Reshaping Global Trade: The Immediate and Long-Run Effects of Bank Failures

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Abstract

I study the first modern global banking crisis that began in London in 1866 and provide causal evidence that financial sector disruptions can reshape international trade patterns for decades. Using newly collected archival loan records that link banks to their operations abroad, I estimate that countries exposed to banks whose headquarters in London failed exported 17% less on average to each destination until 1905. Exporters trading with destinations for the first time, facing more competition in goods markets, and with little access to alternative forms of credit experienced more persistent losses, consistent with hysteresis arising from high sunk costs of entry into exporting.

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How much do financial crises affect international trade? Given the frequency of financial sector disruptions in both developing and advanced economies and the importance of trade to output and growth, understanding how aggregate trade flows respond to crises is crucial both for crafting policy responses and for understanding the relationship between temporary shocks and immediate to long-run outcomes.

Yet establishing the causal effect of financial shocks on trade is difficult for multiple reasons. Economic fundamentals simultaneously impact exports and banking sector health. Even when it is possible to isolate an exogenous shock to the financial sector, studies are usually limited to examining short-run outcomes within one country or else to combining episodes from a variety of institutionally dissimilar countries and time periods.[1] Ideally, it would be possible to trace out the long arm of history over uninterrupted decades in a setting where many countries are affected by the same institutions through uniform channels.

I address these problems by studying the 1866 London banking crisis which differentially disrupted trade financing in countries around the world. At the time, Britain was the center of the global financial system, operating in countries that accounted for 98% of world exports and providing over 90% of trade finance globally.[2] The crisis in London propagated around the world to different degrees based on the network of British banks. This variation in the intensity of the shock allows me to implement a difference-in-difference (DD) specification that compares exports volumes across locations that were more or less exposed to bank failures, before and after 1866.

The banking crisis in this paper provides an ideal setting for causally estimating the international and immediate to long-run effects. It was caused by the unexpected failure of a financial market intermediary—one of London's largest—the firm Overend & Gurney. This event triggered severe bank runs on London's deposit-issuing banks and ultimately, 12 percent of multinational banks (by assets) headquartered in London failed and ceased foreign operations.[3] Since these banks dealt almost exclusively in trade finance, their institutional similarities in funding sources, investment model, management structure, and operations means that they affected exports through the same channel across locations, as opposed

[1]Romer and Romer (2018) documents how in the post-Bretton Woods era, financial crises have very different effects on output depending on policymakers' ability to enact post-crisis countercyclical policies. The extent to which countries were able or willing to intervene following financial crises varied tremendously over the course of the 19th and 20th centuries, even within the set of developed countries, complicating the interpretation of results averaging over all such events.

[2]Calculated using the locations and operations of British and non-British banks and values of exports across countries in 1865.

[3]This incidence of international capital reversals causing cross-border contagion is particularly relevant today. Peek and Rosengren (1997, 2000); Cetorelli and Goldberg (2011); Schnabl (2012) show their effects in a variety of national contexts. In Hale, Kapan and Minoiu (2019), banks with direct or indirect exposure to other banks experiencing systemic crises contract lending, thereby causing lower investment and firm growth.

to the more omnibus bank shocks of the modern period.[4] The crisis also occurred at the beginning of the First Age of Globalization and was followed by almost five decades of relative global peace and low capital and goods flow restrictions, which provides a unique and ideal setting for tracing out the effect of the shock in the long run, where the estimate is not polluted by major subsequent conflicts.

Although my identification strategy does not rely on randomness of bank failures, I provide narrative and quantitative evidence that the crisis followed a panic scenario where the bank runs were unrelated to the banks' solvency. I show that the only observable bank characteristic correlated with failure is a publicly observable connection to Overend & Gurney. Crucially, Overend was not itself involved in trade finance or trade-related activities, so this connection was unlikely to be correlated with exports fundamentals in the banks' operating regions. Consistent with the environment of limited knowledge during the panic, there is also no relationship between the Overend connection and quantitative measures of bank health and risk-taking, or with narrative accounts of the banks' investment opportunities and growth in their operating regions. This pure panic scenario further distinguishes the setting in this paper from other historical banking crises that have usually arisen from negative real economic shocks.

Identification does rely on the less stringent requirement that there is no simultaneous shock to a location that would cause both its exports to decline and the banks operating there to fail (Borusyak, Hull and Jaravel, 2018). I provide a number of covariate balance tests of bank exposure to location characteristics and additional robustness checks in support of this assumption.

My analysis relies on the construction of several new datasets of historical trade and financing activity around the world, both within and across countries. First, I measure countries' and cities' exposure to British bank failures from over 11,000 handwritten archival loan records that represent the distribution of pre-crisis British bank lending relationships around the world.[5] Second, for each bank, I collect balance sheets, shareholder meeting transcripts, and other narrative sources before and after the crisis. Third, for each country, I assemble a panel of bilateral exports values spanning the period 1850–1914. I complement these country-level measures with the initial industry composition of exports from original trade statistics publications. Fourth, within countries, I measure exporting activity with daily port-level ship movements from the *Lloyd's List* newspaper for the two year window

[4]While many papers with modern data are able to exploit bank balance sheet data and firm-bank linkages, it is difficult to directly observe trade finance, so they tend to estimate an overall "bank channel." As noted by Ahn, Amiti and Weinstein (2011) these measurements are often uncorrelated with trade finance.

[5]To my knowledge, these are the only data with global coverage of the dominant financial center's banking relationships in any time period.

around the crisis. I also track the number of banks operating in each city to track financial sector recovery until 1914.

The conceptual framework for how a temporary financial shock could have long-run effects on the patterns of international trade is based on the hysteresis literature.[6] Hysteresis arises when exporters face a sunk cost of entering a new market, as in Baldwin (1988), Baldwin and Krugman (1989), or Dixit (1989).[7] These entry costs generate dynamics where the current period exporting status and volumes depend on previous periods' status. Exporters whose marginal costs have been raised by the financing shock may find their operating profits insufficient to cover the entry costs of selling to a new market. Their unshocked competitors will be relatively advantaged, which induces entry and drives down prices. When goods are highly substitutable and firms face downward sloping marginal revenue curves, these competitive effects during the period of the shock will mean that shocked exporters continue to be disadvantaged even after their marginal costs return to pre-shock levels. In this class of models, failure to gain market share initially due to a shock can lead to being shut out of markets permanently and therefore persistently lower exports.

My first set of results shows that the financing shock lowered exports volumes on the intensive margin. This effect is consistent with the financing shock raising trade costs per unit of good shipped, thereby making an exporter less competitive and reducing its volumes sold. Immediately after the crisis, cities and countries exposed to a one standard deviation increase in bank failures had 8.2% and 10.6% lower exports, respectively.[8] These results are robust to a large number of checks (Appendix E.1). The availability of financing in neighboring cities did not compensate for the immediate losses exposed exporters faced, suggesting that there was relationship-stickiness in banking (Bernanke, 1983).

Consistent with the sunk cost explanation, in my second set of results, I find that exposed exporters had fewer trade partners and were less likely to trade immediately after the crisis on the extensive margin. In the year after the crisis, a one standard deviation increase in exposure caused cities to have 5.6% fewer trade partners and to be 5.2% less likely to engage in international trade at all. I also find that pre-existing exporters who are exposed were not more likely to exit, as predicted by the framework, as they have already paid the sunk costs.

My third set of results show that the exports losses were highly persistent despite the fast local banking sector recovery. The financing shock lasted five years, after which cities

[6]Hysteresis is defined as effects that persist even after the initial stimulus has been removed.

[7]Sunk costs can be micro-founded from the costs of learning about a new market or in acquiring a customer base, and they are estimated to be high even today when information is much cheaper to obtain (Roberts and Tybout, 1997; Bernard and Jensen, 2004; Das, Roberts and Tybout, 2007)

[8]One standard deviation of bank failure exposure for cities was 19% and for countries 16%.

with above-average exposure to bank failures regained the number of banks lost and had as many banks as cities with below-average exposure. In terms of aggregate exports, countries with above-average exposure experienced a large initial difference in annual growth rates which put them on a permanently lower exporting path after 1866. While annual growth rates re-converged after five years, there was no compensating growth that returned these countries to their pre-shock trend levels, leading to a cumulative difference of 76.8% in aggregate exports between the two groups in 1914.

Effects on aggregate exports may in part be driven by differential demand patterns among countries' trade partners. However, even after controlling for annual demand shocks from importers as well as standard measures of resistance to trade between countries using structural gravity, I find that the average importer bought significantly less each year from more-exposed exporters for four decades. The overall magnitude of the financing shock in partial equilibrium is a 17% disruption in world trade annually. As in the immediate effects, there is a meaningful difference between exporters who were new to a destination and had not paid the sunk cost relative to pre-existing ones, where both the magnitudes and persistence of the effects are more severe for the former group. This pattern of slow recovery is robust to controlling for a wide variety of contemporary shocks and initial macro-economic conditions as well as simulated placebo shocks (Appendix E.2).

In the final section of the paper, I provide cross sectional evidence in line with the existence of sunk costs creating hysteresisis. First, affected countries exporting goods more similar to other non-affected countries are less likely to recover in the long-run because exposure to the financing shock positively benefits those non-affected competitor countries' exports. Second, exporters whose exposure to bank failures was likely to be improved by access to alternative sources of financing during the shock were shielded from the hysteretic effects. Third, relationships that are more likely to rely on trade finance, such as those that are more physically distant, experienced more persistent losses than closer relationships.

This partial equilibrium analysis cannot speak to the general equilibrium effects for aggregate global trade, and in particular does not provide a counterfactual for the total amount of world exports lost due to the crisis. However, I provide evidence that aggregate global trade did not suffer persistently. After controlling for income, countries' imports do not appear to be affected by the financing shock, which indicates that importers were able to substitute across exporters and compensate for losses from exposed countries with gains from unexposed countries. This pattern of cross-country substitution by importers also corroborates the conceptual framework that unshocked exporters were able to differentially benefit and gain market share at the expense of their competitors.

The magnitudes of the long-run losses for exporters are large, but they are consistent

with the theoretical results that hysteretic effects from temporary shocks can be permanent and the empirical evidence that export patterns in the absence of shocks appear highly persistent.[9] However, allowing for technological change and the introduction of new varieties of goods over decades will attenuate the market share effects between trade partners. Ultimately, the rate of attenuation remains an empirical question, and this paper provides the first estimate from a quasi-experimental setting.[10] The preponderance of trade in commodities versus manufactured goods, the long delays in communication times, and the rapid rate of globalization in the 1860s and 70s all likely contributed to the magnitudes in this setting.

This paper contributes to several literatures. First it speaks to the debate on the role of finance in trade.[11] Many studies use cross-industry variation in external finance dependence and measure a country or firm's access to finance, finding that costs of external finance differentially affects exports for countries or firms specializing in financially-dependent sectors (Manova, 2008; Iacovone and Zavacka, 2009; Manova, 2013; Muûls, 2015). The trade response to financial shocks gained prominence following the Great Trade Collapse of 2008, and while some studies using this methodology found financial conditions to be a first-order determinant of trade flows (Chor and Manova, 2012) others taking a structural approach attributed the decline to demand and inventory (Alessandria, Kaboski and Midrigan, 2010; Eaton, Kortum, Neiman and Romalis, 2016). My analysis also focuses on post-crisis outcomes, but I present reduced-form evidence using bank-level variation like Amiti and Weinstein (2011); Paravisini, Rappoport, Schnabl and Wolfenzon (2014) while still being able to extend the analysis to every country over much longer periods.

The paper also provides empirical evidence of the hysteretic effects of a temporary shock to trade costs as modeled in Baldwin (1988). Empirical work such as Roberts and Tybout (1997), Eichengreen and Irwin (1998), and Bernard and Jensen (2004) show that firms' and countries' history of exporting matters for contemporary trade patterns, but none provides direct evidence from an exogenous shock nor guidance on how long these effects can last. While the literature in economic geography has shown that fundamental shocks to physical capital and technology can affect initial conditions that lead to agglomeration forces (Davis and Weinstein, 2002; Bleakley and Lin, 2012; Henderson, Squires, Storeygard and Weil, 2017), this paper highlights a separate mechanism showing how financial development affects cross-country differences in trade patterns. In particular, the advantages of

[9]For instance, Bernard and Jensen (2004) find that in a panel of US firms from 1984 to 1992, 87.4% of exporters continue to export while 86.1% of non-exporters do not begin exporting. Eichengreen and Irwin (1998) find that at the country-level, historical trade patterns remain highly predictive of modern ones.

[10]It is worth noting that some studies such as Cerra and Saxena (2008) in the macroeconomic literature also find *permanent* effects on the entire economy.

[11]See Foley and Manova (2015) for a comprehensive review and assessment of the literature.

financial access while integrating into world markets during the First Age of Globalization—a critical juncture in world history—appears to be a source of significant first-mover advantages (Krugman, 1991).

More generally, it relates to the literature that has found that financial crises have long-lasting effects on many components of the economy, such as output and employment, and that they appear to weaken the financial sector and make it more susceptible to other types of crises (Kaminsky and Reinhart, 1999; Cerra and Saxena, 2008; Reinhart and Rogoff, 2009; Schularick and Taylor, 2012; Jordà, Schularick and Taylor, 2013). Studies that focus on the trade effects such as Abiad, Mishra and Topalova (2014) and Benguria and Taylor (2019) also follow this macroeconomic methodology of estimating the average impact over many crises. While this literature has attempted to address the inherent endogeneity concerns arising from correlating indicators of domestic outcomes by using VAR-like techniques or gravity estimations with many controls, they acknowledge that these correlations cannot fully address the issue of reverse causality. I follow the strand of literature that has circumvented these concerns by focusing on crises originating abroad (Peek and Rosengren, 1997, 2000; Cetorelli and Goldberg, 2011), but the recent settings of those studies necessarily prevent them from speaking to long-run effects. By contrast, my historical setting makes it natural to examine decades of outcomes.

Finally, in the modern economy, credit conditions in peripheral countries have been found to be disproportionately associated with capital flows from the current global financial center (Eichengreen and Rose, 2004; Gourinchas, Rey and Truempler, 2012). Rey (2015) shows that the ultimate source of these credit cycles may be monetary policy transmitted through global banks. The setting of a major shock to the pre-WWI global hegemon in this paper also illustrates how conditions in the dominant financial market affects real activity globally, particularly in sectors sensitive to the costs of external financing.

The paper is organized as follows: the next section discusses the historical context and conceptual framework. Section 2 discusses the historical data sources and Section 3 describes the identification strategy. Section 4 reports the main results, and Section 5 provides evidence on the changes in the patterns of trade. Section 6 concludes.

1 History & conceptual framework

1.1 Historical context

1.1.1 Trade finance & British banking dominance

Contractual frictions were a major barrier to establishing international trading relationships in the 19th century (Reber, 1979), just as they are today (Antràs and Foley, 2015; Schmidt-Eisenlohr, 2013). Due to the long lag between the initial shipment by exporters, the receipt of goods by importers, and their final sale to consumers, purchase and payment was staggered, and there was room for default on both sides. Importers were not willing to directly finance exporters through cash-in-advance payment when the exporter was risky and losses due to disputes over quantity or quality were unlikely to be recouped. These contractual frictions were particularly high for exporters in countries of low institutional quality or in new markets where litigation was costly. Exporters waiting for payments faced higher working capital costs, and contemporary 19th century accounts indicate that uncertainty over payments made it difficult for exporters to operate, creating a role for banks (Reber, 1979, p.75).

Banks were well-positioned to overcome these contractual frictions because they operated locally, which gave them superior knowledge of an exporting firm's risk and allowed them to accept collateral.[12] British banks were created to stimulate international trade and were not permitted to act as general commercial banks and invest in long-term, illiquid assets in their local markets abroad (Chapman, 1984).[13] Their business model also benefited from a form of exorbitant privilege due to the pound sterling's centrality. Banks paid low rates on domestic liabilities (deposits) in the largest capital pool in the world and received high rates on their foreign assets (trade finance).[14] These structural advantages over local and other European banks, stemming from the London connection, contributed to British banking dominance and global reach such that by 1865, British banks funded over 90% of

[12]For example, the Bank of London and the River Plate "attempted to assess the credit standing of its customers, although a good deal of business was carried on through personal contacts and oral agreements. The board of directors of the bank sought to establish credit guidelines. It stipulated that no credit exceeding £20,000 should be given to any single person or firm. The bank evaluated the respectability and soundness of mercantile houses and curtailed credit when necessary.[...] Each credit case was worked out individually with the house, and the amount of credit extended depended on the bank's knowledge of the customer's reliability," (Reber, 1979, p. 60-61).

[13]For example, it was in the Chartered Bank of India Australia and China's prospectus that it would be "[prohibited from] the making of advances on landed or other immovable Securities, or on growing crops."

[14]The English and Swedish Bank described this business model in the following way in their shareholder meeting on January 15, 1867: "When the bank was formed it was intended to receive money in England on deposit at the ordinary rate, and lend it out in Sweden at the high rate which was paid there upon such transactions...Money was cheap in England, but a very high rate could be obtained for it in Sweden."

the world's trade credit.

The primary instrument used were short-term, often collateralized, loans called a "banker's acceptance." Acceptances were "IOUs" written between a borrower (an exporting firm) and a creditor (in this case the British bank) in which the creditor "accepted" that the borrower would repay him in the future (usually after 3–6 months). This source of financing provided exporters with working capital costs during the duration of shipment. Contemporaries emphasized that British banks were not limited to funding trade with Britain, and in fact were integral for trade that had no British counterparties.[15]

A banker's acceptance had the feature of joint liability meaning that in the case of default by the borrower, the acceptor (bank) was responsible for the debt.[16] The bank guarantee transformed these instruments from bearing the idiosyncratic risk of the individual exporter into bearing the bank's credit risk instead. The bank absorbed the exporting firms' credit risk by lending to it at the rate it deemed appropriate.

Bills of exchange traded on the London money market, and demand for these bills in London fueled the second half of a bill's life-cycle: after being "accepted" in the local office, the instrument was remitted to London where the head office "discounted" it in the money market (Jones, 2000, p.23).[17] In return for the remitted bills, the head office in London supplied the local offices with fresh capital to transform into bills.[18] Figure C1 documents the full life cycle of a bill of exchange.

Bills accepted by these multinational banks were discountable at the Bank of England (BoE) because these banks had accounts at the BoE, and the BoE monitored its customers' ability to meet its acceptance liabilities (Bignon, Flandreau and Ugolini, 2012). This feature meant that the BoE would ultimately absorb the losses if both the original debtor (the exporting firm) and the original lender (the British bank) defaulted.[19]

[15]For example, "[American imports of] wines from France, coffee from Brazil, sugar from the West Indies, and silk from Hong Kong were paid alike with bills on London," (Jenks, 1927, p. 69)

[16]Contemporaries distinguished the term "banker's acceptance" from the more general "bills of exchange" to emphasize that the former instrument was backed by a trustworthy financial institution. However, in this paper, the two terms will be used interchangeably.

[17]Discounts most resemble a modern-day repurchase agreement: the seller received the face value of the bill minus the discount rate (haircut) at the initiation of the transaction, and he paid the full face value in return for the security at its maturity. At maturity, the bill was presented to the original borrower via his accepting bank for repayment, and the debt was terminated.

[18]The Eastern Exchange Bank described this cycle of financing between its headquarters in London and its office in Alexandria during its bi-annual meeting on March 1, 1865 the following way: "The bills sent home from Alexandria for correction had to be re-discounted in the Liverpool and London market at the current rates, so as to turn them into gold and send them out to Alexandria to be employed in fresh operations."

[19]Bignon, Flandreau and Ugolini (2012) calculates the "amount at risk" on the Bank of England's balance sheet over three crises in the 19th century, and they show that the BoE was careful to limit this amount from any given lender.

1.1.2 London banking crisis of 1866

The 1866 crisis was the first modern global banking crisis and one of the most severe to ever affect the London money market, during which 22 out of 128 multinational banks headquartered in London (12% of banks by assets) failed.

The crisis was caused by the unanticipated bankruptcy of the firm Overend & Gurney, the largest and most prestigious interbank lender in the City of London. Its business as an intermediary was buying and selling liquid, short-term bills of exchange from and to London banks. It did not lend long-term on illiquid assets, and it had no overseas operations. Crucially for the purposes of this study, it did not finance trade and therefore had no exposure to overseas exports markets.

Overend's business had been built over decades by earlier generations of partners such that by the mid-19th century, it was one of the most reputable firms in London. In the early 1860s, a younger generation of partners took over the firm and delegated the business to "wily sycophants" who mismanaged the firm's assets with speculative and illiquid investments that quickly began to fail (King, 1936, p. 246). However, the true state of affairs was not known to the public, and the firm successfully issued equity to convert its ownership structure from that of a privately held company to a publicly-listed joint-stock firm as a gamble to recover its losses in July 1865.[20] *Banker's Magazine*, a leading financial market publication, fully endorsed the firm as one of the best in the City of London when Overend & Gurney announced its equity issuance. Yet the new capital was not sufficient, and less than one year later in May 1866, Overend's directors privately approached the BoE for a private loan. The BoE declined to extend credit, and Overend announced its bankruptcy the following morning.[21] I provide details on the company's history, evidence on shareholders' ignorance of the true state of affairs, and previous scholarship on Overend in Appendix C.2.

Overend's failure had two immediate effects on the London money market: the first was a negative supply shock for liquidity because the largest intermediary could no longer fulfill the banks' need. The second was widespread bank runs on all London banks as the news caused depositors to panic.[22] Ultimately, 22 institutions were forced to close or suspend operations.

Headquarter closures in London caused branches abroad to close immediately.[23] These

[20] After its failure, the shareholders sued the directors in criminal court for concealment in the prospectus. Appendix C.2 gives the full text of the original prospectus and more details from one of the court cases.

[21] The Bank of England justified its actions by claiming that Overend's was insolvent. However, the relationship between the BoE and Overend had been contentious ever since Overend staged a mini run on the BoE in April, 1860.

[22] Appendix C.3.1 provides several contemporary newspaper reports of the crisis.

[23] For example, the Commercial Bank failed in London May 15. The headquarter's telegraph to its Bombay offices arrived on May 24 and read, "This bank suspended. Cease all operations. Make no payments. Allow

branches were directed by the local branch manager, who had wide latitude in daily decisions due to the communication lags with London, but they relied on regular fresh injections of capital from London to operate.[24] The closures in London therefore directly affected the supply of trade finance available in each city around the world that depended on these banks' foreign operations.

1.2 Conceptual framework

A financial shock can generate hysteretic effects on the pattern of trade in a setting in which four assumptions hold. First, firms face two costs when exporting: a marginal cost that scales with the volume exported and a sunk cost that has to be paid to establish a trading relationship with a new destination. Second, the marginal cost is made of two elements: the cost of producing and shipping the good and a financial cost associated with financing the higher working capital requirements when exporting. Third, a free entry condition within each market holds, implying that entry occurs until the sum of discounted future profits in a market equalizes the sunk cost. Fourth, all firms have the same pre-financial crisis marginal costs, so that the hysteretic effects are not arising from productivity differences but purely from the sunk cost of establishing trade relationships.[25]

In this framework, the dynamics of a temporary financial shock that differentially affects firms can be understood in three periods. Figure B1 provides an illustration of the dynamics within a given market over these periods. In the initial period, the prices for goods are at a level p_0 such that incumbent firms operate with positive profits, but those operating profits are not sufficient to cover the sunk entry costs for potential entrants.

In the second period, the financing shock to a subset of firms raises their marginal costs and therefore the final price at with they export within a destination to p_s. The marginal cost of firms not exposed to the financial shock remains constant, so non-shocked firms can continue to export at price at p_0. Since $p_s > p_0$, non-shocked firms will find it profitable to start exporting to these new destinations.

In the third period, the shock has passed, and marginal costs return to their initial pre-crisis value. Incumbent firms do not exit as long as their operating profits are positive despite the now lower prices because they have already paid the sunk costs of entry. Since

no transfers or sales."

[24] Unlike in the modern context where branches and subsidiaries have very different structures that have implications for risk-sharing (Fillat, Garetto and Smith, 2018), the historical operations were a mix between the two: capital was shared, as in a branch system but decisions were local, as in a subsidiary system.

[25] I adapt the conceptual framework from the series of papers by Richard Baldwin, Avinash Dixit, and Paul Krugman on this topic. See for instance Krugman (1986); Baldwin (1988); Baldwin and Krugman (1989); Dixit (1989); Baldwin (1990).

the mass of firms now operating in the destination is larger, the market is more competitive and prices are $p_1 < p_0$. This change in the destination market conditions persistently deters future entry.

The shock has two implications for incumbent exporters who have already paid the sunk cost of entry. First, on the extensive margin, shocked incumbents do necessarily not exit as they have already paid the sunk cost and the financial shock only affects marginal cost. Second, on the intensive margin, the financing shock exposure raises the incumbent exporters' prices, which lowers their quantities sold.

There are also two predictions for new entrants to a given destination. First, on the extensive margin, the probability that a firm enters decreases with the magnitude of the financial shock. The less a firm is shocked, the more it can take advantage of the entry opportunities in various markets. Second, conditional on entry, an increase to the exposure to the shock increases its marginal costs, and therefore reduces its exports volumes, as in the case with incumbent firms.

This framework also generates predictions on the patterns of substitution by importers across their suppliers. In a destination market, when exposed exporters become relatively more expensive, importers will substitute away from them and to others that provide similar goods. Characteristics of exporters or of the trade relationship that make it possible to dampen the financing shock will also reduce the intensive and extensive margin losses and make it less likely that importers will substitute away from them in the long-run.

2 Data

This paper combines several newly collected and digitized historical datasets. This section gives an overview of the most important datasets and variables constructed. I provide the sources and full definitions, details, and documentation for each variable that enters as a regressor in the empirical analysis in Appendix F.

2.1 Bank characteristics

Lending pre-crisis: The Bank of England kept detailed records of every transaction that occurred at its Discount Window. I use the ledgers from 1865–1866 to build a dataset of over 11,000 individual loans from the 128 banks that had international operations in the year before the crisis.[26] An example of a ledger page is shown in Figure B2a. For each

[26]For the entries from 1866, I only include bills that originated before the crisis. For robustness, I restrict the banks' portfolios to only bills discounted in May 1866. The distribution is very similar, and the full discussion is in Appendix C.4.

handwritten loan record, I document the bank that originated and guaranteed the loan, the city the loan was extended in, the amount of the loan, the bank that brought the bill in to be discounted, and the date it was brought to the Bank of England.[27]

I interpret the bills that these banks brought in for discount as an unbiased representation of the universe of loans extended by British banks in locations around the world. I discuss the historical and empirical evidence for this assumption in Appendix C.4.

Bank health: Balance sheets and narrative evidence of the banks' risk-taking and financial health are gathered from transcripts of the bi-annual meetings of shareholders before, during, and after the crisis. Individual bank failures were reported extensively in contemporary newspapers. Names of the managers & directors of the banks were advertised in contemporary newspapers and often mentioned in shareholder meetings.

2.2 Exports

Port-level panel: I build a port-level panel of bilateral shipping activity for ports outside the United Kingdom using the daily publications of the *Lloyd's List* newspaper for the years 1865–1867. An example of this source from September 5, 1866 is shown in Figure B2b. I digitized the daily newspapers for all shipping events and geocoded 99.8% of the origination ports to 377 unique ports. Over 8,000 unique destinations were geo-coded and assigned to 60 countries.[28] Figure 1b maps the distribution of pre-crisis exporting activity for the ports using the log number of ships. These data are the only source for within-year and both across and within-country measures of trade activity historically.[29]

Country-level panel: I construct the country-level panel of bilateral trade values from publicly available datasets of historical trade statistics plus my own contributions to create a meta-dataset that is, to my knowledge, the most comprehensive available. These datasets cover a variety of time periods and territorial border changes, so I standardize country definitions to the smallest landmass unit that is consistently reported over all the years.[30]

[27]Banks brought in packages of bills that had been accepted by other banks, so there is no mechanical connection between a bank's own need for liquidity and the distribution of lending represented by the bills discounted. Deciphering the hand-writing was not trivial. When there was uncertainty about the city of origination, I looked for other loans extended to the same borrower to compare entries. I was able to identify the location and geocode 99.7% of the value of loans.

[28]Destinations are inconsistently listed as countries or cities, so they are aggregated to a larger unit of observation to minimize sparsity in the dataset.

[29]One drawback of the *Lloyd's List* data is that it does not report values of the goods onboard. However, there is a strong positive correlation between the number of ships leaving a country in a year and the total value of the country's exports, shown in Figure B6. I provide additional robustness checks for this concern in Appendix E.1.5.

[30]These units most closely resemble pre-WWI borders.

3 Empirical strategy

The goal of my empirical analysis is to estimate the causal relationship between a location's access to trade finance and exporting activity. I follow the literature and model the underlying relationship between bank credit and economic outcomes by relating the log of exports EX_{lt} at location l in time t to the log of the amount of bank credit:

$$\ln(EX_{lt}) = \alpha + \gamma \ln(\text{Credit}_{lt}) + \Gamma' X_{lt} + \varepsilon_{lt} \tag{1}$$

Identifying γ from Equation 1 is challenging for two reasons. First, direct measures of bank credit are an equilibrium outcome that conflate supply and demand for credit, so places that demand less bank credit are also likely to have less trade. Equation 1 will therefore not satisfy the orthogonality conditions that $\text{E}[\text{Credit}_{lt}\varepsilon_{lt}] = 0$ because ε_{lt} includes the unobserved local economic conditions that are positively correlated with bank credit, which biases γ upward. Second, there might be reverse causality: firms in locations that are already less productive can weaken their banks' balance sheets through non-performing loans and cause those banks to contract their lending or even to fail.[31]

I overcome these two challenges by using the multinational structure of British banking where branch office operations depended directly on their headquarter's health. Banks whose headquarters in London failed due to the panic conditions generates plausibly exogenous variation for their branch cities' and countries' exposure to bank failures.

3.1 Measuring the exposure to bank failures

The total bank credit in Equation 1 is the sum of the credit extended by each bank b: $\text{Credit}_{lt} = \sum_b \text{Credit}_{lbt}$. The location-level growth rate in total credit can be rewritten as the sum of the shares of each bank in a location (city or country) and the local bank growth rates: $\widehat{\text{Credit}}_{lt} = \sum_b z_{lbt} \times \widehat{\text{Credit}}_{lbt}$ where $z_{lbt} = \frac{\text{Credit}_{lbt}}{\text{Credit}_{lt}}$. The shares z_{lbt} sum to equal one in each location. I calculate location l's pre-crisis dependence z_{lbt} (at $t = pre$) using the loans that were originated before May 1866 to avoid the endogeneity of post-crisis sorting among bad banks and bad locations.

The crisis in London generates bank-level shocks that affect locations through their pre-crisis dependence $z_{lb,pre}$ on each bank. I use the shock of bank failure in 1866, which is captured by the binary variable $\mathbb{I}(\text{Failure}_b)$ and takes the value of 1 if the bank failed and 0

[31] Macroeconomic studies usually assume banking crises are completely exogenous. Cerra and Saxena (2008) are unique in the literature by estimating the relationship between output and crises both when they assume that crises are completely exogenous and when they assume that output is completely exogenous.

otherwise. Each location's exposure to bank failure Fail_l is the average of failure rates across its banks, weighted by the pre-crisis importance of each bank to a location:

$$\text{Fail}_l = \sum_b z_{lb,pre} \times \mathbb{I}(\text{Failure}_b) \tag{2}$$

Fail_l takes the form of a Bartik instrument with the following first stage relationship:

$$\Delta \ln(\text{Credit}_{lt}) = \alpha_1 + \beta_1 \text{Fail}_l + \Gamma_1' X_{lt} + \nu_{lt} \tag{3}$$

I provide the derivation of the instrument in Appendix D and discuss instrument validity in Section 3.2.

Figure 1a maps the geographic distribution of exposure to bank failures, Fail_l at the city level. The size of the points measures the pre-crisis amount of British lending in the city, and the color denotes the bank failure share. This map shows within and across-country variation in failure rates. Figure B3 plots the distribution of exposure across ports and countries. Table 1 reports the descriptive statistics for ports and countries in 1865. The average port had 128 ships leaving in the pre-crisis period and 7 pp exposure to failed banks. The average country exported £12.5 million and was exposed to 11 pp bank failures.

Estimating the first stage relationship in Equation 3 requires location-level lending in both the pre- and post-crisis periods. Data limitations prevent this, but there is a strong pseudo first-stage relationship between exposure to bank failures and credit contractions at the bank-level, shown in Table A1.[32] Given the lack of a first stage, the empirical results will be presented in terms of the reduced form relationship between exposure to bank failures and the change in log exports instead:

$$\Delta \ln(EX_{lt}) = \alpha_2 + \beta_2 \text{Fail}_{lt} + \Gamma_2' X_{lt} + \epsilon_{lt} \tag{4}$$

The reduced form coefficient β_2 in Equation 4 is the semi-elasticity of the response of trade activity to bank failures in location l.[33]

In all calculations of the total trade credit in a location, I only observe the amounts extended by British banks, which may lead to measurement error in the endogenous variable

[32] Of the 95 joint-stock banks with balance sheet data, only 31 are disaggregated enough to show the total lending in the form of trade finance annually. The pseudo-first stage is calculated using this subset of banks. Table A2 shows that this subsample of banks is representative of the complete sample of all banks on all other observable dimensions.

[33] Note that estimating the reduced form relationship means it is not possible to distinguish between the many different roles of banking activity, such as credit provision or risk assessment. Given these banks' role as providers of trade finance, I focus on this interpretation, but other forms of banking activity that matter for exporters would also be affected by the bank failures and captured by β.

Credit_{lt}. However, the instrument constructed from the shares and failure rates of British banks will still be valid for the change in *all* credit as long as either non-British banks do not provide trade credit, non-British bank credit did not change, or non-British bank credit changes are uncorrelated with the failure rates of British banks across locations. Since British banks conservatively provided over 90% of trade credit and I find no evidence of an immediate correlation between the non-British bank response and British bank failures, it is unlikely that the measurement error in the endogenous variable drives the results. Appendix D provides the derivation.

3.2 Validity of reduced form estimation

The reduced form relationship in Equation 4 will causally identify the effect of contractions in bank credit on exports if Fail_l satisfies the standard exclusion restriction for an instrumental variable: $\text{E}[\text{Fail}_l \varepsilon_l] = \text{E}[\sum_b z_{lb} \mathbb{I}(\text{Failure}_b) \varepsilon_l] = 0$. It is apparent from the exclusion restriction that the instrument is immediately satisfied if bank failures are randomly assigned, but it does not require it.

The instrument will be valid if the bank-level shocks are uncorrelated with the average location-level characteristics that determine exporting activity in the locations most exposed to each bank (Borusyak, Hull and Jaravel, 2018). The identifying assumption is that banks did not sort to locations such that characteristics of the locations were correlated with both failures of the British multinational banks operating there and declines in exports in 1866. One example of problematic sorting would be if banks that failed had chosen to operate in locations that experienced a boom in the pre-period and a bust post-1866. Declines in exports and failures of the banks operating in those locations would coincide and be falsely attributed to the London crisis. To the extent that indicators of a boom and bust cycle are observable, it is possible to test for systematic sorting.

In the following subsections, I first show that bank failure rates were not correlated with observable quantitative or qualitative characteristics of bank activity using balance sheets and narrative evidence from shareholder meetings. I then provide novel evidence that the determining factor for the bank failures is a publicly observable connection to the failed firm Overend & Gurney. Finally, I test for violations of the identifying assumption directly and show that bank failure rates were also mostly not correlated with observable characteristics of the locations in which they were operating. To the extent that certain characteristics were correlated with bank failures, they are included as controls in all the specifications to residualize their effect on exports activity. I use the Oster (2019) bounds to show that it is unlikely that further unobserved characteristics could be driving the results.

3.3 Determinants of bank failures

3.3.1 Quantitative measures

Banks are balanced across almost all observable pre-crisis bank characteristics (Table 2). Panel A lists publicly-held banks ("joint-stock" banks) that published balance sheets, and Panel B has all banks including privately owned banks that did not publish them.

The balance sheet characteristics are proxies for bank health and risk-taking, and characteristics of the banks that failed are not statistically or economically different from those of the banks that did not fail (Panel A). Banks had on average £1.48 million equity capital, of which almost half was already paid by investors, and their reserve funds, deposit liabilities, total size of the balance sheet, leverage ratio, and reserve ratio were also similar. The similarities in the leverage and reserve ratios suggest that banks that failed did not appear to systematically take on more risk than non-failed banks.

In Panel B, I include all other observable characteristics that are available for all the banks. Panel B shows that banks that survived were slightly older.[34] Geographical region of specialization also did not predict bank failure.[35] This balance helps to address the concern that bank failures and export contractions were simultaneously caused by a shock that was systematically correlated with their geography. Examples of such shocks include weather patterns that affected agricultural output or regional boom-and-bust patterns. In addition, banks in the two groups were similarly geographically diversified, operating in an average of almost 14 cities and 8 countries.

3.3.2 Narrative evidence

In addition to the quantitative evidence, I analyze transcripts of the banks' bi-annual shareholder meetings for that cover their operations from 1865 to 1867. These transcripts provide qualitative evidence on the nature of each banks' business before, during, and after the crisis. Overall, there is no evidence that differences in local economic conditions or bank risk-taking behavior affected their failure rates.

Ex-ante, banks that failed did not appear to be more risk-taking, as measured by the amount of funds they added to their reserve, and their own assessment of the riskiness of their investments. The characterization of economic conditions and opportunities in the markets they served also did not vary systematically across banks that failed and those that

[34] Age would be a potential confounder if older banks operated in locations that were less likely to experience declines in exports.

[35] For each bank, I calculate the total credit extended to each geographic region such as North America or the UK itself to test whether exposure to these regions are correlated with failure. In Table A3, I calculate each bank's geographic exposure as the share of its total size. All measures are balanced there as well.

did not. During the crisis, those that failed emphasized idiosyncratic circumstances such as instances of fraud or else the panic itself. Ex-post, banks that failed cited the panic conditions as the primary reason for closure. These qualitative characteristics of the banks are also not systematically correlated with the public Overend connection. The full results, discussion of the sources, and examples of how the language in the meetings were interpreted are in Appendix C.5.

3.3.3 Overend & Gurney connection

The only statistical and narrative explanation for the banks that failed is a public connection to Overend & Gurney. Although the firm's shareholders were protected by limited liability, the nominal value of the shares were £25, of which the investors had only paid £5 and were at risk for a call of £20 per share.[36] The shareholder list circulated in London at 2.5x the publishing price, and contemporary evidence indicates that depositors found this a valuable source of information.[37]

I digitize the shareholder list from January 1866 (Figure C2a) and compare it to the names of the managers and directors of the London banks (Figure C2b).[38] A bank is characterized as having a known connection to Overend & Gurney if one of its managers and directors is listed as a shareholder. Given that bank managers and directors were themselves invested in their banks, both as equity holders and depositors, it is reasonable that a shock to their wealth might affect the bank's health.[39] Table 2 Panel B row 1 shows that this public Overend connection is the only characteristic that significantly predicts bank failure. Moreover, there is little correlation between the Overend connection and the observable measures of bank health (Table C2).

3.4 Correlation between location characteristics and bank failures

The identification strategy is only threatened if the London headquarter failures were caused by characteristics or events in the banks' subsidiary locations that could affect exports. I follow Borusyak, Hull and Jaravel (2018) and test the exogeneity of bank-level failure rates

[36] £25 is equivalent to £2,995 in 2020.

[37] See Appendix C.3 for contemporary documentation of the crisis and the demand for the shareholder list.

[38] The shareholder list is kept at the Royal Bank of Scotland archives in Edinburgh, Scotland. January, 1866 was the last list that as compiled before the firm declared bankruptcy.

[39] This could occur through a couple of channels: first, the manager/director may need to withdraw his savings or investments from the bank, which would leave it worse-capitalized; second, a reduction in the manager/director's personal wealth may induce him to engage in riskier behavior that also reduces the bank's overall health. These scenarios are not mutually exclusive and both provide rational explanations for why depositors would withdraw deposits from banks that have these public connections to Overend.

to location-level characteristics by calculating each bank's exposure to those characteristics and correlating them with the bank failure rates.[40]

I examine the observable pre-crisis location-level characteristics at both the port-level and the country-level, since those are the two units of observation in the analysis. At the port-level, the observable characteristics include the volume of exports (proxied by the number of ships from the *Lloyd's List*), the importance of the United Kingdom as a destination, the geodesic distance to London, the latitude, the number of destinations, the availability of non-British financing, and whether the port is a capital city.[41] At the country-level, observable characteristics include the total value of exports, the value of exports by industry, the share of commodities in the composition of exports, the monetary system, and whether the country was engaged in conflict. These characteristics help to capture heterogeneity in size and trade patterns. Each bank's share-weighted average exposure $\bar{X}_b$ to these pre-crisis characteristic X_l is calculated as $\bar{X}_b = \frac{\sum_l z_{lb} \times X_l}{\sum_l z_{lb}}$ where larger weights are given to locations more dependent on bank b. The normalized individual bank failure rates are regressed on the transformed location-level characteristics $\bar{X}_b$:[42]

$$\mathbb{I}(\text{Failure}_b) = \alpha + \beta \bar{X}_b + \varepsilon_b \tag{5}$$

Table 3 reports the results and shows that there is balance on almost all characteristics. In terms of port-level characteristics, Panel A shows that two factors are unbalanced: banks operating in ports with a higher fraction of exports going to the UK were more likely to fail, and those operating in ports that were also the capital cities within countries were less likely to fail. These characteristics are included as controls in the baseline specifications to residualize any direct effect that they have on exports.

Table 3 Panel B shows that banks that failed did not systematically operate in countries with lower exports values, with a heavier reliance on commodities, or with exposure to military conflicts. There is also no correlation between exposure to different currency

[40]The advantage of testing the bank-level relationship rather than the location-level relationship, the latter of which is also used in the literature, is that it performs the Adao, Kolesár and Morales (2019) standard error correction. They show that when the source of identification from a Bartik instrument are the shocks, the standard errors of regressions of the instrument on location characteristics tend to over-reject the null hypothesis. Intuitively, the location-level tests target randomness in the shares, but when the location shares themselves are not suitable instruments, the covariance between the shocks and the shares may be relevant. Borusyak, Hull and Jaravel (2018) show that implementing the Adao, Kolesár and Morales (2019) standard error correction is equivalent to translating the location-level characteristics into bank-level exposure rates.

[41]Results are similar using sailing distance (without access to the Suez Canal) instead of geodesic distance to London. Figure B4 shows the strong positive correlation between the two types of distances.

[42]The regressions are weighted by $\hat{z}_b$, which is the average location exposure to bank b: $\hat{z}_b = \frac{1}{L} \sum_{l=1}^{L} z_{lb}$. The weighting is necessary to translate location-level relationships to bank-level relationships. The full derivation for the equivalence is given in Borusyak, Hull and Jaravel (2018).

standards (gold, silver, or bimetallic) and bank failures. This balance helps to address the concern that exchange rate movements are the proximate cause for the observed relationship.

In order to address the possibility of commodity booms and busts, I categorize each country's exports by two-digit SITC categories and test balance across all industries. The full distribution of exports by SITC categories is plotted in Figure B5. Table 3 Panel C shows that banks that failed were not differentially exposed to the top eight industries of raw cotton exports, cotton manufactured goods, bullion, grains, coffee, alcohol, and tobacco. In Appendix Table E18, I provide balance checks for all remaining SITC industries. The location-level characteristics that are correlated with bank failure rates are included as controls in the main empirical specifications to address their potentially confounding effects.

4 Results

The conceptual framework in Section 1.2 generates several empirical predictions. First, for pre-existing (incumbent) exporters, exposure to the financing shock reduces the intensive margin volumes of exports. Second, on the extensive margin, exposed exporters will find it more difficult to pay the sunk costs of entering into new markets and will form fewer trade partnerships and be less likely to export at all. Third, the temporary financial shock can have long-run effects on exports volumes for exposed countries even after the shock has passed. I discuss each of these in detail below.

4.1 Intensive margin effects

I examine the immediate impact of bank failures on the intensive margin of exports volumes for locations that were active both before and after the shock using the number of ships sailed in the two-year window around the crisis as a proxy for exports volumes. The distribution of treatment across ports is well-represented across the entire range of exposure (Figure B3a).

In the raw data, there is a strong negative correlation between exposure to bank failures and the difference in the log number of ships sailed in the post-period relative to the pre-period both across and within countries. Figure B7a plots the linear fit across countries, and Figure B7b the relationship within countries and across ports.

First, at the more aggregate country-level, I estimate the following difference-in-difference regression with continuous treatment intensity:

$$\ln\left(S_{ot}\right) = \beta\left(\text{Fail}_o \times \text{Post}_t\right) + \gamma_o + \Gamma' X_{ot} + \varepsilon_{ot} \tag{6}$$

S_{ot} is the total number of ships departing a country per period ($S_{ot} = \sum_p S_{pot}$). Following

the trade literature, the dependent variable is in logs to reduce the effect of outliers. β is the coefficient of interest, and Fail_o is an exporting country's exposure to bank failures calculated according to Equation 2 using country-level shares of pre-crisis dependence on individual banks. Post_t is an indicator for the post-crisis period that controls for macroeconomic shocks affecting the export trends over time. X_{ot} are pre-crisis country characteristics interacted with Post_t that can be included as additional controls. Country fixed effects γ_o absorb all time-invariant differences in levels of shipping, including those correlated with their exposure to bank failures. Regressions are weighted by the pre-crisis size of ports, measured by shipping activity in the pre-crisis year.

Table 4 Column 1 shows the baseline effect without any controls. The coefficient of -.51 implies that countries with the average exposure of 11% exported 5.6% less than non-exposed countries in the post-crisis year. Appendix Table A4 adds origin-country characteristics as controls to show that the results are not affected by differences in initial macroeconomic conditions, such as the industry composition of exports. While the coefficients are large and statistically significant throughout, it is possible that unobserved country-level shocks are partly accounting for the results, so next I identify the effects using within-country variation from port-level shipping activity which allows me to control for unobserved time-varying shocks to the origin-country.

Second, I estimate the port-level analogue to Equation 6:

$$\ln(S_{pot}) = \beta \text{Fail}_{po} \times \text{Post}_t + \Gamma' X_{po} \times \text{Post}_t + \alpha_p + \gamma_{ot} + \varepsilon_{pot} \tag{7}$$

where now S is the number of ships leaving from port p in origin country o in period t. Each port in the panel is matched to the closest city of financing by geodesic distance, and its exposure to bank failures Fail_{po} is assumed to come from that city.[43] Ports more than 500 km from the nearest city of financing are given an exposure of 0, and I include an indicator for these ports (interacted with the post time period) so that there is a control group of completely unexposed ports.[44] This control group allows for ports that are still connected to London but experienced no bank failures to react differently from ports that were not connected to London at all. X_{po} are pre-crisis port characteristics that can be included as additional controls. Port fixed effects α_p absorb all time-invariant port-specific differences in levels of shipping, and origin-country-period fixed effects γ_{ot} flexibly control for all observed and unobserved characteristics at the country-level that affected shipping. Including these

[43]For example, the port of Piraeus in Greece is designated as receiving its funding from Athens.

[44]The results are not sensitive to the 500 kilometer boundary and the main coefficients are robust for a range of distances and to not including the time-varying intercept for distant ports. See Figure B8 for the coefficient plot for the baseline specification estimated using different distance cutoffs.

fixed effects means β is identified by comparing ports from the same country and year.[45] There are on average 5 ports per country.[46] Standard errors are clustered by the country of origin to allow for heteroskedasticity and within-country spatial correlations.

Table 4 Columns 2–6 presents the baseline results with controls added individually. The coefficients remain stable and statistically significant. The coefficient of -0.56 in Column 6 with all the controls indicates that a port in the top 90%-ile of exposure experienced 27% greater losses than a port in the bottom 10%-ile of exposure in the post-crisis year. I address the concern that the bank failures are correlated with other factors that are responsible for the decline in exports by including observable port-level characteristics as controls in the baseline regression. These controls are based on the port-level characteristics that were not balanced between banks that failed and did not fail in Table 3 and include the average age of the banks, whether the port is the capital city, and the fraction of ships going to the UK in the pre-crisis year.[47] The coefficients in Table 4 Columns 4–7 after including these controls remain stable and statistically significant.

Implementing the recommended bounds in Oster (2019) shows that selection on location-level unobservable characteristics is minimal. These bounds are calculated using changes in the magnitude of the coefficient and the R^2 after controlling for observable characteristics. β^* is the inferred true coefficient if the unobserved bias is as large as the observed bias, and δ is the inferred bias that could induce the estimated β to be zero. I report these as β^* and δ in the last two rows. These calculations show that β^* is almost identical to the estimated β, and that the degree of unobservables bias would have to be at least 31 times larger than the degree of observables bias.

4.1.1 Binding financial shock

Having established that exposure to bank failures caused large immediate intensive margin declines in shipping both across and within countries, I next ask to what extent could exporters establish a new line of credit and ship from a neighboring port?

The similarity in the magnitudes of the estimates in Columns 1 and 6 (-.51 and -.56 respectively) of Table 4 implies that differences in origin-country characteristics are not driving the main results. Moreover, within-country substitution of exporting across ports

[45] Countries with only one port are effectively dropped from this estimation. These account for 16 of the 578 observations (2.8 percent). These come from 8 ports, which reduces the effective number of countries in the estimation from 54 to 46.

[46] One standard deviation of exposure to bank failures across ports within countries is on average 0.13 and it is 0.16 across countries.

[47] Bank-level characteristics are aggregated to the port-level using the pre-crisis shares $z_{lb,pre}$ of the importance of each bank to each location. All country-level differences in Table 3 are absorbed by the country-period fixed effects.

was low: contractions in one port were not compensated in another port. This lack of substitution was likely due to the difficulty of establishing new credit relationships, as in Bernanke (1983).

I directly estimate the degree of substitution among ports in a country by asking whether more exposure to bank failures in the rest of the country benefits a port, controlling for its own exposure. I construct a measure of the average exposure to bank failures in the rest of the country, leaving out the port's own city of financing.[48] I include this measure as an additional control to Equation 7:

$$\ln(S_{pot}) = \beta \text{Fail}_{po} \times \text{Post}_t + \psi \overline{\text{Fail}}_{other,o} \times \text{Post}_t + \alpha_p + \gamma_{ot} + \Gamma' X_{pot} + \varepsilon_{pot} \tag{8}$$

ψ is the main coefficient of interest. It controls for a port's own exposure to bank failures and measures the semi-elasticity of its own exports to the rest-of-country exposure to bank failures. $\psi > 0$ indicates that a higher degree of exposure in the rest of the country benefits a port, and it implies that exporters from the rest of the country can effectively divert their activity to another port. $\psi > 0$ would suggest that this channel of within-country substitution could reduce the country-level losses.

In Table 5 Column 2, I report a non-significant coefficient of -0.266 for ψ. This estimate rules out within-country substitution, and it provides suggestive evidence that city-level shocks may have had negative spillovers to the rest of the country.

4.1.2 Banking sector recovery

While the financing constraint was binding for port cities in the short-run, there was fast recovery. I test this hypothesis explicitly using the city-level panel of banks, and I find that multinational banking did not retrench. I plot the total number of banks and the composition of banks by nationality at the city-level by above and below average exposure to banks that failed in Figure B9. Figure B9a shows that cities that were more exposed to bank failures had access to the same number of banks as cities that were less exposed. This figure shows that the persistent effects across countries could not be explained by the size of the banking sector, measured by the number of banks.[49]

While there is no difference in the total number of banks, there is a change in the composition of nationalities among banks. Figure B9b shows that British banks did not tend to return to the locations that had experienced a higher degree of failures, but that domestic

[48] This measure is calculated by removing each city of financing's contribution from the country-level exposure measure rather than simply leaving out the port's exposure in order not to double-count cities that financed more than one port.

[49] A full time-series for the balance-sheet characteristics of all the banks is not available.

and other European banks filled the gap, likely responding to the investment opportunities left by British banks (Figures B9c and B9d).[50]

4.2 Extensive margin effects

If external finance needs are high, exposure to bank failures makes it more difficult to enter new markets, lowering growth on the extensive margin. I categorize the extensive margin of exporting activity in two ways: the first is the number of unique destinations that a port trades with, conditional on exporting at all, and the second is the likelihood that a port engages in any international trade at all.

First, I estimate the changes to the extensive margin number of destinations using the specification in Equation 7 with the log of the number of unique destinations as the dependent variable. This specification compares the relative number of destinations that more exposed destinations traded with relative to less exposed destinations. Table 6 Columns 1–2 reports the effects for countries and ports, respectively. A one standard deviation increase in exposure reduces the number of unique destinations by 7.7% and 5.6% respectively in the post-period. Since ports grew on average between the two periods, these coefficients indicate that exposed locations grew less. The larger magnitudes at the country-level provide further suggestive evidence that there were negative spillovers from highly exposed ports to the rest of the country rather than redistribution.[51]

The second test of extensive margin effects categorizes ports as "Entering" into international trade if there is no exporting activity in the pre-crisis period and positive exports in the post-crisis period, and "Exiting" if the reverse is true. I estimate a linear probability model on a one-period cross-section where E_{po} is an indicator for either Entry or Exit and standard errors are clustered by the origin-country:

$$\Pr(\mathrm{E}_{po}) = \alpha + \beta \mathrm{Fail}_{po} + \gamma_o + \Gamma' X_{po} + \varepsilon_{po} \tag{9}$$

Table 6, columns 4 and 6 present the within-country likelihood of Entry_{po} and of Exit_{po}, respectively. As predicted by the conceptual framework, the shock was a statistically significant deterrent to the extensive margin decision to enter markets, but it did not significantly alter the Exit decision by those who had already paid the sunk costs. A port in the

[50] These patterns are consistent with the historical consensus that after 1870, France and Germany actively sought to expand their financial presence around the world to compete with Britain (Einzig, 1931; Kisling, 2017). There is also a parallel between the diminished presence of British banks in the long-run and the diminished exports being discussed in this section.

[51] These results are analogous to the findings in Huber (2018) that firms within a county that did not directly experience a financing shock still performed worse post-crisis from declines in aggregate demand.

top 90%-ile of bank failure exposure was 13.5% less likely than a port in the bottom 10%-ile of exposure to begin exporting at all.[52]

4.3 Persistent effects

I have shown that there were large effects immediately after the crisis and that while the financing shock was temporary, it was binding. I now turn to the third prediction that the shock will have persistent effects on export volumes.

4.3.1 Total exports

There is a striking divergence in cumulative growth of total exports across countries in the raw data which shows that exposure to the banking crisis has permanent level effects. In Figure 2a, I plot the annual aggregate values of exports for countries binned into above and below-average exposure to bank failure, where the average exposure is defined in the cross-section of countries, and levels for each group are indexed to 1 in 1866. The blue line shows the total value of world exports. The overall pattern is of tremendous growth: total global trade increased five-fold over this period. Before 1866, exports were expanding at the same rate between the two groups of countries so there are no differential pre-trends between the groups, but after 1866 there is an immediate divergence in levels that does not recover. Figure 2b graphs the difference between the two groups, which corresponds to the DD estimate with binary treatment.

The permanent divergence arises from a short-run jump in the relative annual exports growth rates of unaffected countries in the four years after the crisis. In Figure B11, I plot the annual growth rate of exports and show that they are very similar pre-crisis, diverge after the crisis in 1867, and then converge again to the same pattern by 1880. In the pre-crisis period from 1850–1865, the average annual growth rates are 11.6 percent for both the less exposed (solid line) and more exposed groups (dashed line).[53] In 1867 the less exposed group (solid line) grew 14 percent while the more exposed group (dashed line) grew 9 percent, and in 1868 the growth rates were 22 and 10 percent respectively. The cumulative difference in the annual growth rates between the two groups after the first two years is 17.2 percent. This initial difference in export growth rates is the main driver of the average annual difference in growth rates of 1.6 percent per year between groups from 1867–1914, and it is consistent

[52]Similarly, Berman and Héricourt (2010) find that access to finance influences the firm entry decision, but that it has no effect on the exit decision.

[53]In the immediate pre-crisis period from 1860–1865, the average annual growth rates were 6.7 and 6.5 percent, respectively, and the p-value for the difference in means is 0.97.

with the prediction in the conceptual framework that unexposed exporters were able to grow due their competitors' shock.[54]

I benchmark these findings against estimates of the elasticity of trade with respect to geographic distance for scale. Using my dataset, I estimate a trade elasticity of -1.1 to geodesic distance.[55] Relative to this elasticity, increasing an exporter's exposure to bank failures from below to above average is equivalent to increasing its geographic distance to its trading partners by 15.6 percent after the first two years.

The impact on exports is much larger than the impact on GDP, although there also appears to be a permanent effect on GDP levels. In Figure B12, I plot aggregate GDP for the same two groups of countries, binned by above and below average exposure to bank failures. The difference in the average annual growth rates in output is 0.6 percent. As in the Great Trade Collapse of 2008, the difference in exports is much larger than the difference in GDP, so the trade-specific losses cannot be driven by productivity declines that also affect output.

4.3.2 Bilateral exports & market-share effects

The divergence in total values of exports between more and less exposed countries could be driven in part by the importing country's demand. In particular, if more-exposed countries tend to have stronger exporting relationships with countries who experienced slower imports growth after the crisis, their exports would be affected, but not through the financing constraint channel. I address this possibility by estimating the effect of bank failure exposure on bilateral exports volumes, which allows me to control for annual demand shocks, for the years 1850–1914:

$$\ln(\text{EX}_{odt}) = \beta_t \text{Fail}_o + \Gamma' X_{ot} + \gamma_o + \gamma_{dt} + \theta_t \ln(\text{dist})_{od} + \varepsilon_{odt} \tag{10}$$

The dependent variable is the log value of exports EX_{odt} (in nominal pounds sterling) from origin country o to destination country d in year t. Fail_o is the origin-country exposure to bank failure, and it is interacted with leads and lags that estimates the effect over time. X_{ot} includes contemporaneous characteristics or pre-crisis origin-country characteristics that are interacted with year dummies, which control for macroeconomic differences among countries.

[54]The average annual growth rates from 1867–1913 are 4.5 and 2.9 percent for the less exposed and more exposed groups of countries, respectively. This is calculated using the 1913 values of exports, which were 8.11 and 3.86 times the values in 1866 for the two groups, respectively.

[55]In other words, a 1 percent increase in physical distance between two countries reduces the trade flows between them by 1.1 percent. This elasticity is, coincidentally, exactly the average elasticity found in the literature based on the survey of structural gravity by Head and Mayer (2014). It is slightly larger than the average estimate of -0.93 found in all gravity papers. Table A5 reports the estimates and robustness to controlling for gravity measurements of bilateral resistance.

Origin-country fixed effects γ_o control for time-invariant country characteristics and restrict the source of variation to the change in exports within each country between periods. As in the port-level estimation, I control for the effect of the origin country not having any British banks at all in 1866, which separates the effect of any exposure from the degree of exposure to failed banks.[56] Destination-country year fixed effects γ_{dt} control for demand shocks by restricting the identifying variation to being across exporters, within-destination-year. I omit the covariate in the baseline year and normalize it to zero. Standard errors are clustered at the unit of treatment, the exporter country, following Abadie, Athey, Imbens and Wooldridge (2017).[57]

Equation 10 is the fixed effects estimation of a structural gravity model standard in the international trade literature (Head and Mayer, 2014) which relates the volume of trade flows to the sizes of the importing and exporting countries and the inverse of the distance (geographic and institutional) between them. This specification flexibly controls for both origin-country and destination-country changes in GDP, so these effects should be interpreted as the differential impact on exports beyond just country size (see Appendix E.2 for further discussion). I control for the distance between countries dist_{od} as a standard measure of bilateral resistance. Allowing θ_t to vary by year flexibly controls for shocks to the effective distance between countries due to technological advances. The one departure from the standard fixed effects estimation using panel data is the absence of origin-country year fixed effects because those are collinear with the treatment.

I allow β_t to vary annually and at five-year intervals ($[1850, 1855], ..., [1911, 1914]$). β_t should be interpreted as the semi-elasticity of the response to exposure to bank failures in the exporting country by a given importer in a given year. It is expected to be negative if increases in the cost of financing from bank failures reduces exports to a destination in a given year. For example, how much less is France predicted to import from a country in the 90%-ile of exposure rather than a country in the 10%-ile of exposure in the year 1900?

Figures 3a and 3b plot the estimated β_t coefficients annually and at five-year intervals, where β_{1866} and β_{1861-5} are the omitted years in each specification, respectively.[58] β_t is identified with variation in every cross-section of the data, but it uses the full panel of data to control for determinants of trade flows like country size. The estimated coefficients support the patterns in the raw data for total exports that exposure to the crisis had no effect on exports pre-crisis, but that it immediately lowered trade flows between countries afterward.

The persistence is striking: destination countries imported less from exporters that

[56] These countries accounted for 2% of the value of exports in 1866, and results are robust to not controlling for the non-exposed group.

[57] Results are robust to different ways of clustering in Table A6.

[58] Point estimates are in Table E8 (column 2).

had been exposed to bank failures for almost 40 years. The average estimated annual coefficient from 1867–1900 is -1.71 log points. This magnitude implies that the average importer bought 70% less from an exporter in the 90%-ile of exposure relative to one in the 10%-ile. $\beta_{1901-05}$ is the first period when the effect is not statistically different from zero. However, the average magnitude of the coefficients after 1900 is -1.11, which is still 65 percent of the average effect until 1900. The average estimated coefficient from 1867–1914 is -1.53 log points, and given the average exposure of 11 percent, implies that the (partial equilibrium) disruption in world exports for the post-crisis period until WWI was 17% per year.

4.3.3 Heterogeneity by incumbency status

The burden of the losses falls on new trade relationships that had not existed before 1866. In Figure 4, I categorize bilateral relationships by whether the exporter is a new entrant or incumbent as of 1866. I interact the indicator for both "new" and "old" relationships with each exporting country's exposure to failed banks to illustrate the difference in the effects between the two types of trade relationships.[59] This specification shows that even holding an importer fixed (and controlling for importer demand-side shocks), the market-share losses are heterogeneous depending on whether the exporter has already paid the sunk costs of entry or not. Since these specifications estimate differential effects based on the nature of the bilateral relationship, they provide a further robustness check that the average persistent effects cannot simply be explained by unobserved correlated shocks to the exporter.

The average post-crisis coefficient for exposed exporters who are trading with a destination for the first time is -1.88 log points while it is -0.17 log points for exporters with a pre-existing relationship with the destination. The latter effect is also not statistically significant. In contrast, the effects for the new exporters are significantly different from zero until 1906. This result is consistent with the framework in which new entrants are differentially disadvantaged relative to incumbent relationships because they have not yet paid the sunk costs of entry, and they show that the persistent losses on average are driven by the inability of new entrants to gain market-share.

4.4 Robustness

4.4.1 Immediate effects

I provide a variety of robustness checks for the immediate within-country effects in Appendix E.1. First, I expand the control variables to include all port-level characteristics, even ones

[59] The specification is: $\ln(\text{EX}_{odt}) = \beta_{t,old}\text{Fail}_o \times \mathbb{I}(\text{Old}_{od}) + \beta_{t,new}\text{Fail}_o \times \mathbb{I}(\text{New}_{od}) + \gamma_o + \gamma_{dt} + \varepsilon_{odt}$

that do not appear statistically significantly correlated with bank failures (Table E1). Second, I show that the baseline effects are not due to demand shocks both specifically from the UK and more generally (Table E2). Third, I exclude cotton-exporting countries individually and as a group because they may have experienced a correlated shock due to the end of the American Civil War (Table E3). Fourth, I use the time-series granularity of the *Lloyd's List* and estimate the effects allowing for communication lags from London to cities around the world (Figure E1 and Table E4). Fifth, I account for potential mismeasurement in the outcome variable by re-estimating all the results using count data methods, limiting the sample to well-traveled routes to further diminish the impact of outliers along routes, and showing similarity to annual regressions using country-level values of exports (Figure E2, Tables E5 and A6). The results are robust to all of these checks.

4.4.2 Long-run effects

I provide a variety of robustness checks for the long-run effects. First, I control for a wide variety of initial and contemporaneous macro-economic conditions that could potentially have a confounding effect on the effects. In Table E8 columns 3–8, I show robustness to a variety of origin-country controls, including the pre-crisis characteristics that are correlated with bank failures. In Table E9 I report the estimates after including standard gravity covariates, such as shared language, shared land border, and being in the same European empire. Additional robustness includes controlling for pre-crisis and contemporary military conflicts and exchange rate regimes pre-crisis (Table E10); industry composition of exports pre-crisis and initial trade intensity with the UK (Tables E11 and E19); excluding the cotton-exporting countries (Table E12); excluding countries that may have experienced correlated shocks (Table E13); financial crises like sovereign debt, domestic debt, stock market crashes both contemporaneous and in 1865 (Table E14 and E15); ability to issue long-term debt or equity in London (Table E16); and the number of banks of different nationalities after the crisis (Table E17). The static and the time-varying versions of all of these controls do not affect the statistical significance or the qualitative patterns of the results. These controls rule out the possibility that these other events were the actual drivers of the persistent collapse in exports market share.

Second, I generalize the concern that any individual country is affecting the results by estimating the baseline specification while dropping each exporting country in turn. In Figure E3, I plot the distribution of the estimated coefficients as well as the distribution of the associated p-values. These show that not only are the magnitudes of the coefficients robust, but also the pattern of statistical significance is as well. The coefficients before the shock are close to zero and not significant, and as in the baseline results, they become large

in magnitude and economically significant after 1866 before exhibiting recovery in 1900.

Finally, I test the robustness of the long-term results by implementing the Fisher exact test for randomization inference. This test is conducted by reassigning treatment randomly and without replacement to countries to compare the estimated treatment effect against hundreds or thousands of placebos. At longer time horizons, countries' exports could be affected by a number of reasons, and assigning the treatment randomly will show whether the long-term negative effects could arise naturally from the data for reasons unrelated to the banking shock. If that is the case, the distribution of estimated coefficients will become more negative with each subsequent group of years.

In this test, I redistribute the shocks randomly and simulate the data 1,000 times, then estimate the long-term effects in Equation 10 using the simulated data. I plot the distribution of the coefficients for each group of five years in Figure E4. These plots show that the coefficients are centered around zero in all periods. The lack of drift indicates that the long-term effects are statistically very unlikely to have been generated by unobserved processes of divergence.

5 Mechanism

Having established that the temporary financing shock affected both the intensive and extensive margins of exports for exposed countries, I now show how the sunk cost mechanism induced changes in the patterns of trade after the shock. First, I establish that aggregate world trade did not significantly decline after the shock. Second, I show how the patterns of trade changed due to the relationships that were either severed or did not form.

5.1 Effect on aggregate world exports

The baseline empirical estimations of the impact of the crisis on exporters are partial equilibrium, which do not provide insight on the general equilibrium aggregate effects on *global* trade. In particular, large and persistent losses by exposed exporters relative to unexposed ones may not lead to reductions in world trade if unexposed exporters grow. I analyze this possibility by estimating the effect of the bank failures on a country's *imports*. Given an institutional context in which the banks primarily financed exporters and not consumption, it would not be surprising if after controlling for the effects on income, the crisis did not impact imports.

I estimate the impact of the crisis on a country's imports using the baseline specification in Equation 10, replacing the key regressor of the exporting country's exposure with

the importing country's exposure.[60] As in the baseline, I saturate the estimation with fixed effects so that supply shocks from the exporter are accounted for (γ_{ot}) as well as the importer's overall size (γ_d). I present these results in Table A7. Column 2 shows that exposure to bank failures had no impact on a country's imports with coefficients close to zero and not statistically significant. In Column 3, the import effects robust to controlling for the shock to exporters as well.[61]

Given the symmetry between world imports and exports, the lack of effect on imports indicates that the crisis could not have had an aggregate effect on world trade. This lack of effect on aggregate global trade can be only be reconciled with the market share losses by exposed countries if non-exposed countries were able to compensate by exporting more to each destination market.

5.2 Patterns of substitution

The conceptual framework directly predicts that unexposed countries will gain market share at the expense of their competitors. The degree to which exporters are shut out of destination markets should vary with the competitiveness of the market and the extent to which other factors could compensate for the direct financing shock. I construct several proxies to show how different circumstances affected the likelihood that trade relationships would survive the financing shock.

5.2.1 Comparing direct competitors

A trade cost shock between parties can lead importers to source from new relationships or to increase the amount they buy from pre-existing relationships. In the 19th century, most countries exported commodities that were produced by multiple other countries, leading to a high degree of substitutability across countries. As an example, a country importing sugar could choose among a number of producers in the Caribbean and South America. A large shock to the cost of exporting from one country can give its competitors a relative advantage in each destination where those competitors can enter and capture larger market share. Given the initial sunk costs, once importers establish a relationship, it will be difficult

[60] Given the symmetry in trade flows, one country's exports is its trade partner's imports. Therefore estimating the impact of country A's exposure to bank failures on the amount it *imports* from country B is equivalent to estimating the effect of country B's exposure to bank failures on the amount that exported to country A. The equation of interest, $\ln(IM_{odt}) = \beta_t \text{Fail}_o + \varepsilon_{odt}$, is equivalent to $\ln(EX_{odt}) = \beta_t \text{Fail}_d + \varepsilon_{odt}$.

[61] Directly controlling for the importer's exposure to the crisis makes it impossible to include the full set of controls, such as the destination-year fixed effects that are included in the baseline estimations. Not being able to fully and flexibly control for demand shocks from importers attenuates the estimated effect of the crisis on exporters.

for exporters who had experienced a shock to compete, even after the shock passes.

First, I use the industry composition of a country's exports pre-crisis, categorized by two-digit SITC codes, to test for importers substituting among similar countries. I estimate the baseline specification in Equation 10 with time-varying industry controls where each country is assigned the SITC industry of its biggest export in 1865.[62] The SITC industry controls mean that β_t should be interpreted as the loss of market share into a given destination in a given year by an exporting country *relative* to other countries whose exports also concentrated in the same industry. This estimation is restricted to the 44 countries that reported the composition of their exports in 1865, and they show that the direct comparison implies larger and more persistent losses (coefficients reported in Table E8 column 6 and plotted in Figure B13a).

Next, I broaden the measure of a country's exports composition by using its geographic region as a proxy. I validate that geographic region is a reasonable proxy for the goods exported for the subset of 44 countries with observable industry composition in 1865. For each region, I identify the top three exports categories by SITC codes and calculate the fraction of the total value of exports from the region that fall into those categories.[63] This fraction is equivalent to an exports-weighted average of the cross-country exports concentration within the top three categories. Figure B14 shows that this fraction is above 0.5 for all regions and averages 0.73 across regions, indicating that exports are very similar within region.

I compare the countries within regions to each other by including origin-country region-year fixed effects in the baseline specification in Equation 10. The additional controls restrict the variation such that β_t is estimated off comparisons of countries in the same geographic area exporting to the same destination in the same year. Figure 5 (Table E8 column 8) shows that there is no recovery in this setting. The qualitative interpretation is that countries that are more exposed to bank failures experience exports losses to the average destination every year until 1914. As robustness, I also re-estimate the baseline with region-year fixed effects using the subsample of countries that have SITC information and verify that the patterns are similar (Table E8 column 7 and plotted in Figure B13b).

Third, I directly test for the competitive effects within region by estimating the effect of other countries' average exposure on a given country's exports, controlling for that country's own exposure.[64] The prediction is that there should be positive spillovers ($\theta_t > 0$)

[62]The global value of exports by SITC is shown in Figure B5.

[63]Each region has at least two countries, and the primary exports for all countries outside of Northwest Europe are raw commodity goods.

[64]The specification is: $\ln(\text{EX}_{odt}) = \theta_t \text{Region Fail}_{-o,t} + \beta_t \text{Fail}_o + \gamma_o + \gamma_{dt} + \theta_t \ln(\text{dist}_{od}) + \varepsilon_{odt}$ where $\text{Region Fail}_{-o,t}$ is the average exposure of other countries in a region for a given country o.

because a trade cost shock to a given country will benefit its competitors with similar exports. Figure B15 shows that negative shocks to a country's competitors does benefit its own exports into a given market. While the estimates are noisy, it is worth noting that the outcome variable is a country's total exports rather than industry-specific exports, which would generate attenuation bias.[65]

The sustained persistence of the effects within regions are not driven by the smaller sample comparisons. In a robustness check, I conduct a Fisher exact test for the country groups by simulating 1,000 random group assignments and re-estimating the coefficients. I plot the distribution of the five-year coefficients in Figure E5. This figure shows that the true estimates are very similar to the simulated estimates for the years until 1900. At that point, the true coefficients are larger in magnitude than the average simulated coefficient.

5.2.2 Lower financial needs

Shorter routes are less expensive to finance because goods spend less time in transit. An externally financed loan has shorter maturity, and it is easier for exporters to internally finance out of working capital. Since financing costs increase with the distance between trading partners, the key prediction is that trade between more distant partners will decline after the bank failures.

I test this prediction using the panel of country-level values of trade by allowing for the exposure to failure to differentially affect trading partners that are physically closer. I construct a binary variable "Close" to indicate country-pairs that are less than the average distance between countries trading in 1865. Formally, I estimate the following:

$$\begin{aligned}\ln(\text{EX}_{odt}) = \theta_{t,close}\text{Fail}_o \times \mathbb{1}(\text{Close}_{od}) + \beta_t\text{Fail}_o + \lambda_t\mathbb{1}(\text{Close}_{od}) \\ + \Psi' X_{od} + \gamma_o + \gamma_{dt} + \varepsilon_{odt}\end{aligned} \tag{11}$$

Figure 6 plots $\theta_{t,close}$ in blue and β_t in orange. β_t, the effect of exposure to bank failure, is very similar to the baseline effect in previous estimations. $\theta_{t,close} > 0$ indicates that conditional on exposure to bank failures, exports to closer destinations are positively affected. The main effect for exports to close destinations is given by $\theta_{t,close} + \beta_t$, which is close to zero. The results are robust to constructing the variable over all years or at the end of the sample in 1914. The qualitative interpretation is that a country's exports losses are borne by more distant trading partners, and that exporters are diverting their goods to destinations with lower trade costs.

[65] Bilateral industry-level exports is systematically unavailable in the historical trade data.

5.2.3 Access to alternative sources of financing

Exporters that had more than one banking relationship would have been more likely to be able to source some credit from these other relationships. The presence of non-British banks as an alternative source of financing may therefore mitigate the main effects of bank failures.

Immediate effects within countries

I use the port-level panel to test this hypothesis in the short-term using within-country variation. I do not observe non-British financing relationships directly so I proxy for them using the number of non-British banks pre-crisis. I re-estimate Equation 7 with an interaction term between exposure to failure and the number of non-British banks:

$$\ln(S_{pot}) = \beta \text{Fail}_{po} \times \text{Post}_t + \phi \text{Fail}_{po} \times \text{non-Brit}_{po} \times \text{Post}_t + \alpha_p + \gamma_{ot} + \Gamma' X_{pot} + \varepsilon_{pot} \quad (12)$$

ϕ is the main coefficient of interest: $\phi > 0$ means that conditional on exposure to bank failures, exports were higher in ports that had access to non-British banks. Table 5 (columns 5 & 6) confirms that having access to more non-British banks pre-crisis mitigated the main losses. At the port-level, there is no correlation between the pre-crisis number of non-British banks and bank failure, so this result is not driven by any trends correlated to non-British banks. The magnitude of ϕ (non-Brit banks $\times$ Fail_{po} $\times$ post) is 34 percent of the baseline effect. The estimated coefficient is statistically significant at the 1 percent level, but the economic magnitude depends on assumptions about the size and effectiveness of non-British banks relative to British banks in providing trade credit. The average port had access to 0.6 non-British banks, so assuming the same size and effectiveness, access to other bank-intermediated finance mitigated the main effect of exposure to bank failures by 20 percent.

Long-term effects across countries

I estimate the long-term effects of gaining access to alternative banking networks by using the nationalities and identities of the multinational banks within each city in the five year windows from 1850-1914. French and German banks are the most important alternatives because they accessed the second and third largest money markets in the world after London.

I construct a binary variable called "European bank" ($\mathbb{I}(\text{EB}_o)$) that takes the value of 1 when the exporting country has access to either a French or German bank, and 0 otherwise. This variable proxies for access to the most likely alternative to the London money market.

I estimate the following:

$$\begin{aligned}\ln(\text{EX}_{odt}) = \theta_t \text{Fail}_o \times \mathbb{I}(\text{EB}_{od}) + \beta_t \text{Fail}_o + \lambda_t \mathbb{I}(\text{EB}_{od}) \\ + \Psi' X_{od} + \gamma_o + \gamma_{dt} + \varepsilon_{odt}\end{aligned} \tag{13}$$

λ_t absorbs the time-varying effect of access to common banks across all countries. X_{od} are standard gravity variables of bilateral resistance.[66] Figure 7 plots β_t in orange and θ_t in blue. Interacting $\mathbb{I}(\text{EB}_o)$ with the exposure to failure each year estimates the additional effect of access to alternative financing for exposed places. The full effect for exposed places is $\theta_t + \beta_t$, which is close to 0 for most years, indicating that countries without access to other financing networks are the ones driving the main losses seen in Figure 3.

6 Conclusion

Standard trade and macro-finance models imply that history does not matter, and that financial shocks only affect the real economy as long as the financial sector has not recovered. Yet there has been little causal evidence to show how long finance shocks continue to impact economic performance. This paper uses a salient historical setting and novel archival data to provide new causal evidence on the real economic effects of bank failures both immediately and in the long-run. The first modern global banking crisis serves as a laboratory where London's role as the global financial center meant that bank failures in London were transmitted abroad to cities and countries around the world. Exposure to bank failures caused large immediate declines in exporting activity on both the intensive and extensive margins within and across countries. Ultimately, countries exposed to larger degrees of bank failures experienced market share losses in their exports destinations for four decades.

The main contribution of this paper is to provide causal evidence that even a short-lived financing shock can lead to persistent changes in the patterns of international trade. These persistent effects can be understood within a framework in which establishing trade relationships entails significant sunk costs. Exporters exposed to the financial shock during the cusp of a major expansion in globalization were disadvantaged relative to their competitors and lost market share during this critical juncture. Having failed to gain entry initially, those destination markets then became too competitive to enter even after the shock passed. The patterns of substitution across trade partners documented in the paper provides further evidence for this framework.

The slow post-crisis recovery among advanced economies in recent decades suggests

[66] The results are robust to not including them and to allowing them to vary over time.

that the historical record is more relevant than ever. Moreover, in sectors that are heavily dependent on access to finance, a large shock can act like an initial condition that persistently affects the geographical distribution of economic activity, above and beyond steady-state determinants of comparative advantage. While this paper has provided one set of results for the magnitudes of these effects, gaining a broader understanding of how major shocks impact economies at longer horizons in other contexts would be a fruitful avenue for future research.

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Tables

Table 1: Summary statistics: ports and countries

	Ports			Countries		
	mean	median	sd	mean	median	sd
Exposure to failed British banks	0.07	0.00	(0.19)	0.11	0.03	(0.17)
Exports	127.99	32.00	(231.05)	12.49	2.15	(32.96)
Fraction exports to UK	0.39	0.30	(0.34)	0.62	0.69	(0.37)
Destinations (# countries)	7.60	5.00	(7.28)	3.95	2.00	(8.32)
Distance to destination (km k)	5.31	5.12	(3.48)	6.12	5.26	(3.51)
Banks	6.03	3.00	(7.54)	5.27	1.00	(9.96)
Non-British banks	0.60	0.00	(1.06)	2.97	0.00	(8.74)
Fraction in British Empire	0.34	0.00	(0.47)	0.33	0.00	(0.47)
N	289			55		

Notes: Table 1 shows summary statistics from the port-level panel of shipping activity and the country-level panel of values of exports. All variables are measured at the end of 1865, before the crisis. "Exports" is measured by the number of ships departing for ports, and by the value of exports in millions of pounds sterling for countries. Fraction of exports to the UK is similarly calculated using the number of ships and values of exports.

Table 2: Pre-crisis comparison of bank characteristics

Panel A: Balance sheet characteristics (joint-stock banks)

	All		Not Failed		Failed		Diff	
Capital, authorized (£m)	1.48	(1.06)	1.44	(1.06)	1.67	(1.07)	-0.23	(0.29)
Capital, paid up (£m)	0.59	(0.38)	0.61	(0.38)	0.47	(0.39)	0.15	(0.10)
Deposits (£m)	2.22	(2.73)	2.29	(2.82)	1.85	(2.37)	0.44	(1.14)
Reserve fund (£m)	0.13	(0.12)	0.13	(0.11)	0.15	(0.16)	-0.02	(0.04)
Total size (£m)	4.81	(6.11)	5.08	(6.46)	3.73	(4.48)	1.35	(1.83)
Leverage ratio	0.23	(0.11)	0.24	(0.11)	0.23	(0.11)	0.01	(0.04)
Reserve ratio	0.06	(0.07)	0.06	(0.07)	0.06	(0.06)	0.01	(0.03)
N	95		76		19		95	

Panel B: Other characteristics (all banks)

	All		Not Failed		Failed		Diff	
OG shareholder	0.15	(0.36)	0.11	(0.32)	0.33	(0.48)	-0.22	(0.1)***
Trade credit (£th)	105.79	(246.77)	111.78	(263.41)	75.30	(133.34)	36.48	(59.0)
Age (years)	35.91	(53.62)	40.77	(56.89)	10.40	(15.15)	30.37	(12.8)**
Cities (#)	13.76	(22.88)	14.79	(24.54)	8.48	(9.97)	6.32	(5.5)
Countries (#)	7.63	(8.89)	7.85	(9.24)	6.52	(6.94)	1.33	(2.1)
Asia (£th)	46.01	(170.09)	48.93	(184.16)	31.13	(60.75)	17.80	(40.7)
Africa (£th)	8.17	(25.08)	7.06	(21.86)	13.83	(37.69)	-6.76	(6.0)
N. America (£th)	13.38	(44.37)	15.25	(47.99)	3.85	(13.37)	11.39	(10.6)
S. America (£th)	6.99	(34.12)	7.83	(37.07)	2.70	(9.21)	5.13	(8.2)
Australia (£th)	6.41	(17.25)	7.08	(18.52)	2.98	(7.54)	4.10	(4.1)
Europe (£th)	12.25	(27.40)	10.80	(25.33)	19.62	(36.03)	-8.82	(6.5)
Brit. Emp. (£th)	48.24	(149.39)	53.11	(161.79)	23.46	(47.13)	29.65	(35.7)
UK (£th)	12.59	(40.28)	14.83	(43.72)	1.19	(2.73)	13.63	(9.6)
N	128		107		21		128	

Notes: Table 2 Panels A and B shows bank-level balance across characteristics for banks that failed and did not fail. All variables are measured at the end of 1865 before the crisis. Balance sheet variables were only published for publicly traded banks; these are reported separately in Panel A. "Not Failed" and "Failed" refers to whether a bank suspended or closed during the crisis. Means are reported first, and standard deviations are given in parentheses. "Diff" refers to the difference in means between groups. Standard errors are reported in parentheses for the "Diff" column. £k denotes units of thousands of pounds sterling. £m denotes units of millions of pounds sterling. Leverage ratio is defined as capital (paid and reserves) divided by total assets. Reserve ratio is defined as reserve assets divided by deposit liabilities. Significance is marked by $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$. *Sources:* Bank of England Archives C24/1, *Banker's Magazine*, *The Economist*.

Table 3: Correlation between bank failures and pre-crisis location characteristics

$$\mathbb{I}(\text{Failure}_b) = \alpha + \beta \bar{X}_b + \varepsilon_b$$

Panel A: Port characteristics

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Ships	0.0475								
	[0.0386]								
Steam ships		0.0174							
		[0.0362]							
Fraction to UK			0.0990***						
			[0.0309]						
Distance to London				-0.0244					
				[0.0483]					
Latitude					0.0379				
					[0.0399]				
Non-Brit banks						-0.0259			
						[0.0302]			
Destinations							-0.0150		
							[0.0345]		
Capital city								-0.119***	
								[0.0392]	
OG shareholder									0.0153
									[0.0342]
N	122	122	122	122	122	122	122	122	73

Panel B: Country characteristics

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Exports values	0.109						
	[0.0594]						
Fraction commodities		-0.0257					
		[0.0303]					
Gold			-0.0669				
			[0.0358]				
Silver				-0.00144			
				[0.0413]			
Bimetallic					0.0580		
					[0.0362]		
Conflict: any						0.0517	
						[0.0441]	
Conflict: interstate							-0.0104
							[0.0395]
N	128	128	128	128	128	128	128

Panel C: Country characteristics: exports composition

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Cotton, raw	-0.0250							
	[0.0726]							
Cotton, manufactured		-0.160						
		[0.116]						
Grains			0.157					
			[0.107]					
Bullion				-0.0678				
				[0.108]				
Sugar					0.105**			
					[0.0456]			
Coffee						-0.0128		
						[0.0403]		
Alcohol							-0.0247	
							[0.0366]	
Tobacco								-0.123
								[0.126]
N	128	128	128	128	128	128	128	128

Notes: Table 3 reports estimates from the bank-level regression of bank exposure to location characteristics pre-crisis on bank failure rates. The dependent variable is $\mathbb{I}(\text{Failure}_b)$, the measure of bank failure. The independent variable of interest $\bar{X}_b$ is the share-weighted exposure of banks to location characteristics, normalized to have zero mean and unit variance. The coefficients are interpreted as the increase in the probability that a bank fails given a standard deviation increase in the average bank exposure to a particular characteristic. Panel A includes location characteristics from the port panel. Panels B and C includes country-level characteristics like the monetary standard and presence of conflict in the exporting country in 1865/1866, and the industry composition of exports in 1865. Regressions are weighted by each the average location's exposure to bank b. $^*p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$
As discussed in Borusyak, Hull and Jaravel (2018), another advantage of transforming the balance tests into shock-level (bank-level) regressions is that it makes it clear which shocks (banks) are the most relevant for the results. In Panel A columns 1–8, there are 122 observations instead of the full 128 because 6 banks operated in cities which were not the closest city for any port, so they do not contribute to the port-level exposure measures. In Panel A column 9, there are only 73 banks that advertised their management personnel. These are smaller banks, and excluding them entirely makes no difference for the country-level results either.

Table 4: Immediate effect of bank failures on shipping

$$\ln(S_{pot}) = \beta \text{Fail}_{po} \times \text{Post}_t + \Gamma' X_{po} \times \text{Post}_t + \alpha_p + \gamma_{ot} + \varepsilon_{pot}$$

	Country	Port				
	(1)	(2)	(3)	(4)	(5)	(6)
Fail_{po} × post	-0.514**	-0.707***	-0.722***	-0.673***	-0.618***	-0.558***
	[0.225]	[0.154]	[0.157]	[0.205]	[0.163]	[0.178]
Capital city × post			Y			Y
Age of banks × post				Y		Y
Fraction to UK × post					Y	Y
$\text{Country}_{\text{o}}$ × post FE		Y	Y	Y	Y	Y
Port_{p} FE		Y	Y	Y	Y	Y
N	108	578	578	578	578	578
Ports		289	289	289	289	289
Clusters	54	54	54	54	54	54
β^*	-.515	-.714	-.729	-.68	-.557	-.559
δ	40.37	50.67	53.14	35.67	47.64	30.78

Notes: Table 4 reports estimates from the difference-in-difference regressions from the two-period panel of port-level shipping activity in the year before and after the crisis. The dependent variable is the log of the total number of ships departing in each period. Fail_{po} is the share of the port's banks that failed during the crisis. The mean of Fail_{po} is 0.07, and the standard deviation is 0.2. Post is a dummy for the post-crisis year that takes the value of 1 after May 1866 and 0 otherwise. The time-invariant control variables are measured in 1865 and interacted with the post dummy. They include an indicator for the port being a capital city within the country, the average age of banks, and the fraction of shipping to the UK. The sample is restricted to ports active in both the pre- and post-period. Results from implementing the Oster (2019) test of selection on unobservable characteristics are reported in the last two rows. β^* is a bound on Fail_{po} × post if selection on unobservable is as large as selection on unobservables ($\delta = 1$). δ is the degree of selection on unobservables necessary for the estimated coefficient to be 0. Standard errors in brackets are clustered by country of origin. $^*p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$

Table 5: Testing for within-country substitution and effect of port access to alternative sources of financing

	(1)	(2)	(3)	(4)
$\text{Fail}_{\text{po}} \times$ post	-0.722***	-0.566***	-0.936***	-0.805***
	[0.153]	[0.176]	[0.227]	[0.240]
$\text{Fail}_{\text{other, po}} \times$ post	-0.421	-0.266		
	[0.426]	[0.405]		
non-Brit banks $\times \text{Fail}_{\text{po}} \times$ post			0.290***	0.270**
			[0.111]	[0.106]
Port controls $\times$ post		Y		Y
non-Brit banks $\times$ post			Y	Y
Port_{p} FE	Y	Y	Y	Y
$\text{Country}_{\text{o}} \times$ post FE	Y	Y	Y	Y
N	578	578	578	578
Ports	289	289	289	289
Clusters	54	54	54	54

Notes: Table 5 reports estimates of the effect of the country's exposure to bank failures and access to alternative forms of financing on shipping activity. The dependent variable is the ln of the number of ships sailed. Fail_{po} is the share of the port's banks that failed during the crisis, Fail_{o} is the share of the country's banks that failed, and $\text{Fail}_{other,po}$ is the country-level share of bank failures outside of port p."non-Brit banks" is the number of non-British banks in the port's city of financing in the pre-crisis year. All other variables are defined the same way as in Table 4. Standard errors in brackets are clustered by the origin-country. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$

Table 6: Extensive margin effect of exposure to bank failures

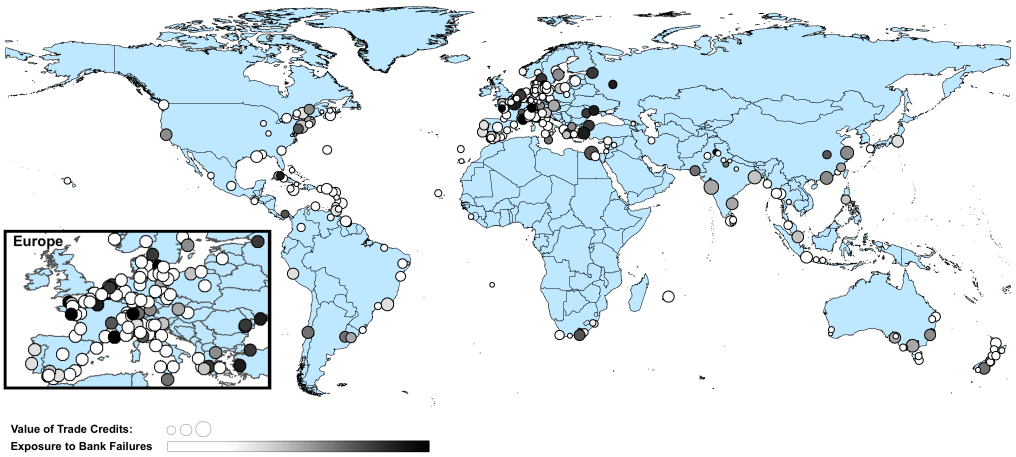
	Country destinations	Port destinations	I(Port Entry)		I(Port Exit)	
	(1)	(2)	(3)	(4)	(5)	(6)
$Fail_o \times post$	-0.484***					
	[0.163]					
$Fail_{po} \times post$		-0.295***				
		[0.113]				
$Fail_{po}$			-0.157**	-0.277***	0.133	0.0406
			[0.0622]	[0.0911]	[0.133]	[0.189]
Port controls × post		Y				
Port controls			Y	Y	Y	Y
$Port_p$ FE		Y				
$Country_o \times post$ FE		Y				
Country controls × post	Y					
$Country_o$ FE	Y			Y		Y
N	108	574	331	331	318	318
Ports		286	331	331	318	318
Clusters	54	54	55	55	54	54

Notes: Table 6 reports estimates of the effect of the exposure to bank failures on the extensive margin of shipping activity. The dependent variable in columns 1 and 2 is the ln number of unique destinations accessed by countries and ports, respectively. The sample in columns 1 and 2 is restricted to ports that were active in both the pre-shock and the post-shock periods. The dependent variable in columns 3 and 4, "I(Port Entry)" is a binary variable that takes the value of 1 for a port that was not active in the pre-shock period and became active in the post-shock period, and 0 otherwise. The dependent variable in columns 5 and 6, "(Port Exit)" is a binary variable for a port that was active in the pre-shock period and became inactive in the post-shock period. The sample size in columns 4–6 reflects the number of ports that were active in the post-period (for Entry) or pre-period (for Exit).
All variables are defined the same way as in Table 4. Standard errors in brackets are clustered by country of origin. $*p < 0.1$, $**p < 0.05$, $***p < 0.01$

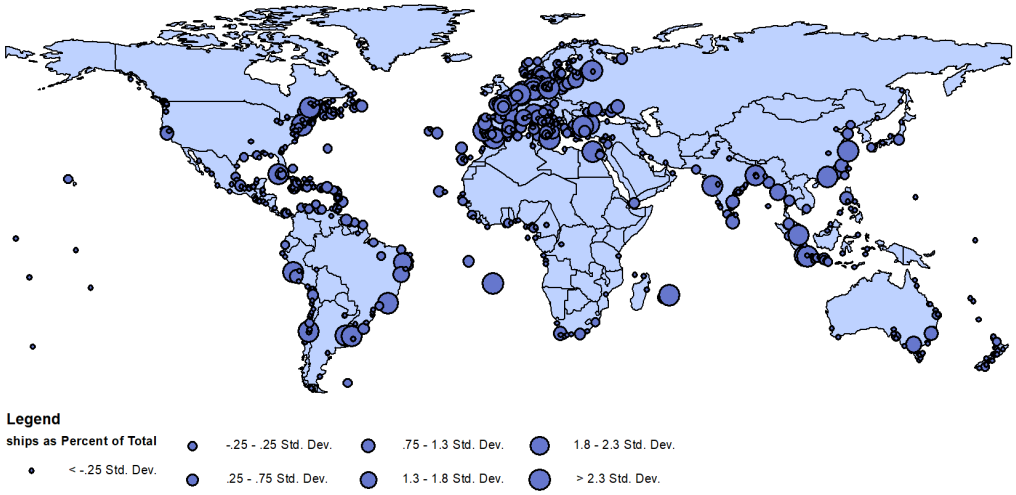
Figures

Figure 1: Geography of banking and trade

(a) British multinational bank lending and failures



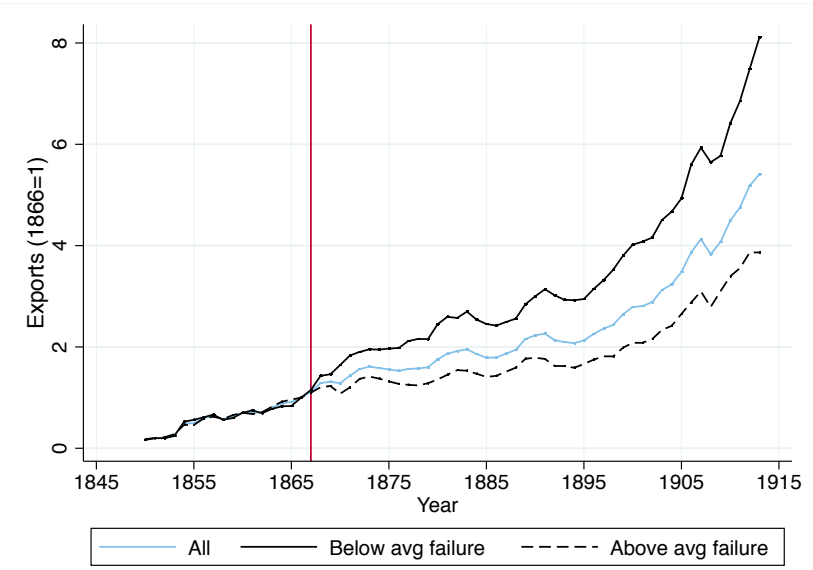
(b) Port-level trade activity



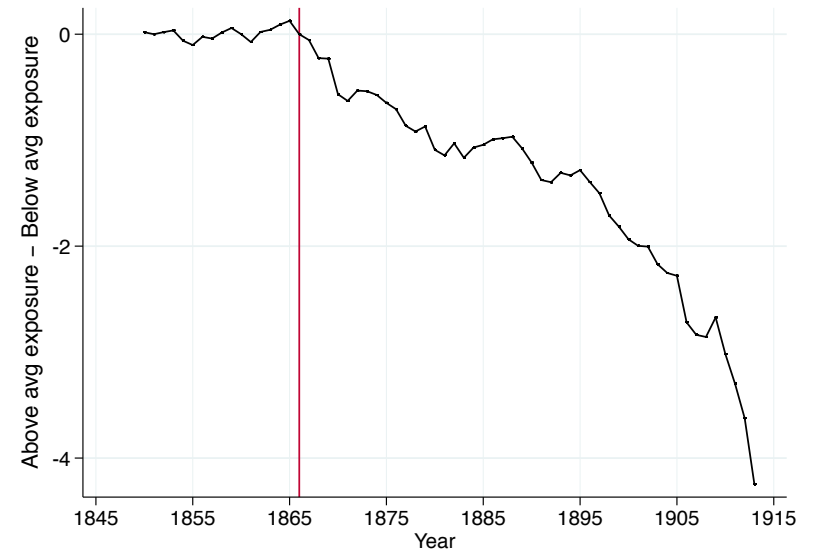
Notes: Figure 1a maps the distribution of the city-level exposure to bank failures Fail_l. The size of the points denote the log value of total credit at each city and the color gradient denotes the exposure to failure, ranging from 0 to 1. Figure 1b maps the distribution of shipping activity at ports in the pre-crisis year. The size of the points denote the log number of ships leaving. Ports in the United Kingdom are not included. Source: *Lloyd's List*.

Figure 2: Aggregate exports, grouping countries by above and below average exposure to bank failures

(a) Exports by group



(b) Difference between groups

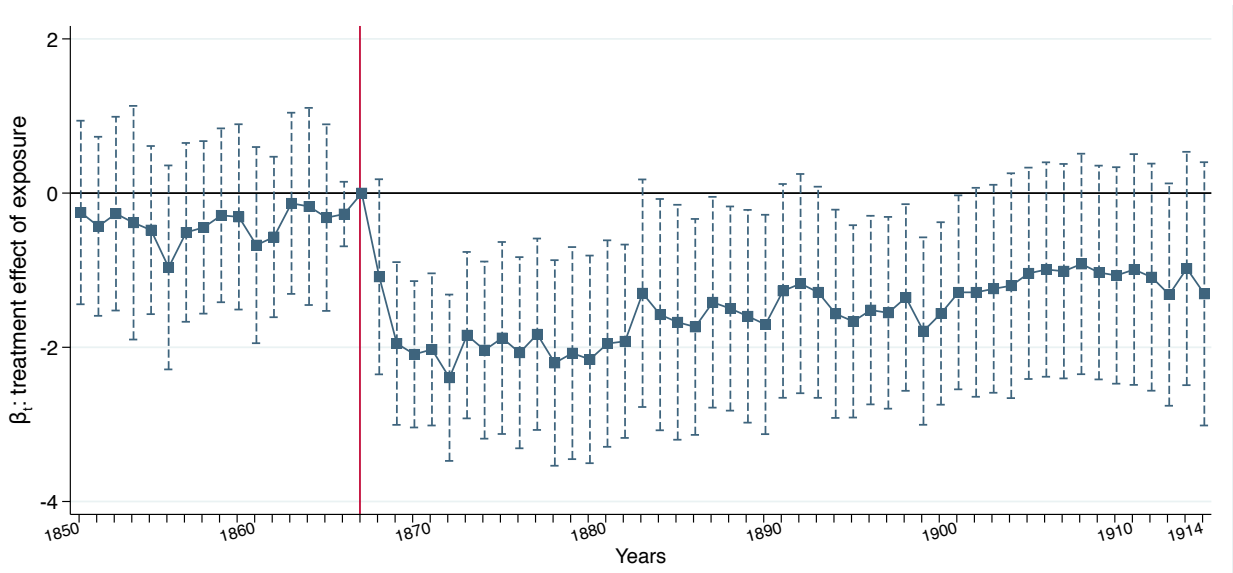


Notes: Figure 2a plots the raw data for the total value of exports by groups of countries from 1850–1914. Countries are binned into two categories: "Below avg failure" refers to countries that experienced below average exposure to bank failures in London, where the average rate was calculated in the cross-section of exporting countries in 1866. "Above avg failure" refers to countries that experienced above average exposure to bank failures. Exports values are normalized to equal 1 in 1866. Figure 2b plots the difference between the values for the two groups. The vertical line marks 1866. Figure B10 plots the coefficients and standard errors from the equivalent regression.

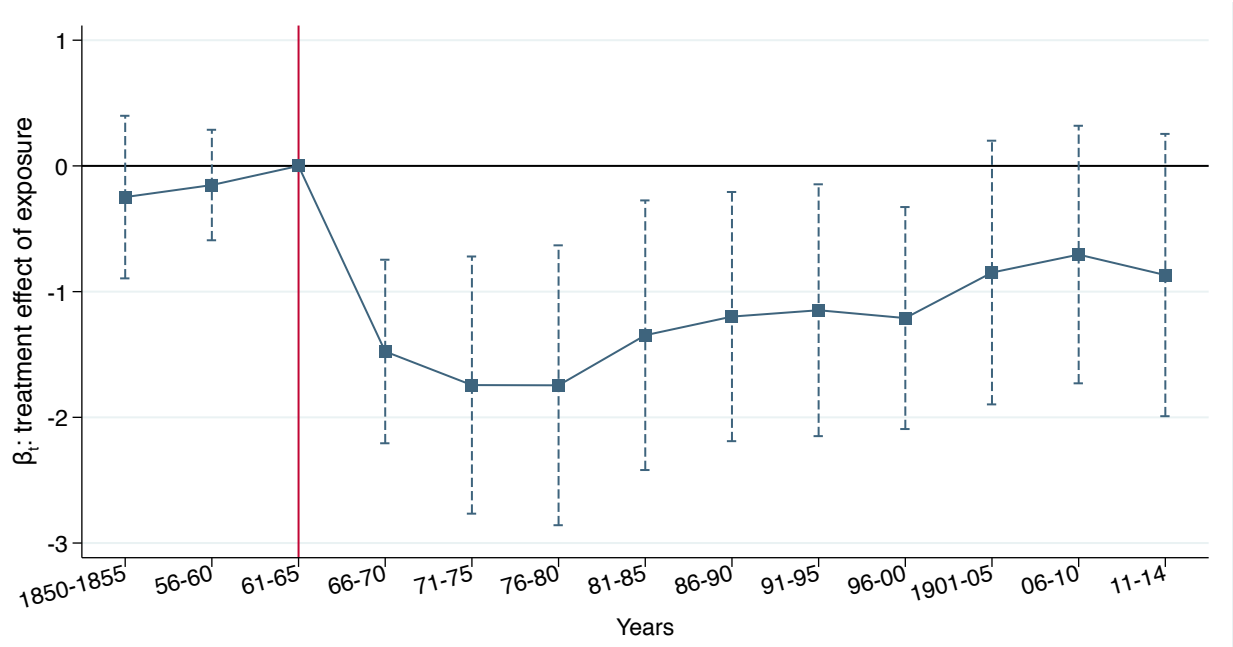
Figure 3: Financing shock has long-term effects on exports

$$\ln(\text{EX}_{odt}) = \beta_t \text{Fail}_o + \Gamma' X_{ot} + \gamma_o + \gamma_{dt} + \theta_t \ln(\text{dist})_{od} + \varepsilon_{odt}$$

(a) β_t estimated annually



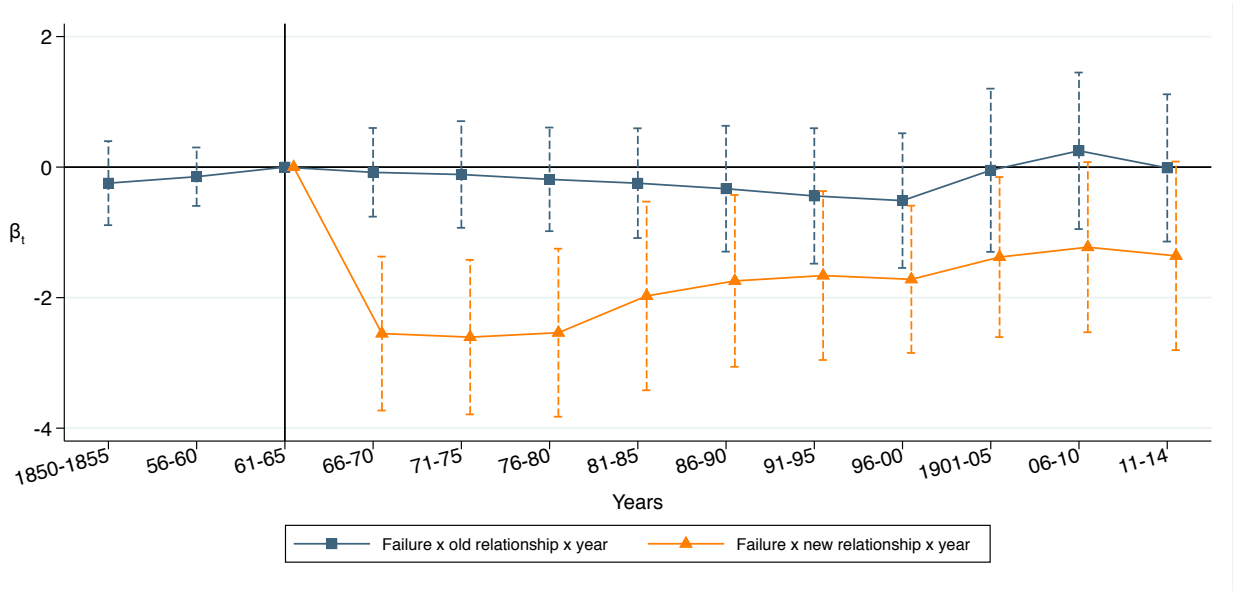
(b) β_t estimated every 5 years



Notes: Figure 3 plots the β_t point estimates and 95 percent confidence intervals for the specification given in equation 10 estimated on the country-level panel of trade. The dependent variable is the ln value of exports. The specification includes origin country o FE, destination country-year dt FE, and time-varying controls for the bilateral distance between countries. β_t is the treatment coefficient on the effect of exposure to failed banks on exports in each group of years. Standard errors are clustered by the origin country. See Table E8 column 1 for the point estimates. N = 67,378.

Figure 4: Effect of exposure to bank failure on new vs pre-existing trade relationships

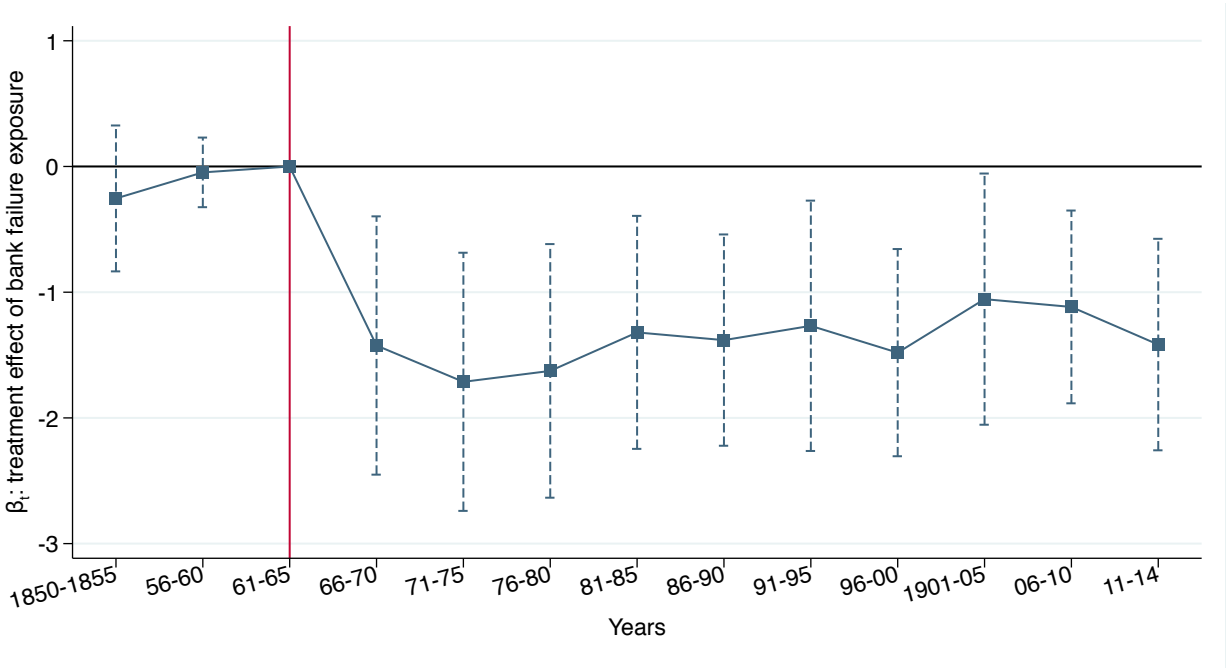
$$\ln(\text{EX}_{odt}) = \beta_{t,old}\text{Fail}_o \times \mathbb{I}(\text{Old}_{od}) + \beta_{t,new}\text{Fail}_o \times \mathbb{I}(\text{New}_{od}) + \gamma_o + \gamma_{dt} + \varepsilon_{odt}$$



Notes: Figure 4 plots the point estimates and 95 percent confidence intervals from the country-level panel of trade in the specification given below. "Failure × old relationships x year" is the treatment coefficient on the effect of exposure to failed banks on exports for bilateral trade relationships that existed prior to 1866. "Failure × new relationships x year" is the treatment coefficient on the effect of exposure to failed banks on exports for bilateral trade relationships that were newly formed after 1866. The dependent variable is the ln value of exports. The specification includes origin country o FE, destination country-year dt FE, time-varying controls for the bilateral distance between countries. Standard errors are clustered by the origin country.

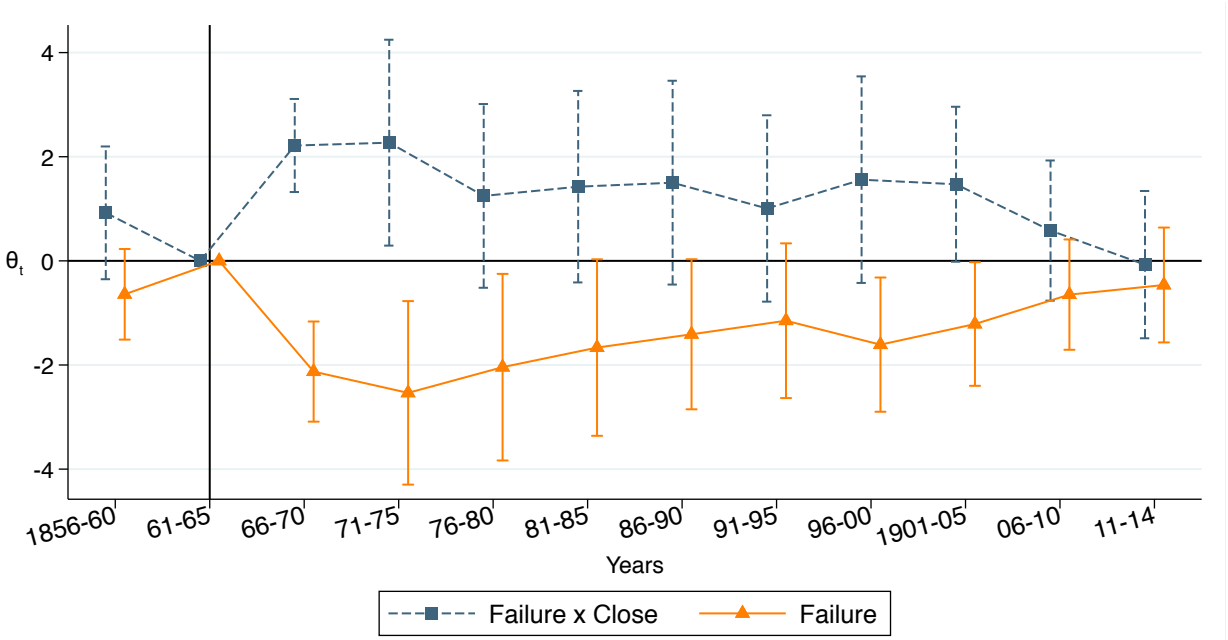
Figure 5: Recovery is worse within groups of countries with similar exports

$$\ln(\text{EX}_{odt}) = \beta_t \text{Fail}_o + \Gamma' X_{ot} + \gamma_o + \gamma_{dt} + \psi \text{Region}_{ot} + \theta_t \ln(\text{dist})_{od} + \varepsilon_{odt}$$



Notes: Figure 5 plots the point estimates and 95 percent confidence intervals for the specification given above estimated on the country-level panel of trade. The dependent variable is the ln value of exports. The specification includes origin-country region-year FE, origin country o FE, destination country-year dt FE, and time-varying controls for the bilateral distance between countries. β_t is the treatment coefficient on the effect of exposure to failed banks on exports in each group of years. Standard errors are clustered by the origin country. See Table E8 column 8 for the point estimates. N = 67,378.

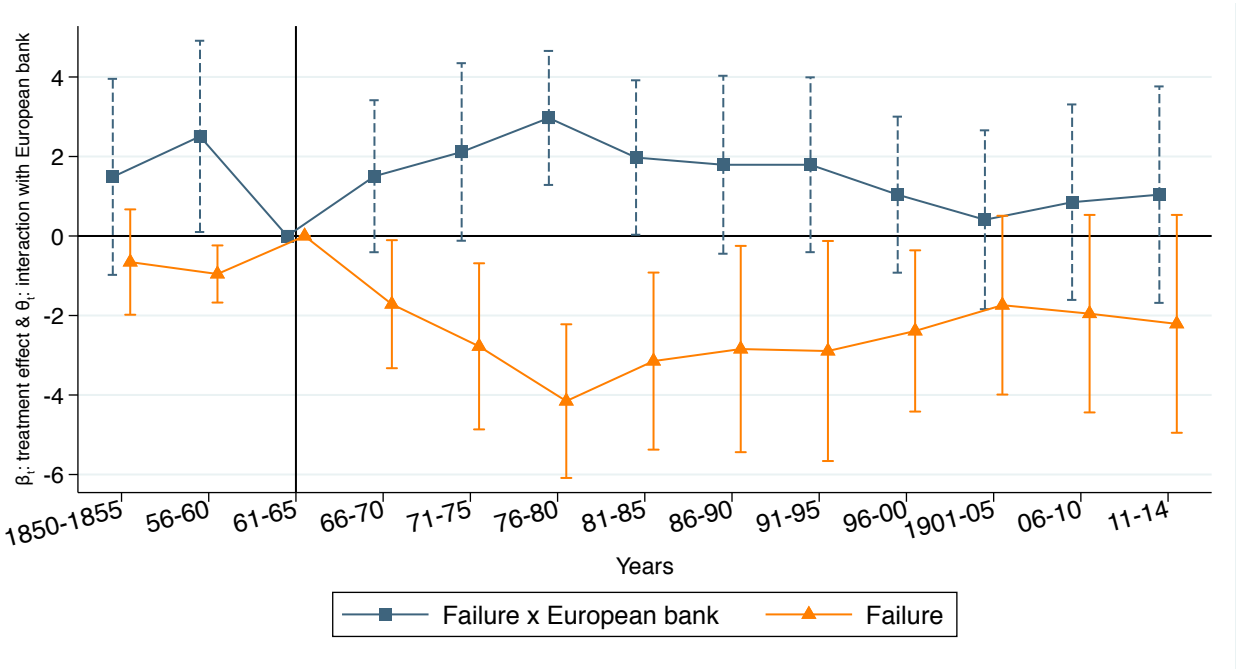
Figure 6: Exports are not affected for closer destinations



Notes: Figure 6 plots the plots the θ_t and β_t point estimates and 95% confidence intervals from the country-level panel of trade in the specification given in equation 11. The dependent variable is the ln value of exports. The specification includes origin country o FE, destination country-year dt FE, and time-varying indicators for common land border, common European colony, and common language. "Failure × Close" is the treatment coefficient on the effect of exposure to failed banks on exports to countries that are less than the average distance away from the destination country, where the average is measured by 1865 bilateral trade flows. Standard errors are clustered by the origin country. N = 66,791.

Figure 7: Recovery is better with access to other banks

$$\ln(\text{EX}_{odt}) = \theta_t \text{Fail}_o \times \mathbb{I}(\text{EB}_{od}) + \beta_t \text{Fail}_o + \lambda_t \mathbb{I}(\text{EB}_{od}) + \Psi' X_{od} + \gamma_o + \gamma_{dt} + \varepsilon_{odt}$$



Notes: Figure 7 plots the β_t and θ_t point estimates and 95 percent confidence intervals for the specification given in equation 13 estimated on the country-level panel of trade. The dependent variable is the ln value of exports. The specification includes origin country o FE, destination country-year dt FE, time-varying controls for the bilateral distance between countries, and time-varying indicators for common land border, common European colony, and common language. "Failure × European banks" is the interaction effect of exposure to failed banks on exports in countries with access to other European banks. "Failure" is the treatment effect of exposure to bank failures for all countries. Standard errors are clustered by the origin country. N = 67,378.