First Era of Globalization and Real Wages*

Bruce Blonigen
University of Oregon and NBER

Woan Foong Wong
University of Oregon and CEPR

December 2024

This is a first draft. Please do not circulate or post.

Abstract

The first era of globalization spanned a time period from the mid-1800s until the outbreak of World War I and saw an increase in world trade volumes by a factor of about twenty. It also coincides with a time when a "great divergence" in incomes began to form between western economies and the rest of the world. Despite its importance, there is still only a small literature on the first era of globalization with almost no analysis of the impact of trade on economic outcomes during this period. We use a recent paper by Xu (2022) documenting a large exogenous shock to trade financing across world port's as an instrument to examine the causal impact of trade on a newly-collected panel of real wages at the port-level for a set of British colonies during this era. We find that agricultural workers experience real wage declines with the negative trade shock, which grows in magnitude over the sample, while workers in the trades see real wage increases, particularly in the middle of our sample years. This is consistent with fact that these colonies were primarily exporters of agricultural goods, and importers of manufactured goods which employed trades people. Agricultural workers experienced lower demand for their product, while trades workers in manufacturing saw increased local demand. Both gained from lower agricultural prices since food was a major portion of consumption baskets during this time period.

*Contact: bruceb@uoregon.edu and wfwong@uoregon.edu. We thank the NSF (Grant SES-1919290) for financial support. Zoe Arnaut, Kelsey Chong, Nathan Currie, Mason DeMartino, Renvir Gellon, Griffin Hsu, Michael Jonsson, Hargobind Khalsa, Athena Konyn, Jessica Lu, Tony Leonard Unger, Jonathon Ely, Natalie Valent, Gaby Persaud, and Luigi Oka provided outstanding research assistance.

1 Introduction

The substantial increase in trade and globalization since the end of World War II is a well-known phenomenon with literally thousands of studies examining various related topics from the drivers of this globalization to its impacts on prices, wages, incomes, and overall welfare. Less well known is the "first era" of globalization in world history, which preceded the post-World War II globalization period, and spanned a time period from the mid-1800s until the outbreak of World War I. This period saw an increase in world trade volumes by a factor of about twenty and by a factor of ten relative to world output (Estevadeordal, Frantz and Taylor, 2003). It also coincides with a very important era for the economic development of many countries around the world.

Despite this very large increase in trade in the late 19th and early 20th centuries, there is still only a very small literature on the first era of globalization, with a focus that has been almost exclusively on the factors driving the increase in trade rather than its impacts. Estevadeordal, Frantz and Taylor (2003) and Jacks, Meissner and Novy (2010, 2011) find that falling transport costs and widespread adoption of a gold standard during this period, providing a "common currency" effect on trade, were the main forces increasing trade in the first era of globalization.[1] Pascali (2017) documents a major technological advance during this period that was likely a key factor in declining transport costs, the conversion from sail to steam ships, and its significant impact on increasing trade.[2] Another significant factor in declining transport costs for certain trade routes was the opening of the Suez Canal in 1870, which Bonin (2010) estimates reduced transport times from London to Bombay, Calcutta, Hong Kong, and Melbourne by 42-43%, 31-32%, 25-27%, and 4-6%, respectively.

There is also a significant literature that examines changes to real wages over this same time period. As documented and examined by economic historians, real wages between countries started to diverge significantly starting in the early 1800s, with substantial growth in real wages in western Europe, the United States, and other areas we now refer to as the "developed world" relative other countries around the globe.[3] Surprisingly, there has been almost no analysis to examine the connection between trade and real wages during this period.[4] There are only a few exceptions we can find that provide some preliminary analysis.

[1] Tena-Junguito, Lampe and Fernandes (2012) and related papers show that trade liberalization in western Europe was an additional factor that led to increased trade for those economies, especially in manufactured goods.

[2] There were very substantial technological advances for both sailing and steam ships during this period. See Knauerhase (1968) and Harley (1988) for more about steamship advances and Graham (1956) for an analysis of advances in sailing ship technology during this period.

[3] This is known as the "Great Divergence" and representative studies in this area include Allen (2001, 2005), Allen et al. (2011), Lindert and Williamson (1983, 2003), and Williamson (2008).

[4] In contrast, the impact of trade on wages since World War II (the second era of globalization) has been the subject of intense study with representative studies and surveys including Autor, Dorn and Hanson (2013), Feenstra and Hanson (1999, 2003), Goldberg and Pavcnik (2007), Harrison, McLaren and McMillan (2011), Feyrer (2019), and Feyrer (2021).

First, studies by Williamson (2008) and Lindert and Williamson (2003) undertake trend analyses of changes to the ratio of rental prices on agricultural land to the real wage of unskilled urban workers. As they note, this was a time when agricultural products and labor-intensive manufactured goods were key products in international trade. They document that the land rental rate to wage rate fell substantially in western European countries where land was relatively scarce and increased substantially in the land-abundant countries of the "New World" during the first era of globalization. Also, consistent with a Heckscher-Ohlin world with two factors of production (land and labor), this period also saw substantial convergence of these two factor prices across countries, with rental-wage rates falling in Europe and rising in the New World. Naturally, trend analyses are limited and cannot provide evidence of any causal link between trade and factor prices, such as wages, particularly when they occur during a period of substantial change for so many other relevant economic factors, including major technological changes, international monetary changes (e.g., adoption of gold standard), financial disruptions, substantial immigration flows, major resource discoveries[5], and significant changes in trade policies. Any of these factors could simultaneously impact trade and wages, leading to a spurious correlation between the two.

Pascali (2017) provides the only formal evidence for a causal link between trade and country-level economic outcomes in the first era of globalization. Pascali (2017) calculates changes in travel times between ports that occurred due to the change from sail to steam ships. Sail times depended significantly on winds, with some routes enjoying systematically more-favorable winds and faster transport times than others, where steam ships largely leveled out the speed of transport across distances. Pascali (2017) shows a significant correlation between reduced transport times from the conversion from sail to steam (which he finds accelerated after 1870) and increased trade. While his study's primary focus is to establish a connection between trade and the efficiency gains from the conversion from sail to steam power in maritime transport, the last section of his paper uses the variation in sail-steam times at the country level as an instrument to examine its impact on country-level outcomes. He finds that positive trade shocks (countries where the steam time was much better than sail time with their trade partners) are correlated with declines in GDP/capita, population and urbanization at the country level, though this effect is mitigated or reversed for richer countries and those with less autocratic forms of government. These results are consistent with the "Great Divergence" hypothesis. At the same time, Pascali (2017) cautions that his causal analysis of the connection between trade and economic development as only "preliminary and exploratory" because the data used for the analysis is at the country-level, with only 37 countries in an unbalanced panel (p. 2849).

In this paper, we provide the first dedicated study of the causal link between trade and wages in the first era of globalization. We introduce a new, rich data set of real wages at the port-level

[5]Just to focus on South Africa alone, diamonds were discovered there in the late 1860s and gold was discovered there in the late 1880s.

from locations across the world and use multiple instruments to estimate the causal relationship between trade and real wages. Importantly, our wage data span a variety of occupations across different sectors of the economy, allowing us to explore heterogeneous effects across workers in different sectors to interrogate more deeply the Great Divergence hypothesis. In addition to the instrument provided by Pascali (2017), a number of other papers document other distinct shocks to trade patterns that had differing impacts across ports of the world during this period and were exogenous to local conditions in those ports.[6]

A completely different trade shock from that of Pascali (2017) that can similarly serve as a suitable instrument candidate for our study is documented by Xu (2022). During this period, London banks were a major source of global trade financing and had affiliates spread across the world's ports in the 1800s. Xu (2022) documents how the unexpected failure of a set of major banks in London in the late 1860s had randomly different impacts on ports across the world depending on which London bank affiliates were servicing that port. She shows that bank failure exposure at the port level was significantly correlated with its trade many years following these events and, importantly for our purposes, that local economic conditions in the ports were uncorrelated with these bank affiliate failures because the affiliates were mainly focused on trade finance of exports out of the ports.

A final shock we use as an instrument is the opening of the Suez Canal in late 1869. As mentioned earlier, it allowed substantial reductions on certain trade routes, while having little to no impact on many others. Using bilateral country-pair trade data, Jacks, Meissner and Wolf (2024) find that the opening of the Suez Canal had a large average effect (72%) on bilateral country-pairs that were affected. A much earlier study by Bogaars (1955) documents a very steep increase in trade for Singapore after the Suez Canal opened.

We use these instruments to identify the causal impact of trade on real wages in first era of globalization. In order to do so, we undertook a major data collection effort to create a new digital database of wage, trade, shipping and local price data across world ports. A key source is the annual reports required of British colonies in what are called "Blue Books," but we also supplement with other historical sources, including those provided by the Global Price and Income History Group at the University of California-Davis.

In the draft of this paper, we only have the instrument from Xu (2022) available for study. We use the measure of a port's exposure to bank failures from Xu (2022) as an instrument in a two-stage least-squares IV estimation of the causal impact of trade on real wages across hundreds of nominal and real wage series eighteen different ports spanning Australia, Asia, Africa and the Caribbean over the period 1855 to World War I. Our first stage shows a strong negative correlation

[6]The sail-steam shock documented by Pascali (2017) is clearly independent of economic conditions in any local port, while also differentially impacting ports across the globe depending on the prevailing wind patterns. As such, it satisfies the sufficient conditions to qualify as an appropriate instrument for estimating the impact of trade on wages using port-level data.

between a port's exposure to bank failures and trade for our sample, which is consistent with the findings in Xu (2022), and indicates the efficacy of bank failure exposure as an instrument. Unlike Xu (2022), we find that this trade shock affects not only exports, but also imports for our sample, which may be due to our sample being comprised of solely British colonies with Great Britain as their major trade partner. Consistent with Xu (2022), we also find that this negative trade shock is long-lasting, with its effects still significant decades later.

In our second stage, we find that this negative trade shock had significant impacts on wages at the port-level, with real wages rising, primarily due to falling prices. (Nominal wages actually show declines). An increase in real wages from a negative trade shock is not surprising in light of the fact that the ports in our sample were primarily exporters of agricultural products. Reduced trade lowered the demand for their exports, reducing the price of agricultural goods, which also made up a large share of their consumption basket.

With our rich panel of wages, we can also explore heterogeneous effects of the trade shock for different occupations. Following occupation categories reported by the British colonies, we group occupations into three categories (domestic, predial, and trades) and estimate the effects of this negative trade shock on each separately. These occupational categories also roughly separate into sectors that had very different trade exposure. Domestic occupations (e.g., house servants) were primarily connected to non-tradeables; predial (agriculture) occupations were connected with the export sector of these economies; and trades (e.g., blacksmiths) were most connected to import-competing sectors in manufactured goods. Our results are quite consistent with how these job categories connect to the different traded goods sectors. We find that predial workers experience real wage declines with the negative trade shock, which grows in magnitude over the sample, while workers in the trades see real wage increases, particularly in the middle of our sample years. We estimate no significant impact of the trade shock on wages of domestic workers.

We next describe the data sample we have collected for our analysis and then turn to describing our empirical methodology and results. A final section concludes with a discussion of our results.

2 Data

Our analysis requires port-level data on trade, wages and prices that pre-date the late 1860s, when our documented shocks to trade occur, and then spans up to as far as the start of World War I in 1914. We rely primarily on the British Colonial Blue Books to source these data. The British colonial network across the world was at its height during this period and, beginning in the early 1800s, Britain required its colonies to collect annual statistics on a range of topics, including population, trade, prices, and wages. While these statistics are collected at the colony

level, the major port city for the colony typically accounts for the majority of the colony's population and economic activity. For larger colonies, we observe multiple port cities per colony like Australia and the Straits Settlement. The British Parliament would get semiannual reports bringing together all the colonial statistics in volumes titled, *Statistical Tables Relating to the Colonial and Other Possessions of the United Kingdom*, which greatly aided our data collection. However, extracting, reformatting, and cleaning the data has required substantial effort, and this first draft of the paper includes data for 18 cities and 14 countries (Table 1).

International Trade The trade data importantly includes the value of imports and exports in British pounds for all trading partners for the colony/port. We associate a major port city with each of the trading partners so we can calculate distance, sail times, and steam times between the port and its trading partner.[7] Data on shipping are also typically collected, which provides the tonnage (not including cargo) of the arriving and departing ships by trading partner as well. Unlike today, each trading partner generally had its own ships, and so this can provide another measure of trade volume between countries.

Wages Annual wage data for each of the colonies is collected for at least three occupation categories; 1) "domestic," which captures servants, maids, and other compensated domestic or household labor, 2) "predial," which corresponds to workers in the agricultural sector, and 3) "trades," which covers workers in occupations such as carpentry, blacksmiths, stone masons, and other workers in construction and manufacturing. Some of the ports collected wage data for many specific occupations within these categories. For example, Victoria (Melbourne), Australia reports wages for over thirty occupations, including such varied ones as "sheep washers", "lithographers", "nursemaids", and "blacksmiths."[8]

Prices Trade can have substantial welfare impacts through prices and it is therefore important to study real wages, in addition to nominal wages. We follow prior studies in constructing a local consumer price index (CPI) to convert nominal wages into real wages for this historical period, which is challenging due to a relative paucity of price data. The task is to construct a weighted average of a basket of goods for which price series are available and that are reasonably representative of the consumption bundle for the worker. At least since Lindert and Williamson (1983), economic historians have developed a consistent approach and assumptions to create CPIs for various parts of the world, including Europe (Allen, 2001), Africa (De Zwart (2011) and Frankema and Van Waijenburg (2012)), and Asia (Allen et al., 2011).

[7] Smaller trading flows were sometimes aggregated into a reported region as the trading partner. In these cases, we use the closest major port from that region to calculate distance between the port and that trading partner.

[8] We assigned all occupations into one of the three occupation categories, which was typically straightforward. For example, "sheep washers" is in the "predial" category, "nursemaids" is in the "domestic" category, and "lithographers" and "blacksmiths" are in the "trades" category.

Table 1: List of Cities and Countries

City	Country
Hobart	Australia
Melbourne	Australia
Perth	Australia
Sydney	Australia
Bridgetown	Barbados
St Johns	Newfoundland Canada
Roseau	Dominica
St George	Grenada
Georgetown	Guyana
Kingston	Jamaica
Valletta	Malta
Auckland	New Zealand
Freetown	Sierra Leone
Cape Town	South Africa
Penang	Straits Settlements
Singapore	Straits Settlements
Scarborough	Tobago
Port of Spain	Trinidad and Tobago

Note: The table reports unique number of cities and countries in our sample. There are 18 cities and 14 countries.

The standard methodology is to use a Lasperes price index, where consumption levels are assumed to be fixed as prices change. These studies have also established a basic set of weights for consumption of primary food items that translates to a subsistence level of calories for a working man during this time period – roughly 2000 calories per day. Based on a variety of historical studies, they also determine weights for energy and lighting sources (typically coal and candles), as well as clothing. Rent data for housing are very scarce and not typically available, though available evidence is that rent was a relatively small part of workers' budgets during this time period (roughly 10%).[9]

British colonies make up the majority of our sample and provide fairly consistent local prices across colonies for a list of items that are primarily staple foods that comprised the majority of workers' calorie needs, such as bread, meat, rice, butter, beer, salt, sugar, coffee or tea, and tobacco. We also use British export prices for a number of other non-food goods in the basket that were typically imported from Britain during this period: Candles, cloth, coal, and soap. Table 2 presents the bundle of consumption goods used to construct local prices.

Before proceeding to our more formal empirical analysis, we provide some descriptive analysis

[9]See p. 422 of Allen (2001) for discussion.

Table 2: Bundle of Consumption Goods Used for Constructing Local CPIs

Product	Annual Quantity	Units	Price Source	Annual Quantity Source
Bread	371.5	lbs	Blue Book Prices	Allen et al. (2011)
Beef	11.4	lbs	Blue Book Prices	Allen et al. (2011)
Mutton	11.4	lbs	Blue Book Prices	Allen et al. (2011)
Pork	11.4	lbs	Blue Book Prices	Allen et al. (2011)
Butter (Salted)	9	lbs	Blue Book Prices	Allen et al. (2011)
Cheese	5.7	lbs	Blue Book Prices	Allen et al. (2011)
Beer	24	gallon	Blue Book Prices	Allen et al. (2011)
Sugar	4.4	lbs	Blue Book Prices	Frankema and Van Waijenburg (2012)
Salt	4.4	lbs	Blue Book Prices	Assumed the same as sugar
Tea	5	lbs	Blue Book Prices	See notes
Tobacco	2	lbs	Blue Book Prices	See notes
Candles	4.3	lbs	UK Export Data	Allen et al. (2011)
Soap	4.3	lbs	UK Export Data	Allen et al. (2011)
Coal	0.14	tons	UK Export Data	Allen et al. (2011)
Cotton Piece Goods	2.2	yds	UK Export Data	Allen (2005)
Linen Piece Goods	2.2	yds	UK Export Data	Allen (2005)

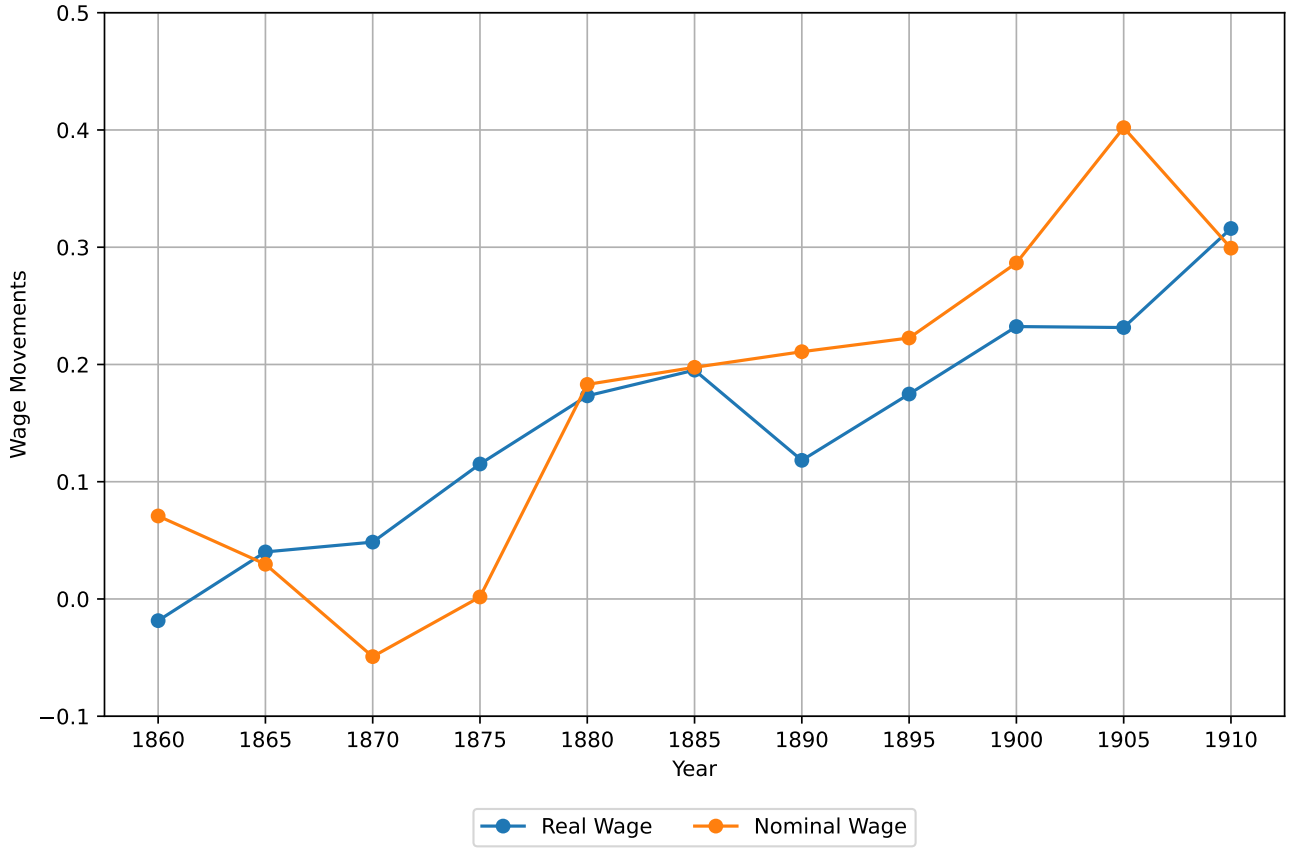
Notes: Consumption quantities based on the average between European "bare bones" and "respectable" consumption bundles in Allen et al. (2011). Metric units converted to English units. In countries where the main starch is rice, rather than bread, we substitute 370.6 lbs of rice, also following Allen et al. (2011). Allen et al. (2011) only specify an annual quantity for "meat," so we split this amount evenly across the three meats typically reported in the Blue Books (beef, mutton, and pork). We use the prices for salted butter, rather than fresh butter, because they are more reliably reported and fresh butter was seen as more of a delicacy. Tea consumption is estimated to be about 5 lbs per person annually (Gupta, 2008). Annual tobacco usage is estimated from the total amount of tobacco production in 1900 reported by the US Department of Agriculture (1938) and world population in 1900. (Both exclusive of China). Tons of coal are translated from the British Thermal Units (BTU) of energy requirement reported by Allen et al. (2011). Past authors have argued that alternative energy sources (e.g., wood or oil) should move together with coal prices. Coal was a main source of home heating in many parts of the world and we have much better data on coal prices than other energy sources. Allen (2005) specifies an annual amount for "cloth," so we divide this equally across "cotton piece goods" and "linen piece goods."

of wage movements in our sample. It is not straightforward to show average movements because our sample is an unbalanced panel of wage series across ports with different local conditions and average wages. To control for these features, we regress wages on year dummies while also including fixed effects by city-occupation pairs. In such a regression, the year dummies identify deviations from the base year (1855 in our sample) using only variation within city-occupation pairs. Figure 1 provides these results for both log wages and log real wages. We average the effects over five-year intervals to smooth out the series where, for example, the year 1870 is the average over the years 1866 through 1870. Given the specification in logs, the y-axis provides the difference in the wage over the base year in roughly percentage terms (in decimal form).

Both nominal and real wages progressively increase over our sample years, with both ultimately about 30% higher in 1910 than in 1855, the base year. As one might expect, nominal wage movement is a bit more variable than real wage variable since local economic and financial shocks can lead both price and nominal wages to vary together.

A key strength of our sample of wages is that it allows us to examine the differential impact of trade on wages across different occupational categories. In the British colonies comprising our sample, exports were mainly comprised of agricultural products, while their imports were

Figure 1: Movements Over Time for Nominal and Real Wages in Our Sample



primarily manufactured goods.[10]. As a result, predial workers were employed in the export sector, whereas many trades workers were in the import-competing sector. Domestic workers, the other major occupation category in our data, were largely in the non-tradeable sector.

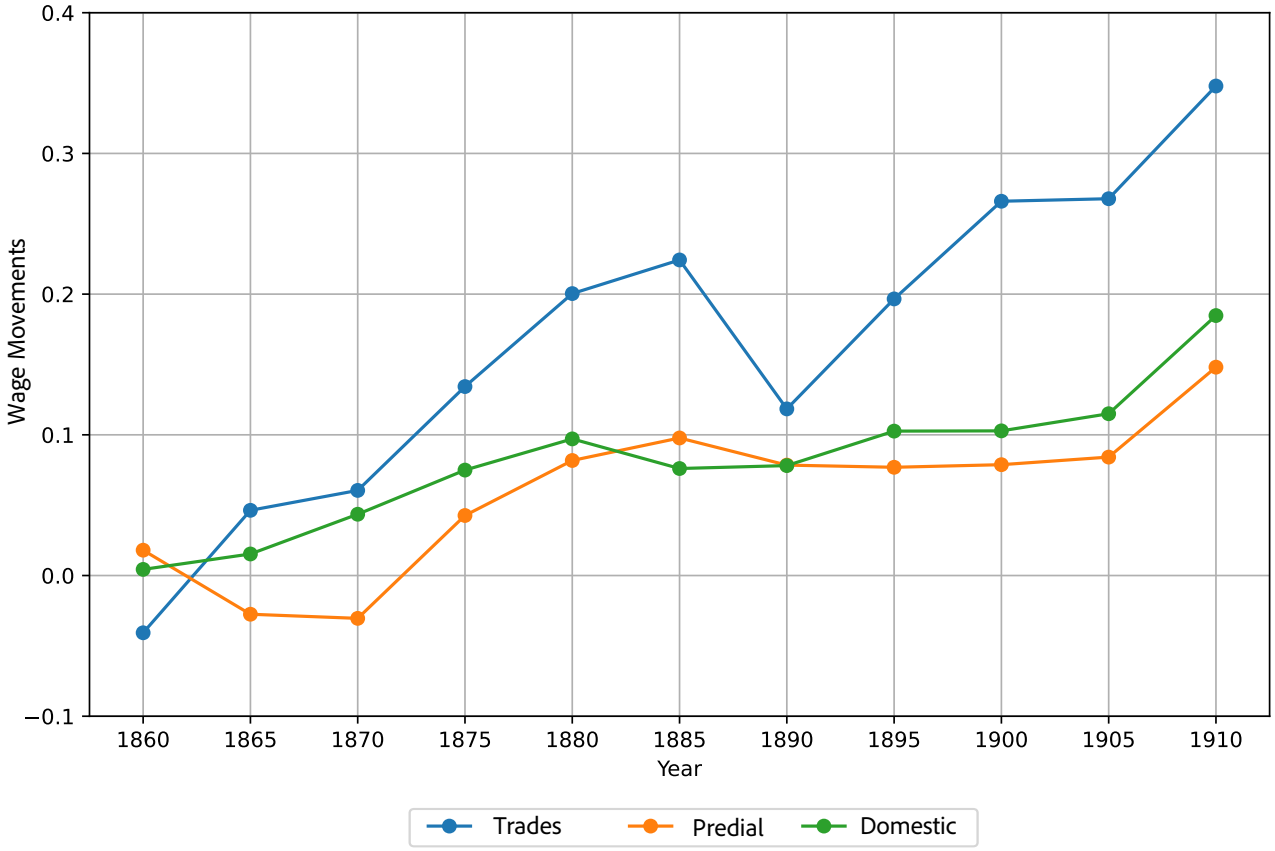
Using the same regression methodology as our graphs of wage movements above, Figure 2 graphs the average real wage movements for the three main occupation categories–domestic, predial and trades–over our sample period. All three categories see real wage increases over the first era of globalization, but the increase for workers in trades is much more substantial than for predial and domestic.

3 Empirics and Results

We now turn to our empirical analysis, which employs a two-stage least-squares instrumental variable (2SLS IV) strategy to estimate the causal impact of trade on real wages. While future drafts will employ all three instrumental variables described in the introduction for identification,

[10]This is true even of the most developed country in our sample—Australia. For example, 75% of exports (by value) for Sydney, Australia, is agricultural in 1870, with another 22% of exports comprised of natural resources (coal and copper)

Figure 2: Real Wage Movements Over Time by Occupation Type



we currently only have the instrumental variable related to Xu (2022) available–exposure to bank failures that originated in London in 1866.

During this historical period, British banks were financing a large portion of world trade and had branches located in port cities around the world. As described in more detail in Xu (2022), trade financing fell almost completely on the exporter during these times, which would need to take out a loan to finance the cost of exporting the goods (including risk of lost cargo or importer default). British banks set up branches in ports around the world to finance exports and through bills of exchange that they would then be remitted to the Bank of England.

The London bank failures began with the uncovering of unexpected fraudulent management of the Overend & Gurney bank. This not only led to the failure of Overend & Gurney, but the failure of 21 out of 128 multinational banks in London.[11] This wave of bank failures exposed port cities around the world differentially depending on the British bank affiliates in their city. Xu (2022) determines the share of financing in a port city that was provided by failed British banks prior to 1866 and this is the key variable used in her study and is also the instrumental variable we use. Like her study, the median port in our sample does not have exposure to bank

[11]Overend & Gurney did not engage in trade financing activities, which further supports the exogenous nature of this shock to trade flows.

failures. Six of our 18 ports have positive exposure with the average exposure being 6%[12]

Xu (2022) undertakes careful analysis to show that the failure of branch banks in ports only affects trade and not other local economic activity. This is critical for the use of this as an instrument in our study, as it needs to be independent of other economic activity at the port-level in order to credibly identify the impact of trade on port-level wages. First, Xu (2022) does a thorough qualitative analysis of British banks' shareholder reports at the time and finds that their branches in ports outside of London were almost exclusively focused on trade financing and failures by these branches were not affected by local conditions. She also does a statistical analysis to show that local conditions were also not related to these British branch bank failures.[13]

Before turning to our analysis, there are a few other notable observations about the results of Xu (2022) and the instrument we use. First, because of the nature of trade financing described above, Xu's analysis finds negative impacts on exports out of affected ports, not imports. Second, the impact on imports found by Xu (2022) is longstanding and continues to have a statistically negative impact on imports into the 1900s. Xu (2022) argues that this is due to the difficulty of regaining lost trade partners and provides evidence that neighboring trade partners with less (or no) trade exposure gain trade partners at the expense of a post with significant trade exposure.

3.1 First Stage: Effect of Bank Failures on Trade

We use the exposure to bank failures from Xu (2022) and start by estimating the impact of the bank failures on trade outcomes (our first stage) using the following regression:

$$\ln Y_{ot} = \alpha_1 \text{Fail}_o \mathbb{1}_{t'=[1866,1880]} + \alpha_2 \text{Fail}_o \mathbb{1}_{t'=[1881,1895]} + \alpha_3 \text{Fail}_o \mathbb{1}_{t'=[1896,1912]} + \delta_o + \gamma_{Ot} + \epsilon_{ot} \quad (1)$$

where Y_{ot} is the trade outcome (total, imports, and exports) for port o at time period t, Fail_o is the bank failure exposure for port o from Xu (2022), indicator $\mathbb{1}_{t=(1866,1880)}$ equals one for years 1866-1880, indicator $\mathbb{1}_{t=(1881,1895)}$ equals one for years 1881-1895, indicator $\mathbb{1}_{t=(1896,1912)}$ equals one for years 1896-1912, δ_o is port fixed effects, and γ_{Ot} is country-time fixed effects. The port fixed effects control for characteristics of each port that do not change over time, including geographic location, infrastructure capacity, or historical trade patterns. The country-time fixed effects control for factors that affect a country over time, including changes in a country's propensity to export and import over time as well as growth. We start by pooling years into three periods over the sample, each about 15 years in length, with the first period being the effect during roughly the first decade after the failures. The coefficient on each of these provides an estimate of the cumulative effect of the bank failures on trade for that period relative the years prior to the bank

[12]The ports experiencing exposure to bank failures in our current sample are Cape Town, Melbourne, Port of Spain (Trinidad and Tobago), Singapore, Sydney, and Valletta (Malta).

[13]See section IV of Xu (2022) for more details.

failures. Below, we provide results when we disaggregate into five-year intervals (Subsection 3.4).

The impacts of bank failures on the trade of ports are reported in Table 3. Similar to Xu (2022), we find that ports that are more exposed to bank failures have significant declines in total trade and exports (Columns (4) and (6), Table 3). However, unlike Xu (2022), we also find that ports that are more exposed to bank failures have greater declines in imports (Column (5), Table 3). This impact may be due to the fact that all of our sample countries are British colonies. Lower export earnings may have translated into lower ability to pay for imports with their main trade partner, Great Britain, than port cities who were not in a colonial trade relationship. The negative effects of bank exposure on trade are long-lasting, as Xu (2022) found as well, and estimate to still have a substantial impact many decades later. Our results are robust to whether we control for port fixed effects and year fixed effects, or a more stringent set of port fixed effects and country-year fixed effects.

3.2 Second Stage: Effect of Trade on Prices, Nominal Wages, and Real Wages

Next, we want to identify the impact of the trade loss due to bank failures on prices, nominal wages, and real wages. We specify our second-stage IV regression as the following:

$$\ln w_{ojt} = \beta_1 \ln \hat{Y}_{ot} \mathbb{1}_{t'=[1866,1880]} + \beta_2 \ln \hat{Y}_{ot} \mathbb{1}_{t'=[1881,1895]} + \beta_3 \ln \hat{Y}_{ot} \mathbb{1}_{t'=[1896,1912]} + \nu_o + \iota_{Ot} + \sigma_{Jt} + \varepsilon_{ot} \quad (2)$$

where w_{ojt} is the outcome variable (nominal wage, prices, or real wage) for job j at port o at time period t, $\hat{Y}_{ot}$ is the predicted total trade for port o at time period t from the first-stage regression, indicator $\mathbb{1}_{t=(1866,1880)}$ equals one for years 1866-1880, indicator $\mathbb{1}_{t=(1881,1895)}$ equals one for years 1881-1895, indicator $\mathbb{1}_{t=(1896,1912)}$ equals one for years 1896-1912, ν_o is port fixed effects, ι_{Ot} is country-time fixed effects, and σ_{Jt} is job type-time fixed effects where job type J is either trades, predial, or domestic. As in the first-stage regressions, the port fixed effects control for characteristics of each port that do not change over time, including geographic location, infrastructure capacity, or historical trade patterns. Likewise, the country-time fixed effects control for factors that affect a country over time, including changes in a country's propensity to export and import over time as well as growth. When specifying a wage variable as our dependent variable, we also include job type-time fixed effects to control for trends that impact each of these types of jobs over time across all countries, such as technological changes. As in the first stage regressions, our variables are logged and so the coefficients on our regressors of interest can be interpreted as the percentage difference from the pre-period (in decimal form).

Table 4 presents the second-stage IV results. The first three columns of Table 4 report results of this negative trade shock on prices, nominal wages, and real wages, respectively, for our base regressions. Note that for the price regression we do not include job type-time fixed

Table 3: Trade and Bank Failures

	(1) Total Trade	(2) Imports	(3) Exports	(4) Total Trade	(5) Imports	(6) Exports
Bank Failure × 1866-1880	-2.480***	-1.770**	-3.367***	-2.634***	-1.937***	-3.437***
	(0.716)	(0.680)	(0.719)	(0.240)	(0.150)	(0.325)
Bank Failure × 1881-1895	-11.196***	-8.427***	-13.721***	-10.911***	-7.668***	-13.999***
	(0.552)	(1.099)	(0.245)	(0.009)	(0.016)	(0.030)
Bank Failure × 1896-1912	-14.000***	-13.149***	-14.803***	-12.695***	-11.503***	-14.016***
	(1.709)	(2.157)	(1.081)	(0.114)	(0.099)	(0.129)
Port FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓			
Country-Year FE				✓	✓	✓
Observations	8383	8381	8383	8383	8381	8383
R^2	0.94	0.95	0.93	0.98	0.98	0.97

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Robust standard errors in parentheses are clustered at the country level. All dependent variables are in logs. Weighted by year 1860 population at ports.

effects because prices do not vary by occupation. These initial results suggest that a negative trade shock actually increases real wages (by over 20% for most of the panel of years) and this mainly comes through a significant decrease in prices, while the shock has no significant effect on nominal wages. These results make sense when considering that these countries were primarily exporting agricultural products and food was a large part of consumption baskets. Decreased exports would lower local prices for food and increase real wages if nominal wages do not change.

Columns 4, 5, and 6 report our IV results for these three variables when we add a more stringent set of fixed effects (port fixed effects, country-year fixed effects, and job type-year fixed effects). Job type is the set of three occupation categories: domestic, predial, and trades. The results have a similar pattern, though now the real wage effect occurs primarily in the second time period (1881-1895), due to the impact on prices. We now estimate a growing negative impact on nominal wages from the negative trade shock, which mitigates the falling prices by the last period so that there is no longer a significant positive impact on real wages. And we get this same pattern when apply an even more stringent set of fixed effects in columns 7 and 8 of Table 4, where we include country-jobtype-year fixed effects with port fixed effects.

3.3 Impact on Nominal and Real Wages by Job Types

We now focus on how the negative trade shock may have impacted different occupation categories: domestic, predial, and trades. As discussed, these categories were associated with sectors of the economy that would be differentially impacted by trade, with agriculture (predial) a major export sector, domestic largely in nontradeable sectors, and trades most exposed to imported manufactured goods. Table 5 estimates the previous 2SLS IV regression separately for each occupation category, both for nominal and real wages. Our results are quite consistent with how

Table 4: Impact of Bank Failures on Prices, Nominal, and Real Wages

	(1) Prices	(2) Nom Wage	(3) Real Wage	(4) Prices	(5) Nom Wage	(6) Real Wage	(7) Nom Wage	(8) Real Wage
Trade × 1866-1880	-0.072	0.024	0.079***	0.007	-0.038	-0.006	-0.015	0.016***
	(0.043)	(0.033)	(0.022)	(0.020)	(0.066)	(0.023)	(0.043)	(0.000)
Trade × 1881-1895	-0.222***	0.071	0.254***	-0.289***	-0.086**	0.283***	-0.051	0.313***
	(0.049)	(0.068)	(0.075)	(0.043)	(0.029)	(0.062)	(0.041)	(0.016)
Trade × 1896-1912	-0.212**	0.042	0.212**	-0.214***	-0.222**	0.095	-0.215*	0.095*
	(0.089)	(0.121)	(0.080)	(0.040)	(0.088)	(0.075)	(0.098)	(0.049)
Port FE	✓	✓	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓					
Country-Year FE				✓	✓	✓		
JobType FE		✓	✓					
JobType-Year FE					✓	✓		
Country-JobType-Year FE							✓	✓
Observations	8383	8383	8383	8383	8383	8383	8377	8377
First Stage F	42.30	42.16	42.16	48.22	37.33	37.33	39.97	39.97

Notes: Robust standard errors in parentheses are clustered at the country level. All dependent variable are in logs. Weighted by year 1860 population and the annual inverse of occupation counts at ports.

these job categories connect to the different traded goods sectors. Predial workers experience real wage declines with the negative trade shock that grows over the sample, while workers in the trades see real wage increases, particularly in the middle of the sample. We estimate no significant impact of the trade shock on wages of domestic workers.

3.4 Event Study

We now estimate the same 2SLS specification in the previous regressions, except with five-year intervals; i.e., ([1850, 1855], [1856,1860],[1861,1865], ... , [1906,1910]). Figure 3a presents the results of bank failures on nominal wages, while Figure 3b presents the results of bank failures on real wages.

We will first note that estimating at five-year intervals now allows one to see pre-trend in the data prior to the event, which generally look good in the sense that there is no pattern or a trend the opposite of what happens after the event. These regression results are generally consistent with what we have found with our prior specifications. The negative shock is associated with nominal wages falling over the sample, but significantly higher real wages by the middle years of the sample (and then falling off again).

We also estimate the event study plots of the effect of the negative trade shock on real wages for the predial (Figure 4a) and trades (Figure 4b) occupation categories. Pre-trends are again good in the sense that here is no pattern before the event, or a trend the opposite of what happens after the event. These results are also consistent with what we obtained above. The real wage for predial jobs (export sector) fall after the negative trade shock (though significant

Table 5: Trade and Bank Failures by Job Types

	(1) Nom Wage	(2) Real Wage	(3) Nom Wage	(4) Real Wage	(5) Nom Wage	(6) Real Wage
Trade × 1866-1880	-0.092	-0.193	0.030*	0.033	0.309	0.045
	(0.134)	(0.243)	(0.014)	(0.041)	(0.991)	(0.805)
Trade × 1881-1895	-0.011	-0.278	0.326***	0.619***	3.644	1.854
	(0.076)	(0.259)	(0.007)	(0.046)	(2.519)	(2.143)
Trade × 1896-1912	0.008	-0.498***	-0.034	0.157**	2.584	-0.129
	(0.075)	(0.030)	(0.102)	(0.066)	(1.861)	(12.467)
Job Type	Predial	Predial	Trades	Trades	Domestic	Domestic
Port FE	✓	✓	✓	✓	✓	✓
Country-Year FE	✓	✓	✓	✓	✓	✓
Observations	1185	1185	5321	5321	1743	1743
First Stage F	12.09	12.09	30.71	30.71	0.47	0.47

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

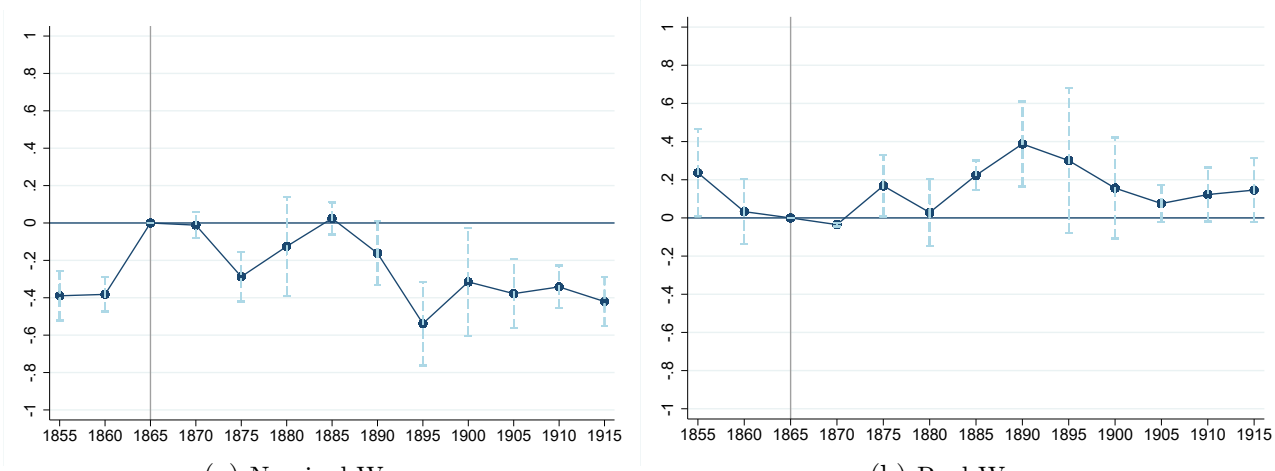
Notes: Robust standard errors in parentheses are clustered at the country level. All dependent variable are in logs. Weighted by year 1860 population and the annual inverse of occupation counts by job types at ports.

for only a few years), whereas real wages are higher for the trades category (import-competing sector) by the middle years of the sample before falling off and becoming insignificantly different by the latter years of the sample.

4 Discussion

Future drafts of this paper will employ the other two instruments discussed in the introduction: 1) Differences in sail versus steam shipping times for ports with their trading partners (Pascali (2017)) and 2) changes in route distances with trading partners due to the opening of the Suez Canal (Jacks, Meissner and Wolf (2024)). There are additional port cities that we plan to add as well, including some U.S. cities and London. A larger sample will also hopefully allow greater statistical power in further examining heterogeneity across occupations and parts of the world, all of which would be novel contributions to the literature.

Figure 3: Impact of Trade Loss on Nominal and Real Wages



(a) Nominal Wages (b) Real Wages

Notes: Standard errors are clustered at the country-level. Weighted by year 1860 population and the annual inverse of occupation counts at ports. Includes port and country-year fixed effects.

Figure 4: Impact of Trade Loss on Predial and Trades Jobs

(a) Predial Jobs (b) Trades Jobs

Notes: Standard errors are clustered at the country-level. Weighted by year 1860 population and the annual inverse of occupation counts by job types at ports. Includes port and country-year fixed effects.

References

Allen, Robert C. 2001. "The great divergence in European wages and prices from the Middle Ages to the First World War." *Explorations in economic history*, 38(4): 411–447.

Allen, Robert C. 2005. "Real wages in Europe and Asia: A first look at the long-term patterns." *Living standards in the past: new perspectives on well-being in Asia and Europe*, 1: 111–131.

Allen, Robert C, Jean-Pascal Bassino, Debin Ma, Christine Moll-Murata, and Jan Luiten Van Zanden. 2011. "Wages, prices, and living standards in China, 1738–1925: in comparison with Europe, Japan, and India." *The Economic History Review*, 64: 8–38.

Autor, David H., David Dorn, and Gordon H. Hanson. 2013. "The China syndrome: Local labor market effects of import competition in the United States." *American Economic Review*, 103(6): 2121–68.

Bogaars, George. 1955. "The Effect of the Opening of the Suez Canal on the Trade and Development of Singpore." *Journal of the Malayan Branch of the Royal Asiatic Society*, 28(1 (169): 99–143.

Bonin, Hubert. 2010. *History of the Suez Canal Company 1858-2008: Between Controversy and Utility.* Librarie Droz.

De Zwart, Pim. 2011. "South African living standards in global perspective, 1835–1910." *Economic History of Developing Regions*, 26(1): 49–74.

Estevadeordal, Antoni, Brian Frantz, and Alan M Taylor. 2003. "The rise and fall of world trade, 1870–1939." *The Quarterly Journal of Economics*, 118(2): 359–407.

Feenstra, Robert C, and Gordon H Hanson. 1999. "The impact of outsourcing and high-technology capital on wages: estimates for the United States, 1979–1990." *The quarterly journal of economics*, 114(3): 907–940.

Feenstra, Robert C, and Gordon H Hanson. 2003. "Global production sharing and rising inequality: A survey of trade and wages." *Handbook of international trade*, 146–185.

Feyrer, James. 2019. "Trade and income—exploiting time series in geography." *American Economic Journal: Applied Economics*, 11(4): 1–35.

Feyrer, James. 2021. "Distance, trade, and income—The 1967 to 1975 closing of the Suez Canal as a natural experiment." *Journal of Development Economics*, 153: 102708.

Frankema, Ewout, and Marlous Van Waijenburg. 2012. "Structural impediments to African growth? New evidence from real wages in British Africa, 1880–1965." *The Journal of Economic History*, 72(4): 895–926.

Goldberg, Pinelopi Koujianou, and Nina Pavcnik. 2007. "Distributional effects of globalization in developing countries." *Journal of economic Literature*, 45(1): 39–82.

Graham, Gerald S. 1956. "The ascendancy of the sailing ship 1850-85." *The Economic History Review*, 9(1): 74–88.

Gupta, Bishnupriya. 2008. "The History of the International Tea Market, 1850-1945." *https://eh.net/encyclopedia/the-history-of-the-international-tea-market-1850-1945/*, Accessed on December 20, 2024.

Harley, C Knick. 1988. "Ocean freight rates and productivity, 1740–1913: the primacy of mechanical invention reaffirmed." *The Journal of Economic History*, 48(4): 851–876.

Harrison, Ann, John McLaren, and Margaret McMillan. 2011. "Recent perspectives on trade and inequality." *Annu. Rev. Econ.*, 3(1): 261–289.

Jacks, David S, Christopher M Meissner, and Dennis Novy. 2010. "Trade costs in the first wave of globalization." *Explorations in Economic History*, 47(2): 127–141.

Jacks, David S, Christopher M Meissner, and Dennis Novy. 2011. "Trade booms, trade busts, and trade costs." *Journal of International economics*, 83(2): 185–201.

Jacks, David S, Christopher M Meissner, and Nikolaus Wolf. 2024. "Suez." National Bureau of Economic Research.

Knauerhase, Ramon. 1968. "The compound steam engine and productivity changes in the German merchant marine fleet, 1871–1887." *The Journal of Economic History*, 28(3): 390–403.

Lindert, Peter H, and Jeffrey G Williamson. 1983. "English workers' living standards during the industrial revolution: a new look." *The Economic History Review*, 36(1): 1–25.

Lindert, Peter H, and Jeffrey G Williamson. 2003. "Does globalization make the world more unequal?" In *Globalization in historical perspective*. 227–276. University of Chicago Press.

Pascali, Luigi. 2017. "The wind of change: Maritime technology, trade, and economic development." *American Economic Review*, 107(9): 2821–2854.

Tena-Junguito, Antonio, Markus Lampe, and Felipe Tâmega Fernandes. 2012. "How much trade liberalization was there in the world before and after Cobden-Chevalier?" *The Journal of Economic History*, 72(3): 708–740.

Williamson, Jeffrey G. 2008. "Globalization and the Great Divergence: terms of trade booms, volatility and the poor periphery, 1782–1913." *European Review of Economic History*, 12(3): 355–391.

Xu, Chenzi. 2022. "Reshaping global trade: the immediate and long-run effects of bank failures." *The Quarterly Journal of Economics*, 137(4): 2107–2161.