expansions: evidence from a large-scale historical experiment," *Review of Economic Studies*, 2021.

Persson, Torsten, "Currency unions and trade: how large is the treatment effect?," *Economic Policy*, 2001, *16* (33), 434–448.

Pisani-Ferry, Jean and Adam Posen, *The euro at ten: the next global currency*, Peterson Institute, 2009.

Polity, IV, "Polity iv project: Political regime characteristics and transitions, 1800-2012," *On-line (http://www. systemicpeace. org/polity/polity4. htm)*, 2012.

Portes, Richard and Helene Rey, "The emergence of the euro as an international currency," 1998.

Putnam, Robert D, Robert Leonardi, and Raffaella Y Nanetti, *Making democracy work*, Princeton University Press, 1994.

Reinhart, Carmen M and Kenneth S Rogoff, "The modern history of exchange rate arrangements: a reinterpretation," *the Quarterly Journal of economics*, 2004, *119* (1), 1–48.

_ **and** _ , "This time is different: A panoramic view of eight centuries of financial crises," Technical Report, National Bureau of Economic Research 2008.

_ **and** _ , *This time is different*, Princeton University Press, 2009.

_ **and** _ , "From financial crash to debt crisis," *American Economic Review*, 2011, *101* (5), 1676–1706.

Rey, Hélène, "International trade and currency exchange," *The Review of Economic Studies*, 2001, *68* (2), 443–464.

_ , "Dilemma not trilemma: the global financial cycle and monetary policy independence," Technical Report, Jackson Hole Symposium Proceedings, Federal Reserve Bank of Kansas City 2013.

_ , *International Monetary System and Global Financial Cycles*, Paolo Baffi Lecture, Banca d'Italia, 2019.

Ritschl, Albrecht, "The German transfer problem, 1920–33: a sovereign-debt perspective," *European Review of History: Revue europeenne d'histoire*, 2012, *19* (6), 943–964.

Roccas, Massimo and Valeria Sannucci, *L'Italia e il sistema finanziario internazionale: 1861-1914*, Laterza, 1990.

Rockoff, Hugh, "The" Wizard of Oz" as a monetary allegory," *Journal of Political Economy*, 1990, *98* (4), 739–760.

_ , "How long did it take the United States to become an optimal currency area?: The troubled history of the American monetary union," in "Monetary Unions," Routledge, 2003, pp. 86–113.

Romeo, Rosario, "Risorgimento e capitalismo, Bari, Laterza, 1959; E," *Sereni, Capitalismo e mer-cato nazionale in Italia, Roma, Editori Riuniti*, 1959.

_ , "Cavour e il suo tempo," *Bari, Laterza*, 1984.

Rose, Andrew K, "One money, one market: the effect of common currencies on trade," *Economic Policy*, 2000, *15* (30), 08–45.

_ , "Why do estimates of the EMU effect on trade vary so much?," *Open Economies Review*, 2017, *28* (1), 1–18.

Sánchez-Alonso, Blanca, "Those who left and those who stayed behind: explaining emigration from the regions of Spain, 1880–1914," *The Journal of Economic History*, 2000, *60* (03), 730–755.

Sarkees, Meredieth Reid and Frank Wayman, *Resort to war: 1816-2007. Correlates of War*, Washington DC: CQ Press, 2010.

Schmelzing, Paul, "Staff Working Paper No. 845 Eight centuries of global real interest rates, RG, and the 'suprasecular'decline, 1311–2018," 2020.

Schmitt-Grohé, Stephanie and Martin Uribe, "Downward nominal wage rigidity, currency pegs, and involuntary unemployment," *Journal of Political Economy*, 2016, *124* (5), 1466–1514.

Schneider, Jürgen, Oskar Schwarzer, and Markus A Denzel, *Währungen der Welt*, Steiner, 1992.

Silva, JMC Santos and Silvana Tenreyro, "The log of gravity," *The Review of Economics and Statistics*, 2006, *88* (4), 641–658.

_ **and** _ , "Currency unions in prospect and retrospect," *Annu. Rev. Econ.*, 2010, *2* (1), 51–74.

Smith, Denis Mack, *Garibaldi e Cavour nel 1860.[Trad. di P. Gori].*, Einaudi, 1958.

Smith, Denis Mack, *The Making of Italy, 1796–1866*, Springer, 1988.

Sørensen, Bent E and Oved Yosha, "International risk sharing and European monetary unification," *Journal of International Economics*, 1998, *45* (2), 211–238.

Sousa, José De, "The currency union effect on trade is decreasing over time," *Economics Letters*, 2012, *117* (3), 917–920.

Spolaore, Enrico, "What is European integration really about? A political guide for economists," *Journal of Economic Perspectives*, 2013, *27* (3), 125–44.

Stiglitz, Joseph E, *The euro: How a common currency threatens the future of Europe*, WW Norton & Company, 2016.

Stringher, Bonaldo, "La politica doganale negli ultimi trent'anni," *Giornale degli Economisti*, 1889, pp. 127–170.

Tattara, Giuseppe, "Paper money but a gold debt: Italy on the gold standard," *Explorations in Economic History*, 2003, *40* (2), 122–142.

_ **and Mario Volpe**, *Italy, the fiscal-dominance model, and the gold-standard age*, Routledge, 2002.

Tavlas, George S, "The 'new'theory of optimum currency areas," *World Economy*, 1993, *16* (6), 663–685.

Tena-Junguito, Antonio, Markus Lampe, and Felipe Tâmega Fernandes, "How much trade liberalization was there in the world before and after Cobden-Chevalier?," *The Journal of Economic History*, 2012, *72* (3), 708–740.

Tenreyro, Silvana, "Comment on" The Estimated Effects of the Euro on Trade: Why Are They Below Historical Effects of Monetary Unions Among Smaller Countries?"," in "Europe and the Euro," University of Chicago Press, 2010, pp. 212–218.

Thomas, Ryland, Sally Hills, and Nicholas Dimsdale, "The UK recession in context—what do three centuries of data tell us?," *Bank of England Quarterly Bulletin*, 2010, p. Q4.

Timini, Jacopo, "Currency unions and heterogeneous trade effects: the case of the Latin Monetary Union," *European Review of Economic History*, 2018, *22* (3), 322–348.

Toniolo, Gianni, "An overview of Italy's economic growth," *The Oxford Handbook of the Italian economy since unification*, 2013.

_ **, Leandro Conte, and Giovanni Vecchi**, "Monetary Union, institutions and financial market integration: Italy, 1862–1905," *Explorations in Economic History*, 2003, *40* (4), 443–461.

Tovar, Camilo E and Tania Mohd Nor, *Reserve currency blocs: a changing international monetary system?*, International Monetary Fund, 2018.

Treasury, Her Majesty's, "UK membership of the single currency: An assessment of the five economic tests," *Convergence, http://www. hm-treasury. gov. uk*, 2003.

Triffin, Robert, *Gold and the dollar crisis: the future of convertibility*, Vol. 39, New Haven: Yale University Press, 1960.

_ , *The evolution of the international monetary system: Historical reappraisal and future perspectives* number 48, International Finance Section, Department of Economics, Princeton University, 1964.

Ugolini, Stefano, "The international monetary system, 1844-1870: arbitrage, efficiency, liquidity," 2010.

_ , "Foreign exchange reserve management in the nineteenth century: the National Bank of Belgium in the 1850s," in "The Gold Standard Peripheries," Springer, 2012, pp. 107–129.

Vernet, Daniel, "Mitterrand, l'Europe et la réunification allemande," *Politique étrangère*, 2003, pp. 165–179.

Weidner, Martin and Thomas Zylkin, "Bias and consistency in three-way gravity models," *Journal of International Economics*, 2021, *132*, 103513.

Wiegand, Mr Johannes, *Destabilizing the Global Monetary System: Germany's Adoption of the Gold Standard in the Early 1870s*, International Monetary Fund, 2019.

Wolf, Nikolaus and Albrecht O Ritschl, "Endogeneity of currency areas and trade blocs: evidence from a natural experiment," *Kyklos*, 2011, *64* (2), 291–312.

Yeyati, Eduardo Levy, Federico Sturzenegger, and Iliana Reggio, "On the endogeneity of exchange rate regimes," *European Economic Review*, 2010, *54* (5), 659–677.

Zamagni, Vera, "Ferrovie e integrazione del mercato nazionale nell'Italia post-unitaria," *Studi in onore di Gino Barbieri*, 1984, *3*.