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Richard Bräuer (Halle Institute for Economic Research and VU Amsterdam)
Wolf-Fabian Hungerland (Federal Ministry of Economic Affairs and Energy Berlin)
Felix Kersting (HU Berlin)

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Spokesperson: Prof. Georg Weizsäcker, Ph.D., Humboldt University Berlin, 10117 Berlin, Germany
info@rationality-and-competition.de

Trade Shocks, Labor Markets and Elections in the First Globalization*

Richard Bräuer† Wolf-Fabian Hungerland‡ Felix Kersting§

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Abstract

This paper studies the economic and political effects of a large trade shock in agriculture – the grain invasion from the Americas – in Prussia during the first globalization (1871-1913). We show that this shock accelerated the structural change in the Prussian economy through migration of workers to booming cities. In contrast to studies using today's data, we do not observe declining per capita income and political polarization in counties affected by foreign competition. Our results suggest that the negative and persistent effects of trade shocks we see today are not a universal feature of globalization, but depend on labor mobility. For our analysis, we digitize data from Prussian industrial and agricultural censuses on the county level and combine it with national trade data at the product level. We exploit the cross-regional variation in cultivated crops within Prussia and instrument with Italian trade data to isolate exogenous variation.

Keywords: Globalization, import competition, labor market, agriculture, migration, trade shock, elections, Germany, Prussia.
JEL classification: F14, F16, F66, F68, N13, R12.

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†Halle Institute for Economic Research, Germany, and Vrije Universiteit Amsterdam, Macroeconomics and International Economics, The Netherlands.

‡Directorate Economic Policy, Federal Ministry of Economic Affairs and Energy, Germany.

§Institute of Economic History, School of Economics and Business, Humboldt-Universität zu Berlin, Germany. Correspondence author: f.kersting@hu-berlin.de.

1 Introduction

Globalization shocks belong to the fundamental drivers of structural change. Blanchard and Katz (1992) showed that local labor markets successfully funnel workers to unaffected regions in response to adverse economic shocks. Thus, when Autor et al. (2013) demonstrated that globalization shocks after 2000 created persistent economic decline and political polarization as well as long lasting income losses for workers, it raised the question of how local economies react to structural change fostered by globalization in other contexts: Can we generalize these sluggish adjustments to other globalization periods?

We address this question by studying labor market adjustment during the first globalization (1871-1913). We apply the approach by Autor et al. (2013) to the case of Prussia. We find that globalization also caused regional decline: A one standard deviation increase in the trade shock corresponds to a decline in employment growth by 0.5 percentage points per year corresponding to 40% of one standard deviation in the dependent variable. However, instead of absorbing the losses, workers migrated to booming cities in Germany. The level of migration was four times as high as today in the US. Thus, neither the average income per capita of those remaining in the county, nor their voting behavior or death rates were affected by trade shocks.

Our contribution is twofold. First, we show that labor mobility can neutralize negative welfare effects of regional decline. This finding contributes to the literature on the effect of contemporary trade shocks by highlighting the importance of the migration response.[1] Since Imperial Germany was industrializing at the time, our findings speak most closely to Dix-Carneiro and Kovak (2017) on Brazil and Erten and Leight (2019) on China. Imperial Germany managed to use trade integration to accelerate structural change like China. Similar to Dix-Carneiro and Kovak (2017), we argue that labor mobility is key in benefiting from globalization during industrialization. Second, we provide strong evidence against the notions that the detrimental effects of the first globalization in agriculture led to radicalization in German politics and that trade shocks increased demand for protectionism (Gourevitch, 1977; Rogowski, 1987; Lehmann, 2010). We thus contribute to the debate on the economic and political effects of the first globalization among economic historians.[2]

Germany before WWI offers an ideal context to investigate the effects of structural change driven by globalization. The ongoing industrialization fostered substantial structural change from agriculture to industry. At the same time, the international economy became more

[1] See for the labor market effects, among others, Autor et al. (2013) and Dauth et al. (2014). For migration effects: Greenland et al. (2019) and Faber et al. (2019). For political effects: Dippel et al. (2021), Colantone and Stanig (2018), and Autor et al. (2020). For welfare analysis: Caliendo et al. (2019). Michaels et al. (2012), Bustos et al. (2016), Nagy (2021), and Fajgelbaum and Redding (2018) look at structural transformation in general.

[2] For further studies on the first globalization see O'Rourke and Williamson (1999), O'Rourke (1997), Suesse and Wolf (2020), and Irwin (1989), for a recent synthesis see O'Rourke (2019). Closely related to our paper, Heblich et al. (2020) provide evidence for a strong migration response after the repeal of the Corn Laws in the UK.

integrated (O'Rourke and Williamson, 1999). Technological progress, notably the spread of steamships, drove this process via falling transport costs (Pascali, 2017), and created a global economy that resembles today's world economy in many ways. The level of trade openness (defined as the share of imports and exports relative to GDP) of 1913 was only reached again 60 years later. As an exogenous shock, we use the grain invasion (O'Rourke, 1997): Cheap grain from the Americas flooded the European market. Starting from almost zero grain imports from the US and Argentina in the 1880s, the annual German import volume dramatically rose to more than 400 million Mark (Figure 1). This increase captures almost the entire increase in agricultural imports during this period.

We relate these trade increases with Prussia's agricultural census containing the cultivation areas for various crops within each county. By linking the crop shares with national trade statistics in a shift-share approach, we compute a measure of competitive pressure that each German county faced from abroad. We then compare the performance of different rural counties with different crop profiles and thus different exposure to world market shocks. However, import competition is potentially endogenous. To circumvent this problem, we adopt the methodology of Autor et al. (2013). We compare the competitive gains of the US and Argentina – by far the biggest import sources – in the German market with those in Italy. Italy senses well for comparison market, as it is another newly formed, rapidly industrializing country.

To validate our identification strategy, we have to ensure that we measure the differential effect of the trade shock and not overall structural change. It is important to stress that we exploit variation *within* the agricultural sector. Following Goldsmith-Pinkham et al. (2020), we argue for the exogeneity of local shares, on which our identification is based: The crop shares within each county must only affect future growth potential through the trade shock and our controls. Therefore, we compare the growth rate of counties before and after the trade shock and find that our estimate is driven by those crops which experienced high trade shocks. Moreover, the absence of significant pre-trends gives validity to our identification strategy. In addition, we show that counties did not foresee and select into the shock. Also, we incorporate the calculation of standard errors as suggested by Adao et al. (2019).

Our results contrast with the findings on the present and require explanation. Our analysis indicates that "the effect of trade shocks" differs with the economy in question. Several factors determine how strong the effects of trade are going to be: We show that worker mobility in general was much higher than today. Workers also needed little occupation-specific human capital when taking up factory jobs and the low-skilled formed the majority of migrants (Grant, 2005, p. 279ff). We confirm these findings using detailed regional statistics on skill level by migrants' region of origin. Moreover, we provide some suggestive evidence that unskilled workers in particular found jobs in competitive industries like machinery and chemistry. In contrast, occupation and sector specific human capital are crucial for the

adjustment process from import competition today (Traiberman, 2019; Dauth et al., 2021): While workers today still switch occupations, they do so within quite narrowly defined fields.

The rest of the paper proceeds as follows: Section 2 describes the first globalization in Germany and our way to measure it. Section 3 introduces our estimation strategy. Section 4 presents our main findings. Section 5 reviews the differences between labor migration in Imperial Germany and in developed economies today, to which we attribute a large part of the differences in economic effects we find. Section 6 concludes.

2 Measuring the first globalization and labor markets in Germany

2.1 Germany's experience of the first globalization

One major aspect of the first globalization (1871-1913) was the integration of the Americas into the world economy. The Americas could enter the world markets forcefully because of the rapid expansion of agriculture, railroads and people into the interior of North and South America. In addition, technology improvements in the field of transportation, especially steamships, reduced trade costs between the Americas and Europe (O'Rourke and Williamson, 1999, Chaper 3; Pascali, 2017). Figure 1 shows the resulting development of agricultural imports into Germany. For our first period from 1883 until 1895, the level of imports was increasing, but from 1895 onwards imports were accelerating reaching their peak in 1901, a year of crop failures in Germany. This shift led to an increase in the share of agricultural imports from the Americas to almost 20 percentage points.

During this period, the German economy integrated with world markets. While Germany had a negative balance of trade in total, economic integration had different consequences for the industrial and agricultural sector. In 1882, 43% of the active workforce still worked in agriculture and 34% in industry. 25 years later, the share in agriculture dropped by 8 percentage points and the share of industry increased by 6 percentage points. The balance of trade became more and more negative for food and live animals (SITC section 0) and crude materials (SITC section 2), while manufacturing, especially machinery (SITC section 7), exported more and more (Hungerland and Wolf, 2021).

The economic pressure of world agricultural markets led to fierce debates on trade policies in Imperial Germany. Notably the conservatives advocated the protection of the German economy from world markets. The so-called "alliance of rye and iron" became a powerful interest group pushing for the protection of agricultural and certain industrial sectors through tariffs (Torp, 2010). Starting in the late 1870s, Germany introduced only average levels of protectionism compared to other European countries of the time (Hungerland and Lampe, 2021). The level of protectionism remained roughly constant over the period we an-

alyze. Crucially for us, we do not observe changing levels of protectionism for agricultural products from the Americas. What is more, there was also no increase in the bilateral tariffs between Russia – the most important trade partner for agricultural products – and Germany. This would have been worrisome because then the increase in imports from the Americas could be due to a composition effect in the trade structure.

2.2 Measuring trade exposure

We determine how hard any specific rural county was hit as measured following Autor et al. (2013): We measure the share of national demand satisfied by foreign imports for all farmers in a county. Since there were no internal tariffs or other market barriers we assume that all producers are selling to a national market for each crop, and thus face similar pressure, whether or not goods are actually imported to their specific county. Goods where high transport costs inhibit a national market (e.g. fresh vegetables) are also not imported in meaningful quantities. Thus, our measure for each county i in year t is

$$\Delta AgriculturalTradeExposure_{i;t}^{Americas} = \sum_{s} \left(\frac{\Delta NetImp_{s;t}}{Area_{s;t}} * Area_{i;s;t}\right) \times \frac{1}{Emp_{i;t}}. \quad (1)$$

The first fraction denotes the change in imports of crop s per acre of land used to produce this good $Area_{st}$. This gives us a measure of the competitive pressure on producers of this good. Second, we multiply this with the number of acres devoted to the specific crop in a county $Area_{ist}$ and add up the result for all crops s within the county. This gives the imported goods assigned to farmers in county i. We divide this sum by the number of workers at the start of each of our two census periods (1880-1895; 1895-1910). This yields the average exposure of the workers within a given county, whether or not they work in agriculture, a measure comparable to that used in contemporary studies. This is done because the y-variables (employment, migration, political outcomes) are also at the level of the whole county, not only its agricultural population.

This measure captures the change in the level of trade exposure (relative to the start of the period) as an approximation of the market share foreign products have in German agricultural production. I.e., if a county faces a change of net-imports of 100 Mark per worker per year (compared to an average wage of 635 Mark in 1895 based on Desai 1968), we use this as a measure of how much additional domestic demand is fulfilled by foreign workers. Series of agriculture output have a higher variance than the manufacturing series used today (see Figure 1). To exclude the possibility of random crop failures driving our results, we take the average of all changes in trade pressure a county experienced throughout our observational periods, instead of just taking the difference between the first and the last value.

Figure 2a shows the counties and their relative average trade exposure for the second period from 1895 to 1910. Darker constituencies were more negatively affected.[3] The variation is very plausible: The eastern part of Prussia is negatively affected by trade shocks. Crucial for our identification, there is a considerable difference between the trade shock and the share of agricultural employment shown in Figure 2b. These differences reflect the different crops cultivated in the counties. Note, for instance, that in the north-eastern part of Prussia most counties had a very high share of agricultural employment, while the average trade shocks differ substantially. Our identification relies on this within-region variation as we use region fixed effects and control for the share of agricultural employment.[4]

To perform this analysis, we link two disjunct subsets of data: country-industry-level trade data and county-level census data. Their different units of analysis require harmonization. The German trade data compiled by Hungerland and Wolf (2021) contain trade flows in and out of Germany on the SITC four-digit level for every year between 1880 and 1913.[5] We match the trade data to the agricultural censuses provided by the Prussian statistics (Königlich Statistisches Bureau, 1884, 1895). These censuses include information on cultivation areas for 47 different crops on a county-level. Thereby, we capture on average for each county 99.8% of the agricultural area. In contrast to the occupation censuses, which only give information on the number of workers in agriculture in general, the agricultural censuses provide us with county-level variation within the agricultural sector.

To link the trade data with the agricultural censuses, we manually build conversion tables between different crops and SITC categories. This procedure leads to 14 harmonized crop categories matched with SITC categories.[6] Based on our conversion table, we capture 94% of all agricultural imports from the Americas. We construct our trade shocks using the net imports of various crops from the US and Argentina, the two fastest growing economies in the Americas and major agricultural exporters. They are also the main German trade partners in the Americas.

2.3 Dependent variables

We study the effects of trade shocks on a large spectrum of economic and political outcomes: employment, migration, income, and elections.[7]

[3]The increase in trade exposure was primarily driven by wheat, fodder, and oil plants – in contrast, for instance, to the relatively unchanged trade balance for rye (Figure A2).

[4]As it is common in the application of our identification strategy, we construct fixed effects for larger regions, in our case four (similar to studies on Germany today in Dauth et al. (2014). The first region (East) consists of the provinces Silesia, Pomerania, East Prussia, West Prussia and Poznan. The second region (West) consists of the provinces Westphalia, Rhine Province and Hesse. The third region (North) consists of the provinces Schleswig-Holstein and Hanover. The fourth region (Center) consists of the provinces Brandenburg and Saxony. As robustness check, we also run the analysis with province fixed effects.

[5]See Hungerland and Altmeppen (2021) for an in-depth exploration of the SITC in this context.

[6]See Table B1 for an overview how we harmonize and group the cultivation areas, Table B2 on the conversion between crop type and SITC codes and Table B3 for the imports by crop type.

[7]Descriptive statistics are provided in Table A1 and Figure A3.

Employment We define employment growth as the average yearly growth in total employment. We rely on the three occupational censuses conducted in 1882, 1895, and 1907 as our main source (Kaiserliches Statistisches Amt, 1884, 1898, 1909).

Migration To measure migration, we are interested in average yearly changes, relative to the initial population. We use the difference between the reported "natural" population growth based on births and deaths for each year and the actual population growth between two censuses conducted every five years provided by Galloway (2007):

$$NetMigration_{i;t} = \left(\frac{Population_{i;t} - Population_{i;t-5} - \sum_{x=t-4}^{x=t}(Birth_{ix} - Death_{i;x})}{Population_{i;t-5}} \right)^{1/5} \quad (2)$$

Income By using the rich information from Prussia's income tax statistics (Königlich Statistisches Bureau, 1892-1911) and additional sources, we calculate yearly income and income per capita growth starting in 1891.[8] The income tax statistics are only available on the level of districts (an aggregation level higher than counties, 37 in total in Prussia). They distinguish between labor and capital income taxes; we only include labor income taxes.[9] The statistics also differentiate between income taxes paid by tax units living in urban and rural areas. We link this data to census data on the urban and rural population on a county level. Thereby, we distribute the income taxes paid by the urban population to a county based on its share in urban population within one district and we do the same for the rural population. This procedure assumes that the average income of an urban and rural tax unit is the same within one district. Doing so, we calculate labor income and labor income per capita. As alternative measure, we use wages of urban and rural day laborers (*Tagelöhner*) provided by Becker et al. (2014). The data are only available for 1892 and 1901, but we think of this as an important robustness check to capture the development of income at the bottom of the distribution.

Political consequences To measure the political consequences of the first globalization, we rely on the national elections provided by Caramani (2004). Perhaps surprisingly, Germany's franchise was Europe's "most democratic franchise at the time" (Sperber, 1997, p. 1) with high turnouts so that parliamentary election results are a good indicator for the political

[8]Total income is the sum of taxed and tax-exempt income. We estimate tax-exempt income following Hoffmann and Müller (1959), who produced the first national income series for Germany between 1851 and 1957. We deflate non-filer average income estimated by the Statistisches Reichsamt (1932) for the year 1913 using the wage index for average gross wages in the industrial and agricultural sector from 1870 to 1914 from Kuczynski (1947). For more information on the calculation of the reference total income, see Appendix C in Bartels et al. (2021).

[9]Our results do also hold when including capital income.

sentiment, especially on trade issues.[10] To analyze the political effects of the trade shock, we focus on the stronghold of protectionism, the conservative party, as well as various radical right-wing, often anti-Semitic parties.

These data enable us to examine the effect of trade shocks on our dependent variables for two periods: from 1880 to 1895 and from 1895 to 1910.[11] In the next step, we describe our empirical strategy.

3 Empirical strategy

The identification strategy has often been used in similar exercises and we refer to Autor et al. (2013) and Dauth et al. (2014) for more details on the methodology. Congruently, we analyze the supply shock from the grain invasion coming from the Americas and exploit variation in initial agricultural specialization in Prussia at the beginning of the rise of the Americas as an exporter of agricultural products.

To isolate the possibly exogenous component of such shocks, we compare the shock hitting Germany to that hitting Italy. To construct the instrument, we use Italian trade data by Federico et al. (2011), from which we only include the growing pressure coming from the US and Argentina, the main global competitors for European agriculture. Trade in agricultural products between Italy and the Americas is similar to trade between Germany and the Americas (Figure 1 and Figure A1). While there is no upward trend in the first period (1880-1895) and the trade volume on a low level, this pattern dramatically changes in the second period (1895-1910) with a high increase in imports from the US and Argentina to the end of the second period.

Italy is a good proxy for the German Empire: Both economies imported their raw produce from the world market instead of their colonies and were comprised of industrializing boom-regions and rural backwaters. Moreover, Italy's industrial centers in northern Italy were connected to the world market via Genoa, while the German industrial infrastructure was geared towards the Rhine and Hamburg. Thus, there is no mechanical reason to expect a correlation in trade flows.

With these considerations in mind, we construct an instrumental variable (IV) for every

[10] Imperial German elections were held directly in single-member constituencies with representatives elected by a majority, following the principle of 'one man, one vote'. There were no major changes in the election law. Suffrage covered all men above age 25 with the exception of people under tutelage, in bankruptcy, or on poor relief. Women were not allowed to vote, so our analysis is limited to the male half of the population. In contrast, the election for the state of Prussia were still held with the restrictive three class suffrage. That is the main reason why not also include the state elections.

[11] In case one variable is not available for these particular years, we choose the closest year for which it is available, which is at maximum three years away.

county i and the different crop types s in Prussia:

$$\Delta AgriculturalTradeExposure_{i;t}^{Americas} = \sum_{s} \frac{\Delta NetImpItaly_{s;t}}{Area_{s;t}} \frac{Area_{i;s;t}}{Emp_{i;t}}. \tag{3}$$

We use this IV in the following specification to instrument the changes in agricultural trade exposure.

$$\Delta Y_{i;t} = \beta_0 + \beta_1 \Delta AgriculturalTradeExposure_{i;t}^{Americas} + X_{i;t}^{'}\beta_2 + \epsilon_{i;t}. \tag{4}$$

We regress the change of county-level outcome (e.g., employment, income or migration) between t and $t+1$ ($\Delta Y_{i;t}$) on changes in average net exposure with additional controls for start-of-period variables X_{it}, and region fixed effects.

The quality of our instruments depends on two conditions: First, our instrument should be able to explain the change in the trade shock to avoid a weak instrument problem, i.e., the Italian experience should be predictive of German market conditions. This might not hold if, e.g., consumer demand was very different in the two countries or if Italy had a different trade policy and thus Italian markets were hit differently or not at all. However, both countries pursued trade policies broadly in line with the European average of the time (Hungerland and Lampe, 2021). As such, our instrument easily passes standard relevance tests.

Second, there should be no strong direct links between Italian and German competitiveness and other supply and demand shocks: If, e.g., Italy and Germany coordinated their tariff policy, Italian trade shocks would no longer be connected to German market conditions only through the grain invasion. Fortunately for our design, while Italy signed various contracts of recognition with German Customs Union, policy was not coordinated. The majority of Italian trade went through Mediterranean ports to world markets, not specifically to Germany. In addition, if anything, the trends in trade policy go in opposite directions in Italy and Germany: While we see in some cases a decline in German tariffs for industrial products during the 1890s, we observe rising tariffs for Italy (Federico and Vasta, 2015).

Crucial for our identification strategy is also the shift-share construction of the shock measure. Different exposure to the trade shock comes from the crops these sectors produce. Both our instrument and our endogenous variable are constructed from these crop shares. Thus, the crop shares within each county must be uncorrelated with county level growth for our instrument to be valid (except through our endogenous variable and our controls). Correlations between levels are unproblematic for our identification. We structure our discussion of the implications of this construction along the lines of Goldsmith-Pinkham et al. (2020) and Borusyak et al. (2021). We argue that our identification comes from the shares and not the shifts in our shock measure. After we present our main results, we discuss the validity of this approach in more detail.

4 Results

4.1 Main Results

Employment The trade shock decreases employment growth in a county (Table 1, panel 1, column 1-3).[12] A trade shock of one standard deviation of imports (15 Mark worth of imports per worker) decreases employment growth by roughly 0.5 percentage points per year, which corresponds to 45% of one standard deviation in the dependent variable.

To confirm the findings, we employ a set of control variables. We control for the share of land ownership in large estates provided by Galloway (2007). Historians highlight the role of land distribution for migration decisions (Bade, 1980). We also control for the distance to the next large city, which makes it harder to emigrate. Lastly, we control for counties' technological sophistication with the amount of horsepower installed in the county coming from Prussian statistics (Königlich Statistisches Bureau, 1878). While the technological sophistication of the county is a powerful predictor of a county's employment growth – as expected – none of these controls affect our estimate substantially (Table 1, panel 1, column 3).

Migration Trade shocks induced workers to emigrate from an affected county in sizeable numbers: An increase in the average trade shock by one standard deviation corresponds to roughly 0.1 percentage points of population decline per year (Table 1, panel 1 column 4-6). Given that the average yearly net migration rate was -0.52, one standard deviation explains roughly 20 percent of the yearly migration rate. Again, these effects remain stable throughout the different specifications.

We show that the migration was determined by movements within Prussia, especially between provinces. To do so, we use the change in the share of population by birth place between two censuses as dependent variable.[13] We find the strongest effect for migration to other provinces within Prussia in Appendix Table A5. Thereby we can also rule out that our results were driven, for example, by immigration to Prussia from other parts of Germany.

Income We regress trade shocks on indicators of broad welfare decline: total income, income per capita, and excess deaths. We find a negative effect of the trade shock on income (Table 1, panel 2, column 1-3). However, we do not observe a corresponding decline in income per capita (Table 1, panel 2, column 4-6) or in the wage of daily rural laborers (see Appendix Table A6, column 3).

[12] See Table A2 for the OLS results. Italy's trade exposure is a good predictor for Germany's trade exposure: The F-statistic for excluded instruments is around 100 regardless of specification. The first-stage results in Table A3 show robust and strong effects for our instrument throughout.

[13] The census allows us to differentiate movement within a province, between Prussian provinces, and within Germany.

Political Consequences Given that we find a strong migration response and no decline in income per capita, we expect no economically motivated shift in political polarization. The results (Table 1, panel 3) are in line with this reasoning: We do not find any significant effect of the trade shock on the voting share of radical right or conservatives parties.[14]

4.2 Validation of the empirical strategy

As mentioned above, the local crop shares are crucial for our identification strategy. Thus, we want to make sure that the crop shares within each county only affect growth through our shock measure (conditional on controls). The agricultural sector was on a negative growth trajectory amid rapid urbanization and industrialization. However, we compare crops *within* the agricultural sector. Thus, if, e.g., wheat farming inherently experiences less growth than vegetable farming and is additionally hit by trade shocks, we would wrongly attribute the decline of wheat farming to international trade. To address this issue, we compare the growth performance of agricultural regions with certain crops before and after the trade shock. Figure A4 and A5 report the results of this exercise following Goldsmith-Pinkham et al. (2020): The growth performance of regions with a high share of wheat, oat, barley, oil fruits, and fodder worsened significantly in the shock period, compared to the 1880-1895 period. Conversely, regions relying on rye, potatoes or grazing grew faster in the shock period (1895-1910) than before. This pattern is well explained by our trade shock, which consists mainly of wheat, oil fruits, and fodder (mostly maize) imports to Germany.

To account for potential correlations between regression residuals across regions with similar crop shares, we follow Adao et al. (2019). In Table 1, columns 3 and 6, we see that this does not change our results for our preferred specifications.

As an additional control for pre-trends, we regress our shock on the second difference of employment and migration. This measures the effect of trade shocks in the acceleration of population decline, not the growth rate itself. The results confirm our main finding (Appendix Table A4). The employment and immigration effects have slightly smaller magnitudes. Unfortunately, we do not have pre-shock data for incomes, as the series starts in 1891.

Another threat to our identification is that farmers might have anticipated rising imports and moved away from contested products before the actual trade shock. This would bias the results towards zero since our measure of import competition would no longer capture the actual pressure faced by regions. To account for this anticipation effect, we use the original distribution of cropland in 1883 also for our shock measure from 1895 onwards. The difference between using pre-period crop weights and contemporary shares is negligible (mean 0.089, sd 4.468). The results for our major regressions do not change when using this pre-period crop shares (Table A8). We are thus confident that our main results are

[14]Similarly, we do not see an increase in death rates due to the trade shock in Table A7.

impervious to anticipation effects.

4.3 Robustness checks and additional results

Size of local labor markets To account for the possibility that counties do not represent local labor markets, we redo the analysis on the level of constituencies, which often consist of two or three counties. Our finding stays qualitatively unchanged (Table A9).

Smaller region fixed effects While we employ region-fixed effects in our main specifications to control for unobserved and time-invariant regional characteristics, we use province-fixed effects as a robustness check. The results confirm our previous findings (Table A10).

Adjustment within counties While the migration response is indicative of adjustment between counties, economic adjustment can also occur within a county. Therefore, we analyze whether local economies change the crop composition in agriculture, specifically whether farmers started to use less of their land for fodder and wheat, the crops most affected by the trade shock. This is not the case (Appendix Table A6, column 1). Moreover, we also do not observe local adjustment between sectors within counties. The trade shock does not affect the change in the sectoral composition between agriculture and non-agriculture (Appendix Table A6, column 2). Structural change occured through migration exclusively.

Price shock The most natural measure of the grain invasion is imports into Germany. Unfortunately, reliable German trade statistics start only in the 1880s. Nevertheless, the grain invasion may also have had indirect effects before, especially through the decline in world market prices. To deal with this caveat, we construct a measure for the price shock in agriculture following Suesse and Wolf (2020). We exchange our net-import-based shock with the price drop and otherwise construct the variable for our regression in the same way. The results confirm our baseline findings (Table A11).[15]

5 Labor Migration then and now

The large migration response we observe constitutes a fundamental difference between the effects of trade shocks during the first globalization and today. Quantitatively speaking, during today's phase of globalization, the quartile of counties affected hardest by trade shocks in the US has 8.2 log points lower employment after 25 years (Faber et al., 2019, p. 37). The

[15] In Appendix C1, we specifically discuss the role of trade shocks for the turn to protectionism during the 1870s. Here, we also do not find evidence that trade shocks led to more demand for protectionism. In addition, we include the price shock for the 1870s as an additional control variable to account for the possibility that the price of the 1870s might be correlated with the later trade shock and thus play a role for the pre-trend. The results remain stable (Appendix Table A12).

hardest affected quartile of counties in Prussia has almost 20 log point lower employment after 15 years of trade shocks from 1895 to 1910 (Appendix Table A13).[16] Adjusting for the different lengths of the periods, the level of migration was four times as high in Imperial Germany during the first globalization as in the US today.

There is a large literature explaining why today's workers hesitate to move in response to shocks, starting with the seminal work by Neal (1995): Workers accumulate firm-, industry-, and occupation-specific skills, some of which they can no longer use when switching jobs. Studying displaced workers, the literature has shown that depending on the occupation, each of these components can be large (Sullivan, 2010). Today, workers especially face large adjustment costs due to specific human capital (Traiberman, 2019). However, large, industry-wide trade shocks make the transition to similar occupations difficult, because these are likely also depressed.

In contrast, workers of the first globalization faced less migration barriers (O'Rourke and Williamson, 1999). A closer look at the migration within Prussia provided by Kaiserliches Statistisches Amt (1910) provides details on migrants' characteristics (Appendix Table A14): Low-skilled migrants from rural regions faced good employment prospects in urban centers and made up a large part of the urban population.[17] For instance, more than 30 percent of all workers in industrializing Brandenburg (including Berlin) were migrants from other provinces (Appendix Table A14, column 3). We observe similar patterns in other more industrialized provinces like Westphalia and the Rhineland. Comparing the skill-level of locals and migrants shows that migrants were – on average – lower skilled than locals in industrialized provinces (Appendix Table A14, columns 1 and 2).[18] The jobs these immigrants took were often physically demanding and paid comparatively low wages. Nevertheless, they gave unemployed rural workers a viable alternative to the countryside that many of them took once trade shocks had worsened their original employment. Importantly, these job changes occurred in a – by today's standard – dynamic labor market with high job fluctuation (Brown and Neumeier, 2001).

Interestingly, we also find that migrant workers got jobs particularly in industries that became more and more competitive during this period. We see the highest share of migrant workers from other Prussian provinces in chemistry and machinery (Appendix Table A14, panel 2). These are exactly the industries with increasing competitiveness according to Hungerland and Wolf (2021).

Overall, our results suggest that movement frictions play a larger role in contemporary settings. To explicitly explore this comparison, one would need individual level data which

[16] Given the high population growth in general, we can also look at population growth driven by migration. Here, we find a difference of 20 log points between the first and fourth quartiles. Unfortunately, it is not possible to exclude "natural" growth from the employment variable.

[17] The census allows us to define low-skilled migration as factory workers, wage workers, day laborers, and apprentices (Kaiserliches Statistisches Amt, 1910, p.1).

[18] The opposite is the case in more rural provinces with a lower share of labor migrants.

is unfortunately not available for our time period.

6 Conclusion

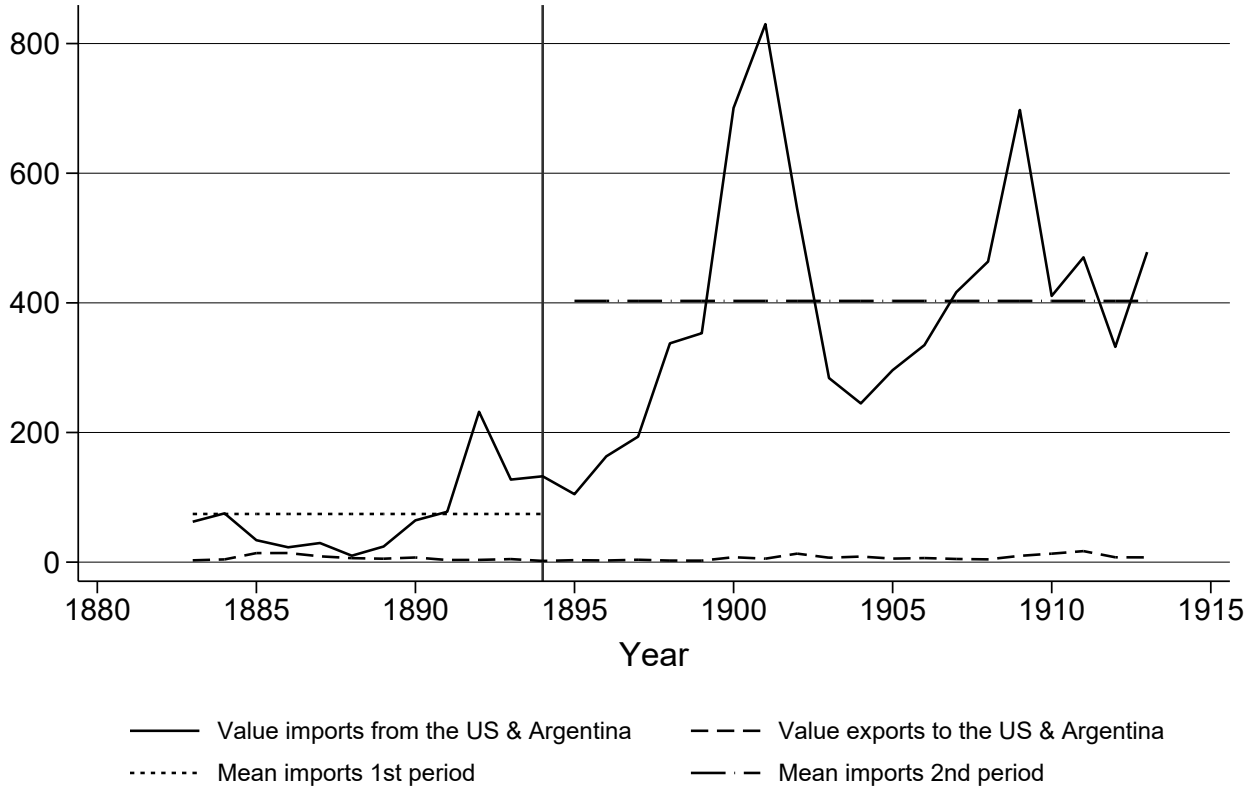
Our paper analyzes the economic and political effects of trade shocks during the first globalization. We find that trade shocks affected local economies just as they do today. However, trade shocks did not cause the long-run losses in per capita income nor in political instability that is observed for today's shocks. We attribute this difference to the large effects of trade shocks on domestic migration, which was considerably higher in comparison to the second globalization: Instead of bearing income losses, rural workers from affected counties moved to the booming cities, where low-paid low-skill employment was available for a large number of new workers.

Our results are in line with canonical labor market analysis (Blanchard and Katz, 1992). The presence of the migration response and the absence of income per capita-effects indicate that labor markets in Prussia seem to have mitigated trade shocks quickly – similar to US labor markets after WWII studied by Blanchard and Katz (1992) and Dao et al. (2017). Moreover, our results are largely in line with the long-term predictions of trade models for the first globalization (O'Rourke, 1997; O'Rourke and Williamson, 1999).[19] The strong migration response validates the assumption on labor mobility typically used in these models.

Our results do not mean that the welfare and distributional consequences of the trade shock in the setting are clear. Still, from an economic policy perspective, these findings show the importance of labor market mobility as an adjustment mechanism for trade shocks as also recently highlighted by Banerjee and Duflo (2019, ch. 3). For today's policymakers, it therefore seems important to better understand the migration response after economic shocks.

[19]Comparing our findings with the effect of declining grain prices in two-sector models used in O'Rourke (1997), our effects on labor income suggest that the negative effect on income due to migration in cities (by an increase in labor supply) equals the positive effect on real wages due to declining prices for agricultural products.

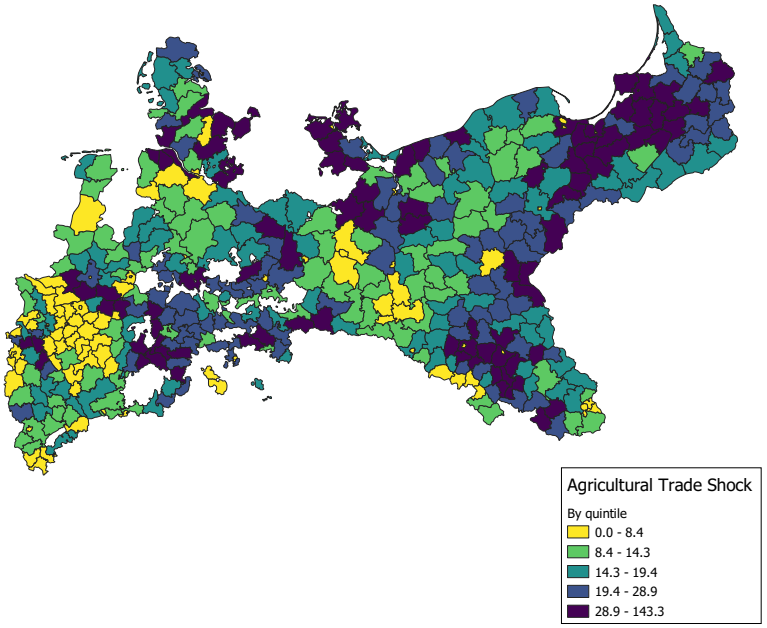
Figure 1: Agricultural Trade with the US and Argentina



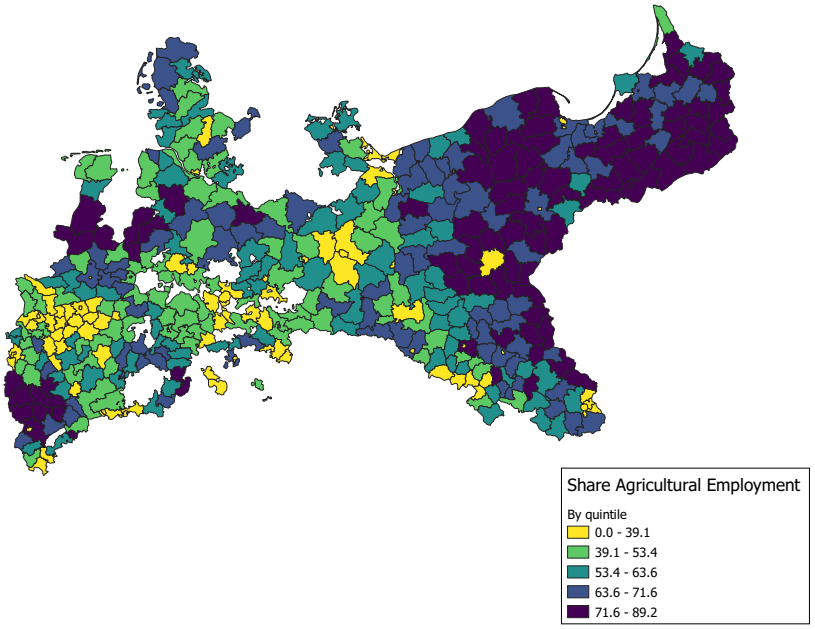
Notes: The figure shows the development of trade with agricultural products between Germany and the US and Argentina (in million Marks).
Source: Own calculation based on Hungerland and Wolf (2021).

Figure 2: Agricultural Trade Shock and Agricultural Employment

a) Average Agricultural Trade Shock, 1895-1910



b) Share of Agricultural Employment, 1882



Notes: Panel (a) Trade shock in agriculture between 1895 and 1910 as measured by equation 1. Dark blue constituencies face higher import competition. Panel (b) Share of agricultural employment in total employment as of 1882.
Sources: Own calculation based on Hungerland and Wolf (2021), Königlich Statistisches Bureau (1895), and Kaiserliches Statistisches Amt (1884).

Table 1: Effect of Trade Shock on Employment, Migration, and Income (2SLS)

	(1)	(2)	(3)	(4)	(5)	(6)
	Panel 1					
	Employment Growth			Migration Growth		
Shock agriculture (in Mark)	-0.032***	-0.031***	-0.032***	-0.012***	-0.012***	-0.012***
	(0.005)	(0.004)	(0.005)	(0.002)	(0.002)	(0.003)
			[0.005]			[0.003]
Mean dependent variable	2.03	2.03	2.03	-0.52	-0.52	-0.52
F-stat excluded instrument	120.30	118.25	116.49	120.30	118.25	116.49
Region FE		✓	✓		✓	✓
Further controls			✓			✓
Observations	449	449	449	449	449	449
	Panel 2					
	Income Growth			Income p.c. Growth		
Shock agriculture (in Mark)	-0.022***	-0.018***	-0.023***	-0.004	-0.002	-0.003
	(0.004)	(0.004)	(0.005)	(0.003)	(0.002)	(0.002)
			[0.008]**			[0.005]
Mean dependent variable	3.14	3.14	3.14	2.22	2.22	2.22
F-stat excluded instrument	120.30	118.25	116.49	120.30	118.25	116.49
Region FE		✓	✓		✓	✓
Further controls			✓			✓
Observations	449	449	449	449	449	449
	Panel 3					
	Conservatives			Nationalist		
	(1)	(2)	(3)	(4)	(5)	(6)
Shock agriculture (in Mark)	0.093	0.093	-0.020	-0.051	-0.051	-0.027
	(0.084)	(0.084)	(0.083)	(0.057)	(0.057)	(0.063)
			[0.048]			[0.057]
Mean dependent variable	-2.61	-2.61	-2.61	-1.90	-1.90	-1.90
F-stat excluded instrument	110.47	110.47	103.93	94.13	94.13	87.47
Region FE		✓	✓		✓	✓
Further controls			✓			✓
Observations	225	225	225	225	225	225

Notes: Unit of observation: county (panel 1 and 2), constituency (panel 3). Standard errors, clustered at the district level, in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Further controls include: distance to large city, share of land owned by large farm owners (more than 50 hectare), horsepower per worker. We control for the initial share of the party throughout all specifications. For column (3) and (6), we calculate in addition the standard errors as suggested by Adao et al. (2019) in square brackets. *Sources*: See Section 2.

References

Adao, Rodrigo, Michal Kolesár, and Eduardo Morales, "Shift-share designs: Theory and inference," *The Quarterly Journal of Economics*, 2019, *134* (4), 1949–2010.

Autor, David H., David Dorn, and Gordon H Hanson, "The China Syndrome: Local Labor Market Effects of Import Competition in the United States," *American Economic Review*, 2013, *103* (6), 2121–68.

_ , _ , Gordon H. Hanson, and Kaveh Majlesi, "Importing Political Polarization? The Electoral Consequences of Rising Trade Exposure," *American Economic Review*, 2020, *110* (10), 3139–3183.

Bade, Klaus, "Massenwanderung und Arbeitsmarkt im deutschen Nordosten von 1880 bis zum Ersten Weltkrieg. Überseeische Auswanderung, interne Abwanderung und kontinentale Zuwanderung," *Archiv für Sozialgeschichte*, 1980, *20* (1), 265–323.

Banerjee, Abhijit V and Esther Duflo, *Good Economics for Hard Times: Better Answers to our Biggest Problems*, London: Penguin UK, 2019.

Bartels, Charlotte, Felix Kersting, and Nikolaus Wolf, "Testing Marx: Income Inequality, Concentration and Socialism in late 19th Century Germany," *EHES Working Paper No. 211*, 2021.

Becker, Sascha O., Francesco Cinnirella, Erik Hornung, and Ludger Woessmann, "iPEHD—The ifo Prussian Economic History Database," *Historical Methods: A Journal of Quantitative and Interdisciplinary History*, 2014, *47* (2), 57–66.

Blanchard, Oliver Jean and Lawrence Katz, "Regional Evolutions," *Brooking Papers on Economic Activity*, 1992, *1992* (1), 1–75.

Borusyak, Kirill, Peter Hull, and Xavier Jaravel, "Quasi-Experimental Shift-Share Research Designs," *Review of Economic Studies*, 2021, *Forthcoming*.

Brown, John C and Gerhard Neumeier, "Job Tenure and Labour Market Dynamics during high Industrialization: The Case of Germany before World War I," *European Review of Economic History*, 2001, *5* (2), 189–217.

Bustos, Paula, Bruno Caprettini, and Jacopo Ponticelli, "Agricultural Productivity and Structural Sransformation: Evidence from Brazil," *American Economic Review*, 2016, *106* (6), 1320–65.

Caliendo, Lorenzo, Maximiliano Dvorkin, and Fernando Parro, "Trade and Labor market Dynamics: General Equilibrium Analysis of the China Trade Shock," *Econometrica*, 2019, *87* (3), 741–835.

Caramani, Daniele, *Elections in Western Europe since 1815: Electoral results by constituencies*, Basingstoke: Palgrave Macmillan, 2004.

Colantone, Italo and Piero Stanig, "The Trade Origins of Economic Nationalism: Import Competition and Voting Behavior in Western Europe," *American Journal of Political Science*, 2018, *62* (4), 936–953.

Dao, Mai, Davide Furceri, and Prakash Loungani, "Regional Labor Market Adjustment in the United States: Trend and Cycle," *Review of Economics and Statistics*, 2017, *99* (2), 243–257.

Dauth, Wolfgang, Sebastian Findeisen, and Jens Suedekum, "The Rise of the East and the Far East: German Labor Markets and Trade Integration," *Journal of the European Economic*

Association, 2014, *12* (6), 1643–1675.

_ , _ , and _ , "Adjusting to Globalization in Germany," *Journal of Labor Economics*, 2021, *39* (1), 263–302.

Desai, Ashok V, *Reallöhne in Deutschland von 1871 bis 1913*, Köln: GESIS Datenarchiv. histat, 1968.

Dippel, Christian, Robert Gold, Stephan Heblich, and Rodrigo Pinto, "The Effect of Trade on Workers and Voters," *Economic Journal*, 2021, *Forthcoming.*

Dix-Carneiro, Rafael and Brian K Kovak, "Trade Liberalization and Regional Dynamics," *American Economic Review*, 2017, *107* (10), 2908–46.

Erten, Bilge and Jessica Leight, "Exporting out of Agriculture: The Impact of WTO Accession on Structural Transformation in China," *Review of Economics and Statistics*, 2019, *103* (2), 1–46.

Faber, Marius, Andres Sarto, and Marco Tabellini, "The Impact of Technology and Trade on Migration: Evidence from the US," *Harvard Business School Working Paper 20-071*, 2019.

Fajgelbaum, Pablo and Stephen J. Redding, "Trade, Structural Transformation and Development: Evidence from Argentina 1869-1914," *UCLA Mimeo*, 2018.

Federico, Giovanni and Michelangelo Vasta, "What Do We Really Know about Protection before the Great Depression: Evidence from Italy," *The Journal of Economic History*, 2015, *75* (4), 993–1029.

_ , Sandra Natoli, Giuseppe Tattara, and Michelangelo Vasta, *Il Commercio Estero Italiano 1862-1950*, Roma: Editori Laterza, 2011.

Galloway, Patrick R., *Galloway Prussia Database 1861 to 1914*, www.patrickgalloway.com, 2007.

Goldsmith-Pinkham, Paul, Isaac Sorkin, and Henry Swift, "Bartik Instruments: What, When, Why and How," *American Economic Review*, 2020, *110* (8), 2586–2624.

Gourevitch, Peter Alexis, "International Trade, Domestic Coalitions, and Liberty: Comparative Responses to the Rrisis of 1873–1896," *The Journal of Interdisciplinary History*, 1977, *8* (2), 281–313.

Grant, O., *Migration and Inequality in Germany 1870-1913*, Oxford: Oxford University Press, 2005.

Greenland, Andrew, John Lopresti, and Peter McHenry, "Import Competition and Internal Migration," *The Review of Economics and Statistics*, 2019, *101* (1), 44–59.

Heblich, Stephan, Stephen J. Redding, and Yanos Zylberberg, "The Distributional Consequences of Trade: Evidence from the Repeal of the Corn Laws," *Princeton University Mimeo*, 2020.

Hoffmann, Walther G. and Jan-Werner Müller, *Das deutsche Volkseinkommen 1851-1957*, Heidelberg: J.C.B. Mohr (Paul Siebeck), 1959.

Hungerland, Wolf-Fabian and Christoph Altmeppen, "What is a Product Anyway? Applying the Standard International Trade Classification (SITC) to Historical Data," *Historical Methods*, 2021, *54* (2), 65–79.

_ and Markus Lampe, "Globalisierung und Außenhandel," in Ulrich Pfister, Jan-Otmar Hesse, Mark Spoerer, and Nikolaus Wolf, eds., *Deutschland 1871: Die Nationalstaatsbildung und der Weg in die moderne Wirtschaft*, Mohr Siebeck 2021, pp. 335–358.

_ and Nikolaus Wolf, "The Panopticon of Germany's Foreign Trade, 1880–1913. New Facts

on the First Globalization," *CEPR Discussion Paper 15988*, 2021.

Irwin, Douglas A, "Political Economy and Peel's Repeal of the Corn Laws," *Economics & Politics*, 1989, *1* (1), 41–59.

Jacks, David S, "Intra-and International Commodity Market Integration in the Atlantic Economy, 1800–1913," *Explorations in Economic History*, 2005, *42* (3), 381–413.

Kaiserliches Statistisches Amt, *Statistik des Deutschen Reichs. Neue Folge. Band 2. Berufsstatistik nach der allgemeinen Berufszählung vom 5. Juni 1882. Berufsstatistik des Reichs und der kleineren Verwaltungsbezirke*, Berlin: Puttkammer & Mühlbrecht, 1884.

_ , *Statistik des Deutschen Reichs. Neue Folge. Band 116. Berufs- und Gewerbezählung vom 14. Juni 1895: Gewerbestatisik der Verwaltungsbezirke, Erster Theil*, Berlin: Puttkammer & Mühlbrecht, 1898.

_ , *Statistik des Deutschen Reichs. Neue Folge. Band 218. Berufs- und Betriebszählung vom 12. Juni 1907: Gewerbliche Betriebsstatistik, Abteilung VI - Kleinere Verwaltungsbezirke, Preußen*, Berlin: Puttkammer & Mühlbrecht, 1909.

_ , *Statistik des Deutschen Reichs. Neue Folge. Band 210. Berufs- und Betriebszählung vom 12. Juni 1907: Gewerbliche Betriebsstatistik, Abteilung IX - Die Bevölkerung nach Hauptberuf und Gebürtigkeit*, Berlin: Puttkammer & Mühlbrecht, 1910.

Kuczynski, Jürgen, *Die Geschichte der Lage der Arbeiter in Deutschland von 1789 bis in die Gegenwart, Band 1*, Berlin: Tribüne, 1947.

Königlich Statistisches Bureau, *Preussische Statistik. Amtliches Quellenwerk. Band 40. Die definitiven Ergebnisse der Gewerbezählung vom 1. December 1875 im preussischen Staate*, Berlin: Verlag des Königlichen Statistischen Bureaus, 1878.

_ , *Preussische Statistik. Amtliches Quellenwerk. Band 81. Die Ergebnisse der Ermittelung der landwirthschaftlichen Bodennutzung und des Ernteertrags im preussischen Staate im Jahre 1883*, Berlin: Verlag des Königlichen Statistischen Bureaus, 1884.

_ , *Statistik der preussischen Einkommensteuer-Veranlagung*, Berlin: Verlag des Königlichen Statistischen Bureaus, 1892-1911.

_ , *Preussische Statistik. Amtliches Quellenwerk. Band 137. Die Ergebnisse der Ermittelung des Ernteertrags im preussischen Staate für Jahr 1894 nebst einem Anhange enthaltend Nachweisungen über Bodennutzung im Jahre 1893*, Berlin: Verlag des Königlichen Statistischen Bureaus, 1895.

Lehmann, Sibylle, "The German Elections in the 1870s: Why Germany Turned from Liberalism to Protectionism," *Journal of Economic History*, 2010, *70* (1), 146–178.

Michaels, Guy, Ferdinand Rauch, and Stephen J Redding, "Urbanization and structural transformation," *The Quarterly Journal of Economics*, 2012, *127* (2), 535–586.

Nagy, D, "Trade and urbanization: Evidence from Hungary," *American Economic Journal: Microeconomics*, 2021, *Forthcoming*.

Neal, Derek, "Industry-Specific Human Capital: Evidence from Displaced Workers," *Journal of Labor Economics*, 1995, *13* (4), 653–677.

O'Rourke, Kevin H., "The European Grain Invasion, 1870-1913," *Journal of Economic History*, 1997, *57* (4), 775–801.

_ , "Economic History and Contemporary Challenges to Globalization," *Journal of Economic History*, 2019, *79* (2), 356–382.

_ **and Jeffrey G. Williamson**, *Globalization and History: The Evolution of a Nineteenth-Century*

Atlantic Economy, Cambridge [MA]: MIT Press, 1999.

Pascali, Luigi, "The Wind of Change: Maritime Technology, Trade, and Economic Development," *American Economic Review*, 2017, *107* (9), 2821–2854.

Preußisches Statistisches Landesamt, *Markt- und Kleinpreise ausgewählter Güter in Preußen 1816 bis 1928*, Köln: GESIS Datenarchiv. histat, 1928.

Rogowski, Ronald, "Political Cleavages and Changing Exposure to Trade," *The American Political Science Review*, 1987, *81* (4), 1121–1137.

Sperber, Jonathan, *The Kaiser's Voters: Electors and Elections in Imperial Germany*, Cambridge: Cambridge University Press, 1997.

Statistisches Reichsamt, *Das deutsche Volkseinkommen vor und nach dem Kriege*, Berlin: Verlag von Reimar Hobbing, 1932.

Suesse, Marvin and Nikolaus Wolf, "Rural Transformation, Inequality, and the Origins of Microfinance," *Journal of Development Economics*, 2020, *143*, 102429.

Sullivan, Paul, "Empirical Evidence on Occupation and Industry Specific Human Capital," *Labour Economics*, 2010, *17* (3), 567–580.

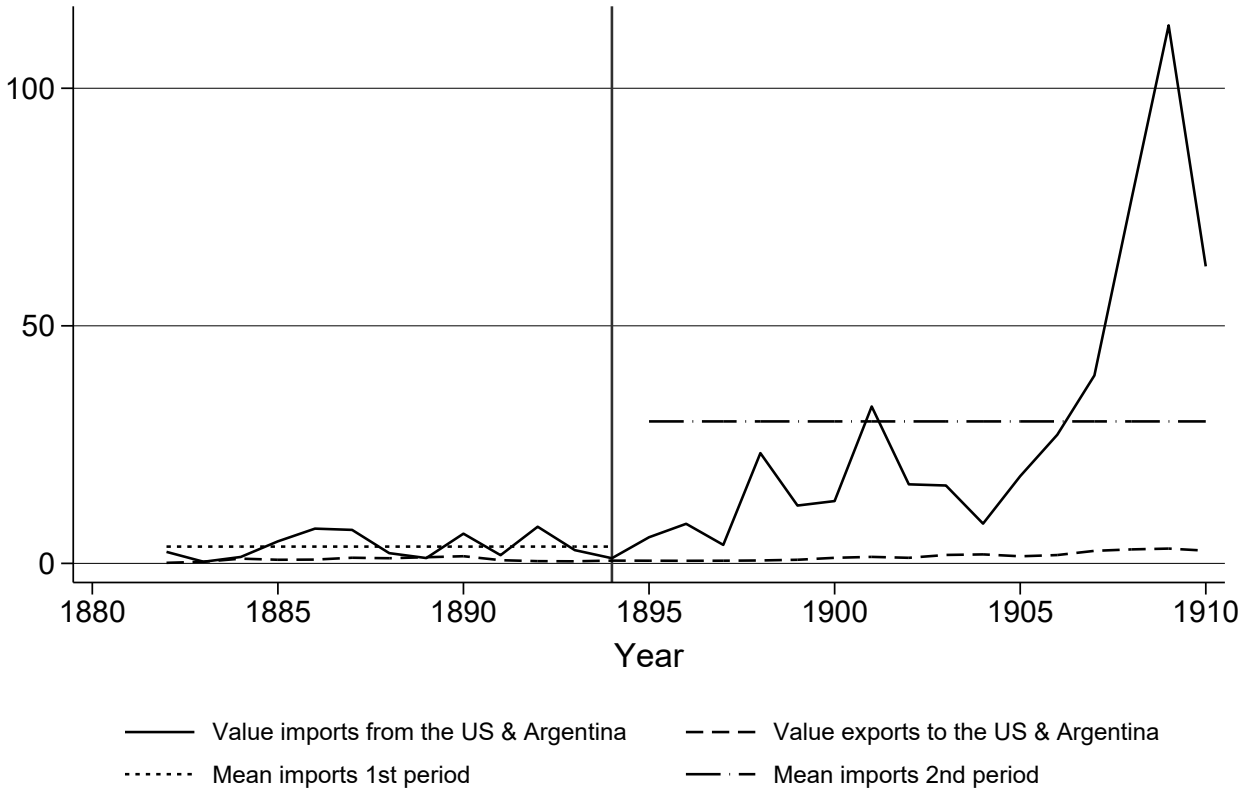
Torp, Cornelius, *Die Herausforderung der Globalisierung. Wirtschaft und Politik in Deutschland 1860–1914*, Göttingen: Vandenhoeck & Ruprecht, 2005.

_ , "The "Coalition of 'Rye and Iron'" under the Pressure of Globalization: A Reinterpretation of Germany's Political Economy before 1914," *Central European History*, 2010, *43* (3), 401–427.

Traiberman, Sharon, "Occupations and Import Competition: Evidence from Denmark," *American Economic Review*, 2019, *109* (12), 4260–4301.

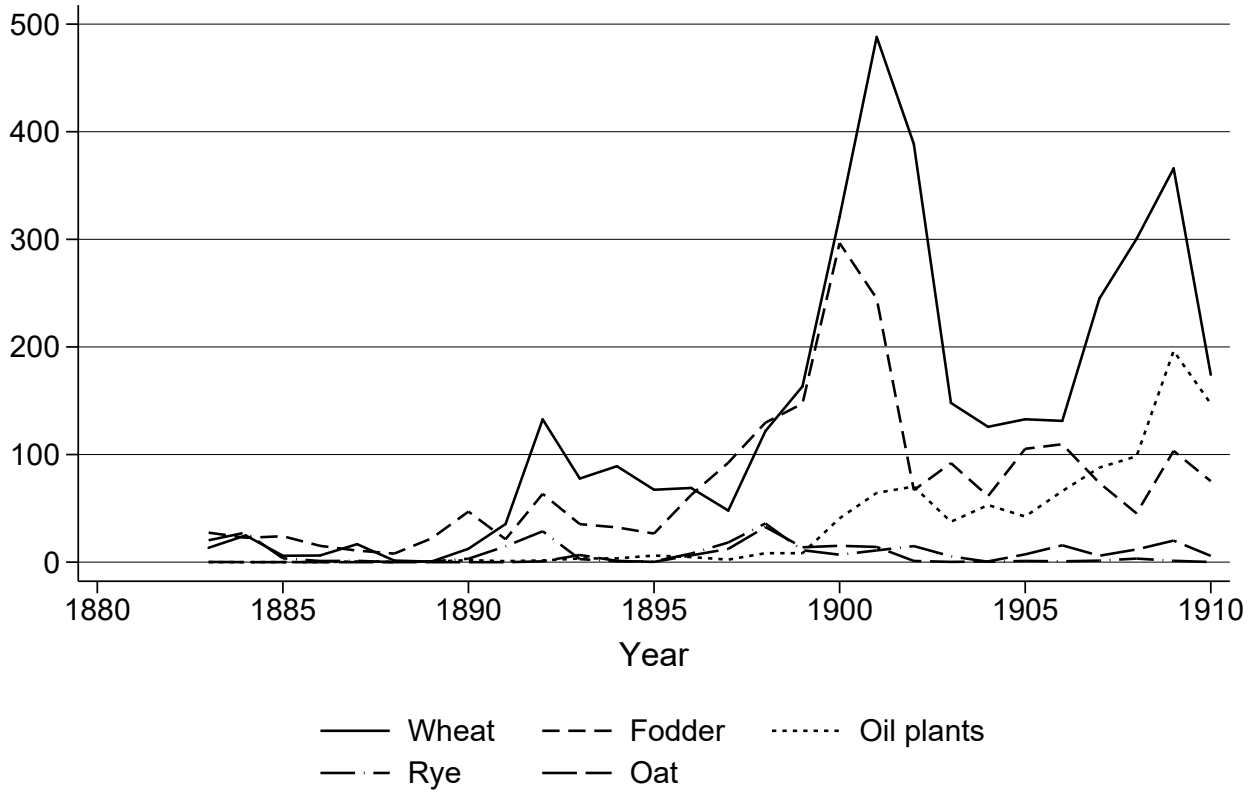
A1 Additional Figures and Tables

Figure A1: Italian Trade with the US and Argentina



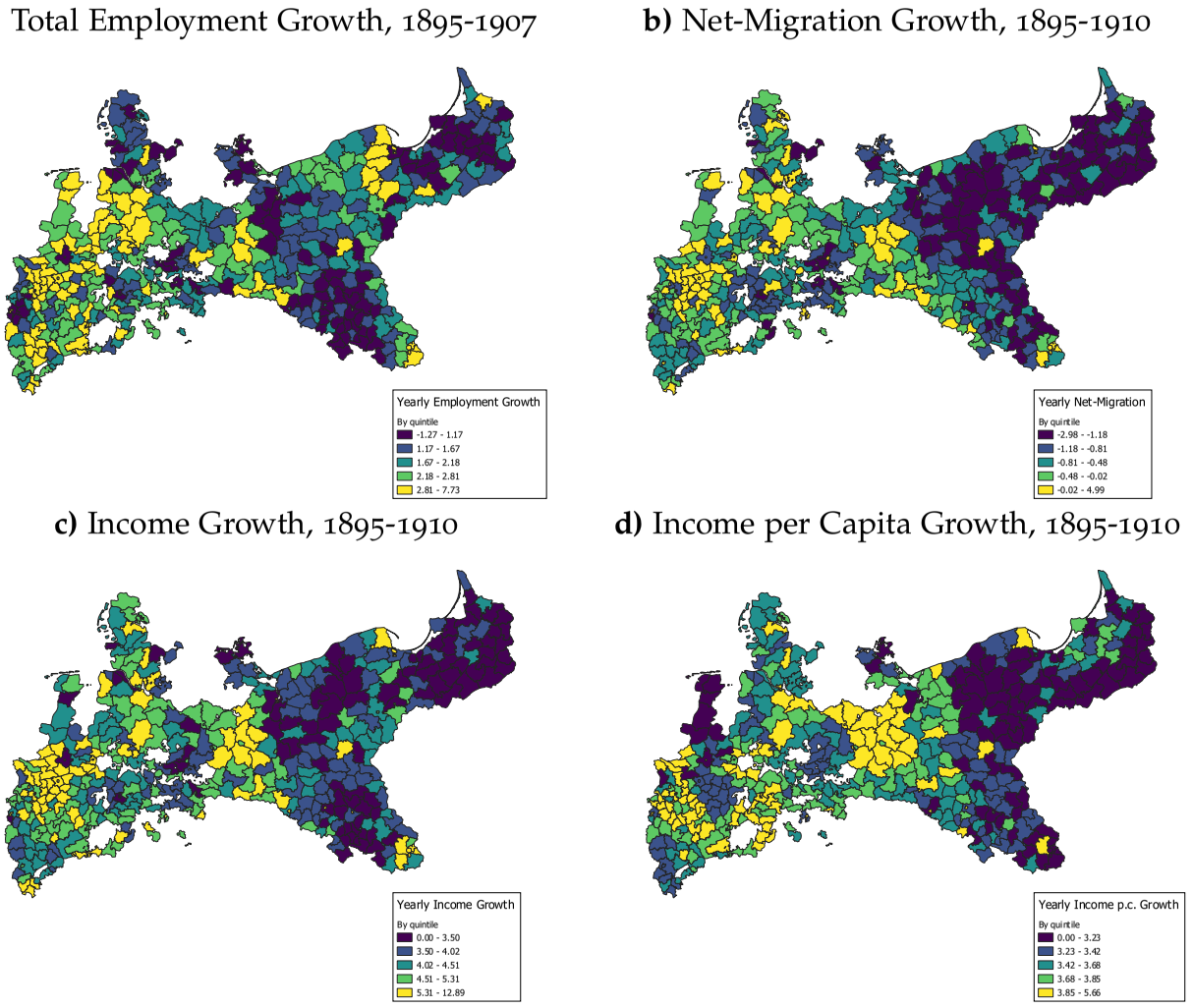
Notes: The figure shows the development of trade with agricultural products between Italy and the US and Argentina (in million Marks).
Sources: Own calculation based on Federico et al. (2011).

Figure A2: Germany's Net-Imports from the US and Argentina by Crops



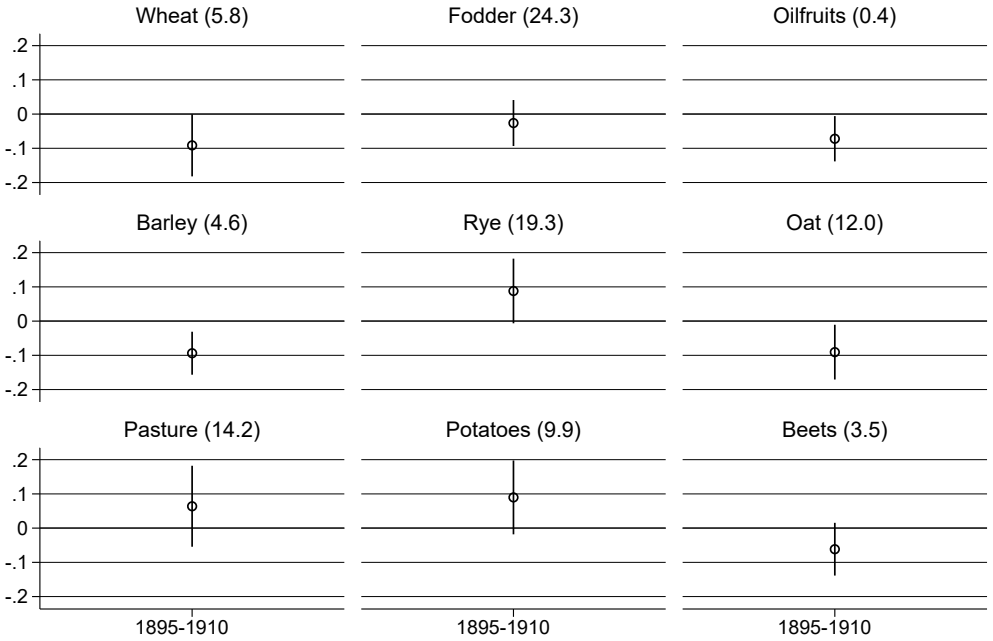
Notes: German net-imports of different crops over time (in million Marks).
Sources: Own calculation based on Hungerland and Wolf (2021).

Figure A3: Main dependent variables



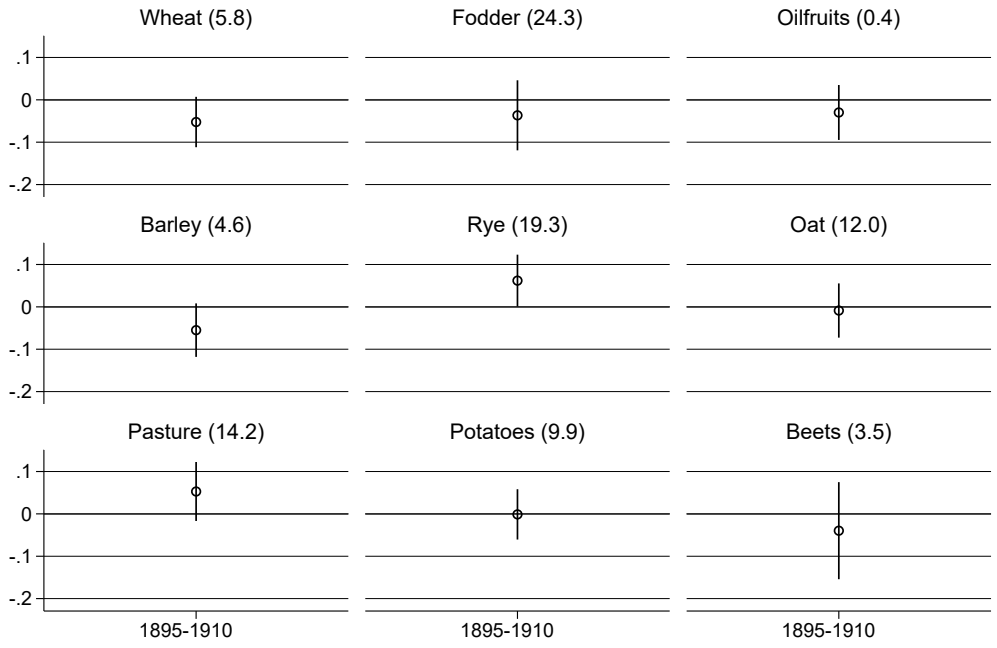
Notes: Yearly changes for employment, migration, income, and income per capita, presented in quintiles.
Sources: Panel (A): Own calculation based Kaiserliches Statistisches Amt (1898) and Kaiserliches Statistisches Amt (1909). Panel (B): Own calculation based on Galloway (2007). Panel (C) and (D): Own calculation based on Bartels et al. (2021).

Figure A4: Correlation between Crops and Employment



Notes: The results present the effect for the share of different crop types on the change in employment. As controls, we include share of agricultural employment, horsepower per worker, distance to big city interacted with year dummies as well as county and time fixed effects. For comparison, we standardize all coefficients. Regression coefficients of interest are interactions between the share of one crop (listed above each figure) and period fixed effects and are estimated relative to the first period (1880-1895). Coefficient estimates are shown with dots with their 95% confidence intervals indicated with vertical lines. In parentheses next to the sector, we report the average share for each crop. Standard errors are clustered at the district level.
Sources: See Section 2.

Figure A5: Correlation between Crops and Migration



Notes: The results present the effect for the share of different crop types on the change in migration. As controls, we include share of agricultural employment, horsepower per worker, distance to big city interacted with year dummies as well as county and time fixed effects. For comparison, we standardize all coefficients. Regression coefficients of interest are interactions between the share of one crop (listed above each figure) and period fixed effects and are estimated relative to the first period (1880-1895). Coefficient estimates are shown with dots with their 95% confidence intervals indicated with vertical lines. In parentheses next to the sector, we report the average share for each crop. Standard errors are clustered at the district level.

Table A1: Descriptive Statistics

	(1) 1880–1895	(2) 1895–1910
Shock agriculture (in Mark)	0.62	19.55
	(1.47)	(14.81)
Employment agriculture (in %)	53.78	50.41
	(21.11)	(21.34)
Yearly employment growth (in %)	0.89	2.03
	(1.15)	(1.11)
Yearly migration growth (in %)	-0.64	-0.52
	(0.91)	(0.89)
Yearly income per capita growth (in %)	-0.97	3.60
	(2.60)	(0.63)
Yearly income growth (in %)	-0.16	4.53
	(2.90)	(1.45)
Land owned by big farms (more than 50 hectares) (in %)	35.21	
	(23.65)	
Horsepower per worker	0.08	
	(0.10)	
Distance to large city (in km)	87.60	
	(47.03)	
Observations	449	449

Notes: Standard deviation is provided in parenthesis.
Sources: See Section 2.

Table A2: Effect of Trade Shock on Employment, Migration, and Income (OLS)

	(1)	(2)	(3)	(4)	(5)	(6)
	Panel 1					
	Employment Growth			Migration Growth		
Shock agriculture (in Mark)	-0.028***	-0.025***	-0.025***	-0.012***	-0.011***	-0.011***
	(0.005)	(0.004)	(0.004)	(0.002)	(0.002)	(0.002)
Emp agriculture (in %)	-0.007*	-0.004	0.001	-0.024***	-0.023***	-0.023***
	(0.004)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)
Land big farms (in %)			-0.001			-0.001
			(0.004)			(0.002)
Distance to next large city			0.001			-0.001
			(0.002)			(0.001)
Horsepower per worker			0.819**			-0.003
			(0.360)			(0.190)
Mean dependent variable	2.03	2.03	2.03	-0.52	-0.52	-0.52
Region FE		✓	✓		✓	✓
R-squared	0.21	0.27	0.31	0.50	0.52	0.52
Observations	449	449	449	449	449	449
	Panel 2					
	Income Growth			Income p.c. Growth		
Shock agriculture (in Mark)	-0.021***	-0.016***	-0.018***	-0.004	-0.000	-0.001
	(0.004)	(0.003)	(0.004)	(0.003)	(0.001)	(0.002)
Emp agriculture (in %)	-0.040***	-0.033***	-0.025***	-0.012***	-0.006***	-0.006***
	(0.005)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)
Land big farms (in %)			0.004			0.001
			(0.004)			(0.002)
Distance to next large city			-0.001			-0.000
			(0.002)			(0.001)
Horsepower per worker			1.009***			-0.071
			(0.360)			(0.115)
Mean dependent variable	3.14	3.14	3.14	2.22	2.22	2.22
Region FE		✓	✓		✓	✓
R-squared	0.45	0.59	0.61	0.20	0.64	0.64
Observations	449	449	449	449	449	449

Notes: Unit of observation: county. Standard errors, clustered at the district level, in parentheses. *** p<0.01, ** p<0.05, * p<0.1.
Sources: See Section 2.

Table A3: First Stage Results

	Shock Agriculture		
	(1)	(2)	(3)
IV shock agriculture	6.407***	6.383***	6.277***
	(0.584)	(0.587)	(0.582)
Emp agriculture (in %)	0.069**	0.056**	0.044
	(0.026)	(0.026)	(0.030)
Land big farms (in %)			0.049***
			(0.018)
Distance to next large city			0.008
			(0.009)
Horsepower per worker			-1.319
			(0.857)
Mean dependent variable	19.55	19.55	19.55
Region FE		✓	✓
R-squared	0.85	0.86	0.86
Observations	449	449	449

Notes: Unit of observation: county. Standard errors, clustered at the district level, in parentheses. *** p<0.01, ** p<0.05, * p<0.1.
Sources: See Section 2.

Table A4: Pre-Trend: Effect of Trade on Second Difference (2SLS)

	Employment (1)	Migration (2)
Shock agriculture (in Mark)	-0.015***	-0.004*
	(0.004)	(0.002)
Mean dependent variable	1.13	0.11
F-stat excluded instrument	116.49	116.49
Region FE	✓	✓
Further controls	✓	✓
Observations	449	449

Notes: Standard errors, clustered at the district level, in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Further controls include: distance to next large city, share of land owned by large farm owners (more than 50 hectares), horsepower per worker, employment share in agriculture. Dependent variable: difference between yearly growth in the dependent variable in the second period and first period.
Sources: See Section 2.

Table A5: Migration by Place of Origin

	Within Province (1)	Within Prussia (2)	Within Germany (3)
Shock agriculture (in Mark)	-0.002**	-0.005***	-0.000
	(0.001)	(0.002)	(0.001)
Mean dependent variable	0.29	0.20	0.08
F-stat excluded instrument	116.49	116.49	116.49
Region FE	✓	✓	✓
Further controls	✓	✓	✓
Observations	449	449	449

Notes: Unit of observation: county. Standard errors, clustered at the district level, in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Controls: distance to large city, share of land owned by large farm owners (more than 50 hectares), horsepower per worker, share of agricultural employment.
Sources: See Section 2.

Table A6: Local Adjustment: Crops, Sectoral Employment, and Wages

	Cultivation of Wheat and Fodder (1)	Employment Non-Agriculture (2)	Day laborers in agriculture (3)
Shock agriculture (in Mark)	-0.031	-0.005	0.014
	(0.020)	(0.019)	(0.042)
Mean dependent variable	3.14	-0.65	116.28
F-stat excluded instrument	116.21	116.49	115.31
Region FE	✓	✓	✓
Further Controls	✓	✓	✓
Observations	449	449	420

Notes: Unit of observation: county. Standard errors, clustered at the district level, in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Controls: distance to large city, share of land owned by large farm owners (more than 50 hectares), horsepower per worker, share of agricultural employment. Dependent variable: change in the share of cultivation areas for wheat and fodder between 1893 and 1901 (in %) in column 1, change in the share of non-agricultural employment between 1895 and 1907 (in %), change in wage for daily laborers in rural counties (in %) between 1892 and 1901 in column 3 and *Sources*: See Section 2.

Table A7: Effect of Trade Shock on Change in Death Rate

	Change in Death Rate		
	(1)	(2)	(3)
Shock agriculture (in Mark)	0.011	0.011	-0.005
	(0.014)	(0.014)	(0.017)
Mean dependent variable	-9.50	-9.50	-9.50
F-stat excluded instrument	120.30	118.25	116.49
Region FE		✓	✓
Further controls			✓
Observations	449	449	449

Notes: Unit of observation: county. Standard errors, clustered at the district level, in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Controls: distance to next large city, share of land owned by large farm owners (more than 50 hectares), horsepower per worker, share of agricultural employment.
Sources: See Section 2.

Table A8: Main Results with Initial Distribution of Crops

	Employment (1)	Migration (2)	Income (3)	Income p.c. (4)
Shock agriculture	-0.031***	-0.010***	-0.017***	0.000
	(0.004)	(0.003)	(0.005)	(0.002)
Mean dependent variable	2.03	-0.52	4.48	3.55
F-stat excluded instrument	297.21	297.21	297.21	297.21
Region FE	✓	✓	✓	✓
Further controls	✓	✓	✓	✓
Observations	449	449	449	449

Notes: Unit of observation: county. Standard errors, clustered at the district level, in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Controls: distance to next large city, share of land owned by large farm owners (more than 50 hectares), horsepower per worker, share of agricultural employment.
Sources: See Section 2.

Table A9: Main Results with Constituencies

	Employment (1)	Migration (2)	Income (3)	Income p.c. (4)
Shock agriculture (in Mark)	-0.047***	-0.025***	-0.043***	-0.009
	(0.008)	(0.005)	(0.012)	(0.007)
Mean Dependent Variable	2.12	-0.40	4.73	3.64
F-statistic excluded instrument	93.73	93.73	93.73	93.73
Region FE	✓	✓	✓	✓
Further Controls	✓	✓	✓	✓
Observations	225	225	225	225

Notes: Unit of observation: constituency. Standard errors, clustered at the district level, in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Controls: distance to next large city, share of land owned by large farm owners (more than 50 hectares), horsepower per worker, share of agricultural employment.
Sources: See Section 2.

Table A10: Main Results with Smaller Region Fixed Effects

	Employment (1)	Migration (2)	Income (3)	Income p.c. (4)
Shock agriculture (in Mark)	-0.031***	-0.010***	-0.017***	0.002
	(0.005)	(0.002)	(0.004)	(0.001)
Mean dependent variable	2.03	-0.52	3.14	2.22
F-stat excluded instrument	94.11	94.11	94.11	94.11
Province FE	✓	✓	✓	✓
Further Controls	✓	✓	✓	✓
Observations	449	449	449	449

Notes: Unit of observation: county. Standard errors, clustered at the district level, in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Controls: distance to next large city, share of land owned by large farm owners (more than 50 hectares), horsepower per worker, share of agricultural employment.
Sources: See Section 2.

Table A11: 2SLS Results with Price Shock

	Δ Migration (1)	Δ Conservative (2)	Δ Socialist (3)	Δ Right-Wing (4)
Price exposure (in Mark)	2.965**	-13.611	-4.852	7.716
	(1.310)	(21.104)	(9.349)	(8.652)
Mean dependent variable	-0.43	-4.23	5.09	0.73
F-stat excluded instrument	5.70	5.68	5.57	5.69
Period FE	✓	✓	✓	✓
Region FE	✓	✓	✓	✓
Further controls	✓	✓	✓	✓
Observations	908	908	908	908

Notes: Unit of observation: constituency. Standard errors, clustered at the district level, in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Controls: share of urban population and for columns 2-4, level of initial votes for the party. The price exposure is based on national price data for four major agricultural crops collected by Preußisches Statistisches Landesamt (1928). We weight the price changes by the local shares for the different crops and deflate by the German-wide consumer price index calculated by Desai (1968). We include wheat, potato, fodder, and oat based on data availability. We use this measure for the trade shock in a regression model following equation 4 and instrument with the price data for the US by Jacks (2005). Due to data limitations we can only use changes in migration and votes for political parties as dependent variables. Taken together, this procedure allows us to construct four periods, each consisting of roughly ten years. First period: 1871-1878, second period: 1878-1890, third period: 1890-1903, fourth period: 1903-1912. The start and end years are given by the general elections.
Sources: See Section 2.

Table A12: 2SLS Results with control for 1870s price shock

	Employment (1)	Migration (2)	Income (3)	Income p.c. (4)
Shock agriculture (in Mark)	-0.036***	-0.024***	-0.048***	-0.011
	(0.010)	(0.007)	(0.016)	(0.008)
Mean Dependent Variable	2.12	-0.40	4.73	3.64
F-statistic excluded instrument	85.22	85.22	85.22	85.22
Region FE	✓	✓	✓	✓
Further Controls	✓	✓	✓	✓
Observations	225	225	225	225

Notes: Unit of observation: county. Standard errors, clustered at the district level, in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Controls: distance to next large city, share of land owned by large farm owners (more than 50 hectares), horsepower per worker, share of agricultural employment, and price shock of 1870s.
Sources: See Section 2.

Table A13: Migration Response by Relative Trade Shock

Variable	All	Q1	Q2	Q3	Q4
Log employment, 1895-1907	1.79	31.29	-1.65	-4.96	-17.90
Log population, 1895-1910	13.35	28.98	12.49	7.00	4.81
Log "natural" population, 1895-1910	21.17	23.82	21.28	20.11	19.45
Log migration, 1895-1910	-7.82	5.16	-8.79	-13.11	-14.65
Observations	449	113	112	112	112

Notes: Unweighted averages by subgroups. Column 1 includes all counties. Columns 2-5 group all counties into quartiles according to their relative exposure to agricultural trade shocks.
Sources: See Section 2.

Table A14: Migration by Skill and Sector

Panel 1: Migration by Skill and Province			
Province	low skilled locals	low skilled migrants	migrants among employed
Brandenburg	77.83	76.05	34.86
Westphalia	76.07	89.30	22.64
Schleswig-Holstein	70.56	81.31	13.78
Rhineland	74.83	81.45	11.01
West Prussia	76.82	71.08	10.26
Hanover	72.89	80.62	10.04
Saxony	77.59	81.30	9.91
Pomerania	76.36	73.95	9.09
Poznan	77.68	64.30	7.59
Hesse and Nassau	72.68	67.05	6.35
Silesia	77.53	66.31	3.06
East Prussia	76.02	57.43	2.22
Panel 2: Migration by Industry			
Sector		Workers from other Prussian province	
Mining		24.92	
Stones		18.05	
Metall		13.27	
Machines		24.54	
Chemistry		24.48	
Textiles		9.36	
Paper		15.80	
Leather		22.28	
Wood		20.36	
Food		17.98	
Clothing		20.59	
Cleaning		24.70	
Construction		17.79	
Print		24.28	
Art		22.98	

Notes: Panel 1: Column 1: share (in %) of low skilled workers among all local workers, i.e., workers born in the province. Column 2: share (in %) of low skilled migrants among all migrants in a province. Column 3: share (in %) of migrants among the workforce in a province. Migrant is defined here as a worker not born in the same province as they work in. Panel 2: Share of migrant workers by industry (in %).
Sources: See Section 2.

B1 Trade and Agriculture Statistics

Table B1: Crop Categories and Cultivation Areas

Crop Category	Area 1	Area 2	Area 3	Area 4	Area 5
Animals	Pasture				
Wheat	Wheat	Spelt	Einkorn Wheat		
Barley	Barley				
Rye	Rye				
Oat	Oat				
Other Cereals	Buckwheat	Millet	Other Cereals and Root Crops		
Potatoes	Potatoes				
Other Vegetables	Cabbage	Other Roots and Vegetables			
Leguminous vegetables	Peas	Lentils	Beans	Vetches	
Beets	Jerusalem artichoke	Carrot	Beets (Sugar, White)	Swedes	Hops
Wine	Wine				
Fodder	Meadows	Fodder Crops	Fodder Beets	Maize	
Flax	Flax				
Oil Fruits	Swede and Turnip Rape	Camelina			

Sources: See Section 2.

Table B2: Crop Categories and SITC

Crop type	SITC code	SITC code	SITC code	SITC code	SITC code
Animals	001				
Wheat	041	0411	0412		
Barley	043				
Rye	0451				
Oat	0452				
Other Cereals	04591	04592	04599		
Potatoes	0541				
Other Vegetables	054	0545	05451	05459	
Leguminous vegetables	0542				
Beets	0548	05481	05482	05484	05488
Wine	0575	05751	05752		
Fodder	0811	044			
Flax	26511				
Oil Fruits	2226	2234			

Sources: See Section 2.

Table B3: Crop Categories and Imports

Crop type	Cultivation Area		Imports			
			Rest of the world		US and Argentina	
	Mean	SD	1st period	2nd period	1st period	2nd period
Animals	14,33%	14,67	320560	321979	687	673
Wheat	5,91%	4,99	104713	243509	34705	209343
Barley	4,63%	4,51	104342	321196	354	5586
Rye	19,09%	7,58	116871	107322	8727	6622
Oat	12,04%	4,93	32637	69823	736	12700
Other Cereals	2,19%	2,07	4087	10099	249	2334
Potatoes	9,81%	5,21	7578	26081	0	0
Other Vegetables	0,55%	1,49	2512	17741	0	0
Leguminous vegetables	2,59%	2,25	14882	48673	315	166
Beets	3,41%	3,71	21268	56752	33	154
Wine	0,18%	0,89	15208	37606	1	119
Fodder	24,34%	8,20	34974	62586	27443	102827
Flax	0,33%	0,38	10468	331	0	0
Oil Fruits	0,46%	0,62	55293	74835	1087	62468

Sources: See Section 2.

C1 The role of trade shocks for the turn to protectionism

Germany and many other European countries experienced a turn towards protectionism in the 1870s. It is therefore possible that shocked regions may have already shown political reactions before the period we observe (Lehmann, 2010). To account for this argument, we use the price shock measure because German trade statistics emerged only in the 1880s. The results in Table C1 show no significant correlation between the price exposure and the conservative party – the stronghold of protectionism – if we only take the first period (1871-1878) into account. Similarly, we observe comparable effects on migration.

To be sure, 1878/79 was the year in which Germany turned protectionist. However, our results suggest that the electoral shift towards the conservative party, which was decisive for the passing of the 1878 law, cannot be explained by the changes in agricultural prices. How can these two, supposedly contradictory, findings be brought together? First, the 1878 election campaign was significantly influenced by two failed assassination attempts on the emperor and the demand for more law and order against the socialists (Sperber, 1997, p. 173f). Second, an important motive for the tariffs was the enlargement of the federal budget, and, thus, a key domestic political issue (Torp, 2005, p. 160f). Third, among the 204 MPs, who early on advocated more protectionist legislation, rural eastern Prussia was not overrepresented and neither was the protectionist conservative party (Torp, 2005, p. 163ff). The push for higher tariffs was instead spearheaded by catholic Center MPs in constituencies around of booming cities, at least partly to limit the expansion of these urban center (Torp, 2005, p. 163ff). Another reason for their support was the interest to send a peaceful sign in order to end the *Kulturkampf* (Torp, 2005, p.169).

Based on these three arguments and our empirical evidence for a strong migration response, we have good reasons to belief that declining agricultural prices did not result in more demand for protectionism.

Table C1: Price Shock 2SLS, 1870s

	Δ Migration (1)	Δ Conservative (2)
Price exposure (in Mark)	2.223***	-11.526
	(0.723)	(31.928)
Mean dependent variable	-0.35	-2.13
F-stat excluded instrument	20.99	20.84
Region FE	✓	✓
Further controls	✓	✓
Observations	225	225

Notes: Standard errors, clustered at the district level, in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Further controls: share of urban population, and for column 2, level of initial votes for the conservative party.
Sources: See Section 2.