Trade Policy as an Exogenous Shock: Focusing on the Specifics*

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Abstract

This paper introduces a novel approach to quantifying the effects of tariff protection on economic outcomes by leveraging heterogeneous dependence on specific tariffs in the presence of price changes. We construct a database encompassing the universe of tariff lines across five US trade policy regimes between 1900 and 1940 and show that our measure of changes in "realized protection" strongly predicts import growth and labor market outcomes during this period. Using linked full-count Census data, we show that import exposure inhibited structural change by slowing the transition out of agriculture and into the expanding manufacturing sector, particularly among the young.

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1 Introduction

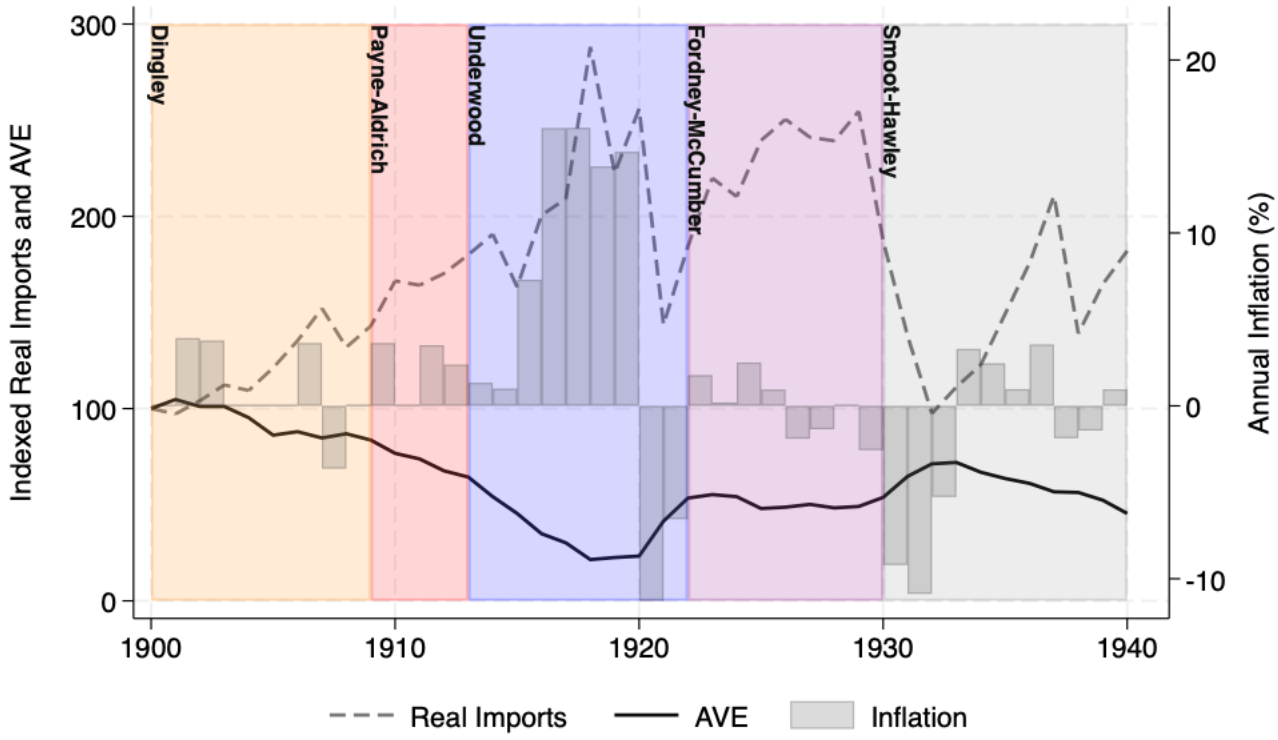
The enormous body of work in recent years on the distributional effects of trade has dramatically improved our understanding of the ways in which individuals and labor markets are affected by trade shocks. However, the overwhelming focus of this research on the past 50 years can give the impression that trade has only recently emerged as a force shaping the distribution of economic activity – particularly in the US. This is not the case. In this paper we show that trade played an important role in shaping structural change in the United States in the early twentieth century, decades prior to the years emphasized by most recent work. This era, in which tariff levels more closely resembled those proposed by the Trump administration than anything in the post-war period, offers an important opportunity to explore the relationship between tariff policy and economic activity.

In particular, we focus on the years between 1900 and 1940, a period of manufacturing expansion in the United States (Irwin, 2003). This era offers several advantages to researchers, including the availability of linked individual-level full count Census data and large swings in tariff protection. However, work on this period has been limited by both a paucity of historical trade data and the inherent difficulty in establishing causality in the face of endogenous tariff setting. We address both of these limitations. After constructing a novel data set of import tariffs and imports, we propose a new instrument for changes in tariff protection that does not rely on endogenous changes to legislated tariff rates. We use these data and this identification strategy to shed light on the role that trade policy played in shaping imports and labor markets in this important period US economic history.

As is generally the case, ours is a setting in which tariff levels are endogenously linked to trade flows via their expected effects on domestic outcomes. Leveraging insights from the work of Crucini (1994) and Irwin (1998a,b), we propose an identification strategy for such settings that exploits unexpected changes in protection that occur conditional on a specified trade policy regime. When a new tariff regime is instituted, identical levels of protection can be achieved with either specific – that is, nominal per-unit – tariffs or ad valorem – percent – tariffs. However, the restrictiveness of specific tariffs varies inversely with the price level; inflation erodes protection while deflation enhances it. By contrast, the protection afforded by ad valorem tariffs is unaffected by price variation. Thus, pre-existing differences in the prevalence of specific tariffs across industries in conjunction with subsequent price movements generate variation in realized protection over time *within* a

trade policy regime. Due to the unpredictability of price movements, such changes are plausibly independent of the demand for protection.

Figure 1: Real Imports, AVE, and Inflation: 1900-1940



Notes: AVE and import values from the USITC. Annual inflation reported in percent and calculated from the Jordà et al. (2017) Macrohistory Database. Real imports and AVE have been indexed to 100 in 1900. Vertical bands indicate the years encompassed by Dingley Tariff of 1897, the Payne-Aldrich Tariff of 1909, the Underwood-Simmons Tariff of 1913, the Fordney-McCumber Tariff of 1922, and the Smoot-Hawley Tariff of 1930, respectively. We display this sample in the context of US tariff rates from 1900-2016 in appendix Figure B.1.

We present visual evidence of the mechanism employed in the paper in Figure 1. Here, each of the five U.S. trade policy regimes of the early 20^{th} century is represented by a distinct colored vertical band.[1] The dashed line represents annual real imports indexed to the year 1900, while the solid black line depicts the ad valorem equivalent (AVE) tariff rate, defined as the ratio of total duties to total import values. Naturally, across policy regimes we observe considerable changes in both average tariff levels and trade flows. This type of cross-regime variation is the source of identification exploited in the vast majority of the literature on trade policy and economic outcomes. However, if trade barriers reflect the demand for protection, such variation is not suitable for identifying the

[1]These regimes correspond to the Dingley Tariff of 1897, the Payne-Aldrich Tariff of 1909, the Underwood-Simmons Tariff of 1913, the Fordney-McCumber Tariff of 1922, and the Smoot-Hawley Tariff of 1930.

effects of tariffs on trade or of trade on economic outcomes.[2] Instead, our identification relies on non-policy variation in the *AVE* tariff rate across years conditional on the pre-existing policy regime. This variation is strongly and negatively correlated with inflation, depicted by gray bars. Periods with high inflation tend to be periods with low average tariff rates and high import growth even within a given tariff regime. We argue that the relationship is causal: in the presence of specific tariffs, inflation erodes the protective capacity of the existing tariff schedule, resulting in increased imports and attendant effects on other economic outcomes.

We rigorously explore this relationship in this era with the aid of a novel database derived from annual editions of *Foreign Commerce and Navigation of the United States*, which we digitize every five years between 1900 and 1930. In order to facilitate a mapping to labor market outcomes, we manually concord tariff lines – approximately 3300 annually – to their two-digit Standard International Trade Classification (SITC) Revision 2 counterpart. This yields an industry-level data set of tariffs covering the universe of US imports in our sample, spanning each of the distinct tariff regimes. We then derive an industry-level measure of intra-policy changes in "realized protection" that depends both on cross-industry differences in the reliance on specific tariffs and time-series variation in aggregate prices. Though they are used most frequently in agriculture, natural resources, and materials manufactures such as textiles, specific tariffs are ubiquitous in our sample.[3] They account for nearly 70% of all duties collected in the first year of the data, dropping to 38% in the 1910s and returning to nearly 60% with the Smoot-Hawley tariff in 1930.

When combined with price movements, specific tariffs generate substantial variation in *AVE* tariff levels over time. For example, between 1915 and 1920, when inflation reaches its in-sample peak, the erosion of protection afforded by specific tariffs leads to a 5.3 percentage point reduction in the *AVE* level – approximately 40% of the initial *AVE* value. While not all periods in our sample are characterized by such large changes, the overall variation we document is large: across our 40-year sample, the standard deviation of annualized five-year changes in realized protection is equal to approximately a one percentage point change in *AVE* levels. This non-policy variation explains more than one-third of industry-level tariff changes in our sample.

[2]For an alternative approach, see Trefler (1993), who deals with endogenous trade policy directly by simultaneously estimating the demand for protection in conjunction with the effects of protection on imports.

[3]See Harrison (2018) for a detailed discussion of the differential use of specific tariffs across industries in the Smoot-Hawley era in particular.

We use this variation to estimate the effect of price-driven changes in realized protection on US industry import growth in our sample over five- and 10-year intervals. We find that a one standard deviation increase in protection decreases relative industry import growth by approximately one-third of a standard deviation. These effects are roughly 20% smaller over five-year windows than over 10 years, though they are always statistically significant and economically meaningful.[4] We also detail the assumptions required to estimate a trade elasticity in our setting and report estimates between 3 and 6. These results obtain even after accounting for initial levels of protection and the initial industry reliance on specific tariffs.

We then turn to the effects of import growth on US labor markets from 1900 to 1940 using linked individual-level data from the full count US Census. We construct county-level measures of changes in realized protection using an employment-weighted average of industry-level changes in the spirit of Kovak (2013) and estimate the effects of import growth on labor market outcomes for nearly 30 million individual-by-decade observations. The nature of the Census data – both its broad coverage and the ability to follow individuals over time – allows us to explore the transition of the US economy along multiple novel dimensions. First, we explore heterogeneity in the response to trade shocks throughout the age distribution. We find that import growth reduces labor force attachment among older individuals and reduces income growth and occupational mobility among those under 30. Second, we exploit the linked nature of the data to estimate the effect of local import growth on the probability of individuals transitioning between sectors. We find that import growth reduces incomes in large part by impeding the mobility of workers out of agricultural and into the expanding manufacturing sector. To the best of our knowledge this is the first analysis linking trade and economy-wide structural change in the US during this era.

While our approach does not rely on tariff levels for identification, our measure does rely on a combination of random price shocks and potentially non-random exposure to these shocks as a function of pre-existing tariff policy. This strategy faces three primary identification concerns. The first is that industries and labor markets with greater reliance on specific tariffs might differ systematically from other industries and labor markets. To partially address this concern, we control directly for the initial level of specific tariffs and ad valorem equivalent in our baseline specifications. Thus, our analysis identifies the differential changes among industries and locations with greater exposure to price

[4]Such differences in the responsiveness of trade flows to trade costs over time have been noted previously. See, for example, Ruhl (2008) and Boehm et al. (2023).

movements – that is, those with higher specific tariff reliance – relative to less-exposed industries and regions, in periods of larger price changes relative to periods with stable prices.[5]

A second, related concern is that our results may reflect other channels through which changing price levels differentially affect economic outcomes. If demand increases disproportionately during expansionary periods for goods relying on specific tariffs, for instance, this would mimic the mechanism we have in mind but would not be causally linked to changing tariff protection. To evaluate this concern, we conduct two placebo exercises. First, we construct an analogous data set for UK industry trade flows to examine the relationship between changes in US tariff protection and UK imports. If changes in price levels disproportionately affect goods that tend to rely on specific tariffs independent of their effect on realized protection, we would expect to see a similar relationship between price changes and imports in the UK to those that we document in the US. We find no such relationship: US specific tariffs predict the response of US imports to changing prices, but not UK imports. Second, we collect additional import and tariff data to examine trade dynamics in the US from 1848 to 1860, a period in which US trade policy featured no specific tariffs. We find that specific tariffs introduced in 1861 are predictive of the industry import response to price changes *after*, but not *before* their implementation. This, again, suggests that it is specific tariffs themselves, rather than underlying industry characteristics, that govern the differential response we observe.

The final identification concern is that the changes in realized protection are themselves a reflection of the demand for protection (Trefler, 1993; Grossman and Helpman, 1994; Hiscox, 2002; McLaren, 2016). That is, politicians may choose a particular combination of ad valorem and specific duties in anticipation of their subsequent effects on realized protection.[6] To address this concern, we show directly that price forecasting is practically infeasible during this era, as the large swings in prices during our era were driven by unanticipated global events. Further, we examine changes in specific tariffs over time and find an extreme level of persistence in industry reliance on specific tariffs. As late as the Smoot-Hawley tariff in 1930, the structure of tariffs is strongly predicted by the tariff schedule under the Morrill Tariff of 1861. This suggests that reliance on specific tariffs in

[5]This is similar in spirit to the approach of Borusyak and Hull (2023), who recommend controlling for the mean of a counterfactual distribution of potential shocks, such that identification comes from deviations from that average.

[6]Relatedly, Irwin (1998a) notes a strong party preference for duty type. Republicans were concerned with importers intentionally undervaluing their shipments to avoid duties. Such behavior was thought to put national budget balances at risk and consequently motivated Republicans to prefer specific tariffs.

our sample largely reflects legislative inertia, rather than time-varying political economy concerns. As a final robustness exercise, we use this pre-Civil War reliance on specific tariffs to construct an IV to estimate the effects of changes in realized protection on US imports – it, too, predicts US import growth from 1900 to 1940.

Our approach draws heavily on the insights of Crucini (1994) and Irwin (1998a,b), who argue that intra-policy variation in the ad valorem equivalent tariff rate is considerable, and is related to both specific tariffs and inflation. These findings motivate the higher frequency analysis of the effects of specific tariffs on aggregate output and investment (Crucini and Kahn, 1996), industry-level tariff wedges and imports (Bond et al., 2013), and prices (Harrison, 2018) for a subset of products surrounding the Smoot-Hawley tariff. This paper complements and extends existing work along several important margins. First, rather than focusing on a single trade policy event or a balanced panel of a subset of goods, we evaluate the importance of specific tariffs with data that covers the universe of duties, imports, and trade policy regimes for a 40-year period.[7] By performing our analysis at higher level of aggregation, we are able to explore the effects of evolving protection among all industries during a sample spanning the first wave of globalization as well as the subsequent interwar trade collapse and rise in protectionism. Second, we provide direct evidence of the relationship between price movements and trade in the presence of specific tariffs and rule out alternative explanations via placebo analysis. Third, we trace industrial reliance on specific tariffs back to pre-Civil War trade policy. Finally, we provide evidence of the spatial effects of import competition on labor market outcomes over a 40-year period and evaluate its role in shaping the industrial composition of the early 20^{th} century American economy. Our paper contributes to this literature by providing support for the idea that trade played a role in governing the transition from agriculture to manufacturing and services (McMillan and Rodrik, 2011; Erten and Leight, 2021) during a key period of growth in US manufacturing (Irwin, 2003).

This era is attractive from an empirical standpoint due to both the prevalence of specific tariffs and the availability of linked full-count Census data, allowing us to follow millions of individuals over time. Further, as noted above, the majority of trade and labor market studies in the US focus on an era in which the manufacturing sector was already in decline. Our paper complements this work by examining structural change in a period of manufacturing expansion. We emphasize, however, that the approach we develop here

[7] Acosta and Cox (2022) highlight the regressivity of the US tariff code in the years following Smoot-Hawley. The prevalence of specific tariffs in our data is consistent with this finding and suggests that the regressive nature of the tariff code exists in the decades prior to their sample as well.

is viable in a plethora of settings and applications. In ongoing work we use this variation to explore the intergenerational effects of trade shocks (Greenland et al., 2024). Klein and Meissner (2024) adopt our identification strategy to evaluate the effect of tariffs on US manufacturing productivity in the late 19th and early 20th century. More recently, specific tariffs accounted for more than a quarter of all tariff lines in the late 1980s, at the conclusion of the phase-in of tariffs negotiated under the Tokyo Round of the GATT. In Greenland et al. (2025) we show that the combination of specific tariffs and rapid inflation in the 1970s reduced the US AVE tariff by approximately four percentage points, despite the absence of large-scale changes in tariff policy. To this day, agricultural goods are disproportionately reliant on specific tariffs, with especially important implications for developing economies (Chowdhury, 2012).

This paper contributes to a large literature exploring the distributional consequences of trade, which has, as noted above, overwhelmingly focused on recent trade events. Trade as a source of identification is limited by both the endogenous nature of trade policy and the relative infrequency of large trade agreements. As such, the vast majority of work has focused on the era beginning in the late 20^{th} century in order to leverage large supply shocks and a handful of abrupt changes to trade policy as sources of exogenous variation. For example, Autor et al. (2013) and Batistich and Bond (2023) link supply-driven variation in US import growth to US labor market outcomes. Similarly, a large number of papers (Pavcnik, 2002; Trefler, 2004; Topalova, 2007; Kovak, 2013; Hakobyan and McLaren, 2016; Pierce and Schott, 2016; Handley and Limão, 2017; McCaig and Pavcnik, 2018; Kovak and Morrow, 2022) study sweeping liberalizations in which the magnitude of the industry-level tariff change is plausibly unaffected by political lobbying.[8] We contribute to this literature by proposing a method to identify the causal effect of trade on economic outcomes in the absence of such relatively infrequent events.

The paper proceeds as follows. In section 2 we derive a simple measure of specific-tariff-induced variation in protection. In section 3 we describe the trade policy environment and present stylized facts about trade and duties from 1900 to 1940. We also construct and describe our primary measure of changes in realized tariff protection. In Section 4 we estimate the effect of changes in realized protection on industry import growth. We also conduct placebo exercises based on contemporaneous UK imports and on US imports surrounding the 1861 Morrill tariff. Section 5 details the effects of inflation-driven changes in average tariffs on local labor markets using linked Census data. Section

[8]For papers outside of the last 30 years, see de Bromhead et al. (2019), Alessandria et al. (2021), Eriksson et al. (2021), and Heblich et al. (2022).

6 outlines additional applications and concludes.

2 Empirical Approach: Tariffs, Inflation, and Changes in Realized Protection

Trade barriers generally reflect both economic conditions and the demand for protection (Grossman and Helpman, 1994; Goldberg and Maggi, 1999), and the early 20th century US is no exception (Irwin and Kroszner, 1996; Irwin, 2017; Irwin and Soderbery, 2021). As a consequence, tariff changes, imports, and domestic outcomes are endogenously linked in a way that limits the usefulness of tariff averages as a source of identifying variation. In this section, we describe an approach that identifies plausibly exogenous variation in the protection afforded by a given tariff schedule by exploiting the structure of tariffs, rather than merely the level. To fix ideas, suppose at time t policymakers select a combination of ad valorem tariffs, τ_v, and specific tariffs, f_v, for each good v. The ad valorem equivalent level of protection at time t is thus

$$AVE_{vt} \equiv \tau_v + \frac{f_v}{p_{vt}} \tag{1}$$

Clearly, given knowledge of contemporaneous price levels p_{vt}, policymakers can achieve identical levels of protection with various combinations of τ_v and f_v. The particular combination chosen for good v generates what we refer to as its "specific tariff share":

$$STS_{vt} \equiv \frac{f_v}{p_{vt}\tau_v + f_v} \tag{2}$$

STS_{vt} represents the proportion of duties on good v generated by specific tariffs. Within a policy regime, this will change as a function of price levels. To see the importance of the specific tariff share, consider the price of an imported foreign variety of good v relative to a domestic variety, equal to one plus the ad valorem equivalent: $1 + \tau_v + \frac{f_v}{p_{vt}}$. Differencing the natural logarithm of this measure and noting that within a policy regime τ_v and f_v are

fixed, the change in the relative price of a foreign variety between periods can be written:

$$\begin{aligned}\Delta \ln(1+\tau_v+\frac{f_v}{p_{vt}}) &= \ln\left(1-\frac{\Delta p_{vt}}{p_{vt+1}}\frac{f_v}{p_{vt}\tau_v+f_v}\frac{\tau_v+\frac{f_v}{p_{vt}}}{1+\tau_v+\frac{f_v}{p_{vt}}}\right) \\ &= \ln\left(1-\frac{\Delta p_{vt}}{p_{vt+1}}STS_{vt}\frac{AVE_{vt}}{1+AVE_{vt}}\right)\end{aligned} \tag{3}$$

In words, the log change in the relative price of a foreign variety is a function of the percent change in the price exclusive of tariffs, the good's specific tariff share, and its initial level of protection.[9] Intuitively, for a given initial AVE_{vt} level, price reductions will increase the ad valorem equivalent more when a larger share of the tariffs are nominally defined. This implies that once policymakers have chosen AVE_{vt} and STS_{vt}, the protection afforded good v in subsequent periods will depend on future price levels. More specifically, as price levels rise, the relative foreign price falls. We would thus expect to observe greater relative import growth among goods more reliant on specific tariffs in the presence of inflation, and lower growth in the presence of deflation.[10]

Of course, if policymakers choose initial tariff levels as a function of expected future outcomes, the measure defined in equation 3 will still be endogenous.[11] As a first step towards addressing this issue, we omit the final term from the measure in our baseline specifications and exploit only the quasi-random variation driven by specific tariff shares and price changes. Thus, unlike in work that relies on exogeneity in pre-existing tariff levels for identification (Goldberg and Pavcnik, 2005; Topalova and Khandelwal, 2011; Hakobyan and McLaren, 2016) it is only the initial structure of tariffs, rather than the level, that drives cross-sectional variation in our approach.

We define our primary covariate of interest, which we refer to as capturing changes in

[9] If the difference is taken across policy regimes τ_v and f_v may also change. We discuss this possibility and generalize this expression to settings spanning multiple regimes and estimate trade elasticities in Appendix C.

[10] Note that, for small changes in p_{vt}, Equation 2 can be approximated as $-\Delta \ln(p_{vt})STS_{vt}\frac{AVE_{vt}}{1+AVE_{vt}}$. We used this expression in a prior version of this article (https://conference.nber.org/conf_papers/f171327.pdf). We use the exact measure in our baseline exercises for comparability to the trade-elasticity literature, though the first-order approximation has a natural shift-share interpretation for labor market applications.

[11] For example, if tariffs lead to firm entry over time, current tariff rates would affect import growth and be correlated with residuals.

"realized protection", as

$$\Delta RP_{vt} = \ln\left(1 - \frac{\Delta p_t}{p_{t+1}} STS_{vt}\right) \tag{4}$$

Where STS_{vt} represents the start of period specific tariff share and $\frac{\Delta p_t}{p_{t+1}}$ is the percentage change in the aggregate price level between t and $t+1$, relative to $t+1$.[12] In words, ΔRP_{vt} is the percent change in tariff protection due to changing price levels.

Note that our measure still potentially includes both random and non-random sources of variation – price changes and pre-existing specific tariff shares, respectively. To the extent that industries with higher values of STS_{vt} experience differential import growth for reasons other than changes in realized protection, estimates of the effect of that protection on trade will still be biased. We take a number of steps to mitigate this concern. First, in all specifications we control separately for STS_{vt}. This implies that estimates of the effect ΔRP_{vt} will capture the differential response of high STS_{vt} industries relative to low STS_{vt} industries, in periods with price movements relative to periods of price stability. Second, we conduct two placebo analyses to demonstrate that high STS_{vt} industries do not systematically respond differently to price movements for reasons other than changes in realized protection. Finally, we show that our results hold when exploiting variation in specific tariff shares determined decades prior to the start of our primary sample. We return to each of these points in section 4 below. First, however, we detail the policy environment and the data sources used in constructing our measure of exposure.

3 Imports, Tariffs, and Prices in the U.S. from 1900-1940

From 1900 to 1940, US trade policy was characterized by five distinct regimes. The Dingley Tariff of 1897 was replaced by the Payne-Aldrich Tariff of 1909, followed by the Underwood-Simmons Tariff of 1913, the Fordney-McCumber Tariff of 1922, and ultimately the Smoot-Hawley Tariff of 1930.[13] We are, of course, not the first to study disaggregate

[12] Crucini (1994) explores variation in product-level tariff rates driven by three channels: legislative changes, changes in import prices in the presence of specific tariffs, and changes in product-level prices relative to the aggregate level. As our focus is on identifying the exogenous component of tariff changes, we focus on the second of these three channels.

[13] Due to its short duration, we omit the Emergency Tariff Act of 1921, which was replaced by September of the following year.

measures of specific tariffs in these settings (Crucini, 1994; Bond et al., 2013; Harrison, 2018; Crucini and Ziebarth, 2022), but in what follows we describe the most comprehensive database of tariff rates over this period.[14]

Our identification comes from changes in realized tariff protection driven by cross-industry variation in the prevalence of specific tariffs, as well as time series variation in price levels. To operationalize this idea, we construct a novel database of tariffs and trade flows in the US by digitizing annual editions of *Foreign Commerce and Navigation of the United States* (FCNUS) every five years between 1900 and 1930 and the *Statistical Abstract of the United States* (SAUS) every year between 1900 and 1940. From these we obtain information on the value of imports, duties collected, and the type of duty at the tariff-line level.[15] To allow for mapping to more aggregate employment data, we manually concord each product to its two-digit Standard International Trade Classification (SITC) Revision 2 counterpart.[16]

In the interest of space, we relegate a detailed discussion of industry-level imports in this era to Appendix D, and briefly outline the nature of import growth here. Especially early in this era, the US exhibited a comparative advantage in agricultural production, with high employment in domestic crops such as corn, cotton, oats, and wheat, and generally low imports in these goods. On the whole, imports were relatively diverse, with the most important industries including sugar-based products, intermediate materials such as textile fibers, rubber, and metal ores, as well as advanced manufactures of these products. As we will see, both overall tariff protection and reliance on specific tariffs in particular differed across all of these industries.

To provide a sense of the cross-policy variation present in our sample, we present

[14]Both Crucini (1994) and Bond et al. (2013) construct tariff line-level databases which for a subset of items that can be linked over time. Bond et al. (2013) construct such data from 1926-1934 to evaluate the role of Smoot-Hawley in propagating the Great Depression. Both Harrison (2018) and Crucini and Ziebarth (2022) rely on these data. Crucini (1994) studies the 1900-1940 period but restricts his analysis to 29 commodities for which he is able to construct a balanced panel. Because we are focused on an industry-level measure of exposure, we need not restrict our attention to a balanced panel of goods. As a result, we are able to focus on the entire set of imported goods and duties in each of these policy regimes.

[15]Products with compound duties – that is, featuring both ad valorem and specific duties – are classified as having specific duties when constructing STS_{vt}. An example of the pre-digitized *Foreign Commerce and Navigation of the US* data used to construct our primary measure can be found in Appendix B.1.

[16]Due to the absence of an official trade classification system until our 1925 sample, data can only be linked over time via product name. This is a time-intensive process that requires a consistent mapping for nearly 25,000 tariff line observations. Given our need to match tariffs and imports from the FCNUS to imports in the SAUS as well as UK import unit values in the Statistical Abstract for the United Kingdom, we aggregate the data to a consistent set of industries. These industry groups are slightly more aggregate than the two-digit SITC Revision 2 classification and are detailed in full in Appendix A.

aggregate policy-level AVE tariff rates and specific tariff shares in Table 1. The table also includes the number of unique tariff lines used to construct these measures, as well as the number of SITC industries to which they are concorded.

Table 1: Reliance on Specific Tariffs by Policy Regime

Year	Policy	AVE_t	STS_t	Industries	Products
		Panel A: 1900-1930			
1900	Dingley	0.27	0.67	33	2113
1905	Dingley	0.23	0.64	33	2352
1910	Payne-Aldrich	0.21	0.57	34	3780
1915	Underwood	0.12	0.38	34	2403
1920	Underwood	0.07	0.45	34	2584
1925	Fordney-McCumber	0.13	0.58	34	5071
1930	Smoot-Hawley	0.15	0.59	34	4601
		Panel B: 1848-1861			
1848	Walker	0.21	0.00	29	302
1861	Morrill	0.16	0.76	29	407

Notes: AVE_t and STS_t are value-weighted policy aggregates of equations 1 and 2. Industries are aggregations of two-digit Rev. 2 SITC industries, as detailed in Appendix A. Data digitized from the Foreign Commerce and Navigation of the United States – detailed sources can be found in Appendix tables B.1 for 1900-1940 and in table B.3 for 1848-1861.

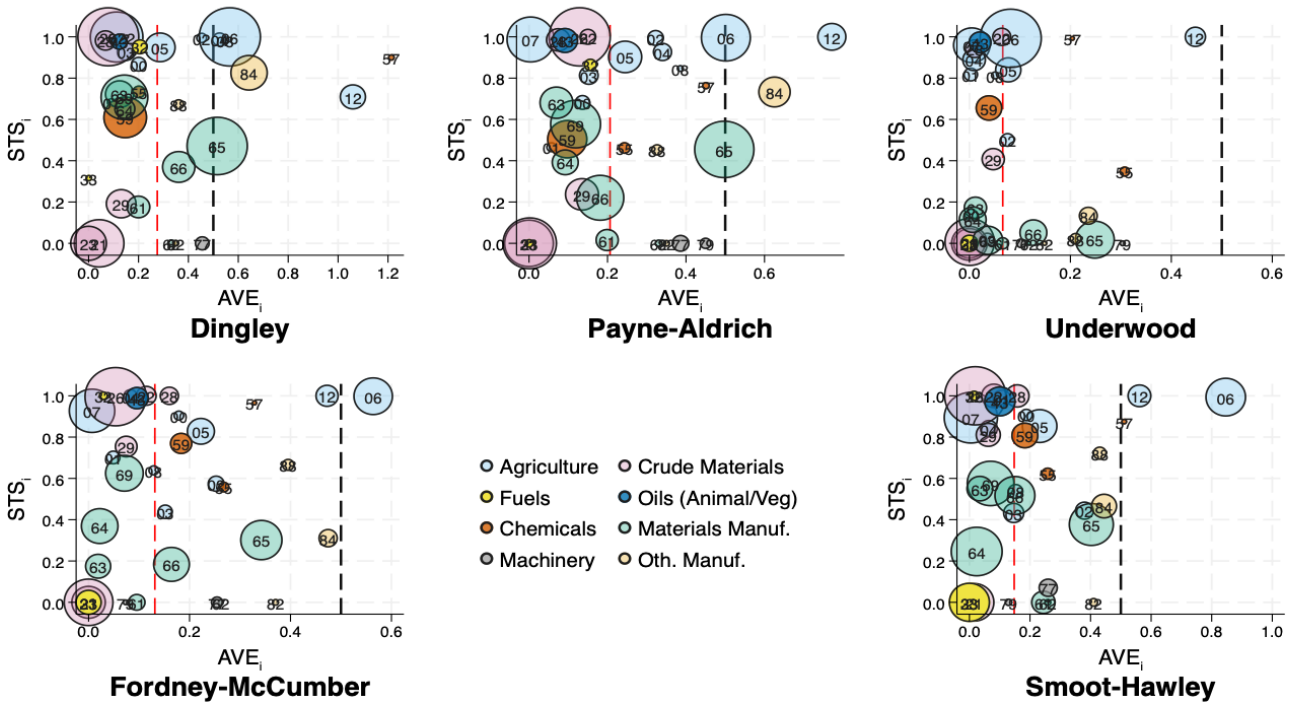
Focusing on Panel A, we see that the aggregate AVE tariff varies considerably during our sample. Beginning with the Dingley Tariff of 1897, the overall AVE rate sits at 27%, then declines somewhat to 21% with the implementation of the Payne-Aldrich Tariff of 1909 before plummeting to 7% by 1920 under the Underwood-Simmons Tariff. The Fordney-McCumber Tariff of 1922, followed by the Smoot-Hawley Tariff of 1930, increase the level back to 15%. Crucially for our identification strategy, specific tariffs feature prominently across all policy regimes. Save for the Underwood-Simmons Tariff era in 1915 and 1920, the share of tariff revenue generated by specific tariffs never falls below 50%. At their minimum in 1915, specific tariffs still generate 38% of all tariff revenue.

Specific tariffs were not always so widely used as a trade policy tool. For a 15-year period following the Walker Tariff of 1846, specific tariffs were wholly absent from the tariff code. They were re-introduced with the Morrill Tariff of 1861 and have been used in some capacity ever since. While we defer the details of this discussion until later, we use data from this era in placebo and robustness exercises.[17] As such, we also digitize tariff-line data on trade flows, tariffs, and tariff type from 1848 to 1861.[18] In Panel B of

[17]The Tariff of 1857 was enacted during this period as well, but it, too, featured no specific duties.
[18]These data are detailed in Appendix B.2.

the table we report AVE tariffs and specific tariff shares for both policies. In addition to re-introducing specific tariffs, the Morrill Tariff reduced the AVE tariff considerably.[19]

Figure 2: Industry level STS_i versus AVE_i by Policy Regime



Notes: Figure displays specific tariff share (STS_i) versus the ad valorem equivalent (AVE_i) for each trade policy regime. Industries are two-digit Rev. 2 SITC industries. Marker size is proportional to share of start of period imports. Black dashed vertical lines indicate a 50% ad valorem equivalent tariff while dashed red vertical lines indicate policy-level ad valorem equivalent tariff.

Identifying variation under our approach comes from both the cross-policy variation highlighted above and cross-industry differences in the prevalence of specific tariffs. To summarize both sources of variation more completely, in Figure 2 we display the relationship between the AVE, STS, and import share of each industry i for each policy regime between 1900 and 1930.[20] Each circle represents an SITC industry, with a size proportional to its share of imports. On the horizontal axis we plot AVE, while the vertical axis depicts the industry specific tariff share. We plot the overall level of tariff protection

[19] As noted by Flaherty (2001), the Morrill Tariff is often portrayed as representing a considerable increase in protection. Flaherty argues that this is in large part due to subsequent increases in tariffs used to raise revenue during the Civil War. Additionally, note that our calculation of the AVE tariff rate reflects the tariffs only on products with non-zero trade flows.

[20] In regimes during which we observe multiple years, our figures display the first year available. For example, 1900 and 1905 both fall under the Dingley Tariff, so we construct the figure based on the 1900 observations.

as a vertical red dashed line. The vertical black line indicates a 50% *AVE* to emphasize differences in the level of tariff protection across years.

Though it needn't be the case, industry AVE and STS are weakly positively correlated under each policy regime.[21] However, for any given level of protection there is substantial variation in the extent to which it is provided by specific tariffs. For instance, consider "Sugar, sugar preparations and honey" (SITC 06) relative to "Textile yarn, fabrics and made-up articles" (SITC 65) under the Payne-Aldrich Tariff. Both industries face an *AVE* rate of approximately 50%. However, the share of specific tariffs in sugar is twice that of textile products. In the face of rising prices during the subsequent decade, realized protection for sugar falls by more than that of textiles, despite the fact that they share the same initial average tariff level. This variation allows us to exploit changes in realized protection while controlling for initial tariffs.

Finally, we note that even as *AVE* tariff levels change across policies, industry specific tariff shares are highly persistent. One can see, for example, that products for human consumption (agricultural, food, and tobacco products, SITCs 00-12) tend to rely heavily on specific tariffs, while material manufactures tend to hover in the middle of the *STS* range.[22] Indeed, cross-policy correlation in industry specific tariff shares never falls below 0.5. This persistence extends beyond our primary sample – the industry specific tariff shares for the five regimes between 1900 and 1940 are highly correlated with those specified by the Morrill Tariff of 1861. This persistence suggests limited use of changes in tariff type as a means of addressing time-varying political economy concerns. We return to this persistence in section 4.1 below.

3.1 Prices, 1900-1940

Temporal variation in our measure of realized protection is driven by changes in the dollar price of US imports over time. Our identification strategy requires that the relationship between prices and imports operates through the effect on realized protection, and not, for example, through unobserved domestic demand shocks. Because US prices are more likely to reflect such shocks, we emphasize variation in foreign price levels. Similarly, as product-level prices are jointly determined by product-level demand and supply shocks that may be endogenously related to US import growth, as a baseline we exploit more

[21] The correlation ranges from 0.15 under the Underwood-Simmons Tariff to 0.24 under Payne-Aldrich.

[22] Because our sample spans the Prohibition era, we omit SITC 11, which is comprised primarily of alcohol.

aggregate price variation that is plausibly exogenous to product-level import values. As a proxy for aggregate foreign price levels, we use the United Kingdom aggregate consumer price index, which we obtain from the Jordà-Schularick-Taylor Macrohistory Database (Jordà et al., 2017).[23]

The drawback of aggregate price indices is of course that they do not allow us to explore differential industry-level price movements. Within-period variation in our measure of realized protection is thus solely driven by cross industry-differences in specific tariff shares. If industry price growth is non-uniform, our industry-level measure of realized protection will be measured with error. To address this shortcoming, as a robustness check we construct industry measures of price growth by digitizing annual UK product-level import values and quantities from 1900 to 1938.[24] As with our US sample, we manually concord these data to the two-digit SITC revision 2 classification, and construct industry log price growth from import unit values. The industries for which we are able to construct prices cover 98.5% of the value of US imports in our sample.[25] For industries in which we are unable to construct a price measure due to inadequate data, we utilize the aggregate UK CPI as our measure of industry price growth.

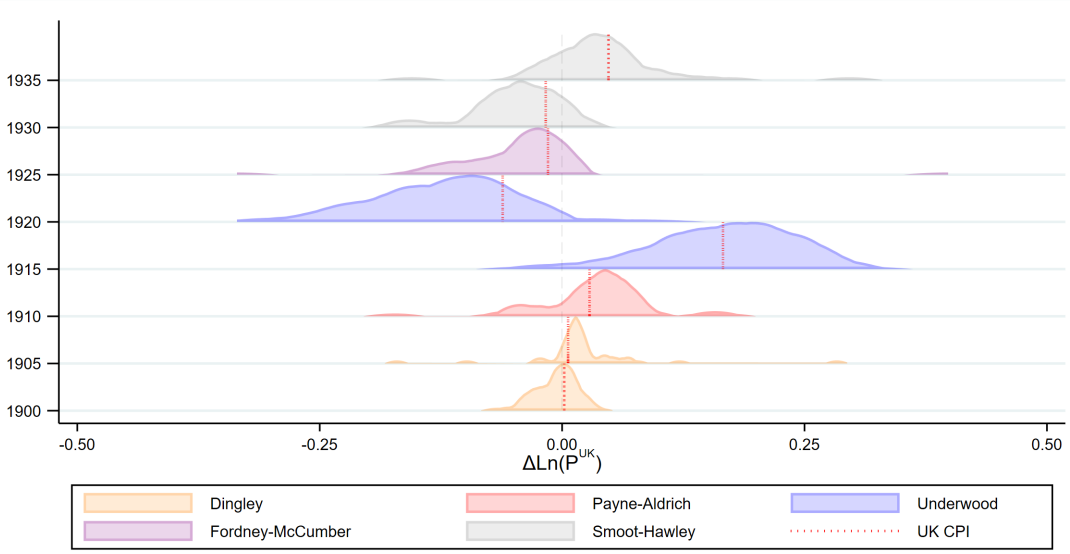
Figure 3 displays the evolution of prices throughout our sample. The figure depicts kernel density plots of annualized five-year changes in UK industry import unit values, with red vertical lines indicating log changes in the aggregate UK CPI. As is clear from the figure, prices rise for the first half of our sample – most sharply during WWI – then fall through 1935 before rising modestly in the final five years of our sample. As expected, industry-level unit values move with the UK price index, but exhibit substantial variation around the average.

[23] http://www.macrohistory.net/data/. As a further robustness exercise, in unreported results we also construct prices for a "rest of world" index based on prices in Australia, Canada, Denmark, France, Italy, Japan, the Netherlands, Norway, Spain, Sweden, Switzerland, and the United Kingdom, also from Jordà et al. (2017). We also conduct additional robustness exercises using the US CPI from the same database and import unit values from the Census volume *Historical Statistics of the United States.* Specifically, the data come from Series 225-258 in Chapter U at https://www.census.gov/library/publications/1975/compendia/hist_stats_colonial-1970.html. Our results are qualitatively unchanged by these measures.

[24] Data are taken from annual editions of the "Statistical Abstract for the United Kingdom", which is not available for 1940.

[25] As detailed in appendix section B.3, we construct these as import-weighted averages of product-level log price growth. As such, we must address changes in the set of products and units of reporting across years. This prevents us from constructing measures for SITC 57 and 82 for our entire sample, for SITCs 00, 32, 55, 77, and 88 for two cross sections, and for SITC 62 for three cross sections. These observations account for less than 1.5% of US imports during our sample.

Figure 3: UK Industry and Aggregate Price Changes, 1900-1940



Notes: Density of annualized five-year changes in log industry prices plotted by cross section. For each five-year period the red dashed line indicates the change in log UK CPI, calculated using data from Jordà et al. (2017). Industry price growth is calculated from digitized versions of the Statistical Abstract for the United Kingdom, as detailed in Appendix B.3. Disaggregate information on industry import levels and import growth during our sample may be found in Section D.

4 US Import Growth and Realized Protection

We now turn to the industry-level relationship between realized protection and imports. Table 2 reports industry-level summary statistics for each five-year period in our sample.[26] As shown in Figure 3 above, prices rise between 1900 and 1920. This, in turn, implies that realized protection falls during these years. For instance, price growth between 1915 and 1920 corresponds to a reduction in realized protection of roughly 5.7 log points annually. Simultaneously, industry imports increase by 8.1 log points annually. This pattern of rising prices, falling realized protection, and rising imports holds more broadly prior to 1920. Similarly, as prices decline and realized protection rises after 1920, industry import growth falls.[27] We display the relationship between annualized changes in industry realized protection and import growth visually in Figure 4.[28] The pattern in the figure is clear: within and across policy regimes, rising prices lead to falling protection, which is associated with increases in imports.

[26] Detailed information on industry imports and import growth can be found in figures D.1 and D.2 of Appendix D.

[27] An analogously constructed table of 10-year changes may be found in D.1.

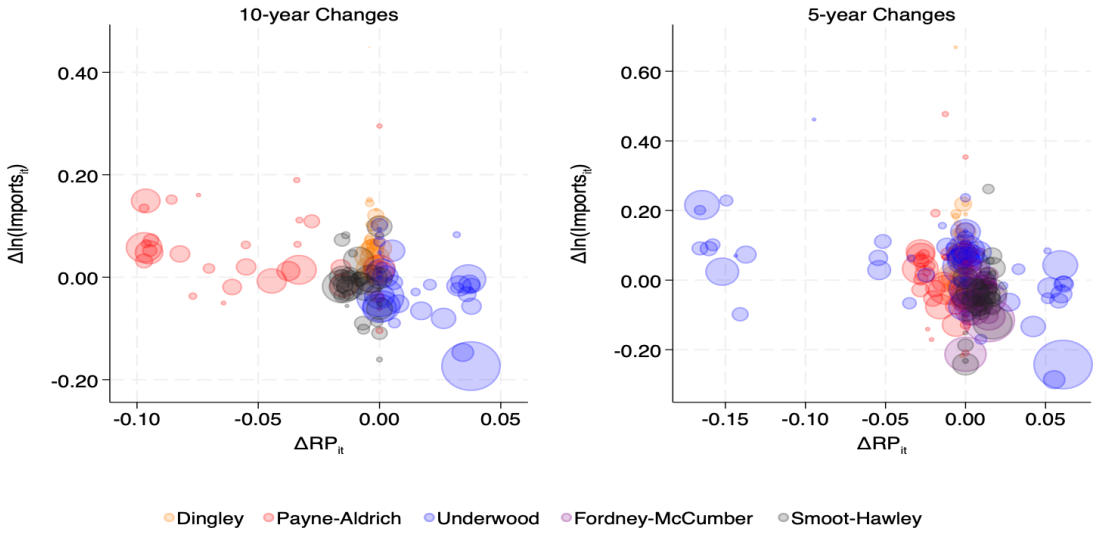
[28] Imports have been deflated by the US CPI.

Table 2: Summary of Import Growth, Tariffs, and Changing Protection

	1900	1905	1910	1915	1920	1925	1930	Total
$\Delta \ln(Imports_{it}^{US})$	0.045	0.100	0.010	0.081	-0.009	-0.022	-0.044	0.023
	(0.074)	(0.126)	(0.134)	(0.105)	(0.097)	(0.066)	(0.089)	(0.112)
$\Delta RP_{it} : UK_t^{CPI}$	-0.001	-0.004	-0.016	-0.057	0.024	0.008	0.010	-0.005
	(0.001)	(0.002)	(0.011)	(0.067)	(0.026)	(0.006)	(0.006)	(0.037)
$\Delta RP_{it} : UK_{it}^{UV}$	0.007	-0.010	-0.023	-0.054	0.057	0.025	0.031	0.005
	(0.017)	(0.039)	(0.035)	(0.073)	(0.079)	(0.057)	(0.039)	(0.063)
AVE_{it}	0.303	0.256	0.238	0.139	0.091	0.175	0.204	0.200
	(0.279)	(0.221)	(0.191)	(0.162)	(0.111)	(0.153)	(0.196)	(0.202)
STS_{it}	0.647	0.593	0.557	0.369	0.377	0.549	0.574	0.523
	(0.364)	(0.371)	(0.384)	(0.412)	(0.418)	(0.394)	(0.380)	(0.397)

Notes: Table presents summary statistics for five-year annualized log industry import growth and annualized changes in realized protection at the industry level. ΔRP_{it}, AVE_{it} and STS_{it} are changes in realized protection, start of period ad valorem equivalent protection and specific tariff shares respectively as defined in equations 4, 1, & 2. Variable means are reported above standard deviations which are reported in parentheses.

Figure 4: Annualized Industry Log Import Growth vs ΔRP_{it}.



Notes: Figure displays annualized log industry import growth against annualized changes in realized tariff protection as defined in equation 4. The left panel shows the 10-year variation in our sample which underlies our labor market analysis. The right panel shows the higher-frequency 5-year variation in our full sample.

More formally, we estimate our baseline regression, in which we relate annualized changes in import growth in industry i to annualized changes in industry realized protec-

tion:

$$\Delta \ln(Imports_{it}^{US}) = \beta_0 + \beta_1 \Delta RP_{it} + \Gamma X_{it} + \eta_t + \epsilon_{it} \tag{5}$$

with

$$\Delta RP_{it} \equiv \ln\left(1 - \frac{\Delta p_t}{p_{t+1}} STS_{it}\right).$$

As we are ultimately interested in an analysis of decadal labor market changes, our baseline regressions employ 10-year changes in log import growth. We present our findings in Table 3, sequentially introducing controls across columns.

Table 3: US Import Growth and ΔRP_{it}^{US}

	$\Delta \ln(Imports_{it}^{US})$		
	(1)	(2)	(3)
ΔRP_{it}	-0.776**	-0.823**	-0.812**
	(0.357)	(0.344)	(0.340)
$\ln(1 + AVE_{it})$		-0.088**	-0.088**
		(0.038)	(0.039)
STS_{it}			0.002
			(0.015)
Std. Coef.	-0.303	-0.321	-0.317
$Adj.R^2$	0.260	0.281	0.276
Obs.	135	135	135

Notes: Dependent variable is annualized 10-year log change in real US industry imports from 1900-1940 in stacked panels. ΔRP_{it}, is the percent change in tariff protection due to the inflationary erosion of specific tariffs and is defined in equation 4. Price growth used in constructing ΔRP_{it} is the UK CPI. All specifications include time fixed effects, and all regressions are unweighted. Standard errors are clustered at two-digit SITC level and reported in parentheses. *, **, and *** indicate p-values $< 0.1, 0.05, 0.01$ respectively.

In column 1 we include only ΔRP_{it} and decade fixed effects to absorb the impact of aggregate shocks to prices and imports. As expected, rising protection is associated with relative declines in import growth. The effect is statistically significant at conventional levels and economically meaningful: a one standard deviation increase in ΔRP_{it} is associated with a relative reduction in import growth of 0.3 standard deviations.[29] In column 2, we condition on the initial level of $\ln(1 + AVE_{it})$ to account for any differential growth among goods with different initial levels of protection. Higher levels of protec-

[29]The standard deviation of 10-year changes in realized protection is 0.032 using the UK CPI and 0.053 using industry prices, while a standard deviation increase in annualized 10-year log import growth is 0.08. Full summary statistics for 10-year changes in imports can be found in D.1.

tion are associated with lower subsequent import growth, but inclusion of this control has little impact on our primary explanatory variable, increasing the magnitude of the estimate only slightly. In column 3 we include the initial industry STS_{it} to account for the possibility that pre-existing differences in reliance on specific tariffs may be related to subsequent import growth. This, too, leaves our primary result largely unaltered.

We note that our findings can be compared to the more familiar import elasticity parameter used extensively in the literature. The estimates in column 3 of Table 3 imply that a 10% increase in realized protection would result in an 8.1% reduction in imports. At the in-sample mean AVE of 20%, this corresponds to an increase in tariffs of approximately 1.7%, implying an approximate import elasticity of 4.8, well within the range of conventional estimates.[30] In Appendix C we provide a more formal discussion of the assumptions required to estimate the import elasticity parameter using aggregate and industry-level price variation in the context of a simple CES structure and estimate the parameter at different levels of aggregation and over different time intervals. Across a wide array of specifications find elasticity estimates in the range of 3 to 6. We also show that estimation exploiting strictly intra-policy changes in tariffs (as implied by our measure) yields similar results to those which span regimes.

In Table 4, we explore the robustness of these results to a number of alternative specifications. In column 1, we repeat column 3 of Table 3 and introduce two-digit SITC industry fixed effects to allow for persistent industry-level trends. The point estimate of interest increases in magnitude slightly, to -0.89, and remains significant at the 5% level. In column 2 we weight observations by start-of-period import values. The magnitude of the effect increases to -1.21, suggesting a larger elasticity among industries accounting for a larger share of US imports. In column 3 we explore annualized five-year changes in imports and analogous measures of realized protection. Here, too, we observe a significant, negative, and economically meaningful effect. The estimate implies that a one standard deviation increase in realized protection leads to a 0.26 standard deviation decrease in import growth at the industry level. Notably, this effect is smaller in magnitude than the analogous 10-year change, consistent with the idea that import growth responds to price-driven changes in trade costs more over time (Boehm et al., 2023). Finally, in column 4 we construct realized protection exploiting industry-level price variation. Specifically, we

[30] This follows from the fact that, for small changes in prices, equation 3 is approximately $\Delta RP_{it} \times \frac{AVE_{it}}{1+AVE_{it}}$. At the mean AVE_{it} of 20%, a 10% increase in realized protection yields a $0.1 \times 0.1667 \approx 1.7\%$ increase in tariffs.

Table 4: US Import Growth and ΔRP_{it}^{US} – Robustness

	$\Delta \ln\left(Imports_{it}^{US}\right)$			
	(1)	(2)	(3)	(4)
ΔRP_{it}	-0.891**	-1.211**	-0.560**	-0.533**
	(0.333)	(0.503)	(0.245)	(0.217)
$\ln(1 + AVE_{it})$	0.015	-0.034	-0.085**	-0.095**
	(0.090)	(0.029)	(0.040)	(0.038)
STS_{it}	-0.003	-0.035	0.012	0.019
	(0.031)	(0.022)	(0.017)	(0.017)
Std. Coef.	-0.348	-0.597	-0.257	-0.340
$Adj.R^2$	0.254	0.527	0.200	0.295
Obs.	135	135	236	135
Period.	1900-40	1900-40	1900-35	1900-40
Price Growth	UK^{CPI}	UK^{CPI}	UK^{CPI}	UK_i^{UV}
Ind FE	Yes	No	No	No
Weighted	Equal	$Imports_{it_0}$	Equal	Equal
Δt	10-year	10-year	5-year	10-year

Notes: Dependent variable is annualized 10-year and 5-year log changes in real US industry imports from 1900-1940 in stacked panels. ΔRP_{it} is the change in realized protection, which is the percent change in US tariff protection due to the inflationary erosion of specific tariffs and is defined in equation 4. Each column makes one adjustment to column 3 of table 3 indicated in the footer. These modifications are industry fixed effects, value weighting, 5-year changes, and UK import unit values to construct changes in realized protection in columns 1-4 respectively. In column 4 we also include but suppress a control for industry-level log price growth. All specifications include time fixed effects. Standard errors are clustered at two-digit SITC level and reported in parentheses. *, **, and *** indicate p-values $< 0.1, 0.05, 0.01$ respectively.

use industry-level import unit values constructed from digitized UK import data. [31][32] As is clear from the column, our primary result still obtains: inflation erodes the protective capacity of specific tariffs and leads to relative increases in import growth.[33]

[31] These data are discussed in more detail in Appendix B.3.

[32] In column 4 we control for and suppress the coefficient for industry-log price growth. In appendix C.3 we also show that one could incorporate exchange-rate variation, though given the prominence of the gold standard in this era under which exchange rates were largely fixed, we leave this to an exercise in the appendix.

[33] We exploit aggregate prices in our baseline specifications due to the fact that industry-prices are more likely to be influenced by US import demand, and as such raise concerns about endogeneity. We discuss assumptions required to incorporate this variation more fully in Appendix C and provide estimates of trade elasticities incorporating this variation in Appendix Tables C.5 and C.6

4.1 Placebo Exercises: UK Imports and The Morrill Tariff of 1861

The preceding results document a differential response to price movements among industries reliant on specific tariffs. While we argue that this is driven by changes in realized protection, there are several potential alternative explanations. First, industries that rely on specific tariffs might be more responsive to price changes than those that rely on ad valorem tariffs for reasons unrelated to trade policy. If this is the case, as prices rise during economic expansions, imports would rise by more among goods reliant on specific tariffs. Similarly, as prices fell during contractions, imports would fall by more in such sectors. Such a pattern mimics the one we find here, though it is driven by cross-industry differences in cyclicality, rather than the response to trade costs. Second, if politicians are able to correctly forecast inflation, they might use this forecast when choosing tariff types in order to protect certain industries. If this is true, then our approach is subject to the same political economy concerns as studies using average tariff levels as a source of identification. We consider each of these possibilities in turn.

We begin by exploring analogous results to those described above in a separate market, namely the UK. As discussed in detail in de Bromhead et al. (2019), for much of this period British trade policy was generally liberal, with exceptions for revenue generation. Beginning in the late 1920s, tariffs rose sharply, with newly added tariffs disproportionately taking an ad valorem form. Given the differences in tariff codes between the two markets, UK imports are not subject to the same changes in realized import protection as US imports. However, to the extent that underlying product characteristics rather than specific tariffs themselves drive our results, we would expect to observe a similar relationship between prices and imports in the two markets as a function of *US* specific tariff shares. To address this possibility, we digitize UK imports from 1900 to 1938 and repeat the preceding analysis in that setting.[34] Specifically, we regress changes in UK industry log imports between 1900 and 1938 on changes in *US* realized tariff protection. As before, standard errors are clustered at the two-digit SITC industry level. The results of this exercise are presented in Table 5.

Columns 1 through 3 replicate our baseline results from the first three columns of Table 3, while columns 4-7 replicate columns 1-4 of Table 4.[35] The contrast in results

[34] Details of these data may be found in Appendix B.3

[35] Here, we employ the US CPI and US import unit values to construct changes in realized protection to avoid the same endogenous relationship between UK imports and prices that motivates the use UK

Table 5: Placebo Analysis of UK Import Growth and ΔRP_{it}^{US}

	$\Delta \ln(Imports_{it}^{UK})$						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
ΔRP_{it}^{US}	0.277	0.284	0.155	0.175	-0.077	0.070	0.057
	(0.338)	(0.334)	(0.333)	(0.362)	(0.368)	(0.244)	(0.212)
$\ln(1+AVE_{it}^{US})$		0.009	0.014	-0.048	-0.012	0.024	0.014
		(0.018)	(0.020)	(0.076)	(0.013)	(0.031)	(0.020)
STS_{it}^{US}			-0.017*	-0.030	0.011	-0.021	-0.019*
			(0.010)	(0.032)	(0.020)	(0.013)	(0.010)
Std. Coef.	0.089	0.091	0.050	0.056	-0.029	0.026	0.027
$Adj.R^2$	0.075	0.068	0.077	0.015	0.258	0.083	0.075
Obs.	120	120	120	120	120	211	120
Period.	1900-40	1900-40	1900-40	1900-40	1900-40	1900-35	1900-40
Price Growth	US^{CPI}	US^{CPI}	US^{CPI}	US^{CPI}	US^{CPI}	US^{CPI}	US^{UV}
Ind FE	No	No	No	Yes	No	No	No
Weighted	Equal	Equal	Equal	Equal	Value	Equal	Equal
Δt	10-year	10-year	10-year	10-year	10-year	5-year	10-year

Notes: Dependent variable is annualized 10-year and 5-year log changes in real UK industry imports from 1900-1940 in stacked panels. ΔRP_{it}^{US} is the US change in realized protection, which is the percent change in US tariff protection due to the inflationary erosion of specific tariffs and is defined in equation 4. Columns 1-3 replicate the analogous columns from Table 3 but replace the UK CPI with the US CPI, while columns 4-7 replicate the robustness specifications found in columns 1-5 of table 4. All specifications include time fixed effects. Standard errors are clustered at two-digit SITC level and reported in parentheses. *, **, and *** indicate p-values < 0.1, 0.05, 0.01 respectively.

across the two markets is stark. UK import growth is not related to changes in realized protection, measured using US specific tariff shares, in any specification. Indeed, the direction of the relationship is reversed in six of the seven specifications. That is, changes in US realized protection predict import growth in the US, but not the UK. This suggests that unobserved product-specific characteristics do not drive our results.[36]

As a second placebo, we turn our attention to an environment in which we do not need to rely on import data from a separate economy. Beginning with the Walker Tariff of 1846, the United States relied solely on ad valorem tariffs for a period of 15 years. In March of 1861, specific tariffs were re-introduced as a policy tool under the Morrill Tariff, after which they remained a prominent feature of US trade policy. If industries that rely

prices in our US import growth setting. We have also estimated these specifications utilizing UK CPI and industry unit values and still find no predictive power of changes in US realized protection on UK import growth. These results are available upon request.

[36] In appendix table D.2 we conduct an additional test to ensure that unobserved trends do not explain our results. Specifically, we show that our results are qualitatively similar when estimating our the effects of changes in realized protection separately among periods of inflation and deflation. Thus, for unobserved trends to be the driver of our results it would need to be the case that those these trends change direction coincidentally during periods of inflation versus deflation.

on specific tariffs respond differently to price changes for reasons other than changes in realized protection, this should be apparent in the years preceding the Morrill Tariff even though no specific tariffs were in place in these years.

To explore this possibility, we digitize product-level imports between 1848 and 1860 from annual editions of *Commerce and Navigation of the United States*. In 1861, we digitize imports and duties under the Morrill Tariff from the same source. As above, we concord these data to the two-digit SITC level and deflate them using the US CPI.[37] For each industry, we calculate the ad valorem equivalent and specific tariff share under the Morrill Tariff – that is, as of 1861. Using the UK wholesale producer price index to measure inflation, we calculate *pseudo* changes in realized protection between 1848 and 1860 from the yet-to-be-enacted Morrill Tariff.[38] We estimate the relationship between industry import growth and these pseudo changes in realized protection as follows:

$$\Delta \ln(Imports_{it}) = \beta_0 + \beta_1 \Delta RP_{it}^{Morrill} + \beta_2 \ln(1 + AVE_i^{Morrill}) + \beta_3 STS_i^{Morrill} + \eta_t + \epsilon_{it}$$
$$\text{with } \Delta RP_{it}^{Morrill} \equiv \ln\left(1 - \frac{\Delta p_t}{p_{t_1}} STS_i^{Morrill}\right). \quad (6)$$

β_1, our point estimate of interest, captures the differential import response to price movements among industries that will ultimately rely more heavily on specific tariffs, but do not during the period under study. If such industries respond differently to price shocks independent of the channel we propose above, we would expect the coefficient to be negative and significant.

Making full use of the 12-year sample, we estimate the model with one-, two-, three-, four-, and six-year changes in log industry imports and the analogous changes in realized protection. We report the results in Table 6. Standard errors are clustered at the two-digit SITC level and all variables are annualized to facilitate comparison with previous tables. Across all specifications, the point estimate of interest is never significantly negatively related to import growth. If anything, the relationship seems to exhibit the opposite pattern, though not robustly so.[39] That is, specific tariffs govern the response of trade

[37] Details on the import and tariff data from this period are documented in Appendix section B.2.

[38] UK CPI data from the Jordà-Schularick-Taylor database are not available during this period. We use the UK PPI as trade data are only available for fiscal years during this period, and inflation using the PPI can be constructed to match this. The PPI is available from Federal Reserve of St. Louis: https://fred.stlouisfed.org/series/WPPIUKQ.

[39] While insignificant, the point estimates in this table are substantially larger than those in our baseline specification, as are the standard errors. This is potentially due to the fact that mean annualized log industry import changes is nearly 10% during the Walker era and a much more modest 2% in our primary sample.

Table 6: Placebo Analysis of US Import Growth and $\Delta RP_{it}^{Morrill}$

	$\Delta \ln\left(Imports_{it}^{US}\right)$				
	(1)	(2)	(3)	(4)	(5)
$\Delta RP_{it}^{Morrill}$	0.872	2.319	0.913	6.170	-7.582
	(1.061)	(1.197)	(1.264)	(3.327)	(5.690)
$\ln(1+AVE_i^{Morrill})$	-0.311	-0.327	-0.311	-0.317	-0.268
	(0.189)	(0.186)	(0.187)	(0.191)	(0.187)
$STS_i^{Morrill}$	0.005	0.032	0.005	0.105	-0.159
	(0.056)	(0.061)	(0.055)	(0.072)	(0.136)
$Adj.R^2$	0.025	-0.000	-0.007	0.073	0.018
Obs.	352	175	116	87	57
Δt	1-year	2-year	3-year	4-year	6-year
Period	1848-60	1848-60	1848-60	1848-60	1848-60

Notes: Dependent variable is annualized log change in industry imports from 1848-1860 in stacked panels. $\Delta RP_{it}^{Morrill}$ is the *pseudo* change in realized protection induced by the yet to be enacted Morrill Tariff of 1861 – given by equation 6. Price growth used in constructing *Pseudo* ΔRP_{it} is the UK PPI. Columns differ in duration of changes and number of panels. All specifications include time fixed effects, and all regressions are unweighted. Standard errors are clustered at two-digit SITC level and reported in parentheses. *, **, and *** indicate p-values < 0.1, 0.05, 0.01 respectively.

flows after they are implemented, but not before.[40]

4.2 Persistence of Specific Tariffs

A further threat to identification is the possibility that changes in realized protection are themselves non-random. This would be possible if specific tariffs were determined jointly with an inflation forecast. That is, if politicians anticipate subsequent price movements and set specific tariffs in expectation of the implied effects on realized protection, our measure would be subject to the same concerns that complicate the use of ad valorem equivalent tariffs directly. For example, in the face of expected deflation, politically influential industries might lobby for higher levels of specific tariffs. Such a possibility requires that politicians frequently alter specific tariffs in the face of changing prices. Conditional on average tariff levels, politicians seeking to protect domestic industries should increase specific tariff shares when expecting deflation and decrease them when expecting inflation. We find no evidence of such behavior. In particular, in Table 7 we show that the correlation between specific tarif shares under the Morrill Tariff and those in our primary sample ranges from approximately 50 to 66%. That is, whether facing inflation or defla-

[40] We have also estimated this specification dropping changes spanning the Canadian-American Reciprocity Treaty of 1854, as well as omitting years following the financial crisis of 1857. Neither modification impacts this null result.

tion, industry reliance on specific tariffs between 1900 and 1930 is strongly predicted by tariff policy in 1861.[41]

Table 7: Cross-Policy Correlation in Industry Specific Tariff Shares

	Dingley	Payne-Aldrich	Underwood	Fordney-McCumber	Smoot-Hawley	Morrill
Dingley	1.000					
Payne-Aldrich	0.950	1.000				
Underwood	0.504	0.592	1.000			
Fordney-McCumber	0.795	0.824	0.664	1.000		
Smoot-Hawley	0.771	0.786	0.694	0.945	1.000	
Morrill	0.572	0.632	0.495	0.665	0.636	1.000

Notes: Table reports pairwise correlations of industry-level specific tariff shares across policies. Specific tariff shares are calculated as the share of duties among products with a specific tariff relative to total duties within an industry and reflect the first period in our data after a policy is implemented. Data are digitized from the Foreign Commerce and Navigation of the United States from 1900-1930 quinquennially to cover the primary five policy regimes, and in 1861 to obtain tariffs under the Morrill Tariff.

As a final attempt to address to potential endogeneity in realized protection, we construct an instrument for our primary sample exploiting the structure of protection under the Morrill Tariff. Specifically, we construct realized protection for each decade between 1900 and 1940 as in equation 4, but use specific tariff shares from 1861. We then examine the effect of changes in realized protection on imports in industry i as

$$\Delta \ln(Imports_{it}) = \beta_0 + \beta_1 \widehat{\Delta RP_{it}} + X_{it}\beta + \epsilon_{it}$$

where,

$$\Delta RP_{it} = \gamma_0 + \gamma_1 \Delta RP_{it}^{Morrill} + X_{it}\gamma + \nu_{it}. \tag{7}$$

Results are reported in Table 8. Consistent with Table 7, the first stage results in Panel B show that specific tariff shares under the Morrill Tariff of 1861 are strongly predictive of those implemented up to 70 years later.[42] Morevoer, the second stage of our IV regression highlights that this variation is sufficient to identify the effect of price-driven changes in AVE levels on US import growth: as in our primary specifications, changes in realized

[41] Additionally, in Appendix D.2 we evaluate the feasibility of price forecasting during our sample and show that an accurate forecast of future price growth was almost certainly beyond the means of early 20^{th} policymakers.

[42] The Montiel Olea and Pflueger (2013) robust weak instrument test with the appropriate small-sample correction is indicated below Panel B.

protection are strongly predictive of changes in imports. This further suggests that the effect of realized protection on import growth is unlikely to be driven by time-varying correlates of reliance on specific tariffs.[43]

Table 8: US Import Growth and Instrumented ΔRP_{it}

	$PanelA: \Delta \ln\left(Imports_{it}^{US}\right)$		
	(1)	(2)	(3)
$\Delta\widehat{RP_{it}}$	-1.253**	-1.266**	-1.451**
	(0.574)	(0.586)	(0.605)
$\ln(1+AVE_{it})$		-0.049	-0.050
		(0.036)	(0.037)
$STS_i^{Morrill}$			-0.015
			(0.011)
Standardized Coef.	-0.606	-0.612	-0.701
R^2	0.365	0.371	0.363
	Panel B: $1^{st} Stage\ \Delta RP_{it}$		
	(1)	(2)	(3)
$\Delta RP_{it}^{Morrill}$	0.575***	0.574***	0.571***
	(0.104)	(0.103)	(0.102)
MP Effective - F	30.77	30.8	31.43
$Adj.R^2$	0.752	0.751	0.749
Obs.	115	115	115

Notes: Dependent variable is annualized 10-year log change in real US industry imports from 1900-1940 in stacked panels. ΔRP_{it}, is the percent change in tariff protection due to the inflationary erosion of specific tariffs and is defined in equation 4. First stage instrument is the change in realized protection using the specific tariff share under the Morrill Tariff of 1861 defined in equation 8. All specifications include time fixed effects, and all regressions are unweighted. Standard errors are clustered at two-digit SITC level and reported in parentheses. *, **, and *** indicate p-values $< 0.1, 0.05, 0.01$ respectively. MP Effective - F is the first stage effective F-statistic with small-sample correction detailed in Montiel Olea and Pflueger (2013).

[43] We estimate import elasticities using Morrill-based specific tariff shares in Table C.3 of section C.

5 Import Growth, Structural Change, and Labor Market Outcomes

We now turn to the effects of trade on structural change in the US. The early 20^{th} century was a period of rapid industrialization in the US (Irwin, 2003), but causal evidence on the role of trade in explaining the transition into manufacturing is lacking. As our approach yields a consistent measure of import exposure across the entirety of this era, it allows us to shed light on the role of trade in structural change in this important period in the history of the American economy. In particular, we explore the effect of import growth on local labor market outcomes and the transition away from agriculture into manufacturing and services, using our measure of realized protection as an instrument.

We begin by aggregating industry-level exposure to the county level using data from the full count decennial Census (Ruggles et al., 2020). To facilitate a mapping between trade flows and employment data, we first concord the SITC industry classification described above to Census industries.[44] For each county c, we then calculate a weighted average of industry-level changes in log imports, using start-of-decade county-industry labor shares among men ages 18-65 as weights. Our county-level measure of import exposure is thus:

$$\Delta \ln(Imports_{ct}) = \sum_i \frac{L_{ict}}{L_{ct}} \Delta \ln(Imports_{it}) \tag{8}$$

Here, $\Delta \ln(Imports_{it})$ represents changes in log industry imports at the national level. This is weighted by $\frac{L_{ict}}{L_{ct}}$, the start-of-decade industry employment share in county c among tradable sectors, as in Kovak (2013).[45]

Similarly, we construct a county-level measure of changes in realized tariff protection, weighting industry realized protection by each industry's start-of-decade labor share

[44] Specifically, we map all counties to consistent geographic 1900 boundaries using crosswalks provided by Eckert et al. (2020). We then construct population weights based on the IND1950 variable in the IPUMS data. Due to the importance of agriculture in this era, we separate agricultural employment (IND1950 105) into crops and livestock using the county-level value of farm products and sales of domestic animals, taken from NHGIS (Manson et al., 2022). We further divide crops into corn, oats, wheat, cotton, and "other", using county acreage shares, also from NHGIS.

[45] As described in Borusyak et al. (2022), this corresponds to a "complete shares" setting. Focusing exclusively on the traded sector as we do here does not impose the assumption that the import shock is mean-zero, while including the non-tradable sector does. The latter case requires incorporating a control for the tradable share of the labor market interacted with time fixed effects. While this set of controls is not required for identification in our setting, we show that our results are robust to its inclusion.

within the county.[46] This yields our county-level measure of realized protection:

$$\Delta RP_{ct} = \sum_i \frac{L_{ict}}{L_{ct}} \ln(1 - \frac{\Delta p_t}{p_{t+1}} \times STS_{it}). \tag{9}$$

Figure 5 displays the geographic distribution of specific tariff shares, which drive the cross-sectional variation in exposure, at the county level in the first and last decades of our sample.[47] As is clear from the figure, the variation across industries described above begets variation across regions. The prevalence of specific tariffs in certain agriculture and food products as well as mining, and textiles, for instance, leads to reductions in protection for the Upper South, Great Plains, and Upper Midwest in the first half of our sample as prices rise. Cotton, however, is duty free at the beginning of our sample, implying very little exposure to price changes for much of the Deep South. Similarly, sharp declines in prices between 1920 and 1930 imply increased protection in much of the West and Appalachia, but not in the South.[48] By 1930, reliance on specific tariffs has expanded more broadly throughout the South and Gulf Coast, and we thus see a more mixed geographical distribution.

To evaluate the labor market consequences of import growth, we use linked Census data from Abramitzky et al. (2020). We follow men between the ages of 18 and 55 across Censuses for each decade between 1900 and 1940.[49] Under this approach, for individual j located in county c in Census t, we regress 10-year change changes in individual outcomes between Census t and $t+1$, $\Delta Outcome_{jct}$, against county-level changes in log imports between Census t and $t+1$, $\Delta \ln(Imports_{ct})$. We instrument for $\Delta \ln(Imports_{ct})$ with changes in county-level realized protection, ΔRP_{ct}. Our baseline outcomes include

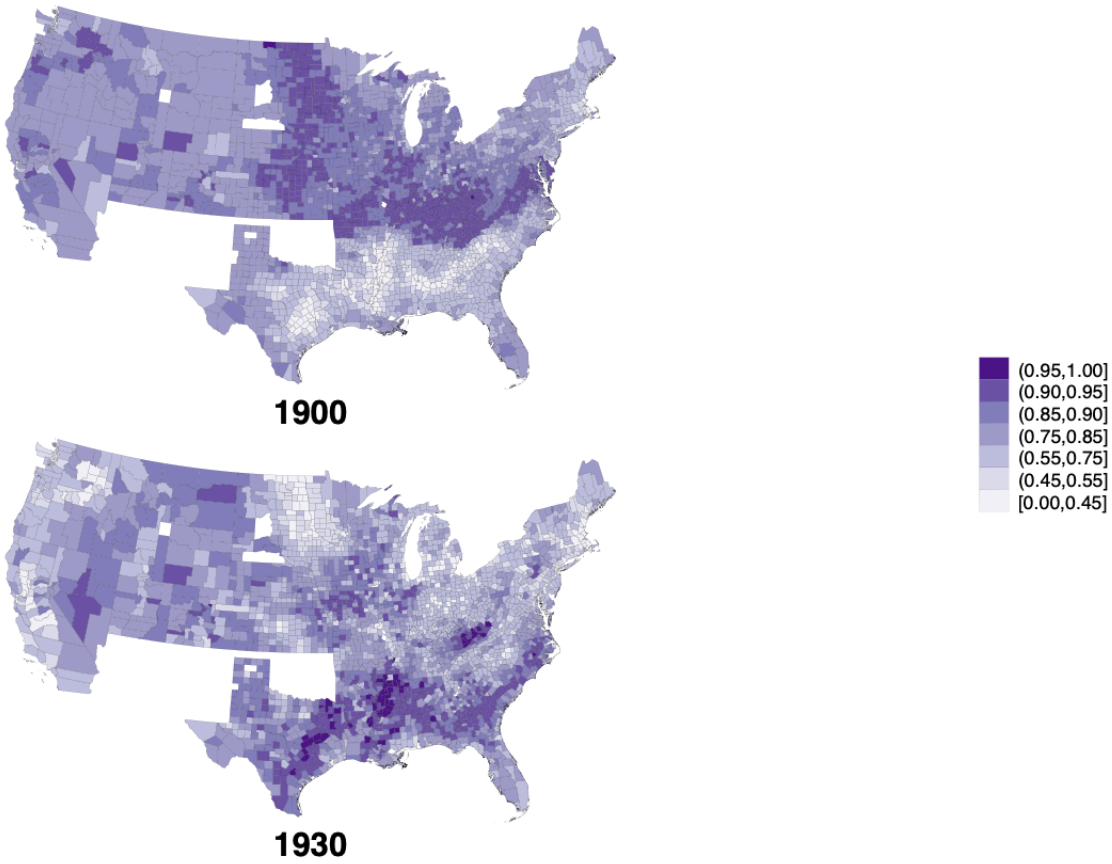
[46] As previously discussed, we believe that changes in realized protection driven by aggregate price-levels have the strongest claim to exogeneity in that they are least likely to be influenced by local US demand and productivity shocks (which would have a direct and confounding effect on local labor markets). As such we use changes in the aggregate UK CPI as our baseline. As with our industry-level analysis, our findings are robust to using other aggregate price series including a Rest of World price index, US import unit values, or the US CPI and are available upon request. However, as these aggregate series ignore industry-level heterogeneity in price movements throughout our sample, we replicate all of the subsequent analysis using UK industry-level unit values in Appendix E.4. This approach yields very similar results. We adopt the changes in realized protection driven by aggregate price series in the main text out of conservatism.

[47] Given the persistence in sectoral reliance on specific tariffs highlighted in Table 7, we show these two years to provide a sense of spatial variation. Maps for all years may be found in the Appendix.

[48] Due to the geographic similarity in the distribution of specific tariff shares in 1910 and 1920 to that of 1900, we have omitted those decades from our figure to improve legibility.

[49] Age is defined as of the start of the relevant decade, such that we observe men as old as 65 by the end of the decade.

Figure 5: Start-of-Decade County STS_{ct}



Notes: Maps depict start-of-decade county-level specific tariff shares for 1900 and 1930. Other decades available upon request. Omitted counties lack data on agricultural output required to construct this measure for agricultural sectors. County boundaries are mapped to consistent county boundaries over time following Eckert et al. (2020).

labor force participation, occupational income scores, cross-state migration, and industry switching. To shed light on long-run structural change, we also explore how the effects of trade differ for these outcomes throughout the age distribution.

Our primary regression is as follows:

$$\begin{aligned} Outcome_{jct+1} = \beta_0 + \beta_1 \Delta \ln(\widehat{Imports}_{ct}) + \beta_2 X_{jt} + \beta_3 X_{ct} \\ + \Sigma_t \beta X_{ct} \times I(Year_t) + \gamma_t + \epsilon_{ct} \end{aligned} \tag{10}$$

Here, γ_t is a decade fixed effect and X_{jt} and X_{ct} represent a set of start-of-decade controls for individual and county characteristics, respectively, that may otherwise contaminate our estimates. Given the non-random application of tariff protection, as a baseline we also control for start-of-period $\ln(1 + AVE_{ct})$ and STS_{ct}, representing county-specific

employment-weighted averages of industry-level $\ln(1+AVE_{it})$ and STS_{it}. All observations are weighted using linking probabilities following Abramitzky et al. (2020).[50] Standard errors are clustered at the county level.

Our county-level identification strategy attempts to isolate quasi-random variation in tariff protection – that is, we rely on exogeneity of "shifts" in realized protection, rather than in pre-existing labor shares. To the extent that changes in realized protection are correlated with unobserved confounding variables, our estimates may be biased. As such, we include a number of controls intended to capture heterogeneous spatial exposure to events of the era that may also be correlated with changes in realized protection.

We begin by constructing a number of county-level measures meant to capture both demographic and production-based drivers of labor market outcomes. To account for differential exposure to changes in the demand for education, as well as institutional changes in educational opportunities (Clay et al., 2021), we control for the share of the county that is literate. Given the heterogeneous evolution of wealth along racial lines (Derenoncourt et al., 2023) and the onset of the Great Migration (Boustan, 2016), we control for the county share of non-white workers. To capture potential heterogeneity in labor market responses among immigrants relative to native-born workers (Abramitzky et al., 2014; Abramitzky and Boustan, 2017) we calculate the foreign-born share of the population. To account for age-specific shocks such as the probability of enlistment during WWI, we calculate the share of the population under 35.[51] Finally, given the differential growth rates across urban and rural centers in our era (Eckert et al., 2023; Eckert and Peters, 2023) we account for the share of the county that is urban. To capture heterogeneity in county exposure to sector-specific shocks, we include several additional controls. To account for exposure to changes in traded activity unrelated to our tariff measure we construct the share of the labor market employed in the tradable sector. To account for shocks related to the rising prominence of US manufacturing and the simultaneous decline in agriculture, we control for the share of employment accounted for by manufacturing and agriculture, respectively.

It is also possible that county-level characteristics matter differentially for labor market outcomes over time. For example, the share of the population under 35 may affect labor market outcomes during the WWI era differently than in the prior decade. To explore

[50] Specifically, we employ the standard algorithm from Abramitzky et al. (2020) requiring exact name matches across Censuses.

[51] Requirements for the WWI draft in 1917 were initially restricted to individuals 30 and younger and later expanded to age 45 (Caprettini and Voth, 2023).

this, in Appendix section E.2 we examine correlates of changes in realized protection at the county level along the lines suggested by Borusyak et al. (2022). We sequentially test whether the interaction of each individual control interacted with decade fixed effects is jointly related to changes in realized protection. We report results in Appendix Table E.4. Here we find that only the agricultural employment share and the share of the population under 35 are significantly related to our measure at the 95% level when interacted with decade fixed effects. As such, in addition to the baseline controls described above we additionally control for the share of employment in the agricultural sector and the share of the population under 35, each interacted with decade fixed effects.[52]

Finally, at the individual level we control for age, literacy, nativity, race, whether the individual is Hispanic, and their urban status. We also control for the individual's start-of-period labor force status by including indicator variables for the following initial sector of employment: agriculture, mining, construction, manufacturing, services, and other. Summary statistics for our key covariates and outcomes can be found in Table E.1.

5.1 Import Growth and Labor Market Results

We begin by exploring labor force attachment as an outcome in column 1 of Table 9. In particular, we specify a linear probability model in which the outcome is an indicator variable equal to one if the individual is not in the labor force at the end of the decade.[53] The point estimate in the column is positive and significant, with a magnitude that implies that an increase in import growth of one standard deviation (approximately 0.66 log points) reduces the probability of labor force participation by approximately 0.9 percentage points.[54] The mean end-of-decade share of our sample not in the labor force is

[52] After conditioning on decade fixed effects and start-of period tariffs, we find that only the urban share of county population and the tradable share of employment are correlated with realized protection in univaraite balance tests. When tested jointly, only agricultural employment shares remain a significant predictor of changes in realized protection. We report these for completeness, but take a conservative approach and include the full set of controls discussed above. Qualitative results are not dependent on this choice.

[53] The definition of labor force participation in the IPUMS data changes throughout our sample and labor force status not available at all as an outcome in 1900. As such, we define labor force participation similarly to the way it is defined in the 1910-1930 data. Namely, we define being in the labor force as "reporting any gainful occupation" – this corresponds to values below 980 of the variable OCC1950 in the IPUMS data. See https://usa.ipums.org/usa-action/variables/LABFORCE#comparability_section.

[54] As with all reduced form studies, this study is subject to the missing intercept problem, and all results should be interpreted as relative effects.

approximately 3.4%, so this is a sizable effect.[55]

Table 9: Import Growth and Individual Labor Market Outcomes

	(1) No-Employment$_{j,t+1}$	(2) $\Delta \ln(Income_{j,t})$	(3) $Migrate_{j,t+1}$	(4) Switch Industry$_{j,t+1}$
$\Delta \ln(Imports_{ct})$	0.014***	-0.029***	0.027	-0.015**
	(0.003)	(0.011)	(0.017)	(0.006)
$\ln(1 + AVE_{ct})$	0.036**	0.037	-0.600***	-0.152***
	(0.014)	(0.103)	(0.193)	(0.053)
STS_{ct}	0.009**	0.016	0.128***	0.118***
	(0.004)	(0.015)	(0.044)	(0.015)
Dep. μ	0.034	0.071	0.282	0.650
Std. Coeff.	0.069	-0.039	0.039	-0.021
1^{st} Stage $\hat{\beta}$	-1.314	-1.314	-1.314	-1.314
1^{st} stage-F	277.661	277.661	277.661	277.661
Obs.	29,792,145	25,390,582	29,792,145	27,001,711
Adj. R^2	0.017	0.121	0.033	0.209

Notes: Regressions of instrumented county-level import growth on longitudinal individual level outcomes based on linked data following Abramitzky et al. (2020) from 1900-1910, 1910-1920, 1920-1930, and 1930-1940. Tables report means of the dependent variable and standardized coefficients (the number of standard deviations change in the dependent variable implied by a one standard deviation increase in import growth) in the footer of each column of each table. Dependent variable in column 1 is whether the individual is in the labor force at the end of the decade. Column 2 outcome is the decadal change in log occupational income score. Column 3 outcome is whether an individual moved to another state during the decade. Column 4 indicates whether an individual switched industries. Import data come from *Statistical Abstract of the United States* and *Foreign Commerce and Navigation of the United States* and authors' calculations. Population data from IPUMS (Ruggles et al., 2020). Individual controls, start of period county-controls, and decade-specific trends for agricultural employment share and under-35 population share are included but suppressed for space. Import growth is instrumented by ΔRP_{ct} as in equation 9. Standard errors are clustered at county level and reported in parentheses. *, **, and *** indicate p-values $< 0.1, 0.05, 0.01$ respectively.

Leaving work entirely is, of course, only one potential response to import competition. Indeed, given the lack of a broad social safety net prior to the onset of the Great Depression, this may not be the primary margin of adjustment during our sample. In column 2 of the table, we explore whether import growth additionally affects growth in income levels among those who remain in the labor force. As the Census does not include income until 1940, we have no direct measure of income for the majority of our sample. However, IPUMS does report occupational income scores, which measure the median income within an occupation. We are thus able to examine whether individuals in counties with higher relative growth in imports disproportionately shift into lower-paying occupations.[56] Col-

[55] Means of the dependent variable and standardized coefficients (the number of standard deviations change in the dependent variable implied by a one standard deviation increase in import growth) are reported in the footer of each column the table.

[56] Note that the occupational income score is defined based on the 1950 Census, and income scores vary across occupations, but not locations or demographic groups.

umn 2 regresses changes in individual log occupational income scores against the same set of covariates as in column 1. Consistent with a general decline in labor market opportunities, import growth corresponds to an average shift towards lower-paying occupations: a one standard deviation increase in import growth maps to a 0.02 log point reduction in log occupational income growth. This is a reduction of approximately 0.04 standard deviations in the observed decadal log income growth during our sample or approximately 30% of the mean.

In column 3, we explore the nature of this adjustment further by examining the effect of import growth on the probability of migrating to another state. We find that a one standard deviation increase in import exposure corresponds to a statistically insignificant 1.7% increase in the probability of migration – roughly 6.4% of the sample mean. In column 4, we explore the effect of import competition on the likelihood of changing industries conditional on being in the labor force at both the beginning and the end of the decade. The column suggests a role for reduced cross-industry mobility in explaining the declining labor market outcomes in columns 1 and 2. Specifically, a one standard deviation increase in import growth corresponds to a 1% reduction in the probability that an individual changes industries throughout the decade. Taken as a whole, these results suggest that trade may have influenced labor market outcomes on a variety of important margins, including participation in the labor force, income growth, and industrial "lock-in".

In Appendix E, we explore the robustness of and heterogeneity in these findings along a number of dimensions. First, we discuss the additional identification assumptions required to incorporate industry-level price variation in our instrument and show that doing so yields qualitatively similar results, albeit with a stronger role for migration and less evidence of industrial "lock-in", especially among the young. Second, we explore heterogeneity among groups divided by race or nativity and find that Black, White, and foreign-born individuals are each impacted by import competition, but along different margins. We explore a range of alternative specification choices, including unweighted regressions, additional flexible-trend specifications, and alternative measures for our instrument and show that our results are robust to these changes. Finally, we conduct our analysis on county-level aggregates rather than on linked individuals and again find quantitatively important effects on income and labor force participation.

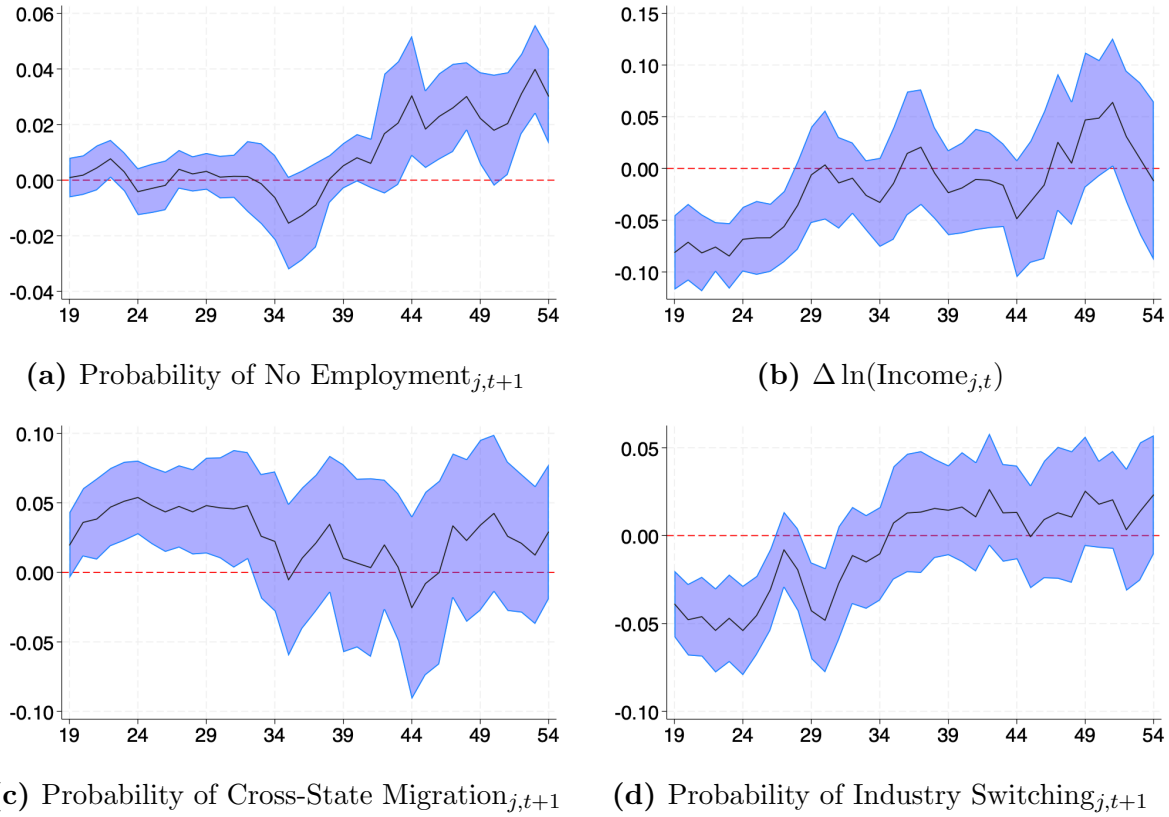
5.2 Effects Throughout the Age Distribution

Our focus is on structural change in response to import growth over a period of decades. Such processes, however, depend not only on what is affected but who is affected. Specifically, the long-run implications of the labor market responses documented above depend on where in the age distribution they are most pronounced. The size of our sample affords us the statistical power to explore heterogeneous effects across age groups in great detail. As such, we repeat the specification from Table 9 separately for rolling three-year age intervals between 18 and 55. That is, we run separate regressions for cohorts of individuals age 18-20, 19-21, and so on. These outcomes then measure the effect of import growth on changes in workers turning 28 and 65 by the end of the decade. Note that, as we exploit variation in tariff rates across multiple decades, we are able to control for time-specific shocks that might affect individuals of a given age cohort at a point in time, such as WWI or the Great Depression – such shocks will only hit one cohort of 18 year-olds, for example, and thus cannot drive our age-based results systematically. Figure 6 plots the point estimates and 95% confidence intervals for each of the outcomes in Table 9, where the age reported on the horizontal axis is the midpoint of the relevant age interval.[57]

Several patterns stand out in the figure. First, the effect of import growth on labor force attachment is driven entirely by those age 40 and older. This effect increases as workers age, suggesting that in the face of import competition, older workers are increasingly likely to leave the labor force rather than seek other employment. The effect of imports on other margins, conversely, is driven exclusively by younger workers. Younger workers see dramatically larger effects on income growth, which peak at age 19 and disappear by age 30. Younger individuals are also more likely to remain in their initial industry. This suggests that workers with less experience may be "locked-in" to lower-paying occupations and industries than those with more years in the labor market. This is suggestive of work on labor market scarring. In a survey of this literature, von Wachter (2020) notes that entering job markets during recessions corresponds to a 10-15% reduction in earnings. We find results of a similar magnitude: a one standard deviation increase in import growth leads to approximately 5.2% lower income growth for a 19 year-old by the time they reach 29. Finally, given both the reduction in industrial mobility and income growth, it is perhaps not surprising that those under 30 are significantly more likely to move in response to a local import growth.

[57] The analogous figure incorporating industry-level price variation in our instrument may be found in Appendix figure E.4.

Figure 6: The Effect of Import Growth on Individual Outcomes by Age



(a) Probability of No Employment$_{j,t+1}$ **(b)** $\Delta \ln(\text{Income}_{j,t})$

(c) Probability of Cross-State Migration$_{j,t+1}$ **(d)** Probability of Industry Switching$_{j,t+1}$

Notes: Figure displays the effect of import growth on decadal changes in individual outcomes by age cohort. Regressions are run separately for ages 18-20, 19-21, 20-22, etc. The coefficient for instrumented county-level import growth is displayed with a 95% confidence interval. Data are constructed based on linking procedures following Abramitzky et al. (2020). All specifications include individual- and county-controls as well as decade dummy variables. Import data come from *Statistical Abstract of the United States* and *Foreign Commerce and Navigation of the United States* and authors' calculations. Population data from IPUMS (Ruggles et al., 2020). Controls are measured at start of decade. Import growth is instrumented by ΔRP_{ct} as in equation 9. Standard errors are clustered at two-digit SITC level and reported in parentheses. *, **, and *** indicate p-values <0.1, 0.05, 0.01 respectively.

Taken as a whole, the effects of trade on structural change operate differentially throughout the age distribution, as younger workers exposed to import shocks see persistently lower income growth and move between locations as a result. This response matters not only for the impacted workers, but also potentially for the labor markets they leave behind.

5.3 Sectoral Transitions

The finding that imports produce relative reductions in both income and the probability of changing industries suggests a reduction in upward mobility as a result of import competition throughout our sample. We explore this possibility more fully by analyzing

the effect of import growth on the probability of transitioning between sectors. The first decades of the 20^{th} century US involved the expansion of the manufacturing and service sectors and the transition away from agriculture for broad swathes of the population (Michaels et al., 2012; Eckert and Peters, 2022; Fiszbein, 2022). Our measure combined with linked Census data allows us to explore the role of trade in this process in an entirely novel way.

Specifically, we group all individuals in our sample into one the following mutually exclusive categories based on their start-of-decade labor force status: employed in agriculture, employed in mining, employed in construction, employed in manufacturing, employed in services, employed in non-classified occupations, or not working. For each group, we run seven separate specifications in which the outcome is a dummy variable equal to one if an individual ends the decade in a given category. Covariates, weighting, and clustering are all as in Table 9. We report the results from these specifications in Figure 7.[58] Each row in the figure corresponds to the labor force status at the start of the decade, while each column corresponds to the accompanying labor force status at the end of the decade. Sectors are ordered from lowest average occupational income score on the leftmost column to highest on the rightmost column. Blue colors represent more positive effects of trade conditional on starting in a particular sector, while red represents more negative effects. The point estimate and standard error for instrumented import growth is reported for each possible transition.[59]

Several striking patterns emerge from the figure. First, the diagonal, which corresponds to the effect of imports on the probability of maintaining one's initial labor force status, is broadly consistent with our occupational lock-in finding above. Those out of the labor force or in agriculture are disproportionately likely to remain in their initial category in the face of rising import growth. We see a similar effect in mining, though it is not statistically significant at conventional levels. Second, workers in agriculture and mining – the lowest income sectors – are disproportionately likely to leave the labor force in response to trade shocks and are less likely to move to higher-paying industries. By contrast, workers who begin in manufacturing and services – the highest-paying sectors – have a reduced probability of moving down the industry ladder and see a modest increase in the chance of transitioning into or remaining in the service sector. Finally, while the effect is not always precisely estimated, there is a reduction in the probability

[58] We omit the "other" employment category for space and due to a lack of interpretability. This omission implies that rows in the figure do not necessarily sum to 0.

[59] The full set of coefficients is reported in Appendix Table E.7.

Figure 7: The Effect of Import Growth on the Probability of Sectoral Transitions



Notes: Figure displays the coefficient on instrumented import growth from separate regressions in which the outcome is an indicator variable equal to one if an individual ended the decade in a given sector – indicated by columns – conditional on having started the decade in a particular sector – indicated by rows. The category "other" is omitted from both rows and columns. NILF corresponds to the no-work category analyzed above. Cells have been color-coded such that dark red indicates the least likely outcome for a given row, while dark blue indicates the most likely. Outcomes are obtained based on linked data following Abramitzky et al. (2020). All specifications include individual and county controls as well as decade dummy variables. Import data come from *Statistical Abstract of the United States* and *Foreign Commerce and Navigation of the United States* and authors' calculations. Population data come from IPUMS (Ruggles et al., 2020). Controls are measured at start of decade. Import growth is instrumented by ΔRP_{ct} as in equation 9. Standard errors are clustered at two-digit SITC level and reported in parentheses. *, **, and *** indicate p-values <0.1, 0.05, 0.01 respectively. Full results reported in Table E.7.

of entering the manufacturing sector regardless of initial sector. Taken together, these results suggest that import growth limits upward mobility among those individuals most exposed to it – workers at the bottom end of the income distribution are more likely to stay in low-income sectors and are less likely to enter high-income ones. Those beginning in high-income sectors are more likely to remain there.[60]

Overall, these findings suggest an important role for trade policy in shaping the evolution of the US economy in the first half of the 20^{th} century. Import growth led to relative

[60] As with the other tables in this section, the analogous figure employing industry-level price changes in the construction of our instrument (and as a control) may be found in Appendix figure E.5.

reductions in manufacturing growth in favor of agricultural or service employment, with the largest effects being borne by those new to the labor market. This suggests the possibility of longer-run effects that we leave to future work.

6 Conclusion

This paper develops a novel approach to quantifying the effects of changes in tariff protection on imports and labor market outcomes to study the effects of tariff policy on trade and structural change in the US between 1900 and 1940. To our knowledge this is the first article to provide economy-wide evidence of the role that tariff policy and trade played in the transition of the US economy from an agricultural economy into a manufacturing and service based economy. By interacting price changes with cross-industry variation in the prevalence of specific tariffs, we construct a measure of exposure at the industry and county level that varies over time even in the absence of changes to policy. The measure predicts import growth at both the industry and county levels, as well as county-level labor market outcomes. Relying on linked individual-level Census data, we highlight novel channels through which trade shaped the US economy in this era. Most notably, import growth impeded the transition from agriculture into the expanding manufacturing sector. The effects were borne most heavily by workers outside of prime earnings years, particularly the young.

We are currently pursuing several extensions of this work, including assessing the effect of trade exposure on Congressional voting on trade bills in the early 20^{th} century (Greenland et al., 2021), a structural framework for incorporating both statutory and inflationary changes in tariffs during the 1970s and 1980s (Greenland et al., 2025), and an assessment of the intergenerational effects of trade shocks (Greenland et al., 2024). This is a small set of the potential applications for this approach. Just as the inflationary relationship between price shocks and nominal tariffs is exploitable well beyond the 1940s in the US, economies around the world continue to rely on specific tariffs to varying extents, suggesting the possibility of a similar approach in a wider range of countries. Further, the period explored in this paper provides a particularly rich policy environment in which to investigate the relationship between trade and a variety of government activities. The ability of governments to ameliorate the negative consequences of trade is of first-order importance for trade economists. Policy shifts in this period on matters of unionization, voting rights, educational standards, and the social safety net provide the

sort of empirical variation that economists require to explore this important topic. The method proposed here thus provides an opportunity to explore not merely trade shocks, but also the accompanying effects of a rich set of coincident policy interventions.

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Appendices

Appendix Table of Contents

This appendix provides additional information about our primary analysis and is broken into five sections.

1. Appendix A details industry definitions and aggregation.
2. Appendix B describes data sources and outlines the mapping between the raw data and industry-level variables.

   [B.1] US tariff and import data sources from 1900-1940.

   [B.2] US tariff and import data sources from 1848-1861.

   [B.3] UK import data and industry price growth construction, 1900-1938.
3. Appendix C provides an additional application in which we show that our identification strategy can be used to estimate import elasticities.

   [Table C.2 & Table C.3] Tables based on exclusively intra-period changes in tariffs.

   [Table C.4] Tables spanning tariff regimes.

   [Table C.5 & Table C.6] Tables based on industry-price and exchange rate variation.
4. Appendix D we provide additional information regarding the SITC industry-level analysis.

   [Figure D.1 & Figure D.2] Characterization of import growth during our sample

   [Table D.1] and summary statistics during our sample

   [Figure D.3 & Table D.2] Subsample and sub-period analysis
5. Appendix E we provide additional information regarding our labor market analysis

   [E.1] provides summary statistics, maps, and densities of import growth

   [E.2] implements balance tests as outlined in Borusyak et al. (2022).

   [E.3] Provides additional robustness tests and detailed estimates from figures

   [E.4] Incorporates industry-level price shocks in our IV, ΔRP_{ct}

   [E.5.] County-level analysis with Borusyak et al. (2022) standard error corrections.

A Industry Classification

The majority of our sample pre-dates a formal statistical classification, with products identified solely by their names. To ensure a consistent mapping across all four of our databases (US tariffs 1900-1930, US imports 1900-1940, UK imports 1900-1938, and US imports 1848-1861) we concord all tariff and import lines to a consistent set of industries based on the two-digit SITC revision 2 classification, which allows us to cover over 95% of all US import value during this period. Due to differences in the level of aggregation provided in the various data sources, we aggregate SITC industries slightly. This process results in 34 two-digit industries. Table A.1 presents the native two-digit SITC code as well as the mapping to our more aggregate industry definitions. Immediately following this table we provide a detailed explanation for any modifications to the original SITC industries. Column 1 reports the original two-digit code. Column 2 provides the two-digit description. Column 3 indicates our industry assignment of these codes, and column 4 provides a description of the resulting industry group.

Table A.1: Aggregation of SITC-2 Industries

SITC-2	SITC Revision 2 2-digit Description	Industry	Short Description
00	Live animals chiefly for food	00	Animals
94	Animals, live, nes, (including zoo animals, pets, insects, etc)	00	Animals
01	Meat and preparations	01	No Change
02	Dairy products and birds' eggs	02	No Change
03	Fish, crustacean and mollusks, and preparations thereof	03	No Change
04	Cereals and cereal preparations	04	No Change
05	Vegetables and fruit	05	No Change
06	Sugar, sugar preparations and honey	06	No Change
07	Coffee, tea, cocoa, spices, and manufactures thereof	07	No Change
08	Feeding stuff for animals (not including unmilled cereals)	08	No Change
09	Miscellaneous edible products and preparations	43*	Split
11	Beverages	†	** Dropped (Prohibition)
12	Tobacco and tobacco manufactures	12	No Change
21	Hides, skins and furskins, raw	21	No Change
22	Oil seeds and oleaginous fruit	22	No Change
23	Crude rubber (including synthetic and reclaimed)	23	No Change
26	Textile fibers (not wool tops) and their wastes (not in yarn)	26	No Change
28	Metalliferous ores and metal scrap	28	No Change
29	Crude animal and vegetable materials, nes	29	No Change
32	Coal, coke and briquettes	32	No Change
33	Petroleum, petroleum products and related materials	33	No Change
34	Gas, natural and manufactured	†	** Dropped (Not observed)
35	Electric current	35	Electric current
41	Animal oils and fats	43	Natural Oils
42	Fixed vegetable oils and fats	43	Natural Oils
43	Animal and vegetable oils and fats, processed, and waxes	43	Natural Oils
51	Organic chemicals	59	Chemicals a.m.o.
52	Inorganic chemicals	59	Chemicals a.m.o.
53	Dyeing, tanning and coloring materials	59	Chemicals a.m.o.
54	Medicinal and pharmaceutical products	59	Chemicals a.m.o.
58	Artificial resins and plastic materials, and cellulose esters etc	59	Chemicals a.m.o.
59	Chemical materials and products, nes	59	Chemicals a.m.o.
55	Oils and perfume materials; toilet and cleansing preparations	55	Chemicals a.m.o.
57	Explosives and pyrotechnic products	57	No Change
61	Leather, leather manufactures, nes, and dressed furskins	61	No Change
62	Rubber manufactures, nes	62	No Change
24	Cork and wood	63	Cork, Wood, a.m.o.
63	Cork and wood, cork manufactures	63	Cork, Wood, a.m.o.
25	Pulp and waste paper	64	Pulp, Paper, a.m.o.
64	Paper, paperboard, and articles of pulp, of paper or of paperboard	64	Pulp, Paper, a.m.o.
65	Textile yarn, fabrics, made-up articles, nes, and related products	65	No Change
27	Crude fertilizer and crude minerals	66	Non-metallic minerals, fertilizers, a.m.o.
56	Fertilizers, manufactured	66	Non-metallic minerals, fertilizers, a.m.o.
66	Non-metallic mineral manufactures, nes	66	Non-metallic minerals, fertilizers, a.m.o.
67	Iron and steel	69	Metals a.m.o.
68	Non-ferrous metals	69	Metals a.m.o.
69	Manufactures of metals, nes	69	Metals a.m.o.
71	Power generating machinery and equipment	77	Machinery
72	Machinery specialized for particular industries	77	Machinery
73	Metalworking machinery	77	Machinery
74	General industrial machinery and equipment, nes, and parts of, nes	77	Machinery
75	Office machines and automatic data processing equipment	77	Machinery
76	Telecommunications, sound recording and reproducing equipment	77	Machinery
77	Electric machinery, apparatus and appliances, nes, and parts, nes	77	Machinery
81	Sanitary, plumbing, heating, lighting fixtures and fittings, nes	77	Machinery
78	Road vehicles	79	Transportation Equipment
79	Other transport equipment	79	Transportation Equipment
82	Furniture and parts thereof	82	No Change
83	Travel goods, handbags and similar containers	61*, 89*, 63*	Split
84	Articles of apparel and clothing accessories	84	No Change
85	Footwear	62*, 61*	Split
87	Professional, scientific, controlling instruments, apparatus, nes	†	*Dropped (Uncategorizable)
88	Photographic equipment and supplies, optical goods; watches, etc	88	No Change
89	Miscellaneous manufactured articles, nes	†	*Dropped (Uncategorizable)
91	Postal packages not classified according to kind	†	*Dropped (Uncategorizable)
93	Special transactions, commodity not classified according to class	†	*Dropped (Uncategorizable)
95	Armored fighting vehicles, war firearms, ammunition, parts, nes	57*, 79*	Split
96	Coin (other than gold coin), not being legal tender	†	* Dropped (Gold Standard)
97	Gold, non-monetary (excluding gold ores and concentrates)	†	* Dropped (Gold Standard)

Animals (SITC 00 & SITC 94): The UK samples separate edible animals from animals for uses other than human consumption inconsistently within decades. In order to construct industry price growth measures, we require a consistent definition of products. Consequently, we map all to a combined animals category.

Miscellaneous Edible (SITC 09): This is comprised solely of "vinegar" and "lard", which appear intermittently throughout the sample. We remap lard to animal fats and oils and drop the remaining vinegar observations, as they appear in a small number of years.

Beverages (SITC 11): This category is almost wholly comprised of alcohol in most years. In 1920, Prohibition in the United States made imports illegal until its repeal 1933. Including this category would result in spurious changes in import growth during our sample that are unrelated to realized protection and confound all but the 1900-1910 cross-section. As a result, we drop SITC 11 from our import data.

Gas, Natural and Manufactured (SITC 34): This category is only observed in 1900 and 1905 in the FCNUS tariff data, making calculation of the effects of changes in import growth over our sample infeasible. We drop these observations.

Natural Oils (SITC 41-43): We combine Animal oils and fats (41), Fixed vegetable oils and fats (42) and Animal and vegetable oils and fats, processed, and waxes (43) due to changing aggregation over time that may otherwise cause elements of 41 and 42 to be categorized in 43.

Chemicals and manufactures of (SITCs 51-54, 58, & 59): We aggregate Organic chemicals (51), Inorganic chemicals (52), Dyeing, tanning and coloring materials (53), Medicinal and pharmaceutical products (54) and Artificial plastic materials, n.e.s. (58), Chemical materials and products, nes (59). 51 and 52 have substantial overlap with 53 and 54, especially as product use over time changes. Chemicals may be used both as a dyeing agent and for medicinal or cosmetic purposes, making consistent distinctions difficult or impossible to make. In some years these chemicals are specified by end use, and others not. Consequently, we construct a single chemicals industry group.

Cork, Wood, and manufactures of (SITCs 24 & 63): This combines cork and wood with cork and wood manufactures. US and UK differ in the extent to which they distinguish these two different groups, and aggregation changes over time.

Pulp, Paper and manufactures of (SITCs 25 & 64): This combines Pulp and waste paper (25) with Paper, paperboard, and articles of pulp, of paper or of paperboard (64). Ambiguity over time regarding waste paper and articles of pulp, for example, make it difficult to separate these categories fully.

Non-metallic minerals, fertilizers, and manufactures of (SITCs 27, 56, & 66): We combine Crude fertilizer and crude minerals (27), Fertilizers, manufactured (56), and Non-metallic mineral manufactures (66). There is substantial overlap between unprocessed and manufactured fertilizers as well as the minerals used in their production.

Metals and manufactures of (SITC 67- 69): We combine Iron and steel (67), Non-ferrous metals (68), and Manufactures of metals, nes (69). Difficulties in distinguishing iron and steel manufactures used as inputs (67) from finished manufactures of metals (69) requires that we aggregate these categories.

Machinery (SITC 71-77): This category contains all machinery with the exception of road vehicles and transportation equipment. The SITC categories disaggretate by industry use, while this level of disaggregation is not always clear in the tariff data, particularly early in the sample.

Transportation Equipment (SITC 78 & 79): This category contains road vehicles and transportation equipment. Due to the rapid onset of automobile production and air travel during our sample, we aggregate these to maintain a consistent set of these products over time.

Splitting: (SITC 83 & 86) Because these categories are infrequently populated in of our samples, we map each product to the product which comprises the majority of its inputs. This is almost exclusively recategorizing rubber footwear to rubber, or leather footwear and luggage to leather products, or wood and wicker baskets to wooden products. These are groups 61 (Leather products), 62 (Rubber manufactures),

and 63 (Cork and Wood a.m.o.). Residual uncategorizable products are assigned to 89 (Miscellaneous manufactured article n.e.s.)

Dropped: (SITC 87): This is comprised of professional scientific instruments, and does not appear before 1930. Consequently we omit these from our analysis.

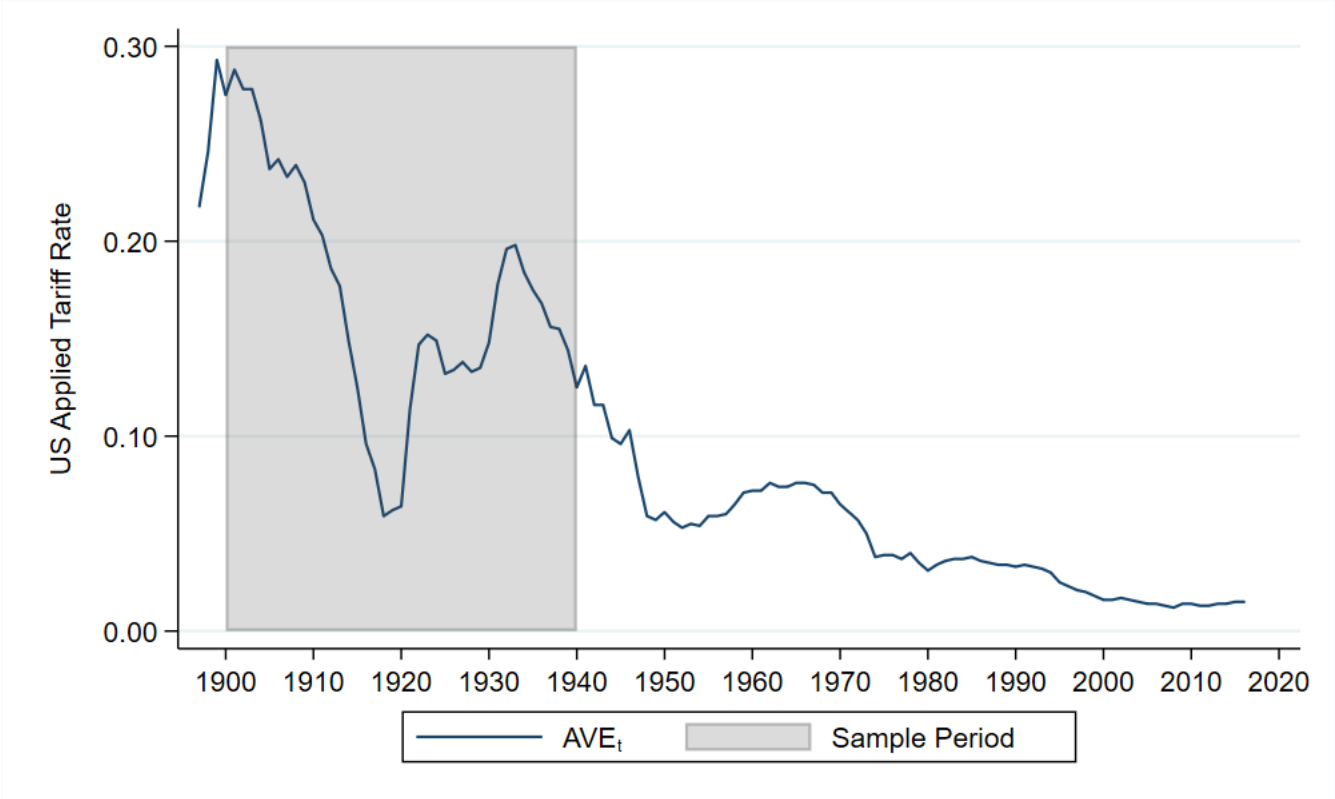
Dropped: (SITC 89) This is comprised of Miscellaneous manufactured articles, nes. While it is always populated, the products have little to no cohesive commonality or obvious means of mapping to labor markets. This is a small portion of our data and is omitted.

Dropped: (SITC 96-97) These categories include coin and non-monetary gold. Due to the reliance on the gold standard during this period we omit golds and gold related products and coins.

B Data Sources and Variable Construction

B.1 US Tariff and Import Data, 1900-1940

Figure B.1: US Applied Tariff Rate 1900-2016



Notes: Figure highlights the tariff rates during our sample period in the context of US tariff rates from 1900-2016. Data taken from USITC.

Foreign Commerce and Navigation of the United States (FCNUS)

For every five years between 1900 and 1930, we digitize the Foreign Commerce and Navigation of the United States (FCNUS) and obtain imports and tariffs by type at the tariff-line level. This digitization results in 25,042 tariff line observations from 1900 to 1930. For each tariff line we identify the appropriate industry based on the SITC revision 2 classification as amended in Section A based solely on product names. This yields a consistent mapping of products over time. We provide details of this data in its raw form in Table B.1.

The first two columns indicate the year and prevailing trade policy regime. The next three columns indicate the data source, table, and pages digitized to obtain our tariff data. The column indicated by tariff lines indicates the number of tariff lines obtained

Table B.1: FCNUS Data Sources

Year	Policy Regime	Data Source	Table	Pages	Tariff Lines	Coverage
1900	Dingley	FCNUS	No. 15	943-1116	2269	95.4%
1905	Dingley	FCNUS	No. 15	930-994	2562	98.9%
1910	Payne-Aldrich	FCNUS	No. 15	943-1147	4173	95.5%
1915	Underwood	FCNUS	No. 9	821-869	2725	96.0%
1920	Underwood	FCNUS	No. 9	525-574	2839	95.2%
1925	Fordney-McCumber	FCNUS	No. 9	15-88	5490	95.0%
1930	Smoot-Hawley	FCNUS	No. 9 Part 2	569-647	4984	95.4%

Notes: Table presents information about the raw tariff line data which form the basis of our analysis. Tariff lines indicates the number of unique tariff line items in each year's data. Coverage indicates the percent of import value which we were able to categorize to a two-digit SITC revision 2 industry as amended in section A

from digitizing the raw data. Coverage indicates the value share of total imports covered by our final sample in each year. Coverage is always less than 100% due to sample restrictions described in appendix A – some imports are un-classifiable or are omitted intentionally (e.g., alcoholic beverages) to ensure consistent coverage of imports.

Our identification strategy requires us to identify the type of duty (specific, compound, or ad valorem) in order to construct industry *AVE* and *STS*. The duty type is readily apparent in the raw data, as can be seen in figure B.2, which reproduces a sample of the undigitized FCNUS data from 1900. We have indicated the duty-free products in gray and specific (both compound and specific only) in purple and salmon. Blue are ad valorem only.

We calculate specific tariff shares at the industry level by summing all duties among goods with any specific component and dividing the sum by total duties collected within an industry. Similarly, industry-level *AVE* is calculated by dividing total duties by total imports in the industry.

Statistical Abstract of the United States (SAUS)

We also digitize the Statistical Abstract of the Untied States (SAUS) every five years between 1900 and 1940. These flows are far more aggregate than the tariff line data and include between 200 and 400 line items annually. These data allow us to construct a measure of imports when the FCNUS would be insufficient. For example, in 1930 imports in the FCNUS span two volumes. Our sample described above only reflects the second volume because the Smoot-Hawley tariff was enacted in the middle of 1930. As a consequence, import values in this FCNUS volume are substantially less than the total import values for 1930. By using the SAUS, we are able to construct a consistent measure of imports for each year. Again, we manually concord these products to their industry counterparts based on name for each year in our series.

While both the FCNUS and SAUS report US import values at a disaggregate level, their coverage does differ. The primary difference between the series is that the FCNUS

Figure B.2: FCNUS Tariff Data

IMPORTED MERCHANDISE ENTERED FOR CONSUMPTION IN THE UNITED STATES, INCLUDING BOTH ENTRIES FOR OF DUTY COLLECTED DURING THE YEARS

1900.

ARTICLES.	Rates of duty.	Quantities.	Values.	Duties.	AVERAGE.	
					Value per unit of quantity.	Ad valorem rate of duty.
Brass, and manufactures of:			*Dollars.*	*Dollars.*	*Dollars.*	*Per cent.*
Old brass, clippings from brass or Dutch metal, fit only for remanufacture (pounds).	Free	4,573,487	553,307.65		0.12	
Wire cloth (pounds)	1¼ cents per pound and 45 per cent.	354.50	497.00	228.08	1.40	45.89
Manufactures of, not specially provided for	45 per cent		25,104.93	11,297.22		45
	Duty remitted (Secs. 2513 and 2514, R. S.)		215.00			
Total brass, and manufactures of	Free		553,307.65			
	Dutiable		25,816.93	11,525.30		44.64
Brazilian pebble, unwrought or unmanufactured	Free					
Breadstuffs:						
Barley (bushels)	30 cents per bushel.	161,613.83	78,257.52	48,484.15	.484	62
Barley, pearled, patent, or hulled (pounds)	2 cents per pound	178,999	23,212.50	3,579.98	.129	15.43
Bran and mill feed	20 per cent		47,786.45	9,557.29		20
Bread and biscuit	20 per cent		95,887.71	19,177.55		20
Buckwheat (bushels)	15 cents per bushel.	285.17	131.50	42.78	.461	32.65
Buckwheat flour (pounds)	20 per cent	68,370	929.50	185.90	.013	20
Corn or maize (bushels)	15 cents per bushel.	3,595.34	3,182.08	539.31	.885	16.94
Corn or maize, burnt or roasted	20 per cent		172.00	34.40		20
Corn meal (bushels)	20 cents per bushel.	68.40	85.84	13.71	1.26	16.13
Macaroni, vermicelli, and all similar preparations (pounds).	1½ cents per pound	18,608,037	820,163.05	279,120.58	.044	34.03
Oat hulls (pounds)	10 cents per 100 lbs.	5,649,850	13,085.00	5,649.85	.002	43.46
Oats (bushels)	15 cents per bushel.	40,554.93	18,361.67	6,083.26	.453	33.24
Oatmeal and rolled oats (pounds)	1 cent per pound	241,674.50	14,313.70	2,416.75	.059	16.9
Rye (bushels)	10 cents per bushel.	330	366.00	33.00	1.11	9.02
Rye flour (pounds)	½ cent per pound					
Wheat (bushels)	25 cents per bushel.		4,705.87	862.97	1.36	18.34
Wheat, crushed	20 per cent	773.09	1,422.00	284.40		20
Wheat flour (barrels)	25 per cent	3,451.88	3,757.12	939.29	4.86	25
Wheat screenings	10 per cent		1,313.00	131.30		10
Total breadstuffs			1,127,132.51	377,136.47		33.46

Notes: Figure displays pre-digitized data from the 1900 Foreign Commerce and Navigation of the US. Color coding reflects duty type. Grey are duty free. Purple are compound duties which we classify as specific tariffs. Salmon are specific (per-unit) tariffs. Blue are ad-valorem duties.

reports imports for consumption (upon which duties may be levied) while the SAUS reports total imports. These may differ if, for example, imports enter the US into bonded storage or for re-export. In such a case, the FCNUS would not report an item in the import data, while SAUS would.

In practice, however, this distinction makes little difference for our analysis. In figure B.3, we compare real import values across these two sources between 1900 and 1925.[61] The industry-level import values across the two sources are correlated at 99.74%. Given the fact that both sources were separately concorded to SITC industries, this also provides a check on the accuracy of the concordances.

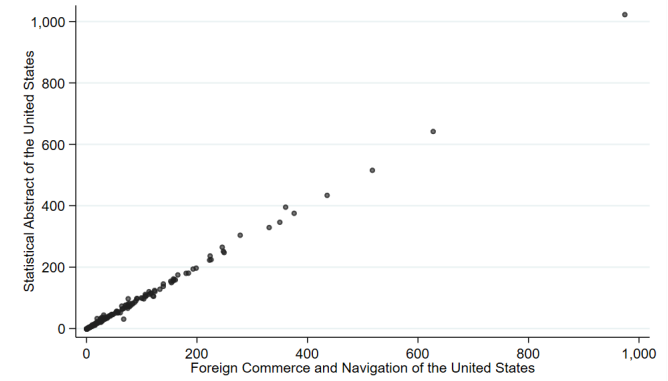
[61] As noted above, although we do have the FCNUS import values under the Smoot-Hawley tariff of 1930, we exclude these data from our comparison because the Smoot-Hawley tariff is implemented partway through 1930, making the FCNUS part 2 an incomplete source for imports in that year.

Table B.2: SAUS Data Sources

Year	Policy Regime	Data Source	Table	Pages	Product Lines	Coverage
1900	Dingley	1905 SAUS	No.72	273-302	207	93.3%
1905	Dingley	1905 SAUS	No.72	273-302	208	91.8%
1910	Payne-Aldrich	1919 SAUS	No. 282	425-472	261	93.7%
1915	Underwood	1919 SAUS	No. 282	425-472	261	95.1%
1920	Underwood	1921 SAUS	No. 308	483-521	490	97.9%
1925	Fordney-McCumber	1929 SAUS	No. 538	550-585	189	96.4%
1930	Smoot-Hawley	1934 SAUS	No. 491	486-520	193	94.5%
1935	Smoot-Hawley	1938 SAUS	No. 536	523-561	187	93.9%
1940	Smoot-Hawley	1941 SAUS	No. 603	613-651	191	95.5%

Notes: Table presents information about the raw import data used in our analysis. Product lines indicates unique lines from the respective table. Coverage indicates percent of import value which we were able to categorize to a two-digit SITC revision 2 industry as amended in section A.

Figure B.3: Real Imports at Census Industry: SAUS vs FCNUS



Notes: This figure presents a scatterplot of the real value of imports digitized from the Foreign Commerce and Navigation of the United States and the Statistical Abstract of the United States. Values are calculated at the two-digit SITC level and are reported in millions of 1900 USD.

Due to its availability throughout the entirety of the sample, we use SAUS data to construct import values in our analysis. However, our results are robust to using import values from the FCNUS whenever possible. Specifically, for log changes ending *prior* to 1930 we have data for the full year's imports from the FCNUS for both the starting and ending periods. This allows us to construct log import growth from the FCNUS. When we do not – i.e., during 1920-1930, 1925-1930, 1930-1935, and 1930-1940 – we use the SAUS to construct log industry import growth. Our results are qualitatively unchanged by this alternative approach.

B.2 US Import and Tariff Data, 1848-1861

This section details the data used in construction of the Morrill Tariff tariff measure, as well as imports in the 13 years immediately preceding the Morrill Tariff. This period was defined by two tariff regimes, the Walker Tariff of 1846 and the Tariff of 1857. Import

data are reported in the *Commerce and Navigation of the United States* over fiscal years beginning July 1 and ending on June 30. For example, the first year of this series is published in 1849 and provides coverage of imports from July 1, 1847 to June 30, 1848. With the exception of the sample from the Morrill Tariff year itself, all of our data from 1848 to 1860 span the same 12-month period. The Morrill Tariff was enacted on March 2, 1861. Consequently, the initial sample of this data span March 2, 1861 through the end of the 1861 fiscal year on June 30, 1861. The full series description for each sample is reported below in Table B.3.

Table B.3: CNUS Data Sources

Year	Policy Regime	Data Source	Table	Pages
1847/1848	Walker	Commerce and Navigation of the US	No. 6 A.	258-270
1848/1849	Walker	Commerce and Navigation of the US	No. 6	266-278
1849/1850	Walker	Commerce and Navigation of the US	No. 6	268-280
1850/1851	Walker	Commerce and Navigation of the US	No. 6	274-287
1851/1852	Walker	Commerce and Navigation of the US	No. 6	266-275
1852/1853	Walker	Commerce and Navigation of the US	No. 6	266-275
1853/1854	Walker	Commerce and Navigation of the US	No. 6	276-285
1854/1855	Walker	Commerce and Navigation of the US	No. 6	292-301
1855/1856	Walker	Commerce and Navigation of the US	No. 6	284-293
1856/1857	Walker	Commerce and Navigation of the US	No. 6	272-281
1857/1858	1857	Commerce and Navigation of the US	No. 6	294-305
1858/1859	1857	Commerce and Navigation of the US	No. 6	290-301
1859/1860	1857	Commerce and Navigation of the US	No. 6	294-305
1861/1861†	Morrill	Commerce and Navigation of the US	No. 9	368-535

Notes: This table presents information regarding the sources of raw US import data used in our Morrill Tariff placebo and IV analysis found in section 4. A sample of this data may be found in B.4. Trade flows were mapped to industries as described in appendix A.

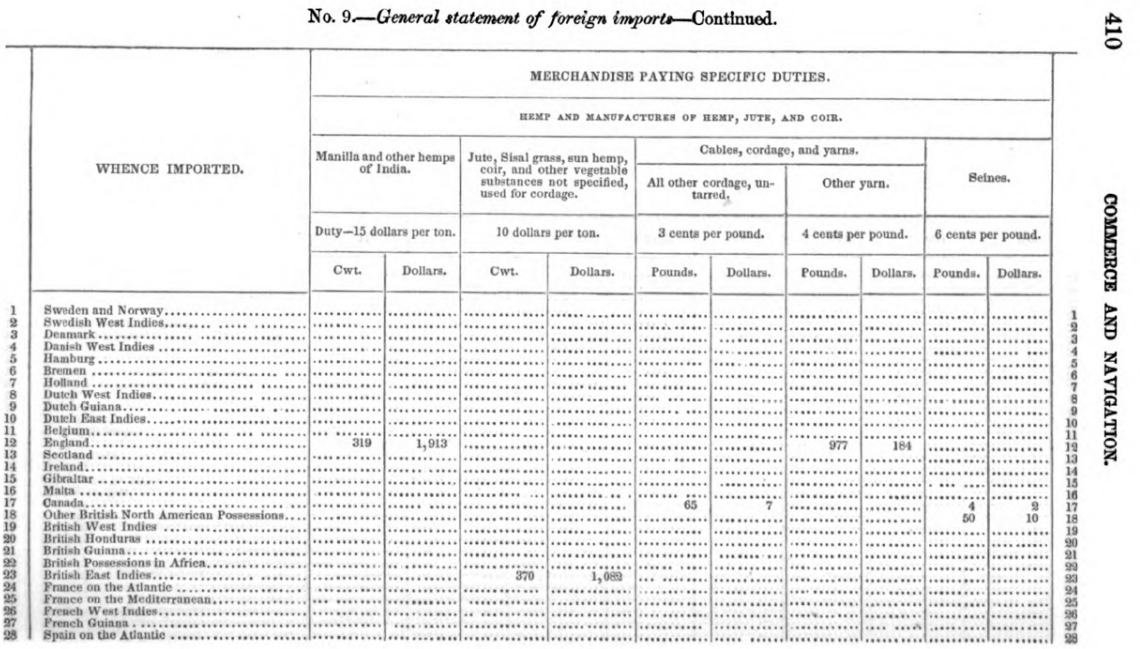
For all years, we digitize import values and quantities, units, duties paid, duty type, and unit duties. We manually link each product to its nearest two-digit SITC industry via the process described in Section A. Of the 34 industries found in our primary sample, 29 are present in the Morrill Tariff data, while 31 are available in the preceding 13 years. They are jointly defined for 28 of those industries. SITC codes 22, 57, and 82 are absent from the Morrill Sample, while SITC 79 is absent from the 1848-1860 sample.

B.2.1 Morrill Tariff Duties and Specific Tariff Share

As noted above, trade flows are recorded by fiscal year. Unlike our baseline FCNUS sample from 1900-1940, duties under the Morrill Tariff are not reported directly. Instead, they must be calculated using the duty rates, value, and quantity – all of which are reported in the Commerce and Navigation of the United States. A sample of these data may be found in B.4.

To see how these data may be used to calculate tariffs and specific tariff shares by industry, consider the product listed "Jute sisal grass, sun hemp, coir, and other vegetable substances not specified used for cordage." Value is recorded in current US dollars, while

Figure B.4: Sample of CNUS Data from Morrill Tariff Era



No. 9.—*General statement of foreign imports*—Continued.

410 COMMERCE AND NAVIGATION.

	WHENCE IMPORTED.	MERCHANDISE PAYING SPECIFIC DUTIES.									
		HEMP AND MANUFACTURES OF HEMP, JUTE, AND COIR.									
		Manilla and other hemps of India.		Jute, Sisal grass, sun hemp, coir, and other vegetable substances not specified, used for cordage.		Cables, cordage, and yarns.				Seines.	
						All other cordage, untarred.		Other yarn.			
		Duty—15 dollars per ton.		10 dollars per ton.		3 cents per pound.		4 cents per pound.		6 cents per pound.	
		Cwt.	Dollars.	Cwt.	Dollars.	Pounds.	Dollars.	Pounds.	Dollars.	Pounds.	Dollars.
1	Sweden and Norway										
2	Swedish West Indies										
3	Denmark										
4	Danish West Indies										
5	Hamburg										
6	Bremen										
7	Holland										
8	Dutch West Indies										
9	Dutch Guiana										
10	Dutch East Indies										
11	Belgium										
12	England	319	1,913					977	184		
13	Scotland										
14	Ireland										
15	Gibraltar										
16	Malta										
17	Canada					65	7			4	2
18	Other British North American Possessions									50	10
19	British West Indies										
20	British Honduras										
21	British Guiana										
22	British Possessions in Africa										
23	British East Indies			370	1,982						
24	France on the Atlantic										
25	France on the Mediterranean										
26	French West Indies										
27	French Guiana										
28	Spain on the Atlantic										

the units are specified as Cwt. (United States hundredweight), and the specific tariff is listed on a per ton basis. Total duties on this product are calculated by converting quantity to tons (dividing observed units by 20) and then multiplying the resulting units by \$10. We manually convert units into the units on which the duty is levied. We then construct STS and AVE at the industry level as in our primary sample. Figure B.5 presents the relationship between these two variables.

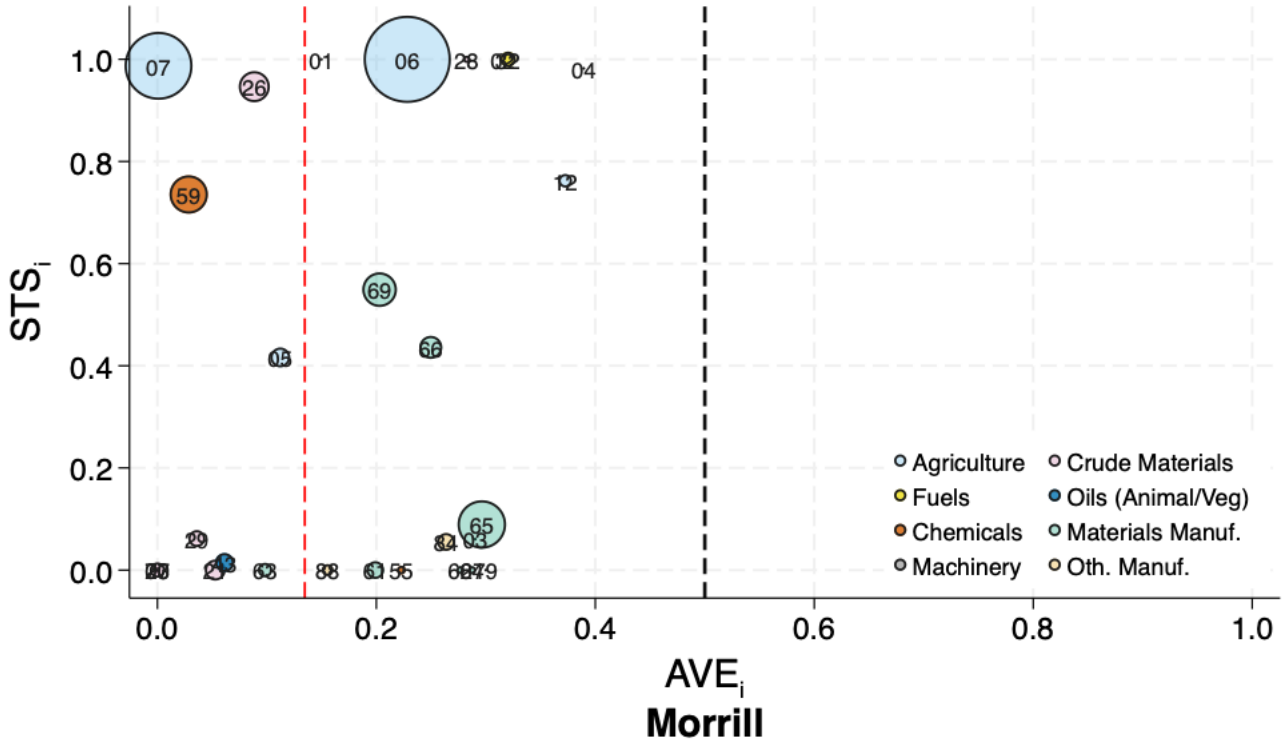
B.3 UK Import Data and Unit Value Construction, 1900-1938

Statistical Abstract for the United Kingdom (SAUK)

We digitize data from four editions of the Statistical Abstract for the United Kingdom. From these we take import values, quantities, and product names. We link these to the two-digit SITC revision 2 as above. The import data are recorded at a more aggregate level in the last two decades of our sample. Sources are reported in Table B.4.

We record bookend periods in duplicate – once from each edition – to ensure that when reported product categories change across editions, we do not construct a change in imports spanning two distinct levels of aggregation. For example, we obtain 1900, 1905, and 1910 from the same edition in order to construct changes in imports and prices between 1900 and 1910. We then re-digitize 1910 from a second edition of SAUK spanning 1910, 1915, and 1920 to ensure a consistent product group and aggregation for our intra-period changes in imports and prices. Because the 1940 data are not available, we digitize

Figure B.5: Industry level STS_i versus AVE_i by Morrill Tariff



Notes: Figure displays the Specific Tariff Share (STS_i) versus the Ad Valorem Equivalent (AVE_i) for the Morrill Tariff of 1861. Industries are two digit SITC REV-2 industries. Marker size proportional to share of start of period imports. Solid vertical line indicates a 50% Ad Valorem Equivalent Tariff while dashed line indicates policy Ad Valorem Equivalent Tariff.

Table B.4: Sources of UK Import Data

Year	Text	Table	Pages
1900-1910	1915 SAUK	No. 39	126-160
1910-1920	1924 SAUK	No. 34	88-120
1920-1930	1932 SAUK	No. 240	350-360
1930-1938	1940 SAUK	No. 285	392-402

Notes: Sources of import values and quantities digitized and used in construction of UK import flows and industry price growth.

the 1938 file and scale up all changes as needed to construct five-year or 10-year equivalent growth in imports and prices.

We assess the quality of our approach by also digitizing "category" level imports and ensuring that the total value of constituent products match these product group aggregate values. For example, in the figure below we check to see that the total value of imported goods categorized under Article I.A. in 1900 is equal to the category total – 62,992,082.

Figure B.6: Sample of 1900-1905 Import Values

IMPORTS—VALUE. 142

No. 39.—DECLARED VALUE of the PRINCIPAL and OTHER (Exclusive of Bullion and Specie.

NOTE.—*The figures given in italics for the totals of the Groups of the several owing to a change in the classification*

ARTICLES.	1900.	1901.	1902.	1903.	1904.	1905.	1906.	1907.
I.—FOOD, DRINK, AND TOBACCO.								
A.—GRAIN AND FLOUR:	£	£	£	£	£	£	£	£
Wheat	23,345,929	23,081,372	27,079,823	29,940,191	34,266,416	35,279,931	32,676,185	37,346,548
Barley	5,152,977	6,163,012	7,136,321	7,230,741	7,171,115	6,031,644	5,677,587	6,564,670
Oats	5,236,409	6,347,719	5,041,323	4,263,960	3,726,120	4,713,265	4,532,160	3,383,553
Maize	12,327,859	12,387,225	11,713,132	12,495,583	10,247,134	11,034,748	11,972,694	14,604,504
Peas (other than fresh), including Split Peas.	780,138	747,168	740,123	690,768	767,097	725,104	614,640	602,648
Beans (other than fresh), including Split Beans.§	536,898	629,831	§ 787,290	738,044	676,284	535,519	383,668	450,539
Lentils, including Split Lentils	Incl. with "Seeds, Tares and Vetches" (Class II., Sec. K.).		* 41,837	52,969	62,078	61,079	53,048	94,991
Rye	359,800	344,383	312,206	302,701	280,393	305,293	323,345	317,456
Wheatmeal and Flour	10,102,548	10,341,519	8,925,617	9,723,652	7,258,600	6,044,845	6,817,213	6,694,082
Oatmeal, Groats, and Rolled Oats (including Quaker Oats).	523,765	546,132	486,241	537,415	456,593	463,293	495,080	479,352
Maize Meal	456,449	457,345	83,270	176,622	100,940	144,829	195,302	213,581
Rice	2,408,069	2,477,465	2,524,156	2,015,188	2,228,997	2,295,756	2,259,732	2,800,464
Rice Meal and Flour				347,103	403,126	562,197	743,847	536,380
Meal, Other	84,886	83,239	‡267,965	250,759	254,537	138,531	239,463	186,437
Other Farinaceous Substances and Manufactures.†	1,676,355	809,695	844,696	906,719	897,257	864,251	893,516	1,133,941
Total of Grain and Flour	*62,992,082*	*64,416,105*	*65,984,000*	*69,642,405*	68,796,597	*69,200,285*	67,880,589	75,409,156

Notes: Figure displays sample of data taken from page 142 of Statistical Abstract for the United Kingdom, 1915.

Each of the aforementioned series were of sufficient quality to match import aggregate import values from these tables almost exactly with the exception of the 1905 data from the 1915 edition of the Statistical Abstract for the United Kingdom. When data were illegible (e.g. import values for steel manufactures on page 152), we turned to the 1919 edition to verify the values and quantities.

Industry Price Indices

When constructing five- or 10-year price changes at the industry level, we restrict our attention to products for which we can identify an appropriate SITC code, for which we are able to construct a unit price during both periods, and for which the units in both periods allow for comparison via a consistent unit value. If unit conversions are feasible – e.g., UK CWT (hundredweight), or UK Tons to 112 lbs. and 2240 lbs., respectively – we make the appropriate quantity conversion to calculate unit values. If this is not the case – e.g., wine counted in bottles in 1900 and kegs in 1905 – then the product is

not included in constructing changes in unit values across periods. Table B.5 reports the percent of aggregate import value for which we are able to map to an SITC code in column 2. Columns 3 and 4 report the percent of this value utilized in construction of SITC-level changes in log unit values.

Table B.5: Value Share Coverage

Year	SITC	5-year $\Delta Ln(P_{it})$	10-year $\Delta Ln(P_{it})$
1900	0.982	0.884	0.884
1905	0.980	0.910	-
1910	0.964	0.899	0.899
1915	0.974	0.933	-
1920	0.998	0.901	0.901
1925	0.997	0.882	-
1930	0.997	0.875	0.875
1935	0.998	0.880	-

Notes: Share of total imports used in construction of UK import values as well as share of these values used in constructing 5-year and 10-year industry price growth.

We calculate within-product changes in log prices by aggregating to the SITC level, weighting by start-of-period import values. For example, to calculate a price change for textile manufactures (SITC 65) we aggregate information on various silk and cotton imports by first constructing the log change in prices among the unit values separately, and then taking an expenditure-weighted average of the cotton and silk products among all cotton and silk expenditures. Finally, in some years we are unable to construct a product-level unit value for any product within an SITC category. In such situations, we substitute the aggregate UK CPI as our measure of industry price growth.

C Tariffs, Import Growth, and Trade Elasticites

As an additional application, this section shows how our IV strategy above may be used to estimate a trade elasticity – a key parameter used throughout the literature on the welfare gains from trade liberalization.

Our primary identification strategy relies only on cross-industry variation in specific tariffs in the presence of aggregate price changes. However, to estimate a trade elasticity we need to incorporate variation based on initial tariff levels. We proceed in six steps and sequentially describe identification challenges and provide estimates beginning with observed endogenous changes in tariffs and ending with a novel IV strategy and estimates.

First, section C.1 details a simple model featuring CES demand and a weakly upward sloping export supply curve and specific tariffs that motivates our empirical specifications. Second, in section C.2 we show that the observed changes in tariffs, which incorporate both price-driven and statutory changes, are insufficient to estimate trade elasticites. In section C.3 we construct a sample of entirely intra-policy changes in trade flows and tariffs, detail our identification strategy, and present estimates. Section C.4 shows that this identification strategy recovers strikingly similar parameter estimates even when the long differences (5- or 10-year) span multiple policy regimes. In section C.4.1 we highlight the additional assumptions required to incorporate disaggregate – in our setting, industry-level – price variation into these estimates. Finally, in section C.5, we show that we can recover these estimates without relying on the potentially endogenous tariff levels by using an IV strategy similar to that in the main text.

C.1 Model

We begin with a simple CES structure in which domestic demand for imports in industry i is subject to time varying taste shocks b_{it} with a constant import demand elasticity σ across all industries $i \in I$.

$$q_{it} = b_{it} p_{it}^{-\sigma} P_t^{\sigma-1} E_t$$
$$\text{with}$$
$$P_t \equiv \left(\sum_{i \in I} b_{it} p_{it}^{1-\sigma} \right)^{\frac{1}{1-\sigma}} \tag{C.1}$$

where p_{it} are tariff-inclusive import prices and p_{it}^* are tariff-exclusive prices in the domestic currency and E_t is exogenously given expenditure on imports. Tariffs can be specified as

ad valorem τ_{it} or specific f_{it}, such that import prices become:

$$p_{it} = p_{it}^* \left(1 + \underbrace{\tau_{it} + \frac{f_{it}}{p_{it}^*}}_{AVE_{it}} \right), \tag{C.2}$$

Export supply for industry i is given by

$$p_{it}^* = e^{\eta_{it}} q_{it}^{\omega}$$

where $\omega \geq 0$ captures the inverse export supply elasticity and η_{it} is a time-varying industry-specific productivity shock. Log import demand and inverse log export supply can then be written:

$$\ln y_{it}^* = -\sigma \ln (1 + AVE_{it}) + (1 - \sigma) \ln p_{it}^* + (\sigma - 1) \ln P_t + \ln E_t + \ln b_{it}$$

and

$$\ln p_{it}^* = \frac{-\sigma\omega}{1+\omega\sigma} \ln (1 + AVE_{it}) + \frac{\omega(\sigma-1)}{1+\omega\sigma} \ln P_t + \frac{\omega}{1+\omega\sigma} \ln E_t + \frac{1}{1+\omega\sigma} \eta_{it} + \frac{\omega}{1+\omega\sigma} \ln b_{it} \tag{C.3}$$

respectively, which yields the following expression for equilibrium industry imports:

$$\ln y_{it}^* = -\frac{\sigma(1+\omega)}{1+\omega\sigma} \ln (1 + AVE_{it}) + \xi_t + \epsilon_{it}. \tag{C.4}$$

Here ξ_t captures aggregate expenditures and price indices while ϵ_{it} captures the unobserved demand and supply shocks, b_{it} and η_{it}, respectively.[62] As is typical in the literature we refer to the $-\frac{\sigma(1+\omega)}{1+\omega\sigma}$ as the trade elasticity.

Identification of the trade elasticity requires that $\ln(1 + AVE_{it})$ is independent of ϵ_{it}. The typical identification concern is that policy variables τ_{it} and f_{it} are chosen by politicians as a function of domestic demand, thus reflecting demand shocks b_{it}, or to provide protection from foreign competition, thus reflecting foreign supply shocks η_{it}. However, since b_{it} and η_{it} are unobserved and thus in ϵ_{it}, regressions of imports on tariff levels in C.4 will yield biased estimates.

A common approach to dealing with endogenous tariff setting is to difference this equation. To that end, we write import growth as:

$$\Delta \ln y_{it}^* = -\frac{\sigma(1+\omega)}{1+\omega\sigma} \Delta \ln (1 + AVE_{it}) + \Delta\xi_t + \Delta\epsilon_{it}. \tag{C.5}$$

[62] Specifically, $\epsilon_{it} \equiv \frac{(1+\omega)}{1+\omega\sigma} \ln b_{it} + \frac{(1-\sigma)}{1+\omega\sigma} \eta_{it}$.

Writing $\Delta \ln (1 + AVE_{it})$ in terms of initial tariff levels and changes as

$$\begin{aligned} \Delta \ln (1 + AVE_{it}) &= \ln (1 + AVE_{it+1}) - \ln (1 + AVE_{it}) \\ &= \ln \left(1 + \frac{\Delta AVE_{it}}{AVE_{it}} \times \frac{AVE_{it}}{1 + AVE_{it}} \right) \end{aligned} \tag{C.6}$$

and further rewriting ΔAVE_{it} as a function of changes in legislated tariffs and price movements

$$\begin{aligned} \Delta AVE_{it} &\equiv \tau_{it+1} - \tau_{it} + \frac{f_{it+1}}{p_{it+1}} - \frac{f_{it}}{p_{it}} \\ &= \Delta \tau_{it} + \frac{\Delta f_{it}}{p_{it+1}} - \frac{\Delta p_{it}}{p_{it+1}} \frac{f_{it}}{p_{it}} \end{aligned} \tag{C.7}$$

one can see that changes in observed tariffs may incorporate both statutory changes across policy regimes, captured by $\Delta \tau_{it}$ and Δf_{it}, and price-driven changes within a policy regime, captured by $-\frac{\Delta p_{it}}{p_{it+1}} \frac{f_{it}}{p_{it}}$. This latter term is the ad valorem equivalent of the specific tariff multiplied by the forward percent change in price. As price rises to infinity, the price term goes to -1, indicating that the entirety of the specific tariff protection is eliminated. If prices fall, this term becomes positive, indicating an enhanced level of protection. We now turn to empirical estimates of a trade elasticity in this setting.

C.2 OLS Estimates Based on Observed Changes in Tariffs

We begin our exercise by regressing changes in log imports on the observed change in log tariffs during our sample. To do so we construct 5- and 10-year changes in log imports and $\ln(1 + AVE_{it})$ and estimate equation C.5. As is clear from equation C.7, the variation in observed changes in log tariffs reflects not only the supply-side inflationary changes we hope to isolate, but also demand-driven price changes, statutory shifts in tariffs, and changes in expenditure shares across goods within an industry. This variation will be endogenously related to import growth and lead to biased estimates. For example, surging US demand could erode the protective power of specific tariffs and lead to falling tariff rates but rising imports. Similarly, if inflationary changes in tariffs are correlated with statutory changes in tariffs, the inflationary erosion we seek to isolate would be correlated with our error term. While the main body of our text shows that we can strike this relationship entirely and exploit only the structure of the tariff schedule to obtain identification, we attempt here to isolate the effects in terms of a tariff elasticity. Given the concerns related to endogeneity, we do not apply a causal interpretation to these estimates, but instead use them as a point of comparison to the estimates we present below.[63]

Column 1 includes only time fixed effects as controls. We sequentially introduce con-

[63] Note here that the sample is constrained to the 1900-1930 period due to the fact that we have do not have a digitized tariff schedule for 1935 or 1940.

Table C.1: Endogenous Tariff Changes Do Not Predict Import Growth

	Dependent Variable: $\Delta \ln(Imports_{it})$					
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta \ln(1 + AVE_{it})$	-0.655	-1.111	-1.106	-0.600	-1.520	-1.525
	(0.778)	(0.720)	(0.730)	(1.016)	(0.989)	(1.008)
$\ln(1 + AVE_{it})$		-0.116**	-0.118**		-0.125**	-0.126**
		(0.051)	(0.050)		(0.056)	(0.056)
STS_{it}			0.004			0.005
			(0.022)			(0.021)
Constant	0.032***	0.051***	0.049**	0.032***	0.052***	0.050***
	(0.009)	(0.015)	(0.018)	(0.009)	(0.015)	(0.018)
Estimator	OLS	OLS	OLS	OLS	OLS	OLS
obs.	202	202	202	101	101	101
R^2	0.143	0.158	0.154	0.178	0.209	0.201
Year-FE	Yes	Yes	Yes	Yes	Yes	Yes
Sample Period	1900-30	1900-30	1900-30	1900-30	1900-30	1900-30
Δ t	5-yr	5-yr	5-yr	10-yr	10-yr	10-yr

Notes: Table presents OLS estimates of equation C.7 using annualized observed changes in log tariffs and imports in 5- and 10-year differences in columns 1-3 and 4-6 respectively in stacked panels. The sample spans 1900-1930. The primary covariate is the change in observed log tariff rates. Standard errors are clustered at two-digit SITC level and reported in parentheses.

trols for the initial tariff wedge $\ln(1 + AVE_{it})$ and the industry specific tariff share STS_{it}. Columns 1-3 provide estimates for 5-year changes, while columns 4-6 provide estimates based on 10-year changes. Across all specifications, changes in log industry tariffs are negative, but small and insignificantly related to changes in log imports.

C.3 Intra-Policy Tariff Changes and Import Growth

While we will return to the case in which legislated tariffs change across policy regimes, we begin with the narrowest case for our identification strategy, with purely intra-policy variation in tariff rates. In this special case, in which $\Delta\tau_{it} = 0$ and $\Delta f_{it} = 0$, the term $\frac{\Delta AVE_{it}}{AVE_{it_0}}$ can be written as the product of the change in price, $-\frac{\Delta p_{it}}{p_{it+1}}$, and the start-of-period share of initial tariff revenue accounted for by specific tariffs, $\frac{f_{it}}{p_{it}\tau_{it}+f_{it}}$ (STS_{it_0}). Our import growth equation then becomes:

$$\Delta \ln y_{it}^* = -\frac{\sigma(1+\omega)}{1+\omega\sigma} \ln\left(1 - \frac{\Delta p_{it}}{p_{it+1}} STS_{it} \frac{AVE_{it}}{1+AVE_{it}}\right) + \Delta\xi_t + \Delta\epsilon_{it}. \tag{C.8}$$

To exploit only intra-policy identification outlined above construct an alternate sample of data than that used throughout the rest of the paper. Namely, instead of using 5- or 10-year changes in outcomes, for each of the five policy regimes in our sample, we construct the longest possible intra-policy change in imports. The precise nature of this change depends on the period during which we have digitized tariff data (1900,1905,1910,...1930b) and imports (bi-annually from 1900-1940). For example, for the Dingley Tariff we measure policy variables τ_{it} and f_{it} in 1900 and construct log changes in imports from 1900-1908.

We construct this series for for Payne Aldrich (enacted in 1909, but our earliest digitized tariff record is during this regime is 1910) from 1910-1912, Underwood-Simmons (enacted in 1914) from 1915-1920, Fordney-McCumber (enacted in 1924) from 1925-1928, and for Smoot-Hawley (enacted in the second-half of 1930) from 1930-1940. We annualize these changes for comparability.

As $\frac{\Delta p_{it}}{p_{it+1}}$ is an equilibrium outcome, it is a function of unobserved demand shocks $\Delta \ln(b_{it})$, and the intra-policy changes in tariffs may still be endogenously related to import growth. As elsewhere in the paper, we seek to isolate supply-side shocks to prices and thus rely on aggregate price changes unlikely to be influenced by US demand for imports. As in the main text, we use changes in the UK CPI as the proxy for non-US-driven aggregate price series, but note that our results are qualitatively similar using US CPI, aggregate US unit values, a rest-of-world price index, and industry-level unit values. We construct price changes over the same intervals as our import growth changes detailed above. Results are reported in Table C.2 below.

Table C.2: Intra-Policy Tariff Changes and Import Growth

	Dependent Variable: $\Delta \ln(Imports_{it})$						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$\Delta \ln(1 + AVE_{it})$	-2.757	-3.658*	-3.044*	-5.038**	-5.290**	-4.603**	-4.967**
	(1.769)	(1.861)	(1.715)	(2.150)	(2.228)	(2.157)	(1.918)
$\ln(1 + AVE_{it})$		-0.088*	-0.090*				
		(0.051)	(0.050)				
STS_{it_0}			0.026	0.019	0.047	0.047	-0.015
			(0.023)	(0.023)	(0.039)	(0.039)	(0.030)
Constant	0.030***	0.044***	0.031	0.015	-0.000	-0.008	0.014
	(0.010)	(0.013)	(0.019)	(0.013)	(0.020)	(0.021)	(0.016)
Estimator	OLS	OLS	OLS	OLS	OLS	OLS	OLS
Obs.	169	169	169	169	169	169	169
R^2	0.047	0.050	0.050	0.035	0.030	-0.016	0.229
Price Index	UK_t^{CPI}	UK_t^{CPI}	UK_t^{CPI}	UK_t^{CPI}	UK_t^{CPI}	UK_t^{CPI}	UK_t^{CPI}
Year-FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
$\ln(1 + AVE_{it_0})$×Year-FE	No	No	No	Yes	Yes	Yes	Yes
SITC-FE	No	No	No	No	Yes	Yes	Yes
Weighted	No	No	No	No	No	Δt	$Imports_{it_0}$

Notes: Dependent variable is annualized log changes in real US industry imports within all 5 trade-policy regimes from 1900-1940 in stacked panels. Import growth and tariff changes are constrained to be within a period (i.e. Dingley 1900-1908, Payne-Aldrich 1910-1912, Underwood-Simmons (1915-1920), Fordney-McCumber 1925-1928, and Smoot-Hawley 1930b-1940). The primary covariate is the intra-policy change in US tariff protection due to the inflationary erosion of specific tariffs and is defined in equation C.8. Columns differ based on included controls and fixed effects. All columns employ time fixed effects. Column 4 includes a suppressed control for year-dummies interacted with initial $\ln(1 + AVE_{it_0})$. Column 5 adds industry-level fixed effects. Columns 6 and 7 re-estimate column5 under panel-length weighting and import value weighting. Standard errors are clustered at two-digit SITC level and reported in parentheses. *,**,*** indicate p-values < 0.1, 0.05, and 0.01 respectively.

In column 1 we present a specification only accounting for time fixed effects. While the point estimate is negative, it is not significant at conventional levels. We now relax a key assumption, that tariff levels do not impact import growth. If politicians were to choose tariffs to alter import growth, this would lead to a mechanical correlation between our measure of inflationary changes in tariff protection and the error term due to the presence

of the term $\frac{AVE_{it}}{1+AVE_{it}}$, which appears in the intra-policy tariff changes derived in Equation C.8. To account for this, we include the start-of period tariff level $\ln(1 + AVE_{it})$.[64] In column 2 we see that initial tariff levels are indeed correlated with import growth. In its own right, this highlights a benefit of our approach: we needn't assume, as is common in the trade policy literature, that initial tariff levels are orthogonal to import growth.[65] Having accounted for this omitted variable, our point estimate of interest is -3.6 and significant at the 10% level. Column 3 includes the start of period specific tariff share as an additional control.

In columns 4-7 we build on this baseline set of controls. In column 4 we include controls for start-of-policy tariff wedges interacted with year dummy-variables. This specification allows for a flexible time-specific relationship between tariff protection and import growth. Moreover, given the fact that our measure of intra-policy tariff changes is time-by-industry-specific interaction with AVE_{it}, this is a very restrictive specification. If anything, this strengthens the precision of our findings; our import elasticity rise to -5.04 and is estimated with 95% confidence. In column 5 we also add industry fixed effects to eliminate the possibility that our results are driven by industry trends.

Finally, columns 6 and 7 estimate the specification found in column 5 under alternate weighting. Column 6 uses the number of years covered by the policy to construct the change as a weight, with the idea that the longer the time horizon, the less the change will be driven by idiosyncratic demand factors. This has little effect on our results. In column 7 we include start of period import-value weighting to ensure our results are not driven by low-import industries whose growth would be exaggerated in logs. Regardless the specification, we find that intra-policy changes in tariffs are well-identified and provide plausible estimates of the effect of tariff changes on import growth.

As argued in section 4, the movement in our aggregate price series is driven largely by global factors which would make forecasting price growth and adjusting the mix of specific and ad valorem tariffs in anticipation of inflation or deflation practically infeasible (see Appendix section D.2). Nonetheless, it may be the case that the unobserved demand shocks are correlated with evolving reliance on specific tariffs. To account for this possibility, we rely on the industry-persistence in the reliance on specific tariffs and omit time-series variation in specific tariff shares. Namely, we substitute $STS_i^{Morrill}$ into our empirical specifications both as a control and in the direct effect of tariff changes.[66]

We sequentially introduce controls, replicating each specification in Table C.2. Notably, because we are using a time-invariant measure of industry reliance on specific tariffs,

[64] This is correlated at over 99% with the term $\frac{AVE_{it}}{1+AVE_{it}}$ but has the appealing interpretation that it is the initial tariff wedge.

[65] This is a common assumption in the empirical work on trade policy, in which tariff levels are often used as an instrument for changes in tariffs. The exclusion restriction in such studies requires that tariff levels are only correlated with imports through their effect on changes in tariffs – an empirical relationship we reject in our setting.

[66] Note that the sample size is reduced from 169 to 144 observations due to the fact that three of our industries were not traded under the initial Morill Tariff and thus the STS could not be constructed. See the main text for more details.

Table C.3: Morrill-Implied Intra-Policy Tariff Changes and Import Growth

	Dependent Variable: $\Delta \ln(Imports_{it})$						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$\Delta \ln(1 + AVE_{it}^{Morrill})$	-3.887*	-4.573**	-4.711**	-5.786**	-5.609**	-4.985*	-6.752***
	(1.926)	(2.041)	(2.171)	(2.156)	(2.177)	(2.694)	(1.841)
$\ln(1 + AVE_{it})$		-0.059	-0.060				
		(0.045)	(0.045)				
$STS_i^{Morrill}$			-0.005	-0.009			
			(0.017)	(0.016)			
Constant	0.020***	0.029***	0.031***	0.021**	0.018***	0.018***	0.004*
	(0.007)	(0.009)	(0.010)	(0.008)	(0.003)	(0.003)	(0.002)
Estimator	OLS	OLS	OLS	OLS	OLS	OLS	OLS
Obs.	144	144	144	144	144	144	144
R^2	0.141	0.145	0.139	0.127	0.109	0.175	0.275
Price Index	UK_t^{CPI}	UK_t^{CPI}	UK_t^{CPI}	UK_t^{CPI}	UK_t^{CPI}	UK_t^{CPI}	UK_t^{CPI}
Year-FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
$\ln(1 + AVE_{it_0})$×Year-FE	No	No	No	Yes	Yes	Yes	Yes
SITC-FE	No	No	No	No	Yes	Yes	Yes
Weighted	No	No	No	No	No	Δt	$Imports_{it_0}$

Notes: Dependent variable is annualized log changes in real US industry imports within all 5 trade-policy regimes from 1900-1940 in stacked panels. Import growth and tariff changes are constrained to be within a period (i.e. Dingley 1900-1908, Payne-Aldrich 1910-1912, Underwood-Simmons (1915-1920), Fordney-McCumber 1925-1928, and Smoot-Hawley 1930-1940). The primary covariate is the intra-policy change in US tariff protection due to the inflationary erosion of specific tariffs and is defined in equation C.8. Policy-specific STS has been replaced with the STS under the Morrill Tariff of 1861 (see section 4.2) for details. Columns differ based on included controls and fixed effects. All columns employ time fixed effects. Column 4 includes a suppressed control for year-dummies interacted with initial $\ln(1 + AVE_{it_0})$. Column 5 adds industry-level fixed effects. Columns 6 and 7 re-estimate column5 under panel-length weighting and import value weighting. Standard errors are clustered at two-digit SITC level and reported in parentheses. *,**,*** indicate p-values of 0.1, 0.05, and 0.01 respectively.

specifications with industry-level fixed effects in columns 5-7 do not contain a direct control for industry $STS_{it}^{Morrill}$. Here too we find a strong relationship between intra-policy changes in tariffs and imports driven by the stochastic nature of specific-tariff-based protection in the presence of price changes. Across both tables our import elasticites range from approximately 3.6 to 6.8.

C.4 Within- and Cross-Policy Tariff Changes and Import Growth

While the prior section shows that we can estimate plausible import elasticites with exclusively intra-policy variation in tariff rates, the primary text adopts 5-and 10-year changes in imports and tariffs, which sometimes span multiple policy regimes. Here, both inflationary changes in tariffs and statutory changes in tariffs may occur. In such a setting we require that our inflation-driven tariff changes are not correlated with unmeasured changes in statutory tariff protection across regimes. To assess this, we construct our measure of intra-policy tariff changes and replicate our intra-policy baseline table with the exception of column 6, but use 5- and 10-year changes in imports in Panels A and B, respectively. Results are reported in Table C.4.

There are two points worthy of note. First, across all columns we see smaller import

Table C.4: 5- and 10-Year Import Elasticities: Aggregate Prices

	Panel A, Dependent Variable: 5-Year $\Delta \ln(Imports_{it})$					
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta \ln(1+AVE_{it})$	-1.724	-2.237*	-2.028*	-4.033**	-3.446**	-5.352
	(1.278)	(1.264)	(1.168)	(1.686)	(1.653)	(3.530)
$\ln(1+AVE_{it})$		-0.087**	-0.092**			
		(0.041)	(0.041)			
STS_{it}			0.018	0.016	-0.027	-0.074***
			(0.018)	(0.018)	(0.042)	(0.026)
Constant	0.021***	0.036***	0.028**	0.012	0.034	0.022
	(0.007)	(0.012)	(0.013)	(0.010)	(0.022)	(0.014)
Estimator	OLS	OLS	OLS	OLS	OLS	OLS
Obs.	236	236	236	236	236	236
R^2	0.180	0.189	0.189	0.202	0.190	0.480
	Panel B, Dependent Variable : 10-Year $\Delta \ln(Imports_{it})$					
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta \ln(1+AVE_{it})$	-2.167	-3.756*	-3.597*	-8.125***	-8.041***	-7.932**
	(1.702)	(1.876)	(1.889)	(1.769)	(1.750)	(3.186)
$\ln(1+AVE_{it})$		-0.119***	-0.119***			
		(0.042)	(0.041)			
STS_{it}			0.006	-0.004	-0.008	-0.008
			(0.016)	(0.017)	(0.033)	(0.018)
Constant	0.016**	0.034***	0.031**	0.007	0.010	-0.017*
	(0.008)	(0.011)	(0.012)	(0.008)	(0.017)	(0.010)
Estimator	OLS	OLS	OLS	OLS	OLS	OLS
Obs.	135	135	135	135	135	135
R^2	0.232	0.270	0.265	0.309	0.283	0.638
Price Index	UK_t^{CPI}	UK_t^{CPI}	UK_t^{CPI}	UK_t^{CPI}	UK_t^{CPI}	UK_t^{CPI}
Year-FE	Yes	Yes	Yes	Yes	Yes	Yes
$\ln(1+AVE_{it_0})\times$Year-FE	No	No	No	Yes	Yes	Yes
SITC-FE	No	No	No	No	Yes	Yes
Weighted	No	No	No	No	No	$Imports_{it_0}$

Notes: This table reports estimates of equation C.8. The dependent variable is annualized log changes in real US industry imports over 5- and 10-year windows in Panel A and Panel B respectively. All columns employ time fixed effects. Column 4 includes a suppressed control for year-dummies interacted with initial $\ln(1+AVE_{it_0})$, Column 5 adds industry fixed effects and column 6 additionally weights regressions by initial industry imports. Standard errors are clustered at two-digit SITC level and reported in parentheses. *,**,*** indicate p-values < 0.1, 0.05, and 0.01 respectively.

elasticities in absolute value over the 5-year intervals than their 10 year counterparts. For example, in column 3, in which we control only for time fixed effects, the initial tariff wedge, and initial specific tariff share, we estimate an import elasticity of 2 over a 5-year window and 3.6 over a 10-year window. Moreover, despite the fact that import growth may span multiple trade-policy regimes, the estimates obtained based on our within-policy measure of tariff changes yields remarkably similar estimates to those obtained from the purely intra-policy estimates found in Table C.2. The comparable specification in that table yields an elasticity of -3, statistically indistinguishable from the estimates based on longer differences.

C.4.1 Incorporating Industry-Level Price Variation.

We now discuss additional assumptions required to incorporate disaggregate price variation in our measure of realized protection. Exploiting only aggregate price variation ignores meaningful differences in how much prices (and thus tariffs) change across industries over time. However, incorporating industry price movements makes it more likely that US demand shocks may have an impact on equilibrium prices. As a consequence, rising prices that erode the protective capacity of specific tariffs may be associated with rising demand and thus lead to attenuated estimates (less negative) of import elasticities.

To the extent that the US can be viewed as a price-taker, such that the demand has no impact on equilibrium prices, all changes in prices are driven by foreign supply shocks. This corresponds to the case in which $\omega = 0$, the coefficients may be interpreted as an estimate of σ, and foreign price shocks are the sole determinant of price changes. In this case, we still require that demand and supply shocks are uncorrelated to obtain identification. In that case, rising prices lead to lower imports and still erode the protective capacity of tariffs. The price effect would still need to be controlled for directly as changes in price are embedded in the term capturing our intra-policy change in tariffs.

We repeat our previous table for 10-year changes but use industry-level price changes to construct our measure of intra-policy changes in tariffs and include the annualized log change in price as an additional covariate in all of our specifications. Results are found in Table C.5.

Here, too, we find negative and significant effects. It is notable that the elasticities are smaller – less negative – though not substantially so. Our benchmark specification found in column (3) yields an estimate of -1.9 and is significant at the 5% level. This less negative effect is consistent with the notion that some of the price changes are driven by demand, which also independently raises imports.Using industry-level variation in this way may thus require a more cautious interpretation as these results are, if anything, likely to understate the effect of tariff changes on imports.

C.5 IV Estimates of Import Elasticities using ΔRP_{it}

The previous sections have used variation in initial tariff protection to estimate import elasticities. While we have tried to control for other confounding factors, it may still be the case that unobserved determinants of the demand for protection also lead to import growth. As a consequence, we here return to our core identification strategy which does not depend on this variation. Specifically, we regress changes in log imports on changes in log tariffs, but instrument for our changes in log tariffs with $\Delta RP_{it} = \ln(1 - \frac{\Delta p_{it}}{p_{it+1}} STS_{it})$.

For the sake of space, Table C.6 provides estimates of a 10-year import growth, and instead of altering controls across columns we use different measures of the endogenous change in tariffs as well as different price variation for our instrument. Panels A and B report the second and first-stage results, respectively. All first-stage controls, including price changes and covariates have been suppressed for space. Full unabridged results are

Table C.5: 10-Year Import Elasticities Incorporating Industry Prices

	Panel B, Dependent Variable : 10-Year $\Delta \ln(Imports_{it})$					
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta \ln(1+AVE_{it})$	-1.799**	-1.906**	-1.925**	-3.104***	-3.525***	-3.016***
	(0.789)	(0.752)	(0.753)	(0.755)	(0.751)	(1.006)
$\ln(1+AVE_{it})$		-0.089**	-0.094**			
		(0.038)	(0.038)			
STS_{it}			0.017	0.019	0.018	0.007
			(0.016)	(0.016)	(0.036)	(0.020)
$\Delta \ln(p_{it})$	0.093	0.103	0.107	0.023	0.070	0.095
	(0.140)	(0.147)	(0.146)	(0.156)	(0.189)	(0.164)
Constant	0.019***	0.035***	0.026**	0.009	0.009	-0.007
	(0.006)	(0.011)	(0.013)	(0.009)	(0.019)	(0.013)
Estimator	OLS	OLS	OLS	OLS	OLS	OLS
Obs.	135	135	135	135	135	135
R^2	0.257	0.280	0.281	0.299	0.305	0.642
Price Index	UK_{it}^{UV}	UK_{it}^{UV}	UK_{it}^{UV}	UK_{it}^{UV}	UK_{it}^{UV}	UK_{it}^{UV}
Year-FE	Yes	Yes	Yes	Yes	Yes	Yes
$\ln(1+AVE_{it_0})\times$Year-FE	No	No	No	Yes	Yes	Yes
SITC-FE	No	No	No	No	Yes	Yes
Weighted	No	No	No	No	No	$Imports_{it_0}$

Notes: This table reports estimates of equation C.8. The dependent variable is annualized log changes in real US industry imports over 10-year windows. The primary dependent variable is the intra-policy change in tariffs due to industry-level price changes. All columns employ time fixed effects and direct controls for industry price changes. . Column 4 includes a suppressed control for year-dummies interacted with initial $\ln(1+AVE_{it_0})$, Column 5 adds industry fixed effects and column 6 additionally weights regressions by initial industry imports. Standard errors are clustered at two-digit SITC level and reported in parentheses. *,**,*** indicate p-values of 0.1, 0.05, and 0.01 respectively.

available upon request.

Specifically, we return to our baseline specification, which controls for initial policy variables $\ln(1+AVE_{it})$ and STS_{it}. In columns 1-3 we use the intra-policy measure of changes in tariffs ($\ln(1-\frac{\Delta p_{it}}{p_{it+1}} STS_{it} \frac{AVE_{it}}{1+AVE_{it}})$) as the endogenous regresssor, as in Tables C.2, C.4, and C.5). We denote this as "Intra." policy variation in the footer of the table. To construct our IV, we use the aggregate UK CPI, UK industry-level unit values, and exchange-rate-adjusted UK industry-level unit values for our measures of price growth in columns 1, 2, and 3 respectively. Columns 4-6 repeats this structure but uses the observed $\Delta \ln(1+AVE_{it})$ which includes statutory, price, and expenditure share changes as in Table C.1. We denote this as "Obs." (observed) tariff variation in the footer of the table.

When using the implied intra-policy change in tariff protection as the endogenous variable, we obtain reasonable and statistically significant estimates of the effect of tariff protection on import growth. In column 1, in which we have the most confidence that the price variation is unlikely to be driven by US demand, we recover an import elasticity of 6.7. As we incorporate industry (column 2) and exchange-rate (column 3) variation, this falls to -3.7 and -3.4. Nonetheless, these estimates are still statistically significant and,

Table C.6: IV Estimates 10-Year Import Elasticities

	Panel A: Second Stage Dependent Variable 10-Year $\Delta \ln(Imports_{it})$					
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta \ln(1+AVE_{it})$	-6.681**	-3.717**	-3.417*	-8.583	-6.675*	-6.259*
	(2.896)	(1.622)	(1.790)	(5.237)	(3.555)	(3.335)
$\ln(1+AVE_{it})$	-0.149***	-0.099**	-0.085**	-0.347**	-0.289**	-0.276**
	(0.043)	(0.038)	(0.040)	(0.163)	(0.121)	(0.116)
STS_{it}	-0.002	0.018	0.019	0.009	0.008	0.008
	(0.016)	(0.016)	(0.017)	(0.025)	(0.023)	(0.023)
$\Delta \ln(p_{it})$		-0.037			0.135	
		(0.163)			(0.196)	
$\Delta \ln(p_{it}^{XR})$			-0.004			0.145
			(0.166)			(0.190)
Estimator	IV	IV	IV	IV	IV	IV
1^{st}Stage-F	17.157	20.971	24.376	3.03	5.061	5.164
	Panel B: First Stage Dependent Variable 10-Year $\Delta \ln(1+AVE_{it})$					
ΔRP_{it}	0.122***	0.143***	0.157***	0.096*	0.083**	0.109**
	(0.029)	(0.031)	(0.032)	(0.055)	(0.037)	(0.048)
Estimator	-	-	-	-	-	-
Obs.	135	135	135	101	101	101
R^2	0.672	0.611	0.615	0.590	0.617	0.620
$\Delta ln(1+AVE_{it})$	Intra.	Intra.	Intra.	Obs.	Obs.	Obs.
Price Index	UK_t^{CPI}	UK_{it}^{UV}	UK_{it}^{UV-XR}	UK_t^{CPI}	UK_{it}^{UV}	UK_{it}^{UV-XR}
Sample	1900-1940	1900-1940	1900-1940	1900-1930	1900-1930	1900-1930
Δt	10-yr	10-yr	10-yr	10-yr	10-yr	10-yr
Year-FE	Yes	Yes	Yes	Yes	Yes	Yes
$\ln(1+AVE_{it_0})\times$Year-FE	No	No	No	No	No	No
SITC-FE	No	No	No	No	No	No
Weighted	No	No	No	No	No	No

Notes: This table reports results from two-stage-least-squares regression of equation C.5 in which the term $\Delta ln(1+AVE_{it})$ is instrumented for with the change in realized protection $\Delta RP_{it} \equiv \ln(1-\frac{\Delta p_{it}}{p_{it_1}} STS_{it_0})$. The dependent variable is the annualized 10-year change in log industry imports in stacked panels. All specifications employ time fixed effects and direct controls for industry price changes. Column 1 uses only aggregate variation UK-CPI to construct our instrument, Column 2 additionally incorporates log industry-level unit value changes, Column 3 additionally incorporates exchange rates. Columns 4-6 repeat this structure but use the observed change in log tariffs rather than that implied solely by intra-policy variation as the endogenous measure $\Delta \ln(1+AVE_{it}$. First stage information reported in Panel B.

given the strength of the first stage relationship, meaningfully related to the inflationary erosion of specific tariffs. Turning to columns 4-6, which rely on observed changes in log tariffs, we see negative but less precisely estimated import elasticites. While the first stage relationship is similar in magnitude, we attribute some of the decline in precision and first-stage F-statistics to the 25% reduction in sample size. We provide additional IV estimates based on 5-year changes at the end of this section and observe estimates ranging from -1.9 to -5.

C.6 Discussion

Taken as a whole, this section shows that one can construct a measure based on intra-policy variation in tariffs to estimate import elasticites. If one is willing to assume that tariff levels are not chosen to impact import growth, one can exploit purely intra-policy variation to recover these in an OLS setting. Estimates based on the intra-policy measure yield similar estimates over 5- and 10-year changes despite the fact that they may span multiple policies. As found elsewhere in the literature – e.g. (Boehm et al., 2023) – these elasticites are larger over longer time horizons. We also discuss additional identification concerns surrounding disaggregate price variation or exchange rate movements in constructing such intra-policy tariff changes. Finally, we have shown that our IV strategy recovers plausible and statistically significant estimates over a 10-year horizons using either industry or aggregate price variation to construct our instrument.

Table C.7: IV Estimates 5-Year Import Elasticities

	Panel A: Second Stage Dependent Variable 5-Year $\Delta \ln(Imports_{it})$					
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta \ln(1+AVE_{it})$	-5.281*	-2.257	-1.915	-7.614**	-5.332**	-4.674*
	(2.665)	(1.342)	(1.575)	(3.205)	(2.382)	(2.325)
$\ln(1+AVE_{it_0})$	-0.112**	-0.088**	-0.087**	-0.307**	-0.246**	-0.227**
	(0.042)	(0.041)	(0.040)	(0.120)	(0.095)	(0.094)
STS_{it_0}	0.012	0.024	0.023	-0.004	0.001	0.001
	(0.017)	(0.018)	(0.018)	(0.027)	(0.024)	(0.023)
$\Delta \ln(p_{it})$		0.128			0.214	
		(0.154)			(0.130)	
$\Delta \ln(p_{it}^{XR})$			0.155			0.223*
			(0.160)			(0.127)
Estimator	IV	IV	IV	IV	IV	IV
1^{st}Stage-F	8.957	18.414	21.164	4.822	5.833	5.281
	Panel B: First Stage Dependent Variable 5-Year $\Delta \ln(1+AVE_{it})$					
ΔRP_{it}	0.106***	0.135***	0.146***	0.092**	0.078**	0.096**
	(0.035)	(0.031)	(0.032)	(0.042)	(0.032)	(0.042)
Estimator	-	-	-	-	-	-
Obs.	236	236	236	202	202	202
R^2	0.513	0.608	0.615	0.457	0.480	0.478
$\Delta ln(1+AVE_{it})$	Intra.	Intra.	Intra.	Obs.	Obs.	Obs.
Price Index	UK_t^{CPI}	UK_{it}^{UV}	UK_{it}^{UV-XR}	UK_t^{CPI}	UK_{it}^{UV}	UK_{it}^{UV-XR}
Sample	1900-1935	1900-1935	1900-1935	1900-1930	1900-1930	1900-1930
Δt	5-yr	5-yr	5-yr	5-yr	5-yr	5-yr
Year-FE	Yes	Yes	Yes	Yes	Yes	Yes
$\ln(1+AVE_{it_0})\times$Year-FE	No	No	No	No	No	No
SITC-FE	No	No	No	No	No	No
Weighted	No	No	No	No	No	No

Notes: This table reports results from two-stage-least-squares regression of equation C.5 in which the term $\Delta ln(1+AVE_{it})$ is instrumented for with the change in realized protection $\Delta RP_{it} \equiv \ln(1-\frac{\Delta p_{it}}{p_{it_1}} STS_{it_0})$. The dependent variable is the annualized 5-year change in log industry imports in stacked panels. All specifications employ time fixed effects and direct controls for industry price changes. Column 1 uses only aggregate variation UK-CPI to construct our instrument, Column 2 additionally incorporates log industry-level unit value changes, Column 3 additionally incorporates exchange rates. Columns 4-6 repeat this structure but use the observed change in log tariffs rather than that implied solely by intra-policy variation as the endogenous measure $\Delta \ln(1+AVE_{it}$. First stage information reported in Panel B.

D Industry Import Descriptives and Robustness

In this section we provide additional information on industry-level trade flows, and demonstrate robustness of the baseline industry specifications found in Section 4.

We begin by providing summary statistics for the 10-year changes in log imports, realized protection, AVE, and STS. These can be found in Table D.1 and are the counterpart to the five-year sample found in Table 2 in the primary text. The series found in both tables have been annualized to facilitate comparison.

Table D.1: Summary Statistics for 10-Year Sample

	1900	1910	1920	1930	Total
$\Delta \ln(Imports_{it}^{US})$	0.072	0.045	-0.015	-0.019	0.021
	(0.080)	(0.082)	(0.062)	(0.053)	(0.080)
$\Delta RP_{it} : UK_t^{CPI}$	-0.003	-0.049	0.015	-0.009	-0.012
	(0.002)	(0.037)	(0.016)	(0.006)	(0.031)
$\Delta RP_{it} : UK_t^{UV}$	-0.001	-0.056	0.036	0.009	-0.003
	(0.025)	(0.047)	(0.051)	(0.021)	(0.051)
AVE_{it_0}	0.303	0.238	0.091	0.204	0.208
	(0.279)	(0.191)	(0.111)	(0.196)	(0.214)
STS_{it_0}	0.647	0.557	0.377	0.574	0.538
	(0.364)	(0.384)	(0.418)	(0.380)	(0.396)

Notes: Table presents summary statistics for 10-year industry import growth and changes in realized protection. For ease of comparison with table 2, all variables have been annualized. Variable means are reported above variable standard deviations (in parenthesis).

Next, we detail the relative importance of various US sectors in driving import growth during our sample. To do so, we provide two characterizations of our data. In figure D.1 we display annualized US log import growth for each five-year period in our sample. This variation underlies the dependent variable the our industry-level analysis found in Section 4. These are color coded to match their use elsewhere in the paper and reflect the trade policy in place at the start of period – the Dingley Tariff (orange), Payne-Aldrich (red), Underwood-Simmons (blue), Fordney-McCumber (purple), and Smoot-Hawley (Gray).

Given the heterogeneous importance of sectors in the overall composition of US imports, we also present a scatterplot of the relationship between real log import growth and start-of-period real log imports in Figure D.2.

Figure D.1: Annualized Log Import Growth by Industry

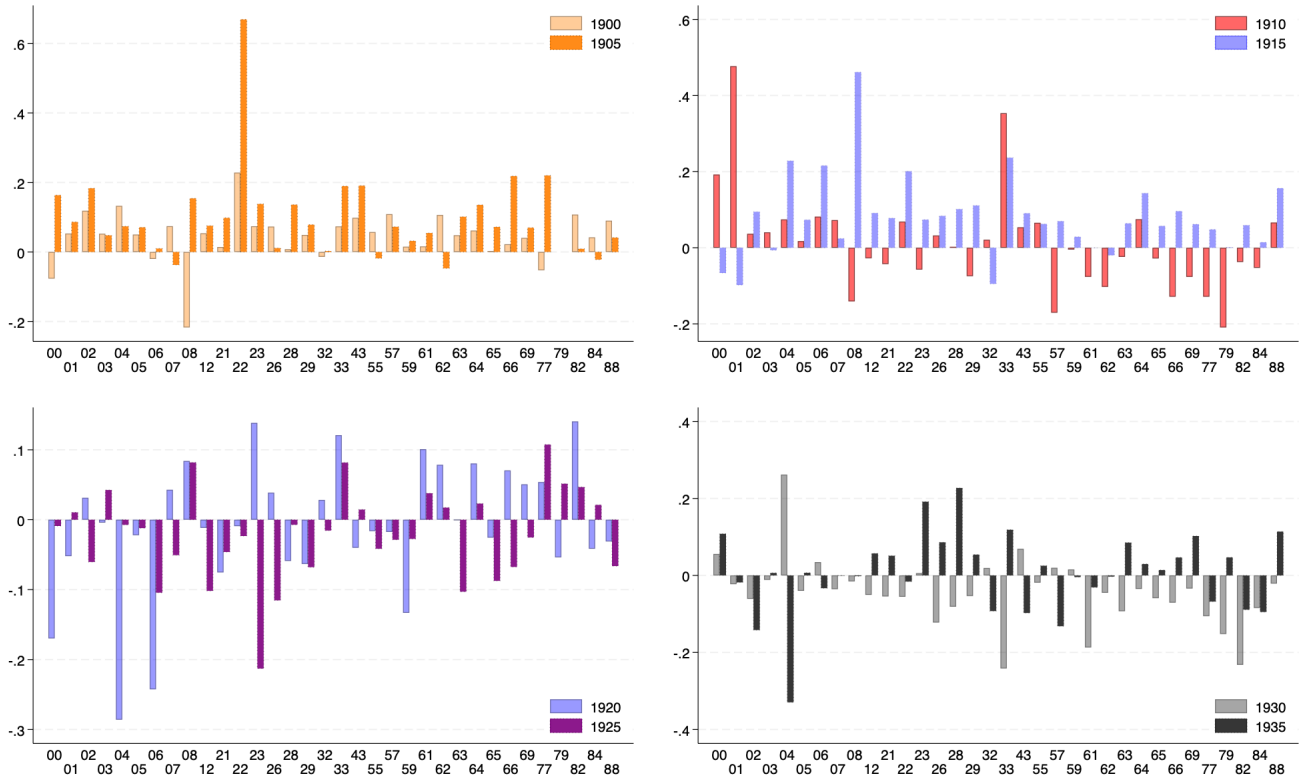
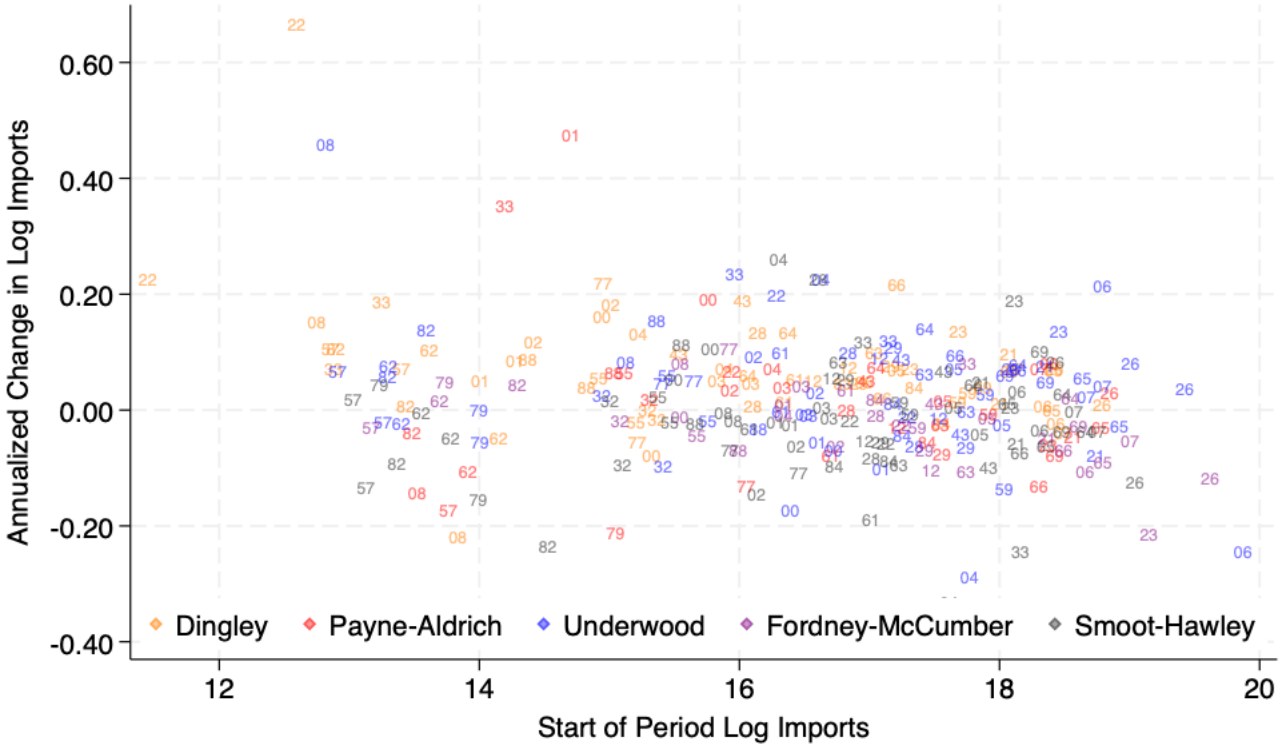


Figure D.2: Growth in Log Imports vs Log Imports by Industry and Policy



Notes: This figure presents annualized 5-year import growth for from 1900-1940 by two-digit SITC industry as amended in Appendix A. Imports are digitized from the Foreign Commerce and Navigation of the United States and Statistical Abstract of the United States.

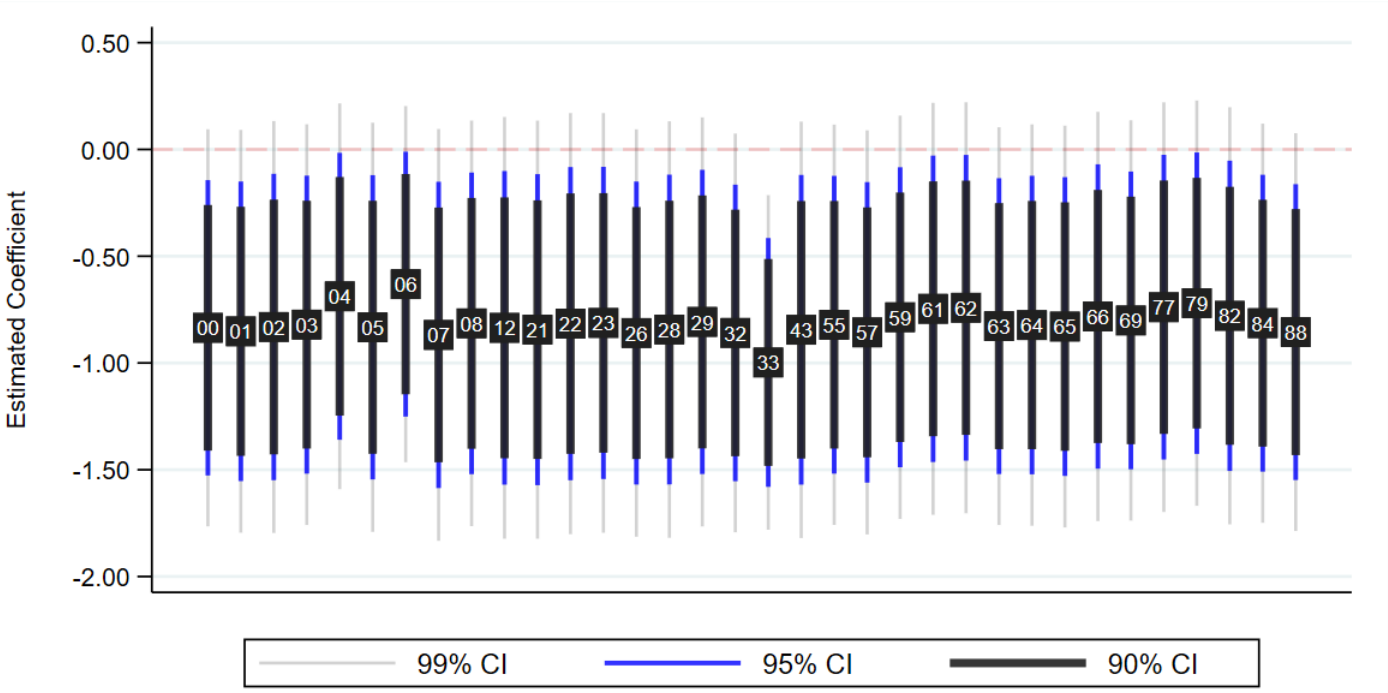
D.1 Sub-period and sub-sample analysis

D.1.1 Robustness to Dropping Industries

We now turn to additional specifications of our industry analysis.

In Figure D.3 we demonstrate that our primary findings are not driven by any single industry. To do so, we estimate our industry-level import growth regressions as in columns 3 of table 3, sequentially omitting each two-digit SITC code in our sample. We report the primary coefficient of interest (ΔRP_{it}) from these specifications with the omitted industry indicated in the circle. Standard error bars indicate significance at 10, 5, and 1% respectively. Results are qualitatively similar using industry-level price variation and available upon request.

Figure D.3: Annualized Log Import Growth Omitting Industries



Notes: Each vertical bar is the primary coefficient from table 3 column 3 estimated by omitting the indicates two-digit SITC code. Black, blue, and grey bars indicate 90%, 95%, and 99% confidence intervals respectively.

D.1.2 Estimating Effects During Inflation and Deflation Separately

Here we estimate the effects of changes in realized protection separately during inflationary and deflationary periods. Across the entirety of our 40-year sample, prices increase modestly. As such, one might worry that our estimates capture unobserved industry-level correlates of changes in realized protection that are also associated with import growth. To explore this possibility, we split our sample into inflationary (1900-1920) and

deflationary (1920-1935) periods and estimate our baseline equation for five-year changes separately for each period:

$$\Delta \ln(Imports_{it}^{US}) = \beta_0 + \beta_1 \Delta RP_{it} + \Gamma X_{it} + \eta_t + \epsilon_{it}$$

with

$$\Delta RP_{it} \equiv \ln\left(1 - \frac{\Delta p_t}{p_{t_1}} STS_{it}\right).$$

In order for unobserved industry trends to be driving our results, the trends would have to change signs in 1920 as the inflationary erosion of protection associated with rising imports became deflationary increases in protection leading. Without a clear mechanism for such a switch, finding that our baseline results obtain after splitting our sample should assuage such fears. Table D.2 replicates Table 3 with the inflationary period (1900-1920) in Panel A and the deflationary period (1930-1935) in panel B.

As before, column 1 includes only time fixed effects as a control. Changes in realized protection predict import growth in both the inflationary and deflationary periods, though the effect is larger in deflationary periods. The addition of initial AVE_{it_0} levels as a covariate in column 2 makes no qualitative difference on this conclusion. It is only in column 3, in which we control for STS_{it_0} directly that this effects diverge meaningfully – the estimate in deflationary periods increases and is cut in half in deflationary periods. This may be driven by the high degree of multicolinearity between STS_{it_0} and our measure of realized protection when split separately into high and low inflation periods. Given the persistence in STS over time, a within-period correlation of STS_{it_0} and $\Delta RP_i t$ of -63% and 83% in periods of inflation and deflation, respectively, makes it difficult to separately identify the two coefficients. Put another way, if prices grew linearly, the two estimates would not be separable when using aggregate price variation. Identifying them both thus requires meaningful deviation from price trends, such as bouts of inflation and deflation or incorporation of industry-level prices. Further, note that STS_{it_0} is always insignificantly related to import growth in the pooled sample.

That our main effect holds in the first two columns and maintains a consistent sign in all specifications suggests little evidence for unobserved trends that coincidentally switch signs at the same time as realized protection.

Table D.2: Asymmetry of Import Growth and ΔRP_{it}^{US}

	Panel A: Inflationary Periods		
	(1)	(2)	(3)
ΔRP_{it}	-0.464*	-0.522*	-0.278
	(0.263)	(0.270)	(0.300)
$\ln(1 + AVE_{it_0})$		-0.113**	-0.123**
		(0.054)	(0.056)
STS_{it_0}			0.035
			(0.036)
Std. Coef.	-.232	-.261	-.139
R^2	0.078	0.095	0.096
Obs.	134	134	134
Panels	4	4	4
	Panel B: Deflationary Periods		
	(1)	(2)	(3)
ΔRP_{it}	-1.208**	-1.207**	-3.006***
	(0.539)	(0.543)	(1.082)
$\ln(1 + AVE_{it_0})$		-0.007	-0.020
		(0.044)	(0.041)
STS_{it_0}			0.086**
			(0.034)
Std. Coef.	-.36	-.359	-.895
R^2	0.050	0.040	0.082
Obs.	102	102	102
Panels	3	3	3
Price Growth	UK^{CPI}	UK^{CPI}	UK^{CPI}
Time FE	Yes	Yes	Yes
Weighted	Equal	Equal	Equal
Δt	5-year	5-year	5-year
Period	1900-35	1900-35	1900-35

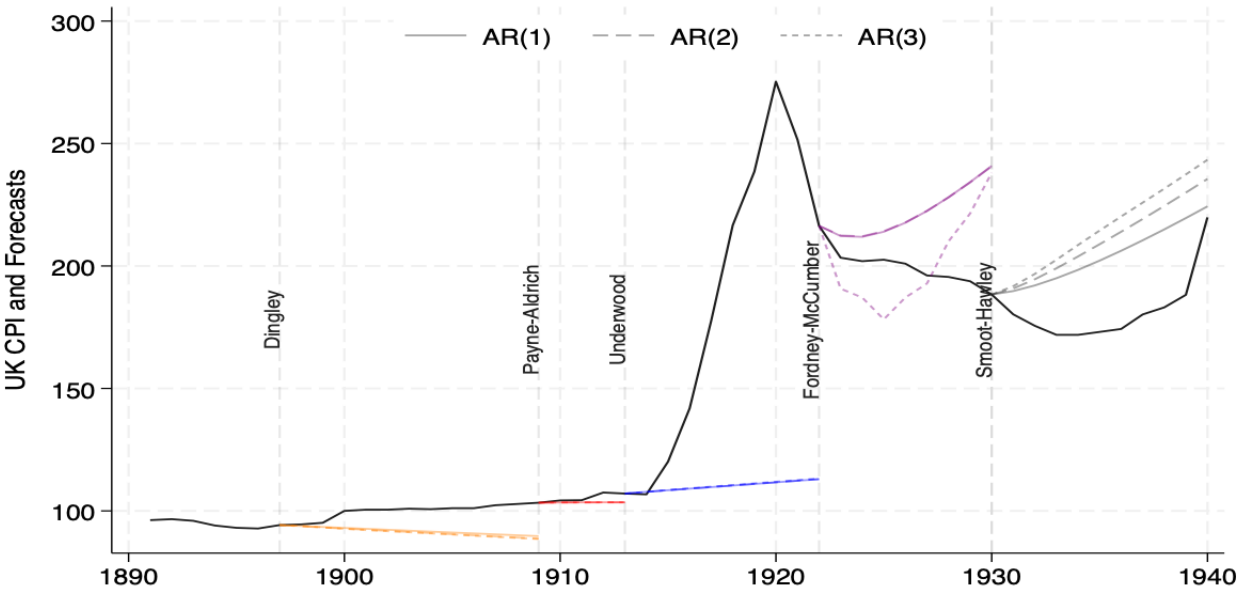
Notes: Dependent variable is annualized 5-year log changes in real US industry imports from 1900-1935 in stacked panels. ΔRP_{it}^{US} is the US change in realized protection, which is the percent change in US tariff protection due to the inflationary erosion of specific tariffs and is defined in equation 4. Columns 1-3 replicate baseline the analogous columns from Table 3. Panel A estimates this effect during inflationary periods, while Panel B does so during deflationary periods. Standard errors are clustered at two-digit SITC level and reported in parentheses.

D.2 Price Forecasting

As discussed in the text, a further threat to identification is the possibility that changes in realized protection are themselves non-random. This would be possible if specific tariffs were determined jointly with an inflation forecast. That is, if politicians anticipate subsequent price movements and set specific tariffs in expectation of the implied effects on realized protection, our measure would be subject to the same concerns that complicate the use of ad valorem equivalent tariffs directly. For example, in the face of expected deflation, politically influential industries might lobby for higher levels of specific tariffs. With this in mind, we evaluate the feasibility of price forecasting during our sample.

Prices in this era experienced periods of rapid inflation, as well as bouts of substantial deflation, as highlighted in Figure 1 in the text. To accurately use specific tariffs as a means of future protection, politicians would need to correctly anticipate both. To further emphasize this point, we explore how well a simple price forecast matches subsequent price growth in this period.

Figure D.4: UK CPI Forecasts at Policy Onset



Notes: Forecast series constructed from AR(1), AR(2), and AR(3) models of log UK CPI growth, respectively, and are based on years (t_{-25}, t_{-1}) preceding the policy's onset at year t. UK CPI data taken from Jordà et al. (2017).

Specifically, in Figure D.4 we present forecasts of the UK CPI, as used in our baseline measure of changes in realized protection. We estimate an auto-regressive model of log price growth based on 25 years of data prior to each change in tariff policy and use estimates from these models to construct a dynamic forecast beginning at the onset of the policy regime and continuing through the subsequent policy regime's inception. We

report forecasts from models estimated using one to three lags. As is clear from the figure, differences between the expected and realized price growth are considerable and represent likely unanticipated changes in realized protection. Take, for example, price forecasts at the onset of the Dingley Tariff in 1897. Forecasts would have predicted subsequent deflation, thus favoring specific tariffs as a tool to engender increased protection. In fact, prices increased. Even in cases when a simple forecast correctly predicts the direction of price changes, such as under the Underwood Tariff, the discrepancy between the magnitude of anticipated and realized price movements is substantial. Such volatility limits the scope for endogenous tariff setting through specific tariffs, as unanticipated changes in price levels lead directly to unanticipated changes in protection.[67]

[67] These results are consistent with the broader literature on price forecasting during this period, e.g. Irwin (2014), Evans and Wachtel (1993), Hamilton (1992), and Dominguez and Fair (1988).

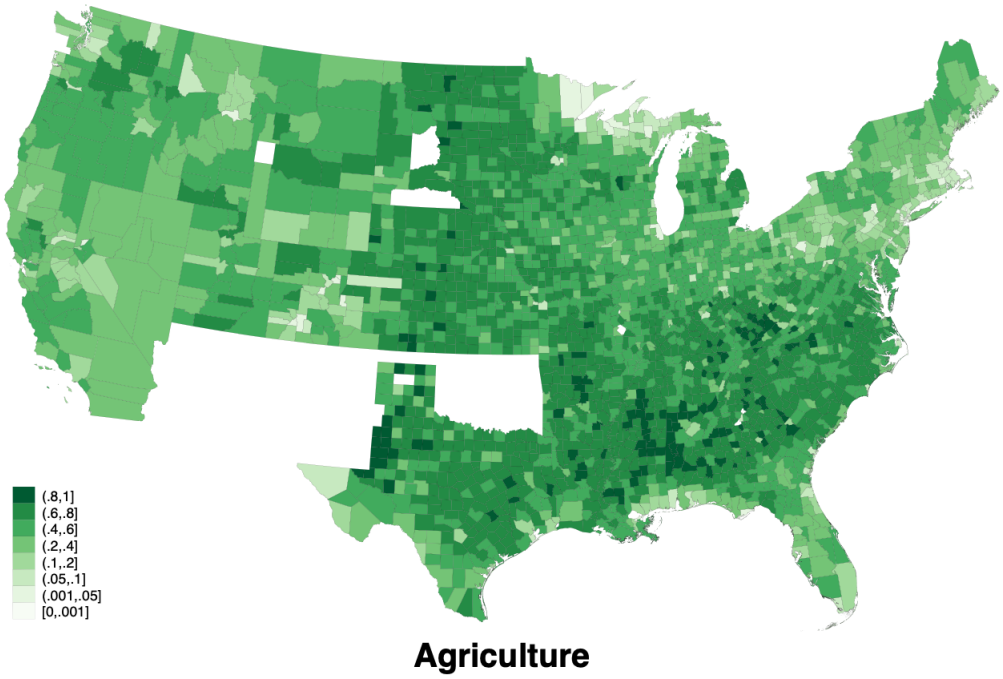
E Labor Market Descriptives and Robustness

This section provides additional information regarding the spatial mapping of trade flows to labor markets in Section 5, as well as additional descriptive features of the labor market shock. Section E.1 provides county-level descriptive statistics and additional maps. Section E.2 provides balance tests and identifies potential confounding variables that motivate our controls. Section E.3 presents additional labor market robustness tables based on our primary analysis. Section E.4 re-estimates the tables in Section 5 incorporating industry-level price variation in the construction of our IV, ΔRP_{it}. Section E.5 provides a county-level analysis of labor market outcomes at the "shock-level" and provides Borusyak et al. (2022) standard error corrections.

E.1 Labor Market Descriptive Information and Summary Statistics

In order to construct our shift share shock we map national import growth to counties by creating an employment-weighted average of national industry imports. Given its importance to labor markets in this era, we display the share of county employment accounted for by agriculture in Figure E.1.

Figure E.1: Employment Shares in Agriculture, 1900



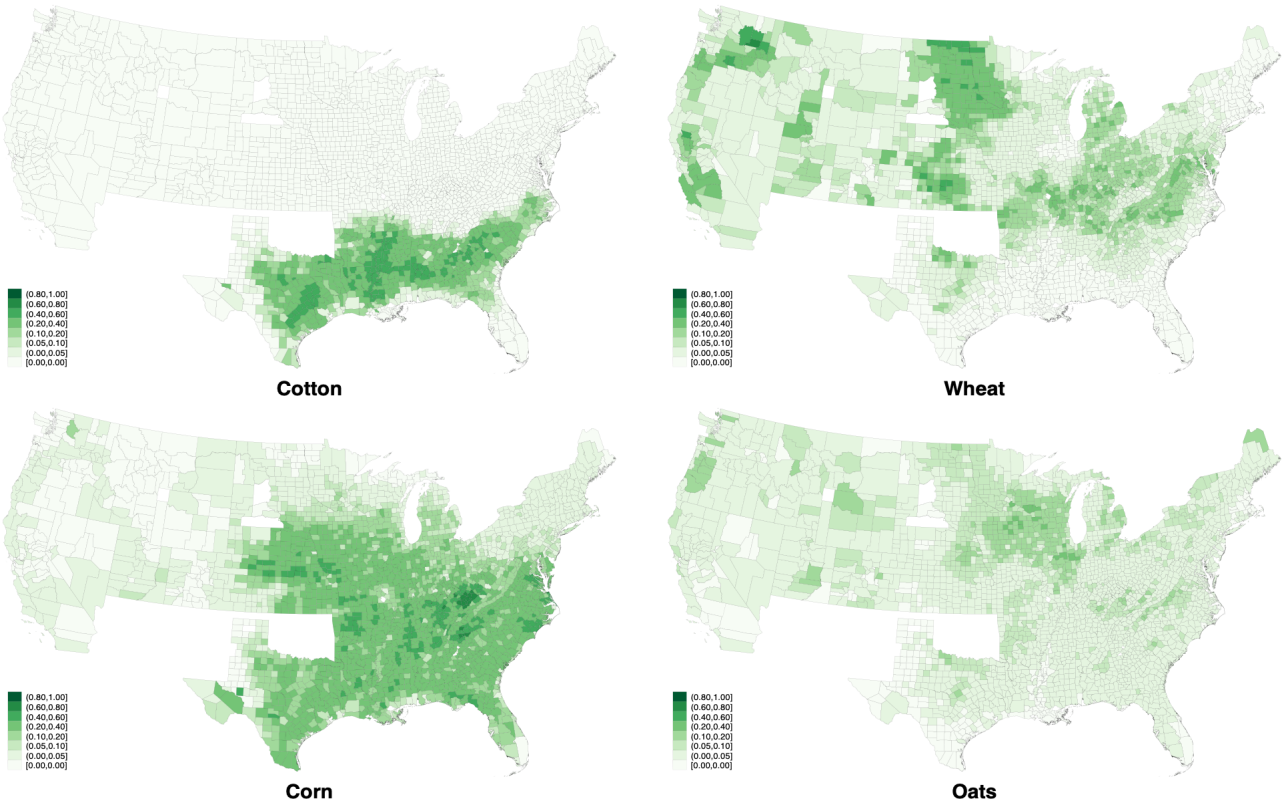
Notes: Agricultural employment defined as 1950 IPUMS Census industry 105.

On average, one-third of county-level employment is engaged in agriculture. Due to

the importance of agriculture as a whole, as well as the geographic dispersion of crops, we separate four major crops from our industry import data and map them to labor markets with the aid of the NHGIS county-level acreage data from 1899. These data provide county-level acreage by crop type for each of 37 crops. Over 93% of all acreage is used in the production of five crops: corn,grasses, wheat, oats, and cotton. Of these, we can readily identify corn, wheat, oats, and cotton in the FCNUS, SAUS, and SAUK data.[68]

We thus construct acreage share-based employment weights for agricultural workers within a county based on corn, oats, wheat, cotton, livestock production, and a composite residual category. We display the variation for the four major crops in E.2.

Figure E.2: Employment Share Attributed to Major Crop Groups



For all other products, we map imports to labor markets by concording trade flows to the Census Industry (IND1950) through three steps. First, using a conversion table provided by UN Trade Statistics we map SITC codes to the 6-digit 1993 Harmonized System (HS) classification scheme.[69] This is an n-to-one mapping, so we apportion trade SITC flows to each HS product weighting by the inverse number of HS codes to which a given SITC code concords.

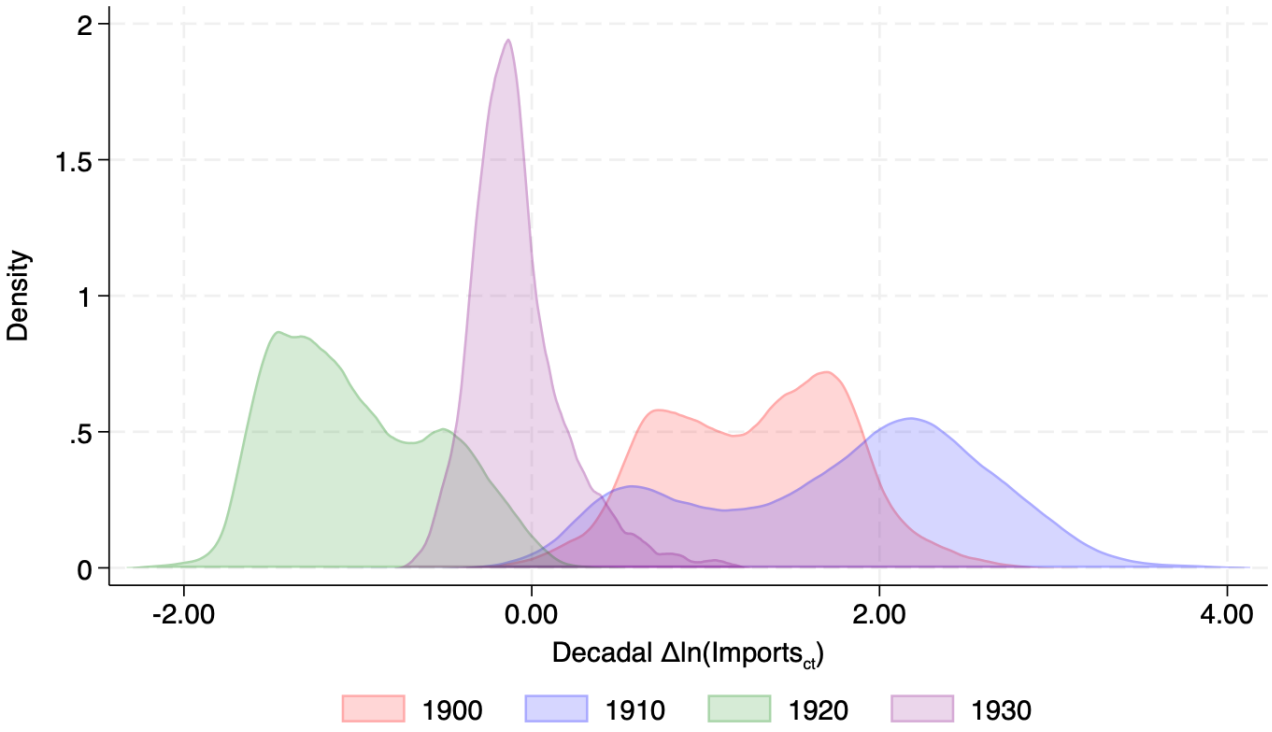
[68] Corn imports are missing from the Statistical Abstract data in 1910. Due to corn's importance in employment, we infer corn imports in this year by multiplying corn imports from the 1910 FCNUS data by the ratio of Statistical Abstract to FCNUS imports for corn in 1909. We then subtract this value from "other breadstuffs" in the Statistical Abstract data.

[69] https://unstats.un.org/unsd/trade/classifications/correspondence-tables.asp

We then map from HS to 4-digit SIC codes using the concordance constructed by Pierce and Schott (2012). We apportion these codes in equal share to the SIC products to which they concord. Again, we weight trade flows by the inverse number of SIC products to which an HS code maps. Finally, we concord SIC codes to 1990 Census industry codes using the concordance provided by James Lake (http://p2.smu.edu/jlake/data_code.html). These then map in an n-to-one fashion to 1950 census industry codes, which is the native classification for industrial employment in our 1900-1940 census data.

In Figure E.3 we display the distribution of our shift share shocks by decade. As is clear from the figure, these county level shocks match our aggregate import growth patterns: 1900-1920 was characterized by import growth, while 1920-1940 experienced a contraction, though county-level experiences differed substantially.

Figure E.3: Kernel Density of Import Exposure by Decade



Notes: Figure displays kernel density of county log changes in imports per worker by decade.

Table E.1 provides summary statistics for the covariates in our individual labor market analysis in section 5.

Note that these summary statistics are reported for the full sample of observations. These values may differ slightly from table footers which indicate "Dep. μ," or the mean of the dependent variable, as the sample size of those regressions differ across specifications. The value "Dep. μ" reports the estimating sample mean.

Table E.1: Descriptive Statistics for Individual Labor Market Analysis

	1900	1910	1920	1930	Total
$\Delta \ln(Imports_{ct})$	1.011	1.197	-0.597	-0.138	0.989
	(0.456)	(0.925)	(0.555)	(0.235)	(0.660)
ΔRP_{ct}	-0.030	-0.609	0.143	-0.088	-0.140
	(0.006)	(0.187)	(0.082)	(0.030)	(0.250)
$NoWork_{i,t+10}$	0.030	0.047	0.038	0.066	0.034
	(0.170)	(0.211)	(0.191)	(0.248)	(0.180)
$\Delta \ln(Income_{i,t+10})$	0.064	0.093	0.080	0.074	0.071
	(0.502)	(0.453)	(0.437)	(0.477)	(0.490)
$MigrateState_{i,t+10}$	0.298	0.236	0.215	0.185	0.282
	(0.458)	(0.424)	(0.411)	(0.388)	(0.450)
Switch Industry$_{i,t+10}$	0.663	0.607	0.616	0.664	0.650
	(0.473)	(0.488)	(0.486)	(0.472)	(0.477)

Notes: Table reports summary statistics for key dependent and explanatory variables by decade and overall. Variable mean stacked above variable standard deviation (in parenthesis). As with individual-level regressions, summary statistics are weighted following Abramitzky et al. (2020).

E.2 Balance Tests and Control Selection

Our identification strategy relies on exogeneity in changes in realized protection, ΔRP_{ct}. A threat to this approach is the possibility that such changes are correlated with unobserved industry- and county-level characteristics. In this section we explore that possibility, following the approach suggested by Borusyak et al. (2022).

First, we examine the relationship between changes in realized protection and a host of county-level characteristics at the "shock-level." In Table E.2 we regress county-level characteristics against changes in realized protection, instrumenting with the "shock-level" treatment as in Borusyak et al. (2022). Specifically, we explore the the correlation between our shock and the start of decade share of the population that is: employed in agriculture, literate, foreign born, non-white, under 35, urban, employed in the traded sector, or employed in the manufacturing sector. In all specifications we have conditioned on year fixed effects, initial tariff protection $\ln(1 + AVE_{ct})$, and reliance on specific tariffs STS_{ct}.

Only the size of the traded sector (relative to total employment) and the share of a county that is urban are related to our shock in this univariate framework. Note that, because we are operating in the complete-shares case, in which we define labor weights only in the traded sector, the tradable share of employment is not inherently a part of the identifying variation used in our primary analysis. However, the share is correlated with the magnitude of the shock *within* the traded sector. The erosion of tariff protection is more prominent among locations with a larger traded sector, while urban locations see relatively less tariff erosion than rural ones.

Table E.2: Balance Tests

	(1) Ag_{ct}	(2) $Literate_{ct}$	(3) $For.Born_{ct}$	(4) $NonWhite_{ct}$	(5) $Under35_{ct}$	(6) $Urban_{ct}$	(7) $Trade_{ct}$	(8) Mfg_{ct}
ΔRP_{ct}	-0.072	0.017	0.063	-0.024	-0.002	0.136*	-0.074*	0.031
	(0.084)	(0.026)	(0.049)	(0.061)	(0.008)	(0.081)	(0.043)	(0.029)
$\ln(1 + AVE_{ct_0})$	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
STS_{ct_0}	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Table presents "shock-level" balance tests for our labor-market study based on start of decade county-level shares of the population falling in various categories. Borusyak et al. (2022) corrected robust standard errors reported in parentheses. *, **, and *** indicate p-values $< 0.1, 0.05, 0.01$ respectively.

Given that we do not conduct a univariate analysis, and that many of these county-level controls are correlated with each other, in Table E.3 we re-estimate this relationship controlling for all other covariates. That is, we only need to be concerned about things which are correlated with our instrument *conditional on our controls*. Here we see that only the share of employment in agriculture remains significantly related to our measure, conditional on the other controls. This suggests that the traded and urban share relationship we document above is a product of correlation with other covariates.

While more flexible, this specification still imposes that the relationship between

Table E.3: Balance Tests with Controls

	(1) Ag_{ct}	(2) $Literate_{ct}$	(3) $For.Born_{ct}$	(4) $NonWhite_{ct}$	(5) $Under35_{ct}$	(6) $Urban_{ct}$	(7) $Trade_{ct}$	(8) Mfg_{ct}
ΔRP_{ct}	0.037***	0.001	0.020	0.005	0.001	0.006	-0.005	0.009
	(0.011)	(0.004)	(0.015)	(0.010)	(0.003)	(0.010)	(0.007)	(0.008)
$\ln(1+AVE_{ct_0})$	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
STS_{ct_0}	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Other Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Table presents "shock-level" balance tests for our labor-market study based on county-level shares of the population falling in various categories. All columns include all other county shares as controls and are suppressed to save space. Dependent variable is listed in the header. Borusyak et al. (2022) corrected robust standard errors reported in parentheses. *, **, and *** indicate p-values $< 0.1, 0.05, 0.01$ respectively.

ΔRP_{ct} and these county controls is constant throughout our sample. Given the fact that our sample spans four decades, this may not be the case. As such, we turn to a final exercise in which we allow for the relationship between the covariates and our shock to differ by decade. Specifically, we condition on the full set of covariates in Table E.3 and sequentially interact each on with a set of year-dummies. We regress these on the fitted value of the ΔRP_{ct} at the shock level. We then perform a hypothesis test that the county-by-year characteristics are jointly zero and report the result of this test as "Joint. Sig. p-val." in Table E.4. Said differently, we are testing whether, conditional on our baseline start-of-decade controls, there is evidence that time-specific county-level controls are correlated with our shock.

Table E.4: Flexible-Trends Balance Tests

	Dependent Variable: ΔRP_{ct}							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$X_{ct_0} \times I(1900)$	1.056***	2.175	0.201	1.890	4.213	0.225	0.175	0.997
	(0.337)	(1.975)	(0.741)	(1.549)	(3.953)	(0.563)	(0.713)	(0.927)
$X_{ct_0} \times I(1910)$	0.678	2.286	1.264	1.952	7.087*	0.973	-0.526	1.889
	(0.848)	(3.842)	(1.119)	(1.403)	(4.131)	(0.981)	(1.515)	(2.477)
$X_{ct_0} \times I(1920)$	0.730*	6.317*	1.205	0.650	-5.544**	0.643	-0.954	0.029
	(0.381)	(3.454)	(1.015)	(0.915)	(2.607)	(0.442)	(0.665)	(0.480)
$X_{ct_0} \times I(1930)$	0.939***	4.688	0.588	0.838	-0.676	0.373	-0.175	0.158
	(0.364)	(3.315)	(0.945)	(0.886)	(2.918)	(0.408)	(0.672)	(0.530)
X_{ct_0}	Ag_{ct}	$Literate_{ct}$	$For.Born_{ct}$	$NonWhite_{ct}$	$Under35_{ct}$	$Urban_{ct}$	$Trade_{ct}$	Mfg_{ct}
Joint Sig. p-val	0.015	0.081	0.504	0.286	0.043	0.223	0.207	0.519
$\ln(1+AVE_{ct_0})$	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
STS_{ct_0}	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
County Controls$_{ct_0}$	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Table presents "shock-level" balance tests for our labor-market study based on county-level shares of the population falling in various categories interacted with year dummies. All columns include all other county shares as controls and are suppressed to save space. Dependent variable is listed in the fitted-value of ΔRP_{ct} at the "shock-level." Borusyak et al. (2022) corrected robust standard errors reported in parentheses. *, **, and *** indicate p-values $< 0.1, 0.05, 0.01$ respectively.

Here we see that only two of covariates are related to our shock with 95% confidence. We reject that agirultural employment share-by-year controls are unrelated to our instrument with a p-value of 1.5%. Similarly, we reject that under-35-by-year controls are unrelated to our instrument with a p-value of 4.3%. Together, these suggest that places with more agricultural employment and younger populations are differentially exposed to our shock. Thus, any shock that differentially affects young workers or agriculturally intensive regions would be fasely attributed to our tariff shock if not appropriately controlled for. As a consequence, in all specifications we include the full baseline set of controls, time fixed effects, our tariff controls, and year fixed effects interacted with the agricultural employment share and the under 35 share, respectively. In robustness exercises we control for a variety of other county-by-year variables and show that our primary results are unaffected by the change.

E.3 Heterogeneity and Robustness of Linked Results

In Table E.5, we repeat the specification from Table 9 separately for Black, White, and foreign-born individuals. As is clear from the table, while the channels and magnitudes differ across groups, the overall implication that relative labor market conditions declined as a result of import growth is not specific to any particular group. White workers are impacted on all margins, while the effects for Black workers are limited to industry lock-in and income growth effects. Foreign-born workers see rising incomes in response to foreign competition. This effect is consistent with evidence elsewhere that foreign-born workers exhibit less locational attachment and may be more willing to relocate for work – though we do not find that trade is a driver of *cross-state* migration for such workers. Finally, foreign-born workers are the most susceptible to industry lock-in.

In Table E.6, we subject our baseline estimates to a battery of alternative specification choices. In column 1, we run unweighted specifications. In column 2 we omit all controls except year fixed effects and start of period tariff controls. In column 3 we introduce county fixed effects to control for time-invariant county characteristics that might drive our results. In columns 4 and 5, respectively, we include county tradable employment shares and manufacturing employment shares, each interacted with year fixed effects. This addresses the concern that our trade shocks capture more general sector-specific time-varying changes. In column 6 we exploit tariff data as of the middle of the decade, rather than the beginning, to capture the fact that trade policy changes throughout the decade and initial tariffs levels might be a poor proxy for tariff protection in place for much of the decade. In column 7 we employ the full measure of changes in ΔAVE_{it} in constructing our instrument, as derived in equation 3, rather than omitting initial AVE levels as in our baseline. As is clear from the table, our results are broadly robust to these alternative specifications.

The only substantial deviations from our baseline findings are in industry switching, for which both unweighted results and manufacturing employment share-by-year controls cause the sign to change. We do not believe these to be serious shortcomings as we believe the weighted regressions are less likely to over-weight sparsely populated rural counties, and our balance tests in section E.2 suggest no reason to be concerned that manufacturing-year variation is systematically related to our measure of realized protection. Finally, unweighted results reveal a more significant role for migration which is consistent with results observed when allowing for industry-level price variation or age-specific coefficients on import growth.

Lastly, Table E.7 provides full estimates underlying Figure 7.

Table E.5: Baseline Individual Results by Demographic Status

	Outcomes Among White Males			
	(1) $NoEmployment_{i,t+1}$	(2) $\Delta \ln(Income_{i,t+1})$	(3) $Migrate_{i,t+1}$	(4) Switch Industry$_{i,t+1}$
$\Delta \ln(\widehat{Imports}_{ct})$	0.013***	-0.027***	0.026**	-0.020***
	(0.004)	(0.005)	(0.011)	(0.006)
$\ln(1 + AVE_{ct})$	0.048***	0.097***	-0.659***	-0.114
	(0.012)	(0.024)	(0.099)	(0.080)
STS_{ct_0}	0.008**	0.019**	0.128***	0.078***
	(0.004)	(0.008)	(0.022)	(0.011)
1^{st} Stage $\hat{\beta}$	-1.370	-1.370	-1.370	-1.370
1^{st} Stage F	262.047	262.047	262.047	262.047
Obs.	28,012,850	23,831,262	28,012,850	25,377,089
	Outcomes Among Black Males			
$\Delta \ln(\widehat{Imports}_{ct})$	-0.001	-0.057***	-0.002	-0.056***
	(0.003)	(0.014)	(0.019)	(0.013)
$\ln(1 + AVE_{ct})$	-0.005	0.106*	-0.587***	-0.093*
	(0.010)	(0.058)	(0.142)	(0.055)
STS_{ct_0}	0.000	0.062***	0.099***	0.178***
	(0.003)	(0.019)	(0.035)	(0.018)
1^{st} Stage $\hat{\beta}$	-1.033	-1.033	-1.033	-1.033
1^{st} Stage F	147.430	147.430	147.430	147.430
Obs.	1,745,047	1,531,978	1,745,047	1,595,769
	Outcomes Among Foreign-born Males			
$\Delta \ln(\widehat{Imports}_{ct})$	0.005	0.102**	-0.026	-0.099***
	(0.011)	(0.052)	(0.055)	(0.031)
$\ln(1 + AVE_{ct})$	0.046*	-0.094	-0.718**	-0.197*
	(0.026)	(0.202)	(0.366)	(0.105)
STS_{ct_0}	0.024	-0.046	0.104	0.099**
	(0.017)	(0.079)	(0.131)	(0.050)
1^{st} Stage $\hat{\beta}$	-1.373	-1.373	-1.373	-1.373
1^{st} Stage F	54.620	54.620	54.620	54.620
Obs.	4,113,675	3,532,575	4,113,675	3,781,485

Notes: Regressions of instrumented county-level import growth on longitudinal individual level outcomes based on linked data following Abramitzky et al. (2020) from 1900-1910, 1910-1920, 1920-1930, and 1930-1940. Dependent variables is whether the individual was in the labor force at the end of the decade in column 1. Column 2 is the decadal change in occupational income score. Column 3 is whether an individual moved to another state. Column 4 indicates whether an individual switched industries. Panels differ in terms of which sub-population the effects are estimated for. Panel A is White males. Panel B is Black males. Panel C is Foreign-born males. Import data from *Statistical Abstract of the United States* and *Foreign Commerce and Navigation of the United States* and authors' calculations. Population data from IPUMS (Ruggles et al., 2020). Import growth is instrumented by ΔRP_{ct} as in equation 9. Standard errors are clustered at the county level and are reported in parentheses. *, **, and *** indicate p-values $< 0.1, 0.05, 0.01$ respectively. All controls from table 9 are included and have been suppressed for space.

Table E.6: Robustness of Baseline Individual Results to Alternate Specifications

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Panel A: No Employment						
$\Delta \ln(\widehat{Imports}_{ct})$	0.017***	0.004***	0.015***	0.015***	0.015***	0.031***	0.015***
	(0.004)	(0.001)	(0.004)	(0.003)	(0.003)	(0.010)	(0.003)
$\ln(1 + AVE_{ct})$	0.028**	0.042***	-0.021	0.036***	0.035**	0.082***	0.036**
	(0.013)	(0.008)	(0.032)	(0.014)	(0.015)	(0.027)	(0.015)
STS_{ct}	0.001	0.020***	-0.008	0.009**	0.010**	0.006	0.009**
	(0.003)	(0.003)	(0.007)	(0.004)	(0.005)	(0.005)	(0.004)
1^{st} Stage $\hat{\beta}$	-0.847	-3.240	-1.081	-1.213	-1.329	-0.553	-11.325
1^{st} Stage F	79.695	1215.130	224.045	217.988	223.659	26.702	39.092
Obs.	29,811,174	29,792,145	29,792,145	29,792,145	29,792,145	29,792,145	29,792,145
Spec. Change	Unw.	TrOnly.	Cnty F.E.	Trd X Yr	Mfg. x Yr	Mid-Samp.	Alt. IV
	Panel B: $\Delta \ln$ (Income)						
$\Delta \ln(\widehat{Imports}_{ct})$	-0.048***	-0.002	-0.027**	-0.030***	-0.056***	-0.036	-0.012
	(0.008)	(0.003)	(0.012)	(0.011)	(0.010)	(0.022)	(0.023)
$\ln(1 + AVE_{ct})$	0.044**	-0.445***	0.236**	0.036	0.009	-0.019	0.045
	(0.018)	(0.044)	(0.100)	(0.101)	(0.102)	(0.110)	(0.095)
STS_{ct}	0.037***	0.167***	0.004	0.016	0.035**	0.011	0.008
	(0.007)	(0.013)	(0.012)	(0.015)	(0.016)	(0.018)	(0.014)
1^{st} Stage $\hat{\beta}$	-0.847	-3.240	-1.081	-1.213	-1.329	-0.553	-11.325
1^{st} Stage F	79.695	1215.130	224.045	217.988	223.659	26.702	39.092
Obs.	25,405,982	25,390,582	25,390,582	25,390,582	25,390,582	25,390,582	25,390,582
Spec. Change	Unw.	TrOnly.	Cnty F.E.	Trd X Yr	Mfg. x Yr	Mid-Samp.	Alt. IV
	Panel C: Migrate State						
$\Delta \ln(\widehat{Imports}_{ct})$	0.098***	-0.001	-0.007	0.023	0.010	-0.053	-0.022
	(0.016)	(0.008)	(0.011)	(0.020)	(0.025)	(0.055)	(0.025)
$\ln(1 + AVE_{ct})$	-0.385***	-0.002	-0.118	-0.604***	-0.616***	-0.894***	-0.625***
	(0.059)	(0.160)	(0.109)	(0.194)	(0.201)	(0.289)	(0.181)
STS_{ct}	0.023	-0.011	-0.048***	0.131***	0.139***	0.189***	0.153***
	(0.015)	(0.036)	(0.015)	(0.046)	(0.052)	(0.058)	(0.040)
1^{st} Stage $\hat{\beta}$	-0.847	-3.240	-1.081	-1.213	-1.329	-0.553	-11.325
1^{st} Stage F	79.695	1215.130	224.045	217.988	223.659	26.702	39.092
Obs.	29,811,174	29,792,145	29,792,145	29,792,145	29,792,145	29,792,145	29,792,145
Spec. Change	Unw.	TrOnly.	Cnty F.E.	Trd X Yr	Mfg. x Yr	Mid-Samp.	Alt. IV
	Panel D: Switch Industry						
$\Delta \ln(\widehat{Imports}_{ct})$	0.038***	-0.057***	0.004	-0.018**	0.016*	-0.031*	-0.019***
	(0.008)	(0.003)	(0.007)	(0.007)	(0.008)	(0.017)	(0.006)
$\ln(1 + AVE_{ct})$	-0.031	1.145***	0.021	-0.156***	-0.117**	-0.228***	-0.154***
	(0.042)	(0.089)	(0.064)	(0.052)	(0.055)	(0.076)	(0.051)
STS_{ct}	0.014**	-0.209***	-0.028**	0.122***	0.095***	0.128***	0.120***
	(0.007)	(0.023)	(0.011)	(0.016)	(0.018)	(0.017)	(0.015)
1^{st} Stage $\hat{\beta}$	-0.847	-3.240	-1.081	-1.213	-1.329	-0.553	-11.325
1^{st} Stage F	79.695	1215.130	224.045	217.988	223.659	26.702	39.092
Obs.	27,017,834	27,001,711	27,001,711	27,001,711	27,001,711	27,001,711	27,001,711
Spec. Change	Unw.	TrOnly.	Cnty F.E.	Trd X Yr	Mfg. x Yr	Mid-Samp.	Alt. IV

Notes: Regressions of instrumented county-level import growth on longitudinal individual level outcomes based on linked data following Abramitzky et al. (2020) from 1900-1910, 1910-1920, 1920-1930, and 1930-1940. Each column changes the specification relative to that found in our baseline regressions in Table 9. Column 1 reports unweighted regressions. Column 2 includes county fixed effects. Columns 3-5 include interactions between tradable share, manufacturing share, and agricultural share with year dummies, respectively. Column 6 uses mid-decade policy variables for STS and AVE. Column 7 uses the full measure of changes in tariffs as derived in equation 3 as an instrument. Column 8 uses an alternate measure of import growth. Each panel reports an outcome from table 9. Dependent variable is whether the individual was in the labor force at the end of the decade in Panel A. Panel B is the decadal change in log occupational income score. Panel C is whether an individual moved to another state. Panel D indicates whether an individual switched industries. Import data from *Statistical Abstract of the United States* and *Foreign Commerce and Navigation of the United States* and authors' calculations. Population data from IPUMS (Ruggles et al., 2020). Controls are measured at start of decade. Import growth is instrumented by ΔRP_{ct} as equation 9 except in column 7. Standard errors are clustered at the county level and are reported in parentheses. *, **, and *** indicate p-values < 0.1, 0.05, 0.01 respectively. All controls from table 9 are included and have been suppressed for space.

Table E.7: Sectoral Transitions by Initial Sector

	(1) No-Industry	(2) Agriculture	(3) Mining	(4) Construction	(5) Manufacturing	(6) Services	(7) Other
	When Starting from No-Industry						
$\Delta \ln(\widehat{Imports}_{ct})$	0.030**	0.011	-0.017***	-0.007*	-0.004	-0.014	-0.007
	(0.012)	(0.014)	(0.005)	(0.004)	(0.008)	(0.013)	(0.005)
Obs.	1,587,590	1,587,590	1,587,590	1,587,590	1,587,590	1,587,590	1,587,590
1^{st} Stage $\hat{\beta}$	-1.488	-1.488	-1.488	-1.488	-1.488	-1.488	-1.488
1^{st} stage-F	272.461	272.461	272.461	272.461	272.461	272.461	272.461
	When Starting from Agriculture						
$\Delta \ln(\widehat{Imports}_{ct})$	0.016***	0.034***	-0.000	-0.008***	-0.029***	-0.005	-0.007***
	(0.003)	(0.007)	(0.002)	(0.002)	(0.004)	(0.005)	(0.002)
Obs.	8,044,799	8,044,799	8,044,799	8,044,799	8,044,799	8,044,799	8,044,799
1^{st} Stage $\hat{\beta}$	-1.127	-1.127	-1.127	-1.127	-1.127	-1.127	-1.127
1^{st} stage-F	216.152	216.152	216.152	216.152	216.152	216.152	216.152
	When Starting from Mining						
$\Delta \ln(\widehat{Imports}_{ct})$	0.043***	-0.008	0.076	0.005	-0.035	-0.109**	-0.014
	(0.016)	(0.042)	(0.059)	(0.014)	(0.053)	(0.053)	(0.022)
Obs.	728,957	728,957	728,957	728,957	728,957	728,957	728,957
1^{st} Stage $\hat{\beta}$	-0.827	-0.827	-0.827	-0.827	-0.827	-0.827	-0.827
1^{st} stage-F	39.124	39.124	39.124	39.124	39.124	39.124	39.124
	When Starting from Construction						
$\Delta \ln(\widehat{Imports}_{ct})$	0.000	0.022**	0.001	-0.009	-0.018*	0.022**	-0.013***
	(0.007)	(0.011)	(0.005)	(0.014)	(0.011)	(0.011)	(0.005)
Obs.	1,902,453	1,902,453	1,902,453	1,902,453	1,902,453	1,902,453	1,902,453
1^{st} Stage $\hat{\beta}$	-1.277	-1.277	-1.277	-1.277	-1.277	-1.277	-1.277
1^{st} stage-F	144.446	144.446	144.446	144.446	144.446	144.446	144.446
	When Starting from Manufacturing						
$\Delta \ln(\widehat{Imports}_{ct})$	0.004	0.013	-0.007	-0.010***	-0.003	0.019*	-0.009
	(0.006)	(0.011)	(0.006)	(0.004)	(0.015)	(0.010)	(0.006)
Obs.	5,988,134	5,988,134	5,988,134	5,988,134	5,988,134	5,988,134	5,988,134
1^{st} Stage $\hat{\beta}$	-1.236	-1.236	-1.236	-1.236	-1.236	-1.236	-1.236
1^{st} stage-F	178.278	178.278	178.278	178.278	178.278	178.278	178.278
	When Starting from Services						
$\Delta \ln(\widehat{Imports}_{ct})$	0.004	-0.001	-0.001	-0.000	-0.025***	0.032**	-0.011**
	(0.007)	(0.011)	(0.004)	(0.003)	(0.008)	(0.015)	(0.005)
Obs.	9,803,471	9,803,471	9,803,471	9,803,471	9,803,471	9,803,471	9,803,471
1^{st} Stage $\hat{\beta}$	-1.319	-1.319	-1.319	-1.319	-1.319	-1.319	-1.319
1^{st} stage-F	151.800	151.800	151.800	151.800	151.800	151.800	151.800
	When Starting from Other						
$\Delta \ln(\widehat{Imports}_{ct})$	0.009	0.058***	-0.043***	-0.008	0.002	0.007	-0.024***
	(0.005)	(0.013)	(0.013)	(0.006)	(0.012)	(0.012)	(0.006)
Obs.	1,146,497	1,146,497	1,146,497	1,146,497	1,146,497	1,146,497	1,146,497
1^{st} Stage $\hat{\beta}$	-1.631	-1.631	-1.631	-1.631	-1.631	-1.631	-1.631
1^{st} stage-F	224.364	224.364	224.364	224.364	224.364	224.364	224.364

Notes: Table displays the primary coefficient from a single regression of import growth on the likelihood of entering a given sector conditional on having started the decade in the sector. Outcomes are obtained based on linked data following Abramitzky et al. (2020). All specifications include individual and county controls as well as time decade dummy variables. Import data from *Statistical Abstract of the United States* and *Foreign Commerce and Navigation of the United States* and authors' calculations. Population data from IPUMS (Ruggles et al., 2020). Controls are measured at start of decade. Import growth is instrumented by ΔRP_{ct} as equation 9. Standard errors are clustered at the county level and are reported in parentheses. *, **, and *** indicate p-values < 0.1, 0.05, 0.01 respectively. All controls from table 9 are included and have been suppressed for space except for initial sector of employment because the regressions are only run conditional on being employed in a particular sector.

E.4 Incorporating Industry-Level Prices in ΔRP_{ct}

In this section we re-estimate our baseline linked regressions using industry-level price variation to construct our measure of changes in realized protection. Namely, we estimate the following equation

$$\begin{aligned}\Delta Outcome_{jct+1} = \beta_0 + \beta_1 \Delta \ln(\widehat{Imports}_{ct}) + \beta_2 X_{jt} + \beta_3 X_{ct} \\ + \Sigma_t \beta X_{ct} \times I(Year_t) + \gamma_t + \epsilon_{ct}\end{aligned} \tag{E.1}$$

in which we instrument for $\ln(Imports_{ct})$ with

$$\Delta RP_{ct} = \sum_i \frac{L_{ict}}{L_{ct}} \ln(1 - \frac{\Delta p_{it}}{p_{it+1}} \times STS_{it}) \tag{E.2}$$

Here, our measure of changes in realized protection uses 10-year changes in UK industry-level unit values detailed at length in Section B.3. We also directly control for log growth in these industry prices in every regression in this section. Exploiting such variation requires that one assume that US demand has no impact on industry-level prices and that they are not correlated with changes in prices coincidentally – i.e., that these price shocks do not reflect changes in quality which would simultaneously shift the demand curve. Results for our labor market analysis may be found below.

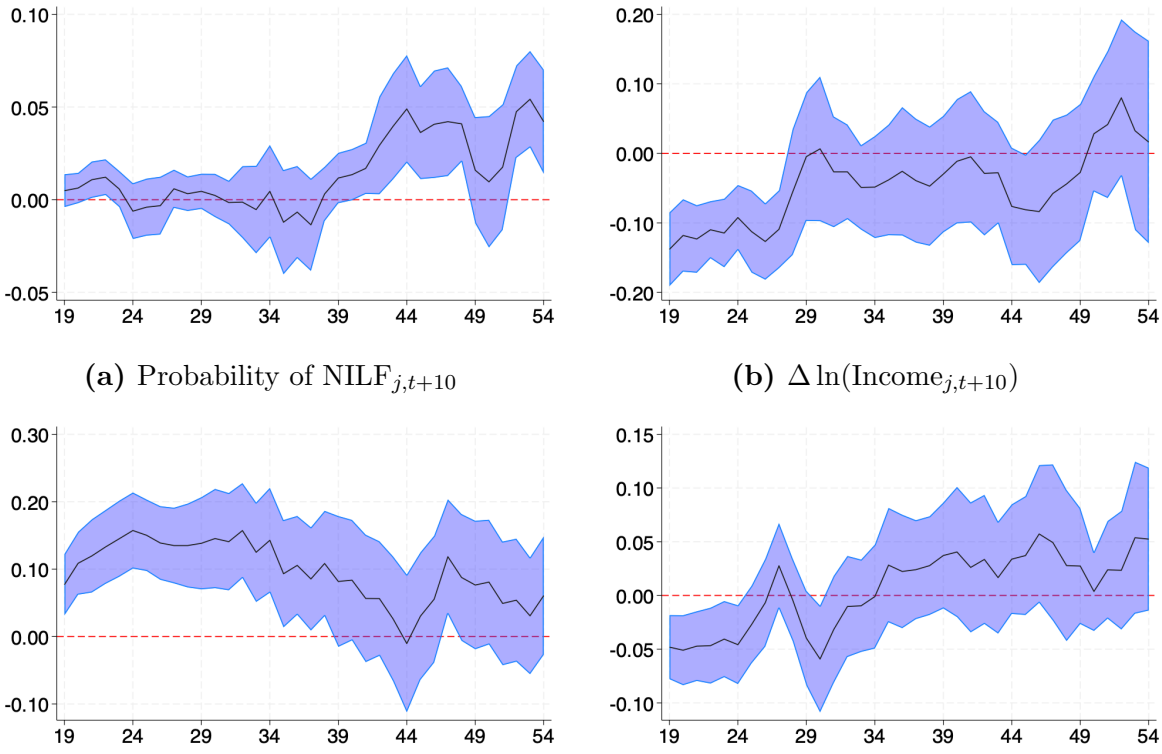
As in our primary specification, we find that import growth increases the probability of being out of the labor force and decreases earnings growth. Notably, however, industry-level price variation identifies a stronger migratory effect and no industry lock-in on average. Turning to the effects throughout the age distribution, the pattern is very similar to our benchmark results. Namely, it is only older workers who are likely to leave the labor force, while younger workers experience lower income growth. As before, younger workers are more likely to move, but here the effect is substantially larger and becomes insignificant only by age 39. This drives the more positive migration result we observed above. As in the results based on our aggregate price shock, very young workers experience occupational lock-in, and save for the spike among 27 year-old workers, we find significant evidence of industry lock-in for those workers under 30.

Table E.8: Import Growth and Individual Labor Market Outcomes

	(1) No-Employment $_{i,t+1}$	(2) $\Delta \ln(Income_{i,t})$	(3) $Migrate_{i,t+1}$	(4) Switch Industry$_{i,t+1}$
$\Delta \ln(\widehat{Imports}_{ct})$	0.019***	-0.061***	0.101***	-0.005
	(0.005)	(0.017)	(0.029)	(0.011)
$\ln(1 + AVE_{ct})$	0.047***	0.013	-0.522***	-0.122**
	(0.013)	(0.103)	(0.200)	(0.056)
STS_{ct}	-0.001	0.041**	0.049	0.088***
	(0.006)	(0.018)	(0.045)	(0.016)
$\Delta ln(p_{it})$	-0.019***	0.020	-0.095***	-0.056***
	(0.004)	(0.014)	(0.023)	(0.008)
Dep. μ	0.034	0.071	0.282	0.650
Std. Coeff.	0.084	-0.124	0.231	-0.009
1^{st} Stage $\hat{\beta}$	-0.544	-0.544	-0.544	-0.544
1^{st} stage-F	113.522	113.522	113.522	113.522
Obs.	29,792,145	25,390,582	29,792,145	27,001,711
Adj. R^2	0.017	0.120	0.030	0.209

Notes: Regressions of instrumented county-level import growth on longitudinal individual level outcomes based on linked data following Abramitzky et al. (2020) from 1900-1910, 1910-1920, 1920-1930, and 1930-1940. Dependent variable in column 1 is whether the individual is in the labor force at the end of the decade. Column 2 outcome is the decadal change in log occupational income score. Column 3 outcome is whether an individual moved to another state during the decade. Column 4 indicates whether an individual switched industries. Import data come from *Statistical Abstract of the United States* and *Foreign Commerce and Navigation of the United States* and authors' calculations. Population data from IPUMS (Ruggles et al., 2020). Controls are measured at the start of decade. Import growth is instrumented by ΔRP_{ct} as in equation E.2, and incorporates UK industry-level unit values as a measure of price growth. While suppressed, we also separately control for the log change in industry-level prices. Standard errors are clustered at county level and reported in parentheses. *, **, and *** indicate p-values $< 0.1, 0.05, 0.01$ respectively.

Figure E.4: The Effect of Import Growth on Individual Outcomes by Age



(a) Probability of $\text{NILF}_{j,t+10}$ **(b)** $\Delta \ln(\text{Income}_{j,t+10})$

(c) Probability of Cross-State $\text{Migration}_{j,t+10}$ **(d)** Probability of Industry $\text{Switching}_{j,t+10}$

Notes: Figure displays the effect of import growth on decadal changes in individual outcomes by age cohort. Regressions are run separately for ages 18-20, 19-21, 20-22, etc. The coefficient for instrumented county-level import growth is displayed with a 95% confidence interval. Data are constructed based on linking procedures following Abramitzky et al. (2020). All specifications include individual- and county-controls as well as decade dummy variables. Import data come from *Statistical Abstract of the United States* and *Foreign Commerce and Navigation of the United States* and authors' calculations. Population data from IPUMS (Ruggles et al., 2020). Controls are measured at the start of decade. Import growth is instrumented by ΔRP_{ct} as in equation E.2, and incorporates UK industry-level unit values as a measure of price growth. While suppressed, we also separately control for the log change in industry-level prices. Standard errors are clustered at the county level and are reported in parentheses. *, **, and *** indicate p-values < 0.1, 0.05, 0.01 respectively. All controls from table 9 are included and have been suppressed for space.

Figure E.5: The Effect of Import Growth on the Probability of Sectoral Transitions



Notes: Figure displays the coefficient on instrumented import growth from separate regressions in which the outcome is an indicator variable equal to one if an individual ended the decade in a given sector – indicated by columns – conditional on having started the decade in a particular sector – indicated by rows. The category "other" is omitted from both rows and columns. Cells have been color-coded such that dark red indicates the least likely outcome for a given row, while dark blue indicates the most likely. Outcomes are obtained based on linked data following Abramitzky et al. (2020). All specifications include individual and county controls as well as decade dummy variables. Import data come from *Statistical Abstract of the United States* and *Foreign Commerce and Navigation of the United States* and authors' calculations. Population data from IPUMS (Ruggles et al., 2020). Controls are measured at the start of decade. Import growth is instrumented by ΔRP_{ct} as in equation E.2, and incorporates UK industry-level unit values as a measure of price growth. While suppressed, we also separately control for the log change in industry-level prices. Standard errors are clustered at the county level and are reported in parentheses. *, **, and *** indicate p-values < 0.1, 0.05, 0.01 respectively. All controls from table 9 are included and have been suppressed for space.

Finally, we replicate our industry transition matrix and find similar results to the baseline. Those in lower-income industries are disproportionately likely to be pushed out of the labor market. And as before, agricultural workers are particularly susceptible to being locked-in and substantially less likely to transition to manufacturing. Transitions into manufacturing are less likely from both construction and services. Conditional on being in manufacturing at the start of period, we do not see reductions in the probability of staying in the sector.

E.5 County-Level Labor Market Analysis

We now turn to the effect of trade on aggregate local outcomes, focusing on labor force participation and log average income., using all 18-65 year-old males to calculate our measures. We regress changes in local outcomes against county-level averages of changes in log imports, $\Delta \ln(Imports_{ct})$, for each decade t between 1900 and 1940, instrumenting with ΔRP_{ct}:

$$\Delta Outcome_{ct} = \beta_0 + \beta_1 \Delta \ln(\widehat{Imports}_{ct}) + \beta_2 X_{ct} + \gamma_t + \epsilon_{ct} \tag{E.3}$$

Here, X_{ct} represents a set of start-of-decade controls for county characteristics that may otherwise contaminate our estimates. All specifications are weighted by county population and include decade fixed effects, γ_t. Following the approach developed by Borusyak et al. (2022), we estimate these regressions at the industry-year level, which allows us to correct for correlation in residuals across counties driven by similarity in local industrial composition.[70] While we observe over 11,000 county-year observations, this masks the more aggregate industry-level variation at the heart of studies employing a shift-share approach. Consequently, in each table we report both the number of industry-by-year observations as well as the inverse Herfindahl-Hirschman index of industry-level employment. This "effective sample size" (Borusyak et al., 2022) captures the extent to which industrial employment is concentrated, which may lead to inappropriate statistical inference.[71]

We construct county-level exposure using only information on the tradable sector and do not impose a shock of "zero" on the non-tradable units. This follows the approach of Borusyak et al. (2022) and Kovak (2013). While the data reported in Table E.9 are the raw county-level summary statistics, we follow Borusyak et al. (2022) and demean these samples in our analysis so that the employment share weighted average shock (ΔRP_{ct}) is zero across our entire sample when estimated at the "shock" level. This will have no impact on the standard deviations reported in this table, nor the standardized effects reported in county-level robustness tables below.

We begin by exploring labor force attachment as an outcome. In Table E.10 we regress decadal changes in labor force-to-population ratios for men ages 18-55 against county-level import growth. As with our main text, these 10-year changes mean we have coverage for individuals who will be 65 by the end of decade. Column 1 includes only import growth and decade fixed effects. The point estimate is negative and significant. The magnitude of the effect implies that a one standard deviation increase in import exposure reduces

[70] Estimating this relationship in the "complete-shares" case – that is, calculating labor shares using tradable employment only – ensures that our experimental design does not exploit variation in exposure to the non-tradable sector and so does not require including the tradable share as a control. Further, it ensures that our fixed effects isolate intra-period variation without having to include the share of the labor force in tradable sectors interacted with time fixed effects.

[71] In Monte Carlo simulations Borusyak et al. (2022) find that an effective sample size of at least 20 provides appropriate rejection rates for hypothesis testing. Our effective sample size is more than three times this large.

Table E.9: Descriptive Statistics for County Labor Market Analysis

Year	Stat.	$\Delta \frac{Labor_{ct}}{Population_{ct}}$	$\Delta \ln(Income_{ct})$	$\Delta \ln(Imports_{ct})$	ΔRP_{ct}	$\ln(1 + AVE_{ct})$	STS_{ct}
1900-1910	μ	0.028	0.036	1.122	-0.030	0.197	0.726
	σ	0.033	0.038	0.475	0.006	0.054	0.149
1910-1920	μ	-0.017	0.029	1.152	-0.602	0.193	0.671
	σ	0.034	0.036	0.930	0.185	0.045	0.180
1920-1930	μ	0.003	0.015	-0.588	0.136	0.064	0.350
	σ	0.033	0.034	0.564	0.081	0.041	0.212
1930-1940	μ	-0.039	0.005	-0.139	-0.090	0.159	0.588
	σ	0.027	0.036	0.235	0.030	0.041	0.194
Total	μ	-0.010	0.019	0.275	-0.137	0.149	0.569
	σ	0.040	0.037	0.954	0.288	0.070	0.235

Notes: Table reports summary statistics for key dependent and explanatory variables by decade and overall. Variable mean stacked above variable standard deviation below. As with county-level regressions, summary statistics are weighted by start of decade county population.

growth in labor force participation rates by approximately 0.27 standard deviations.[72] In columns 2 and 3 we sequentially introduce start-of-decade controls for county-level AVE_{ct} and STS_{ct}. These leave our estimates largely unchanged.

Table E.10: Changes in County Labor Force Participation

	$\Delta \frac{LaborForce}{Population}$				
	(1)	(2)	(3)	(4)	(5)
$\Delta \ln(\widehat{Imports_{ct}})$	-0.011***	-0.011***	-0.014***	-0.018**	-0.025***
	(0.001)	(0.001)	(0.002)	(0.007)	(0.009)
Additional Controls	Year FE	AVE_{ct}	STS_{ct}	*Production*	*Demographic*
1^{st} Stage Coeff.	-3.328	-3.318	-3.322	-0.856	-0.889
1^{st} Stage F	29.350	31.445	27.054	192.449	180.107
Obs.	262	262	262	262	262
Effective N	65	65	65	65	65
Std. Coeff.	-0.267	-0.269	-0.347	-0.440	-0.589

Notes: Dependent variable is change in log labor force to population ratios among men ages 18-65 at the county level from 1900-1910, 1910-1920, 1920-1930, 1930-1940. Import data from *Statistical Abstract of the United States* and *Foreign Commerce and Navigation of the United States* and author's calculations. Population data from IPUMS Ruggles et al. (2020). Controls are measured at start of decade. Import growth is instrumented by ΔRP_{ct} as defined in equation 9. Regressions are weighted by start-of-period population. Standard errors in industry-year "shock-level" regressions (Borusyak et al., 2022) are clustered at the two-digit SIC level.

In column 4 we control for county tradable employment share, manufacturing employ-

[72] The standard deviation in log import growth is 0.95. Multiplying this by the reported point estimate yields a reduction in the labor force-to-population ratio of .0096, which is 0.27 standard deviations of the growth standard deviation.

ment share, and agricultural employment share, each interacted with decade fixed effects as discussed in Section E.2. This has little impact on our findings. Finally, in column 5 we include the remaining controls indicated by our balance tests. These controls include the share of the population that is literate, the share of the population that is foreign-born, the share of the county that is urban, the share of the population that is non-white and the share of the population that is under age 35 interacted with year fixed effects. Across all specifications we find significant effects of instrumented import growth on labor force participation.

Table E.11: Changes in Log Average County Income

	$\Delta \ln(Income_{ct})$				
	(1)	(2)	(3)	(4)	(5)
$\Delta \ln(\widehat{Imports}_{ct})$	-0.005*	-0.005**	-0.012***	-0.062***	-0.049***
	(0.002)	(0.002)	(0.003)	(0.006)	(0.005)
Additional Controls	Year FE	AVE_{ct_0}	STS_{ct_0}	*Production*	*Demographic*
1^{st} Stage Coeff.	-3.329	-3.318	-3.323	-0.856	-0.888
1^{st} Stage F	29.348	31.444	27.054	192.165	179.816
Obs.	262	262	262	262	262
Effective N	65	65	65	65	65
Std. Coeff.	-0.119	-0.123	-0.308	-1.567	-1.237

Notes: Dependent variable is change in log average county income among men ages 18-65 at the county level from 1900-1910, 1910-1920, 1920-1930, 1930-1940. Import data from *Statistical Abstract of the United States* and *Foreign Commerce and Navigation of the United States* and author's calculations. Population data from IPUMS Ruggles et al. (2020). Controls are measured at start of decade. Import growth is instrumented by ΔRP_{ct} as defined in equation 9. Regressions are weighted by start-of-period population. Standard errors in industry-year "shock-level" regressions (Borusyak et al., 2022) are clustered at the two-digit SIC level.

In Table E.11, we repeat the same specifications with decadal log changes in the average county-level income as our outcome. As with labor participation, we find significant effects of import growth shocks on county-level income growth. Across all specifications we find significant and quantitatively meaningful effects. In our final column we find relative reductions in log county income of approximately 4.9% following a one standard deviation increase in import growth.