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

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Abstract

This paper proposes a novel strategy for identifying the effects of import competition on economic outcomes that avoids standard concerns related to the endogeneity of trade policy and provides a consistent measure of exposure to trade over time. Conditioning on the *level* of import tariffs, our approach exploits cross-industry differences in the relative importance of *specific* rather than *ad valorem* tariffs. As they are expressed in per unit terms rather than as a share of value, the effective protection provided by a given specific tariff varies with price levels. Using digitized tariff line data between 1900 and 1940, we relate inflation-driven changes in trade protection to changes in imports and labor market outcomes in the full count US Census. We show that our measure predicts import growth at both the industry and county level. Using our measure as an instrument, we show that import competition reduces labor force participation in traded sectors during this period. Labor market effects are widespread but fall most heavily on those with little experience or fewer outside labor market options: the young, seniors, and those in rural areas.

Keywords: International Trade, Economic History, Trade Policy, Inflation, Labor Markets

JEL classification numbers: F1, F6, N1, N7, J2

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1 Introduction

Increasingly, economists have turned their attention to international trade not only as an important phenomenon in its own right, but as a potential source of causal identification more broadly. Changes in trade flows create meaningful variation in economic conditions across industries, firms, and workers, which can then serve as a testbed to answer questions beyond trade specifically.[1] However, the usefulness of trade as a source of identification has thus far been limited by both the endogenous nature of trade policy and the relative infrequency of large trade agreements. As such, much of the focus in this literature has centered on once-in-a-generation supply side shocks and a handful of abrupt changes to trade policy as sources of exogenous variation in trade flows.[2] Furthermore, the unique nature of each trade agreement makes comparisons across long periods of time difficult, limiting the timeframe amenable to study in any given application. In this paper we propose a method to identify causal effects of trade on economic outcomes in the absence of these infrequent, idiosyncratic events. Our measure is consistent over time and can be applied to any country or time period featuring two elements: per unit tariffs and price variation.

Our approach takes as given – and conditions on – the level of tariff protection and exploits variation in the extent to which this protection is implemented via specific – that is, nominal per unit – tariffs rather than on a percentage, or ad valorem basis. When a given tariff code is specified, identical levels of protection can be achieved with either type of duty. However, as price levels change over time, the effective protection provided by specific tariffs will vary inversely with the price, while the effective protection afforded by ad valorem tariffs remains constant. Thus, temporal price variation in conjunction with pre-existing differences across industries in the prevalence of specific tariffs generates quasi-random variation in effective tariff protection in the periods *between* trade liberalizations. We leverage this variation to explore the labor market consequences of exposure to imports in the US from 1900 to 1940.

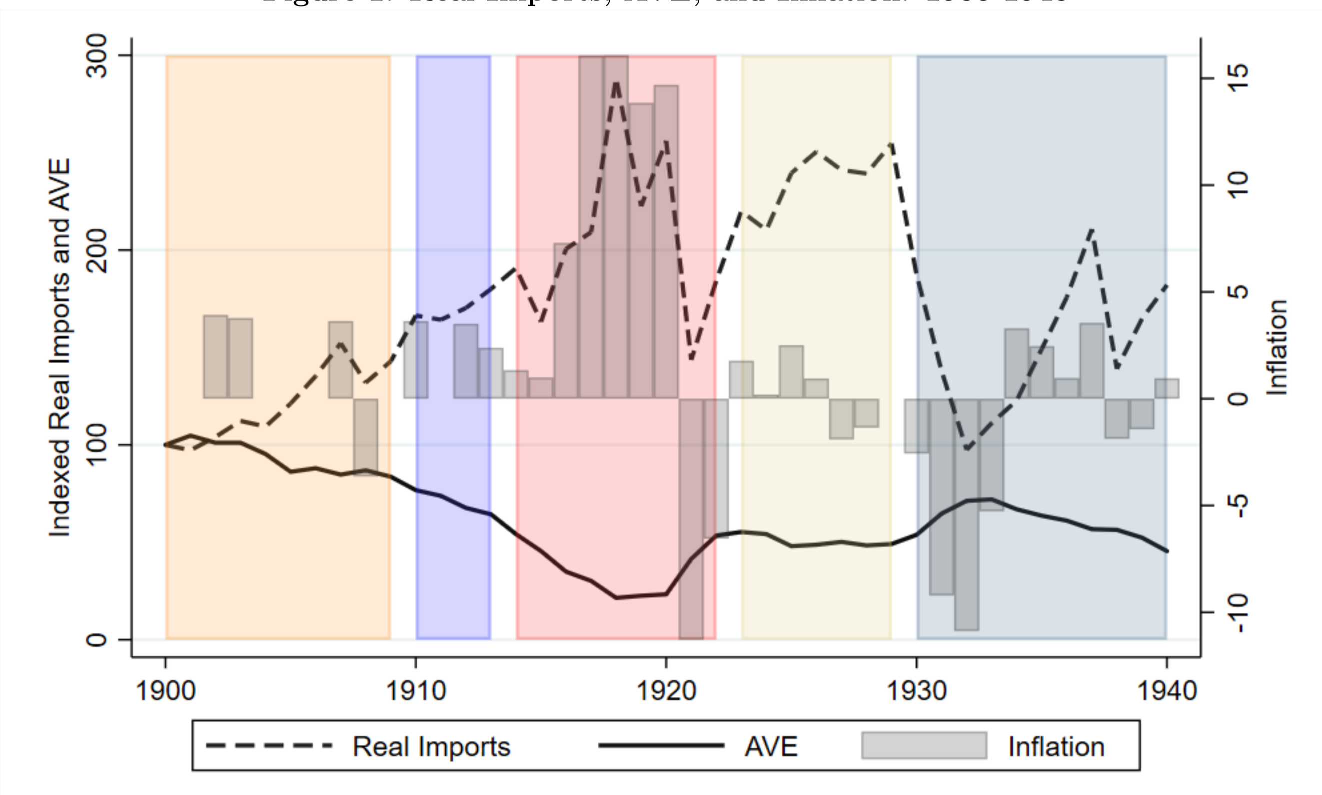
We present visual evidence of the mechanism employed in the paper in Figure 1. Here, each of the five distinct U.S. trade policy regimes of the early 20^{th} century is represented by a distinct

[1] See, e.g., Chetverikov et al. (2016), Feler and Senses (2017), and Pierce and Schott (2020) for recent examples of this approach.

[2] See Trefler (1993) for a discussion of confounding labor market effects. For attempts to circumvent these via supply side shocks or policy changes, see, e.g., Autor, Dorn, and Hanson (2013); Pierce and Schott (2016); Fajgelbaum, Goldberg, Kennedy, and Khandelwal (2020).

colored vertical band.[3] 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 imports. Naturally, across policy regimes we observe considerable changes in both average tariffs and trade flows. This type of cross-regime variation is the source of identification exploited in virtually all of literature on trade policy and economic outcomes. However, there is considerable non-policy variation in the AVE tariff rate across years within a given policy regime. Further, we observe that this within-regime variation is strongly and negatively correlated with inflation rates, depicted by gray bars. Periods with high inflation tend to be periods with low average tariff rates and high import growth *conditional on the pre-existing tariff regime.* In this paper, 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.

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



Notes: AVE and Import values from the USITC. Imports deflated using to a 1900 base year. Real imports and AVE indexed to 100 in 1900. Vertical bands indicate the years encompassed by Dingley Tariff of 1897, the Payne-Aldrich Tariff of 1909, the Underwood Tariff of 1913, the Fordney-McCumber Tariff of 1922, and the Smoot-Hawley Tariff of 1930 respectively.

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

To test this idea directly, we construct a novel database covering the universe of product-level import values and duties by duty type by digitizing editions of *Foreign Commerce and Navigation of the United States* for a number of years between 1900 and 1940. After manually concording several thousand tariff lines to more aggregate industries, we construct an industry-level measure of inflation-driven changes in effective protection. We relate this measure to both industry and county-level trade flows, and ultimately to changes in county-level labor market outcomes between Censuses (Bartik, 1991).

We begin by documenting key stylized facts surrounding tariffs in our data. First, specific tariffs are used extensively as a source of protection during this period. They account for 70% of all duties collected in the first year of our sample, dropping to 40% in the 1920s and returning to 67% with the implementation of the Smoot-Hawley tariff in 1930. Second, there is substantial variation in the industry-level use of specific duties conditional on the chosen *AVE* tariff level of protection, both across time and industries. Notably, specific tariffs tend to be more heavily utilized in agricultural and food-related products. Given the geographic clustering of such industries, there is thus substantial variation across regions in the relative protection provided by specific rather than ad valorem tariffs. Third, when combined with inflation dynamics, the share of total industry duties generated by specific tariffs (the industry's *specific tariff share*) predicts aggregate changes in industry imports, even conditioning on the overall level of industry protection. This is true both at the industry level and when weighting industries by their respective labor share at the county level.

We then use the full count US census from 1900-1940 to estimate the effects of changes in import exposure on labor market outcomes at the county level.[4] We employ a shift share IV research design in which we instrument for county-level import growth with an employment-weighted average of industry specific tariff shares interacted with inflation. We find that increasing import exposure leads to reductions in labor force participation and occupational income scores. To ameliorate concerns that our results may be driven by heterogeneous exposure to large, aggregate shocks including WWI and the Great Depression, we show that our findings are robust to sequentially omitting each decade in our sample. Further, our results are robust to alternative weighting of

[4] In ongoing work, we are extending this analysis to the individual level using linked full count Census data between 1900 and 1940.

tradable versus non-tradable industries (Kovak, 2013).

Finally, we explore the effects of import exposure on sectoral employment shifts and population adjustments, as well as heterogeneity across demographic groups. We find that import exposure is associated with declines in manufacturing, agricultural, and transportation employment, with smaller positive effects on construction and mining. There is no statistically significant relationship between imports and county population growth. We find that the bulk of the negative labor force participation effect falls on young individuals and those that live in rural areas, while the negative income effects are larger among older, urban populations. This is consistent with individuals at the lower end of the income ladder being driven from the labor force entirely, while those with higher initial incomes see their occupational standing deteriorate, but are more likely to remain in the labor force. These findings are potentially consistent with the agricultural sector offering a buffer for impacted labor markets akin to the informal sector employment documented by Dix-Carneiro, Goldberg, Meghir, and Ulyssea (2021).

Our approach draws heavily from the insights of Crucini (1994) and Irwin (1998), who argue that intra-policy variation in the ad valorem equivalent tariff rate is considerable, and is related to both specific tariffs and inflation. Crucini (1994) tracks the tariffs dictated by law for a panel of 30 commodities between 1900 and 1940 and documents price-driven variation in the ad valorem average tariff compared to the rate specified by policy. Irwin (1998) demonstrates that the aggregate U.S. ad valorem equivalent rate varies substantially with inflation, even accounting for trade policy regimes. He concludes that inflation-driven deterioration of specific tariffs contributes substantially to falling tariff rates over time. While these studies inform our approach, we extend the existing work along several important dimensions.[5]

First, we greatly expand coverage of traded economic activity by digitizing the universe of product-level imports for a subset of years during this period. This allows us to measure the reliance on specific tariffs directly. To the extent that existing work has considered specific tariffs at all, it has done so either by looking for indirect evidence of their effects at the aggregate level or directly within a small subset of products. Second, we provide direct evidence of the relationship between inflation and trade in the presence of specific tariffs. Finally, we demonstrate that this

[5] Less directly, we also connect to work emphasizing the importance of per unit trade costs (Hummels and Skiba, 2004; Eaton et al., 2014).

mechanism can be used to capture – and measure the effect of – labor market trade shocks.

Our paper also contributes to the literature on the political economy of trade and endogenous protection. The primary difficulty in identifying the relationship between trade policy and economic outcomes is that each depends upon the other – politicians respond to economic conditions, which respond to policies, which are determined by politicians (Grossman and Helpman, 1994; Hiscox, 2002; McLaren, 2016). By exploiting quasi-random variation in price levels in the presence of specific tariffs, our approach circumvents this concern to some extent. While it is possible or even likely that omitted variables such as political influence or expected wage growth affect average tariff levels, it is less clear how such conditions would map to the use of specific rather than ad valorem tariffs conditional on the AVE tariff. In such an environment trade will respond to policy, but not necessarily in a way that politicians could accurately forecast.[6] In ongoing work parallel to this, we use the measure developed here to estimate the effect of import competition on Congressional voting on trade bills during the twentieth century (Greenland, Howell, and Lopresti, 2021).

The paper proceeds as follows. In section 2 we provide a simple description of specific tariff induced variation in effective protection, document stylized facts about trade and duties from 1900-1930, and construct and describe our primary measure. We also provide evidence of the impact of inflation on the ad valorem equivalent prices their combined effects on imports. Section 3 details the effects of import competition on labor force participation. Section 4 explores alternative labor market outcomes and heterogeneity across demographic groups. Section 5 outlines additional applications for our approach and concludes.

2 Empirical Approach: Inflation and Effective Trade Protection

Our ultimate interest is identifying the effects of import competition on economic outcomes over time, whether or not there is a formal change to trade policy. To that end, we build on the literature exploiting pre-existing variation in local exposure to changes in trade policy as a source of exogenous variation in labor market conditions. The primary concern with this approach, acknowledged widely in the literature on trade and local labor markets, relates to the potentially endogenous

[6] Moreover, Irwin (1998) documents 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.

relationship between industry imports and economic outcomes. For example, technology shocks that affect industry employment might also drive imports, biasing estimates of the effect of imports on employment. Previous studies have largely addressed this by appealing to the specifics of a distinct trade shock, attempting to isolate exogenous growth in the supply of trade (Autor et al., 2013) or abrupt policy changes (Topalova, 2007; Pierce and Schott, 2016; Dix-Carneiro and Kovak, 2017; Fajgelbaum et al., 2020). Because our interest is in outcomes over a long and continuous period, we adopt an alternative strategy.

Specifically, our approach exploits unintended variation in *effective* protection resulting from the pervasive use of per unit, or *specific* tariffs. Import tariffs are expressed in either specific or *ad valorem* – that is, percentage – terms. A crucial difference between these tariff types lies in the effective protection they provide as aggregate prices fluctuate. To see the point clearly, suppose that each product p in industry i is potentially subject to specific tariff $f_p \geq 0$ and ad valorem tariff $\tau_p \geq 0$. We can then write the ad valorem equivalent tariff for industry i as:

$$\begin{aligned} AVE_i = \frac{\sum_{p\in i} Duties_p}{\sum_{p\in i} Imports_p} &= \frac{\sum_{p\in i} q_p f_p + q_p p_p \tau_p}{\sum_{p\in i} q_p p_p} \\ &= \sum_{p\in i} \frac{f_p}{p_p} \frac{q_p p_p}{\sum_{p\in i} q_p p_p} + \tau_p \frac{q_p p_p}{\sum_{p\in i} q_p p_p} \\ &= \sum_{p\in i} \left(\frac{f_p}{p_p} + \tau_p \right) s_{ip} \end{aligned} \tag{1}$$

Where s_{ip} is the share of imports in industry i accounted for by product p. Intuitively, the industry-wide ad valorem equivalent is the weighted average across products of the sum of the ad valorem tariff, τ_p, and the ad valorem equivalent of the specific tariff, f_p/p_p.[7] Holding constant the product shares, s_{ip}, and the policy variables, f_p and τ_p, we can define the change in effective protection $\Delta EP_{it_{0,1}}$ as the change in the AVE_i driven solely by aggregate price variation. Specifically, suppose

[7] As is clear from the last line of equation 1, policy makers can target a given level of protection using either τ_p, f_p/p, or some combination of the two.

products are subject to a uniform ι percent price change between t_0 and t_1:

$$\begin{aligned}
\Delta AVE_{it_{0,1}} =& AVE_{i,t_1} - AVE_{i,t_0} \\
=& \sum_{p \in i} \left(\frac{f_p}{p_{p,t_1}} + \tau_p \right) s_{ip} - \sum_{p \in i} \left(\frac{f_p}{p_{p,t_0}} + \tau_p \right) s_{ip} \\
=& \sum_{p \in i} \frac{f_p s_{ip}}{(1+\iota) p_{p,t_0}} - \frac{f_p s_{ip}}{p_{p,t_0}} \\
=& -\frac{\iota}{1+\iota} \sum_{p \in i} \frac{q_p f_p}{q_p p_{p,t_0}} s_{ip} \\
=& -\frac{\iota}{1+\iota} \frac{SpecificDuties_i}{Imports_i} \\
=& -\frac{\iota}{1+\iota} \underbrace{\frac{SpecificDuties_i}{TotalDuties_i}}_{STS_{it_0}} \underbrace{\frac{TotalDuties_i}{Imports_i}}_{AVE_{it_0}}
\end{aligned}$$

Controlling directly for the initial ad valorem *level* in industry i, AVE_{it_0}, we can calculate changes in effective tariff protection as a function of the percentage price change between t_0 and t_1 and the ratio of specific duties to total duties at time t_0 in industry i, STS_{it_0}, referred to as an industry's specific tariff share:

$$\Delta EP_{it_{0,1}} = -\frac{\iota}{1+\iota} STS_{it_0} \qquad (2)$$

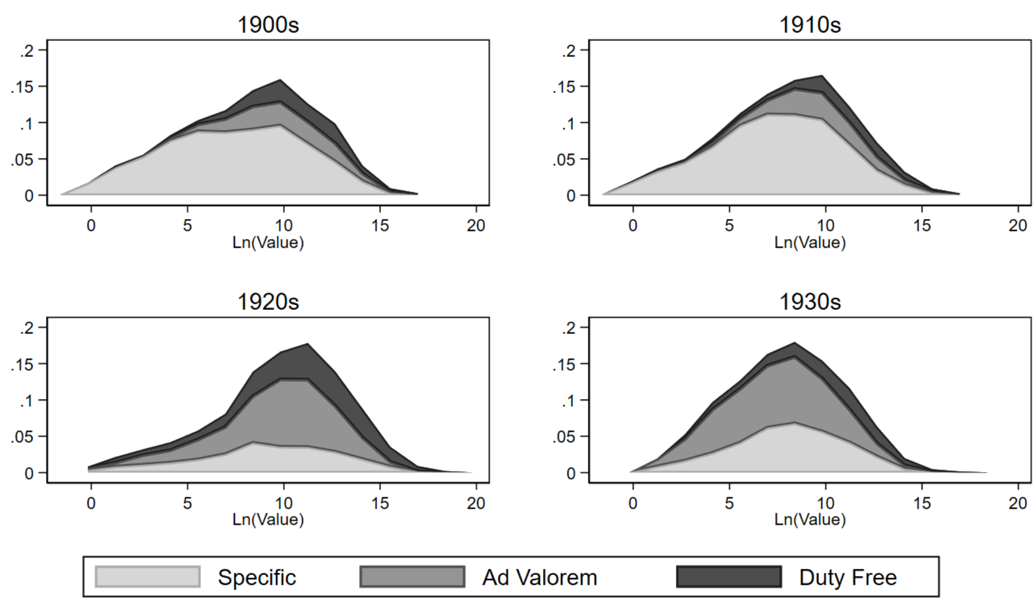
Intuitively, inflation will have no effect on specific tariffs, which are fixed in nominal terms by law, so the relative restrictiveness of such tariffs declines as prices rise and vice versa. Ad valorem tariffs, on the other hand, remain equally restrictive as prices change since they are expressed as a share of goods' value. Thus, as prices increase – that is, for positive ι – industries with higher specific tariff shares will experience reduced effective protection, *even conditioning on the initial tariff level.* This is the key insight for our identification strategy. As noted above, while politicians may respond to political influence or economic conditions in setting tariff levels – protecting politically important sectors or those at risk of decline, for instance – it is less obvious how such considerations would affect the choice of specific rather than ad valorem tariffs conditional on the overall level of protection. As the effective protection afforded by specific rather than ad valorem tariffs depends on the direction of price movements, endogenous trade policy along this dimension would require an accurate forecast of future aggregate price changes.

2.1 Trade, AVE, and STS in the U.S. from 1900-1940

As outlined above, our identification comes from changes in effective tariff protection driven by cross-sectional variation in specific tariff shares and temporal variation in aggregate price levels. To operationalize this idea, we construct a novel database of tariffs and trade flows in the US from 1900-1940 by digitizing annual editions of the *Statistical Abstract of the United States* and *Foreign Commerce and Navigation of the United States* for select years. From these we obtain information on the value of imports, duties collected, and the type of duty at the tariff line level.

Both ad valorem and specific duties are used extensively throughout our sample, though the relative importance of each type varies substantially both across industries and over time. In Figure 2 we display the kernel density of log import values, which we assign to three mutually exclusive categories: those that are duty free, those that are exclusively ad valorem, and those having any specific tariff.[8]

Figure 2: Value of Imported Line Items by Dutiable Status



Notes: Tariff line trade values and dutiable status from annual editions of the *Statistical Abstract of the Untied States* and the *Foreign Commerce and Navigation of the United States*.

[8]Many tariffs are specified to include both a specific and ad valorem component. We classify these as specific tariffs.

In both 1900 and 1910, specific tariffs are more prevalent among products with smaller import flows. By 1920 duties had fallen dramatically as a result of the Underwood Tariff of 1913 – both in terms of overall protection and the proportion of trade accounted for by specific tariffs. The Smoot-Hawley Tariff Act of 1930 reversed this pattern, increasing protection overall and re-establishing the widespread use of specific tariffs. While these policy changes are important, and we control for the overall level of protection in our analysis, it is the cross-industry differences in the prevalence of specific tariffs that offers our primary source of identifying variation.

There are an average of approximately 3500 tariff lines annually in the data. We concord these data to the 2-digit Standard International Trade Classification (SITC) level.[9] For each industry we calculate both AVE and STS at the beginning of the decade based on the trade policy in place at the time.[10] As a way of better understanding the variation in the data, consider for example the extremes of protectionism as of 1910. Manufactured fertilizers (SITC 56) enter the US duty-free under the Payne-Aldrich tariff of 1909, while beverages and tobacco face an AVE of 77.2%, consisting entirely of specific tariffs. Due to the staggering 120% inflation between 1910 and 1920 – roughly 7.8% annually – beverage and tobacco experience a substantial trade liberalization relative to fertilizers, for which the level of effective protection remains fixed at zero. Consequently, we anticipate a relative increase in imports in beverages and tobacco.

Not all of our variation lies at these extremes, of course. For instance, consider animal and vegetable oils (SITC 54) relative to pharmaceutical products and medicines (SITC 43). As of 1910, both industries face an AVE rate of protection around 9%. However, the share of specific tariffs in oils is twice as high as the share in pharmaceutical products. In the face of rising prices, the effective rate of protection for pharmaceuticals remains much higher during the subsequent decade than that of oils, despite the fact that they share the same average initial tariff level.

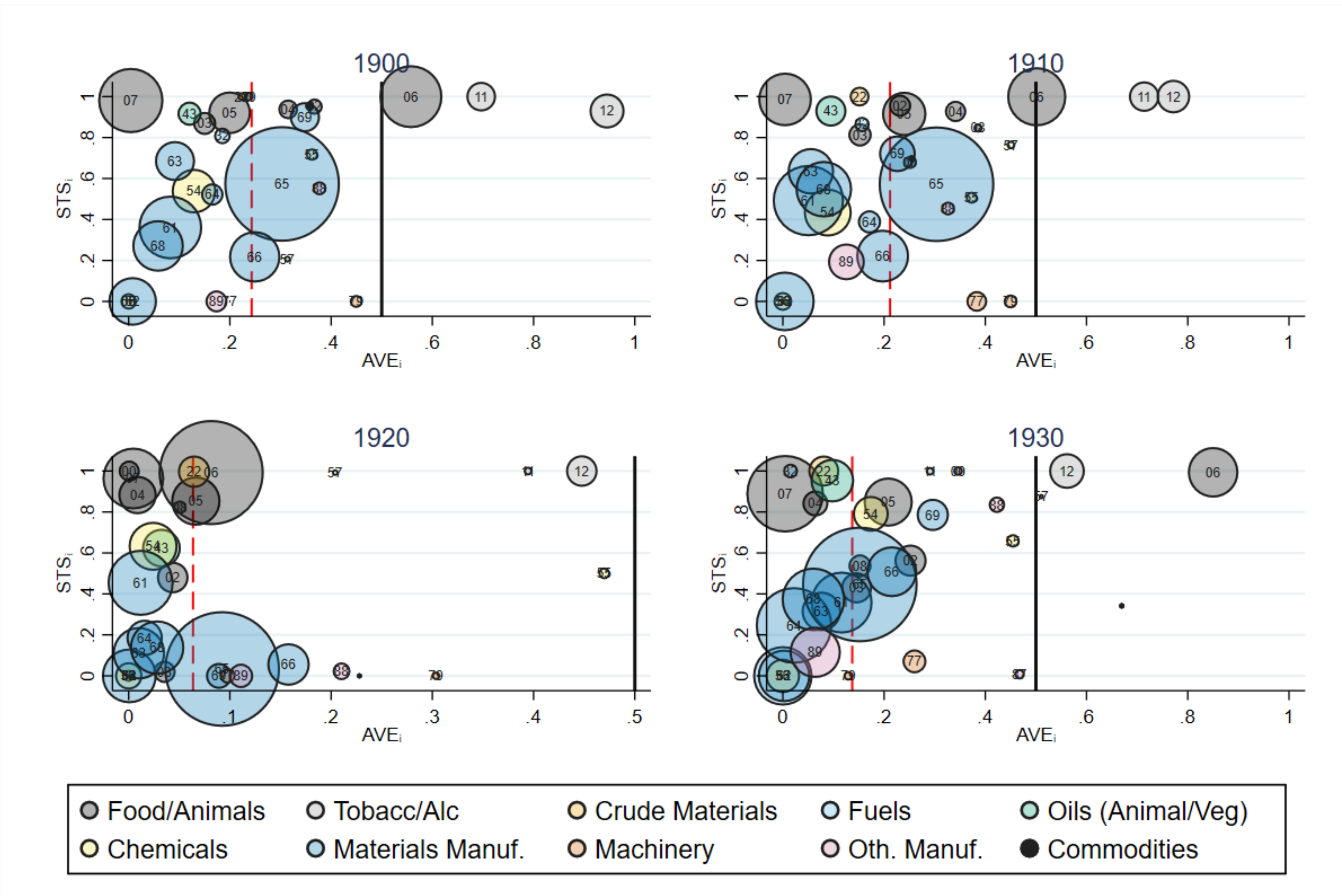
To summarize this variation more completely, in Figure 3 we display the relationship between the AVE, STS, and import share by decade from 1900 to 1940. Each circle reflects an SITC industry, with the size being proportional to the share of imports. On the horizontal axis we plot the AVE tariff for that industry, while the vertical axis depicts the industry's specific tariff share.

[9] We aggregate slightly to facilitate matching across years and data sources. We are left with 32 distinct 2-digit SITC revision 2 categories.

[10] We currently have only digitized data as far back as 1905. As a result, we use the specific tariff shares as of 1905 to represent 1900. Both years fell under the Dingley Tariff of 1897. In future versions of the paper we intend to digitize earlier years and use 1900 directly.

Additionally, we plot the overall AVE as a vertical red dashed line. The vertical black line indicates a 50% AVE to emphasize differences in scale across years.

Figure 3: $\mathbf{STS_i}$ versus $\mathbf{AVE_i}$ by SITC-2 and Year



Notes: Figure displays the Specific Tariff Share (STS_i) versus the Ad Valorem Equivalent (AVE_i) for each decade by SITC-2 industry. Vertical line indicates a 50% Ad Valorem Equivalent Tariff. Marker size proportional to share of start of period imports.

Between 1900 and 1910, the overall AVE rate declines modestly from 24% to 21%, before plummeting to 6.3% by 1920. The onset of the Smoot-Hawley Tariff of 1930 increases the level back to 13%. Though it needn't be the case, the AVE and STS are positively correlated in each year save the 1920s.[11] Yet, for any given level of protection there is substantial variation in the extent to which it is provided by specific tariffs. This variation allows us to identify outcomes through

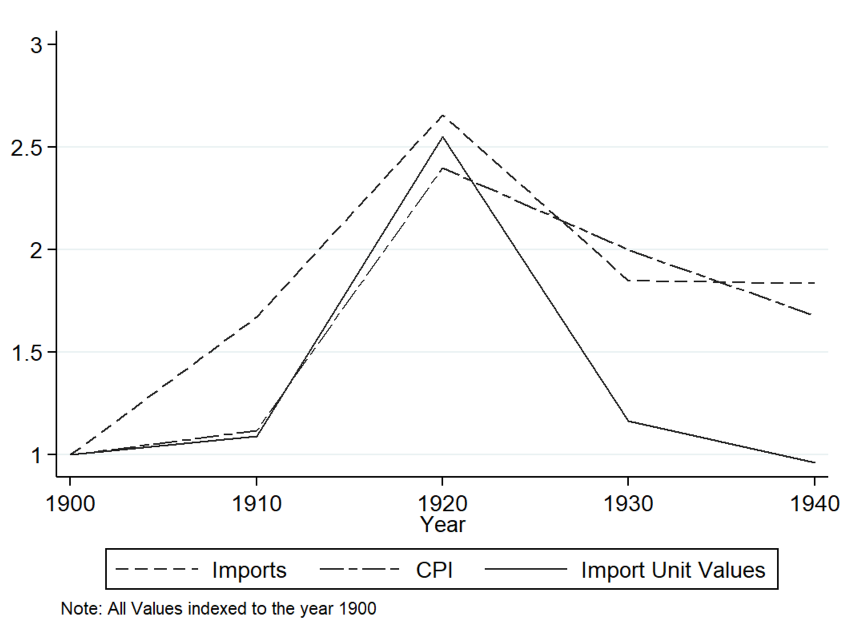
[11] The correlation coefficient between STS and AVE ranges from .15 to .4

changes in effective protection while controlling for the intended level of protection (AVE). Before turning to our labor market outcomes, we provide evidence of the importance of inflation-driven changes in effective protection both within and across sectors.

2.2 Effective Protection and Industry Imports

Here we relate changes in effective protection (as defined in equation 2) to changes in log imports at the industry level. This requires data on industry level imports as well as price levels. Our import data come from annual editions of both the *Statistical Abstract of the United States* and *Foreign Commerce and Navigation of the United States.* These data are reported in product groups that we manually concord to the 2-digit SITC Revision 2 classifications.[12] We also collect aggregate price data from from two distinct sources. In our baseline results we use US consumer price indices from the Jordà-Schularick-Taylor Macrohistory Database.[13] As robustness, we employ import price data from the Census volume *Historical Statistics of the United States.*[14]

Figure 4: Imports and CPI, 1900-1940



[12]There are approximately 86 product groups in the *Statistical Abstract*, and between 94 and 131 in *Foreign Commerce and Navigation.* We aggregate concord to 32 distinct 2-digit SITC categories to match to our measures of protection STS and AVE.

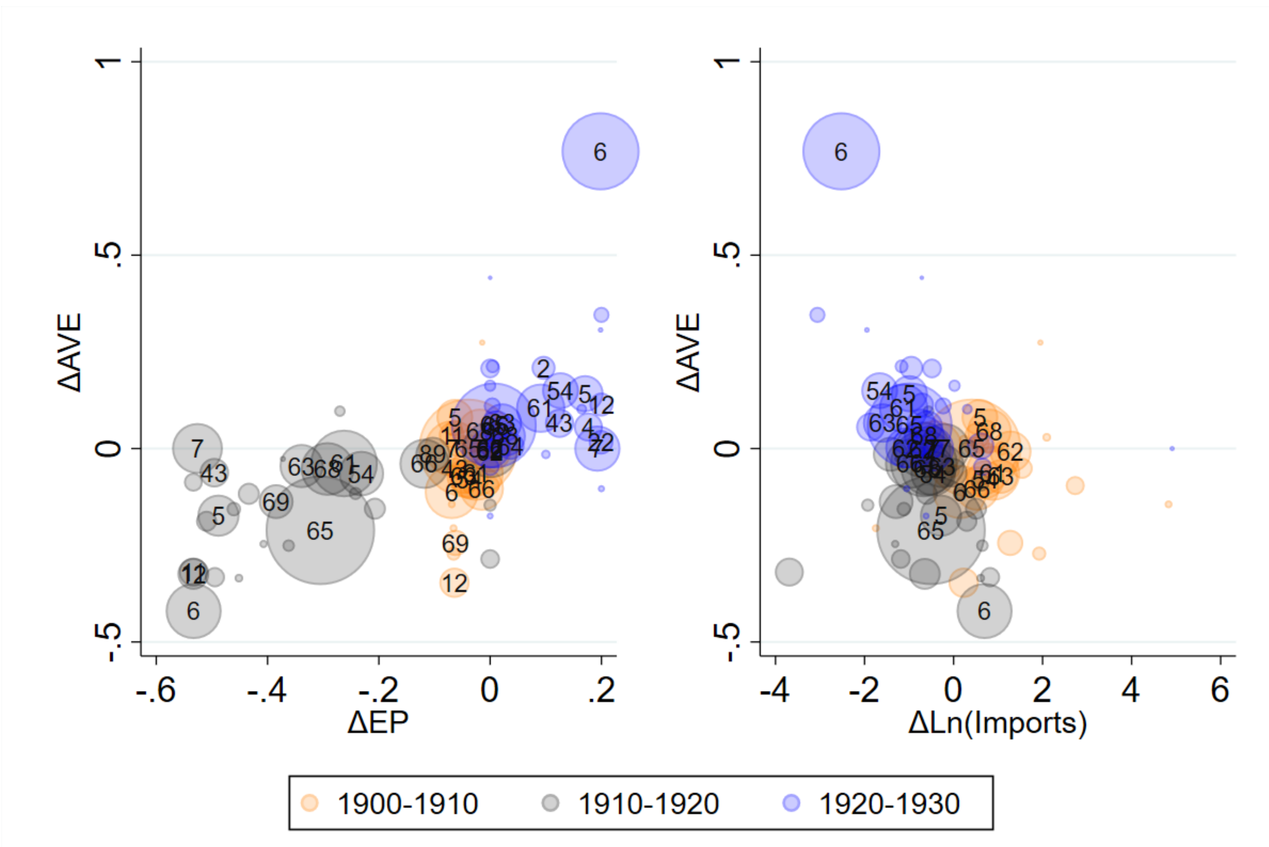
[13]http://www.macrohistory.net/data/

[14]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.

Figure 4 displays the evolution of price levels throughout our sample, as well as aggregate real imports. As is clear from the figure, both prices and imports rise for the first half of our sample, then fall throughout the second half due to the depression of 1920-21 and the Great Depression.

We begin by documenting that cross-industry variation in specific tariffs does in fact meaningfully affect the level of effective protection. One may be concerned, for instance, that inflation leads to within-industry substitutions in such a way that measured protection is left unaffected. As our analysis is conducted at the industry level, such cross-product adjustments are a serious concern.

Figure 5: ΔAVE, ΔEP, and $\Delta Ln(Imports)$



Notes: Figure relates changes in effective protection driven solely by inflation $\frac{-\iota}{1+\iota} STS_{it}$ to the industry AVE tariff. Marker size proportional to share of start of period imports. SITC-2 indicated. Second panel compares AVE to decadal change in log industry imports.

A visual inspection of figure 5 alleviates this concern. As expected, the measured change in industry AVE, driven both by inflation and changes in product shares, is strongly correlated with portion driven solely by inflation and pre-existing specific tariff shares. Over 45% of the variation in ΔAVE can be attributed to ΔEP.[15] Further, these observed changes in AVE are negatively related to import growth. Thus, not only do price fluctuations generate meaningful variation in effective protection, but this variation leads to meaningful changes in industry imports. To the best of our knowledge, this is the first direct evidence of inflation-driven trade tariff protection, a concept proposed a quarter century ago by Crucini (1994) and Irwin (1998), affecting trade flows.[16]

As we conduct the bulk of our formal analysis at the level of the local labor market, we must map these trade flows to the Census industry classifications.[17] Here, we provide evidence that the dynamics highlighted above are also observed at this level of aggregation. In Table 1, we regress the change in log imports, $\Delta Ln(Imports)_{it,t+1}$, against the change in effective protection, $\Delta EP_{it,t+1}$, every ten years from 1900 and 1940 at the Census industry level. In columns 1 through 3 we use CPI to construct price changes, while in Columns 4 through 6 we use import unit values. As shown in column 1, the relationship is negative, as predicted, and statistically significant. As inflation increases, effective protection falls, and imports rise. The point estimate implies that a 10% increase in prices corresponds to an increase in imports of approximately 10.7% for an industry at the 75th percentile in terms of its specific tariff share relative to an industry at the 25th percentile. The average decadal change in industry imports throughout our sample is approximately 17%, so this is a meaningful effect.

To the extent that the specific tariff share varies with the average level of tariffs, our estimates will capture the differential response across industries as a function of both tariff structure and tariff levels, and will thus be biased. We address this concern in column 2 by introducing an additional control for the start of period ad valorem equivalent in each industry i, AVE_{i,t_0}. Our results are unchanged by this addition. Finally, in column three we introduce industry fixed effects to capture persistent differences in import penetration growth across industries throughout this time period. Again, the point estimate on $\Delta EP_{it,t+1}$ is unaffected. Because industry imports ultimately impact aggregate price levels one might worry that the CPI is an endogenous function of the level

[15] Omitted for brevity, this relationship obtains after accounting for industry and year fixed effects and controlling for the level of AVE and is significant at (p=.043).

[16] We do not have the tariff line data in 1940 to calculate the true change in AVE from 1930-1940 and thus omit it from the graphs above. Nonetheless, because our variation comes from start of period specific tariff shares, we are able to examine trade and labor market changes through 1940.

[17] Specifically, we map the 2-digit SITC categories to HS 1992 categories using the concordance provided by the United Nations (https://unstats.un.org/unsd/trade/classifications/correspondence-tables.asp). We then concord these to 4-digit 1987 SIC categories following Pierce and Schott (2012). Finally, we concord these to Census industries using the concordance provided by James Lake (http://p2.smu.edu/jlake/data_code.html).

Table 1: Industry Import Growth and Changes in Effective Protection

	$\Delta Ln(Imports_{it,t+1})$					
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta EP_{it,t+1}$	-2.383***	-2.388***	-2.334***	-0.821***	-0.863***	-0.894***
	(0.644)	(0.592)	(0.626)	(0.271)	(0.247)	(0.283)
STS_{it}	-0.178	-0.175	-0.127	0.169	0.223	0.443
	(0.169)	(0.165)	(0.339)	(0.215)	(0.183)	(0.279)
AVE_{it}		-0.015	0.887		-0.188	0.396
		(0.310)	(1.181)		(0.274)	(1.135)
Year FE	Y	Y	Y	Y	Y	Y
Industry FE	N	N	Y	N	N	Y
Price Index	CPI	CPI	CPI	Unit Values	Unit Values	Unit Values

Notes: Dependent variable log change in industry imports at the county level across from 1900-1910, 1910-1920, 1920-1930, 1930-1940. Data from *Statistical Abstract of the United States* and *Foreign Commerce and Navigation of the United States* and author's calculations. AVE, STS measured at the start of decade. Regressions are weighted by industry imports as of 1900. Robust standard errors in parenthesis. *, **, *** indicate $p < .1$, $p < .05$, $p < .01$ respectively.

of protection. This would bias our estimates. We address this in columns 4-6 by using import unit values to construct changes in prices. To the extent that changes in import prices primarily reflect export market shocks, this mitigates concerns regarding reverse causality. As can be seen in the table, the change does reduce the magnitude of the point estimate substantially – by nearly two-thirds. However, the relationship remains negative, economically meaningful, and statistically significant.

3 Local Trade Exposure

In order to explore labor market responses to trade, we now turn to the local level. Our data on local characteristics and outcomes come from the full count decennial Census, available through IPUMS (Ruggles et al., 2020). We focus here on average outcomes at the county level. In ongoing work, we also plan to take advantage of linked individual data available through the Census Linking Project to estimate the effect on specific individuals, and to follow the trajectory of individuals in response to trade shocks over time.[18]

We begin by aggregating industry exposure to the level of the county. In order to create county-specific measures of trade exposure, we concord the industry classifications described above to Census employment data, which are reported by Census 1990 industries. For each county c, we

[18] https://censuslinkingproject.org/

then construct a weighted average of log changes in industry imports:

$$\Delta Ln(Imports)_{ct,t+1} = \sum_i \frac{L_{ict}}{L_{it}} \Delta Ln(Imports)_{it,t+1}. \tag{3}$$

As above, $\Delta Ln(Imports)_{it,t+1}$ is the change in log imports in industry i between decadal censuses. Similarly, we construct a county-level measure of changes in effective tariff protection by weighting the $\Delta EP_{it,t+1}$ local industry labor shares as:

$$\Delta EP_{ct,t+1} = \sum_i \frac{L_{ict}}{L_{ct}} \Delta EP_{it,t+1} \tag{4}$$

Where ι is the increase in price levels from t to $t+1$. As is standard in the literature, we fix labor shares and duties at their start-of-period values in order to avoid concerns regarding endogenous policy responses to labor market outcomes.[19] As noted above, in our analysis we will additionally control for the start of period ad valorem equivalent AVE_{ct}, constructed as an employment-weighted average of $\frac{TotalDuties_{it}}{Imports_{it}}$ across industries within a county. Our cross sectional variation thus comes from differences in the county-average specific tariff shares *conditional on average tariff levels*. We again emphasize the plausible exogeneity of such a measure – endogenous policy setting in this environment requires politicians to accurately forecast price changes over the subsequent ten years, and to choose specific or ad valorem tariffs accordingly, holding the overall level of protection constant.

Figure 6 displays the specific tariff share across counties as of 1900. As is clear from the figure, the variation across industries described above begets variation across regions. Agriculture and food products tend to have the highest specific tariff shares, while manufacturing industries rely less on specific tariffs. As a result, county-average specific tariff shares tend to be highest in the south and the plains regions, whereas the northeast and west have consistently lower average shares. Of course, such patterns raise the concern that our measure captures variation in the response to price changes based not on the tariff code, but some other characteristic of the local economy. We return to this possibility below.

[19] Further, note that county labor L_{ct} captures employment all industries, including non-tradable industries without tariffs. This is equivalent to assuming a specific tariff share equal to zero in such industries. As robustness, we report results setting L_{ct} equal to employment only in traded industries. This assumes that trade shocks pass through to non-tradable industries, as in Kovak (2013). As we show below, our baseline results are robust to this choice of weighting.

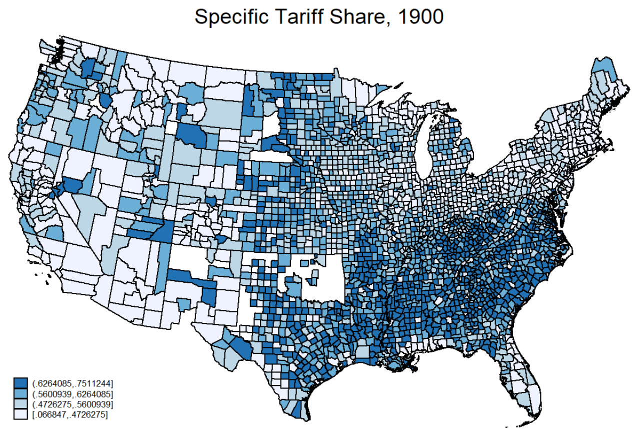


Figure 6: County Specific Tariff Shares, 1900

Figure 7 displays decadal log import growth at the county level for each decade in our sample. The mean change in county level log real imports is -0.02, with an interquartile range of 0.48. As is clear from the figure, the first two decades of our sample are characterized by relative increases in import competition in agricultural-producing regions. This pattern is reversed beginning in the 1920s, with manufacturing heavy locations experiencing relatively faster growth – or, in the case of the 1920s, less of a relative decline.

The specific tariff shares in 6 combined with the the price growth from 1900-1920 and declines from 1920-1940 bear a striking resemblance to the observed change in import growth in figure 7. We now turn to documenting this relationship formally.

3.1 County-Level Effective Protection and Imports

Our labor market analysis regresses local outcomes against increases in county log imports, $\Delta Ln(Imports_{ct,t+1})$, instrumenting with $\Delta EP_{ct,t+1}$:

$$Outcome_{ct,t+1} = \beta_0 + \beta_1 \Delta Ln(\widehat{Imports}_{ct,t+1}) + \beta_2 X_{ct} + \gamma_t + \epsilon_{ct} \tag{5}$$

X_{ct} represents a set of controls for CZ characteristics that may otherwise contaminate our estimates.

Before turning to labor market effects directly, in Table 2 we conduct a similar exercise to the one described in Table 1, this time at the county level.[20] This amounts to the first stage regression

[20]For all results in this section, we use CPI as our price measure, but note that our results are robust to using import unit values.

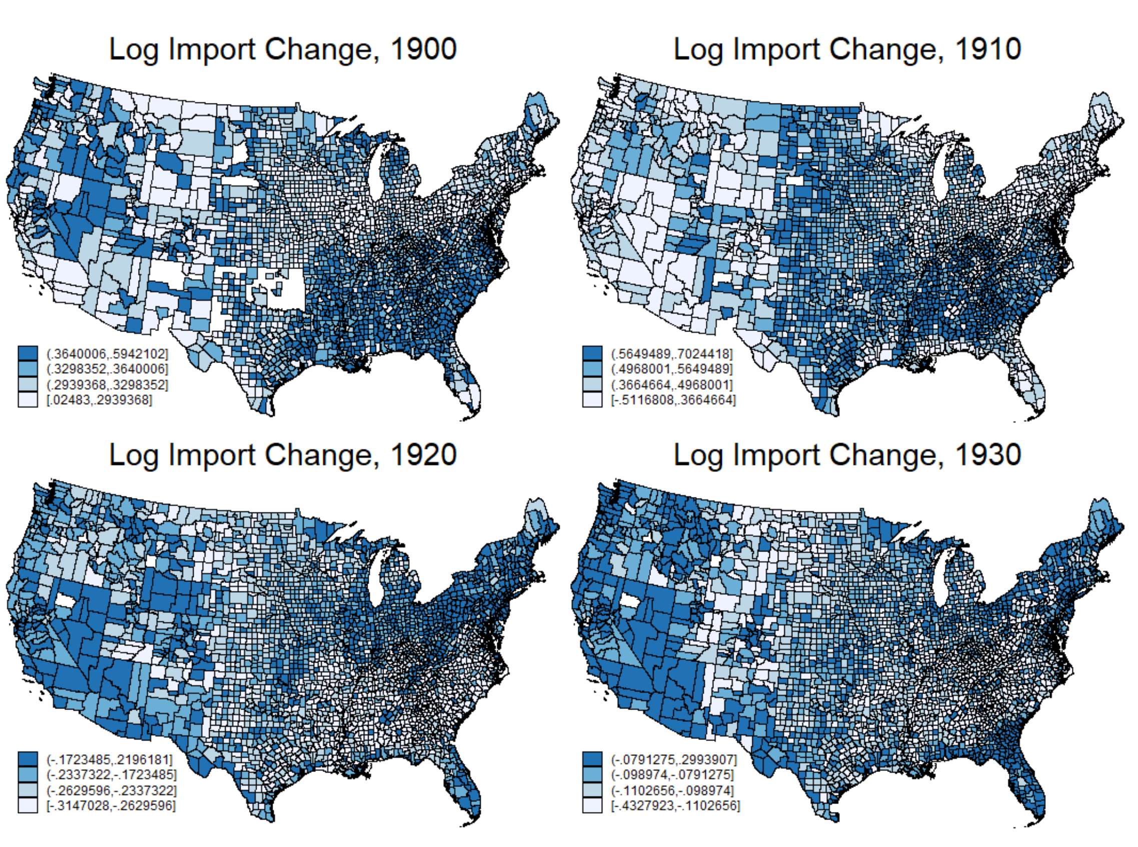


Figure 7: County Import Penetration Growth, 1900-1940

for our subsequent labor market analysis.

In column 1 we regress $\Delta Ln(Imports)_{ct,t+1}$ against $\Delta EP_{ct_{t,t+1}}$ and STS_{ct}. As with the industry specifications, the relationship is negative and statistically significant. By way of interpretation, note that a 10% increase in CPI corresponds to a 3.1% increase in imports for the county at the 75th percentile in terms of STS_{ct} relative to the 25th percentile. This is approximately 30% of the mean change in county imports across all decades in our sample. In column 2 we introduce a control for the county ad valorem tariff equivalent. Inclusion of this control reduces the magnitude of the point estimate of interest slightly, but leaves it both statistically significant and economically meaningful. In column 3, we introduce Census region fixed effects to control for regional differences in import growth throughout the period. Our results are unaffected by this addition. We note that the start of period ad valorem equivalent tariff, AVE_{ct}, is positively correlated with subsequent import growth. This is consistent with the idea that labor markets more exposed to import competition lobby for protectionist policies. This further highlights the value of our approach.

Table 2: County Log Import Growth and Trade Exposure

	$\Delta Ln(Imports_{ct,t+1})$						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$\Delta EP_{ct,t+1}$	-1.936***	-1.681***	-1.656***	-1.557***	-1.874***	-1.539***	-1.775***
	(0.018)	(0.036)	(0.038)	(0.048)	(0.050)	(0.034)	(0.049)
STS_{ct}	0.055***	-0.106***	-0.141***	-0.208***	-0.016	-0.059**	-0.209***
	(0.005)	(0.018)	(0.020)	(0.026)	(0.017)	(0.030)	(0.023)
AVE_{ct}		1.021***	1.145***	1.675***	0.502***	1.009***	1.207***
		(0.100)	(0.106)	(0.164)	(0.070)	(0.133)	(0.135)
Year FE	Y	Y	Y	Y	Y	Y	Y
Region FE	N	N	Y	Y	Y	Y	Y
Years Omitted	None	None	None	1900-1910	1910 - 1920	1920-1930	1930-1940

Notes: Census industry regressions of log change in real imports against changes in effective protection from 1900-1910, 1910-1920, 1920-1930, 1930-1940. Data from *Statistical Abstract of the United States* and *Foreign Commerce and Navigation of the United States* and author's calculations. AVE, STS measured at the start of decade. Robust standard errors in parenthesis. *, **, *** indicate $p < .1$, $p < .05$, $p < .01$ respectively.

A primary issue for our analysis is the effect of large, idiosyncratic events such as World War I or the Great Depression. To ensure that the relationship documented in the table is not driven by outlier occurrences, in Columns 4 through 7 we repeat the specification from Column 3, sequentially omitting one decade in each column. As is clear from the columns, the relationship is not driven by any specific decade.

3.2 Import Growth and Labor Force Participation

We now explore the labor market consequences of exposure to trade. Under this approach, we use $\Delta EP_{ct_{t,t+1}}$ as an instrument for $\Delta Ln(Imports)_{ct,t+1}$ between 1900 and 1940. Due to the low share of women in the labor force during this period, we focus exclusively on male outcomes in our baseline specifications. In Table 3 we regress decadal changes in labor force to population ratios for men ages 16-65 against $\Delta Ln(\widehat{Imports})_{ct,t+1}$. All specifications are weighted by 1900 county population.

Column 1 includes only our measure of interest and the specific tariff share itself. The results in the column show that increased import competition reduces county labor market attachment. The point estimate implies that a 10% increase in log imports reduces the county labor force to population ratio by approximately 0.01 – roughly 20% of the interqartile range of the dependent variable. In column 2 we introduce controls for the county ad valorem equivalent tariff. This increases the magnitude of the point estimate of interest slightly.

Table 3: County Log Import Growth and Changes in Labor Force Participation

	$\frac{\Delta LaborForce_{ct,t+1}}{Population_{ct}}$					
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta Ln(Imports)_{ct,t+1}$	-0.086***	-0.096***	-0.111***	-0.112***	-0.112***	-0.083***
	(0.009)	(0.013)	(0.010)	(0.010)	(0.010)	(0.019)
STS_{ct}	0.024***	0.013*	-0.042***	-0.050***	-0.047***	-0.032**
	(0.003)	(0.007)	(0.012)	(0.012)	(0.011)	(0.015)
AVE_{ct}		0.085	0.079*	0.063	0.057	-0.019
		(0.054)	(0.046)	(0.051)	(0.056)	(0.061)
Farm Share$_{ct}$			0.047***	0.046***	0.043***	0.044***
			(0.010)	(0.010)	(0.009)	(0.010)
MFG Share$_{ct}$			0.009	0.008	0.012	0.016*
			(0.009)	(0.010)	(0.011)	(0.010)
Farm Share$_{ct}$ $\times I(1930-1940)$			-0.033**	-0.031**	-0.031**	-0.031***
			(0.015)	(0.014)	(0.014)	(0.009)
MFG Share$_{ct}$ $\times I(1930-1940)$			-0.020	-0.018	-0.020	-0.012
			(0.023)	(0.022)	(0.021)	(0.020)
Share $Literacy_{ct}$				-0.049	-0.066*	-0.029
				(0.030)	(0.035)	(0.034)
Share Foreign Born$_{ct}$				-0.015***	-0.017***	-0.007
				(0.004)	(0.006)	(0.005)
Share Non-White$_{ct}$				-0.024**	-0.024**	-0.013
				(0.011)	(0.011)	(0.011)
Share Under 35$_{ct}$				-0.024	-0.021	-0.012
				(0.018)	(0.020)	(0.018)
Year FE	Y	Y	Y	Y	Y	Y
Region FE	N	N	N	N	Y	N
Region-Year FE	N	N	N	N	N	Y
Obs	11892	11892	11892	11892	11892	11892
R-Squared	0.136	0.136	0.144	0.148	0.15	0.179
F-Stat	69.2	74.87	48.1	68.4	63.5	676.14

Notes: Dependent variable is change in labor force to population among ment ages 16-65 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). Unless otherwise indicated data controls are measured at start of decade. Import growth is instrumented by $\Delta EP_{ct,t+1}$ as equation 4. Regressions weighted by start of period population. Standard errors clustered at the state level. *, **, *** indicate $p < .1$, $p < .05$, $p < .01$ respectively.

A potential concern with our approach is that specific tariff shares are chosen non-randomly. While we argue above that it is unlikely that politicians select specific tariffs rather than ad valorem tariffs for strictly protective reasons, it is possible that industry-specific, and therefore county-specific tariff shares, are correlated with other economic traits. As discussed above, the southern and central plains regions had persistently high specific tariff shares. As can be seen in Figure

8, this regional variation corresponds closely to the variation in agricultural and manufacturing employment, with the southern and plains regions focused primarily on agriculture, while manufacturing clusters in the north. If industries respond differentially to price shocks - for instance, if the price elasticity of agricultural output is greater than that for manufacturing – then our estimates may be biased. We take several steps to address this concern. First, in column 3, we include the county share of the population that lists "farmer" as an occupation in the 1900 Census. Since we are running a first difference specification, this amounts to accounting for agricultural trends throughout our sample.[21] Second, because our sample spans the Great Depression and the accompanying turmoil in the labor market, we include an additional variable that interacts both the farm and manufacturing shares with a 1930-1940 dummy. The allows for period-specific shocks that may confound our measure of changes in import growth. The agricultural controls significantly predict changes in labor force participation, but their inclusion makes little impact on our primary results.

In column 4 we introduce a number of county-specific, start-of-period measures intended to control for differential trends in labor market outcomes as a function of local characteristics. These controls include the share of the population that is literate, the share of the population that is foreign born, the share of the population that is non-white, and the share of the population that is under age 35. Inclusion of these controls increases the magnitude of the point estimate slightly. Finally, we directly control for persistent differential labor market trajectories across geographic areas via Census region fixed effects. In column 5 we introduce region fixed effects by themselves. Our results are largely unaffected by this addition. In column 6 – our most restrictive specification – we include region-by-year fixed effects to account for regional shifts over time. Similar in spirit to the farm and manufacturing controls in column 3, this addresses the concern that our results might be driven by variation in broader, regionally clustered sectoral responses to economic shocks. This reduces our point estimate of interest somewhat, but leaves it statistically significant. The result implies that a 10% increase in import reduces the labor force to population share by approximately 0.007, approximately 16% of the interqartile range of growth in county labor force to population ratios during the sample.

These results suggest that import competition reduced labor force attachment during this pe-

[21] Specifically, we identify the share of the population that lists "Farmers (owners and tenants)", "Farm managers", "Farm foremen", "Farm laborers, wage workers", "Farm laborers, unpaid family workers", or 'Farm service laborers, self-employed"' as their occupation. Manufacturing corresponds to 1990 IPUMS Census industries 100-392.

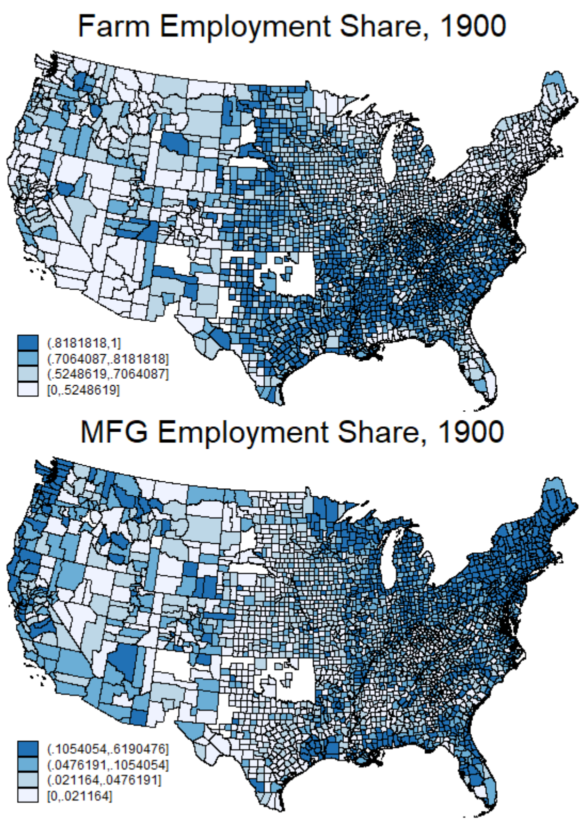


Figure 8: Count Manufacturing and Farm Employment Shares, 1900

Notes: Figure indicates share of county population that lists "Farmers (owners and tenants)", "Farm managers", "Farm foremen", "Farm laborers, wage workers", "Farm laborers, unpaid family workers", or 'Farm service laborers, self-employed"' as their occupation. Manufacturing employment corresponds to IPUMS 1990 Census industries 100-392.

riod. In Table 4, we consider a number of robustness tests of this baseline result. Specifically, we replicate column 5 of Table 3 with a single modification in each column.

Column 1 represents our baseline result without weighting by start of period population. This increases the point estimate slightly but has little impact on our findings. In column 2 we reconstruct ΔEP_{ct} and use import unit values to construct ι. Our point estimate is comparable to our baseline result and significant at the 1% level. In column 3 we consider an alternative approach to weighting trade shocks at the local level. Kovak (2013) presents a general equilibrium model of trade and local labor markets and argues that shocks to the tradable sector will be transmitted through prices to the non-tradable sector. Within such a framework it is appropriate to construct $\Delta EP_{ct,t+1}$ and $\Delta Ln(Imports)_{ct,t+1}$ with employment shares solely within the traded sector. While

Table 4: County Log Import Growth and Changes in Labor Force Participation Robustness

	$\frac{\Delta LaborForce_{ct,t+1}}{Population_{ct}}$						
	Unweighted	Import Unit Values	Kovak (2013) Weighting	Omitting 1900-1910	Omitting 1910-1920	Omitting 1920-1930	Omitting 1930-1940
$\Delta Ln(Imports)_{ct,t+1}$	-0.132***	-0.124***	-0.082***	-0.121***	-0.143***	-0.083***	-0.113***
	(0.011)	(0.013)	(0.008)	(0.014)	(0.029)	(0.017)	(0.011)
STS_{ct}	-0.061***	-0.056***	0.019	-0.063***	-0.058***	-0.069***	-0.027*
	(0.015)	(0.013)	(0.012)	(0.015)	(0.016)	(0.012)	(0.014)
AVE_{ct}	0.150***	0.106*	0.132***	0.133	0.111*	0.157**	0.057
	(0.052)	(0.057)	(0.036)	(0.082)	(0.063)	(0.071)	(0.054)
Farm Share$_{ct}$	0.042***	0.044***	-0.005	0.054***	0.036***	0.016	0.035***
	(0.008)	(0.010)	(0.009)	(0.012)	(0.014)	(0.015)	(0.009)
MFG Share$_{ct}$	-0.008	0.009	0.002	0.001	0.010	0.005	0.008
	(0.009)	(0.010)	(0.008)	(0.015)	(0.015)	(0.011)	(0.012)
Farm Share$_{ct}$	-0.046***	-0.034**	0.005	-0.036***	-0.032**	-0.007	0.000
$\times I(1930-1940)$	(0.009)	(0.014)	(0.013)	(0.013)	(0.015)	(0.016)	(.)
MFG Share$_{ct}$	-0.049***	-0.024	0.005	-0.012	-0.030	-0.024	0.000
$\times I(1930-1940)$	(0.013)	(0.022)	(0.021)	(0.021)	(0.027)	(0.020)	(.)
Share *Literate*$_{ct}$	-0.061***	-0.066*	-0.049	-0.044	-0.088*	-0.121***	-0.013
	(0.017)	(0.035)	(0.035)	(0.052)	(0.051)	(0.046)	(0.011)
Share Foreign Born$_{ct}$	-0.028***	-0.018***	-0.012*	0.002	-0.014	-0.031***	-0.017**
	(0.007)	(0.006)	(0.006)	(0.006)	(0.009)	(0.008)	(0.007)
Share Non-White$_{ct}$	-0.014*	-0.023**	-0.016	-0.013	-0.033**	-0.049***	0.001
	(0.008)	(0.011)	(0.011)	(0.015)	(0.015)	(0.014)	(0.004)
Share Under 35$_{ct}$	0.006	-0.025	-0.042*	-0.059**	0.017	-0.054**	0.008
	(0.015)	(0.021)	(0.024)	(0.025)	(0.027)	(0.023)	(0.019)
Year FE	Y	Y	Y	Y	Y	Y	Y
Region FE	Y	Y	Y	Y	Y	Y	Y
Obs	11892	11892	11892	9095	8950	8831	8800
R^2	0.138	0.148	0.129	0.115	0.125	0.186	.172

Notes: Dependent variable is change in labor force to population among men ages 16-64 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). Unless otherwise indicated data controls are measured at start of decade. Import growth is instrumented by $\Delta EP_{ct,t+1}$ as equation 4. Regressions weighted by start of period population. Standard errors clustered at the state level. *, **, *** indicate $p < .1$, $p < .05$, $p < .01$ respectively.

this weighting reduces the magnitude of the point estimate somewhat, we note that the interquartile range of county log import changes is approximately 50% larger, such that the interquartile effect is quite similar under the two approaches.

Finally, in our remaining four columns, we sequentially drop each decade in the sample to further demonstrate that neither heterogeneous exposure to WWI nor the Great Depression drive our results. This is particularly important as the 1910-1920 period exhibits the greatest price growth, while the Great Depression led to the most negative price growth. Nonetheless, our key finding obtains: inflation-driven changes in effective protection affects local labor markets. Even after conditioning on the initial tariff level, inflation erodes the protective capacity of specific tariffs. Protection falls, imports rise, and counties experience relative declines in labor force participation.

4 Other Economic Outcomes

Leaving the labor force entirely is only one potential response to import competition. In this section we consider other mechanisms of adjustment, including changes in occupation, industry, and location.

4.1 Income, Occupation, and Industry Switching

In Table 5 we explore whether import growth also impacts income. At the start of our sample, the federal income tax did not exist. Consequently, we have no direct measures of income. 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 more exposed to imports shifted to lower-paying occupations on average.[22] In the table, we repeat the specifications from Table 3 with log changes in average county occupational income – among individuals reporting a non-zero income – as the outcome. Across all columns, the effect is large and statistically significant. That is, increases in imports do lead individuals to shift from higher income occupations to lower income occupations, conditional on remaining in the labor force. The results in column 5 indicate that a 10% increase in imports corresponds to a 1.3% reduction in occupational income score growth.

This result suggests labor market adjustment across jobs among those remaining in the labor force. We explore this directly in Table 6. In the table, we decompose our labor force participation result from column 5 of table 3 into shifts across mutually exclusive sectors. For brevity, we include here only the coefficients from import growth and start of period STS and AVE and suppress all other covariates.[23]

[22]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.

[23]Full coefficients are available upon request.

Table 5: County Log Import Growth and Occupational Income

	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta Ln(Imports)_{ct,t+1}$	-0.072***	-0.138***	-0.034***	-0.034***	-0.034***	-0.078***
	(0.009)	(0.014)	(0.013)	(0.012)	(0.012)	(0.015)
STS_{ct}	0.100***	0.024*	0.020*	0.013	0.010	-0.018
	(0.007)	(0.014)	(0.012)	(0.011)	(0.011)	(0.014)
AVE_{ct}		0.558***	0.145**	0.131**	0.131**	0.257***
		(0.081)	(0.062)	(0.057)	(0.059)	(0.055)
Farm Share_{ct}			0.025**	0.019*	0.022**	0.027**
			(0.011)	(0.010)	(0.011)	(0.013)
MFG Share_{ct}			0.045***	0.049***	0.036***	0.017
			(0.014)	(0.011)	(0.011)	(0.011)
Farm Share_{ct} $\times I(1930-1940)$			0.103***	0.104***	0.105***	0.098***
			(0.010)	(0.011)	(0.010)	(0.013)
MFG Share_{ct} $\times I(1930-1940)$			-0.028	-0.030	-0.029	-0.017
			(0.022)	(0.023)	(0.022)	(0.024)
Share Literate_{ct}				-0.006	-0.001	-0.023
				(0.023)	(0.021)	(0.021)
Share Foreign Born_{ct}				-0.037***	-0.046***	-0.044***
				(0.008)	(0.008)	(0.008)
Share Non-White_{ct}				-0.017**	-0.014*	-0.020**
				(0.009)	(0.008)	(0.008)
Share Under 35_{ct}				-0.002	0.050	0.036
				(0.032)	(0.031)	(0.031)
Year FE	Y	Y	Y	Y	Y	Y
Region FE	N	N	N	N	Y	N
Region-Year FE	N	N	N	N	N	Y
Obs	11889	11889	11889	11889	11889	11889
R-Squared	.345	.344	.421	.426	.432	.447

Notes: Dependent variable is log change in occupational income score among men ages 16-64 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). Unless otherwise indicated data controls are measured at start of decade. Import growth is instrumented by $\Delta EP_{ct,t+1}$ as equation 4. Regressions weighted by start of period population. Standard errors clustered at the state level. *, **, *** indicate $p < .1$, $p < .05$, $p < .01$ respectively.

Our primary coefficient reveals that the majority of job loss takes place in trade-related sectors. We observe large reductions in labor force participation in Agriculture, Manufacturing, and Transportation, and find increases in service sectors such as Retail and Construction. The largest effect by a substantial margin is in manufacturing. It bears repeating that this specification exploits cross county differences in effective protection *within* regions. Thus, these results cannot be explained by aggregate shocks that might differentially affect manufacturing- or agriculture-intensive regions. These results, combined with the spatial clustering of specific tariffs in the south paints an interest-

Table 6: **County Log Import Growth and Labor Force Participation**

	(1) Ag.	(2) Manuf.	(3) Mining	(4) Constr.	(5) Transp.	(6) Wholesale Retail	(7) Finanec Services	(8) Other
$\Delta Ln(Imports)_{ct,t+1}$	-0.042***	-0.119***	0.021**	0.065***	-0.068***	0.019**	0.014*	-0.001***
	(-2.96)	(-6.07)	(2.11)	(4.72)	(-7.56)	(2.11)	(1.94)	(-6.06)
STS_{ct}	-0.055***	-0.053***	-0.072***	0.119***	0.001	0.013	0.001	-0.001***
	(-2.79)	(-2.72)	(-6.13)	(8.63)	(0.14)	(1.42)	(0.25)	(-5.28)
AVE_{ct}	0.027	-0.017	-0.046	-0.145***	0.013	0.153***	0.070*	0.002**
	(0.29)	(-0.18)	(-1.12)	(-3.25)	(0.28)	(5.01)	(1.77)	(2.36)
Year FE	Y	Y	Y	Y	Y	Y	Y	Y
Region FE	Y	Y	Y	Y	Y	Y	Y	Y
Obs	11892	11892	11892	11892	11892	11892	11892	11892
R^2	0.349	0.247	0.075	0.493	0.319	0.523	0.353	0.066

Notes: Dependent variable is change in share of employment accounted for by different industries among men ages 16-64 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). Unless otherwise indicated data controls are measured at start of decade. Import growth is instrumented by $\Delta EP_{ct,t+1}$ as equation 4. Regressions weighted by start of period population. Standard errors clustered at the state level. *, **, *** indicate $p < .1$, $p < .05$, $p < .01$ respectively.

ing picture. Among other important points, price growth from 1900-1920 plausibly led an increase in import competition in the south that may have retarded growth in the manufacturing sector as compared to some less impacted and northern counterparts.

Beyond endogenous occupation and industry switching, migration offers a potential margin of adjustment to import competition shocks. However, even in response to large shocks, migration effects may be muted (Hakobyan and McLaren, 2016; Dix-Carneiro and Kovak, 2019) or masked by secular migratory trends and sluggish (Greenland, Lopresti, and McHenry, 2019). We explore the extent to which migration played an important role in the response to import competition during this period by regressing the change in log county population on import growth, again instrumented by changes in effective protection. Results are reported in Table 7. Suppressed for space, we introduce controls sequentially as in Table 6.

Unconditionally, we observe that increased import growth leads to lower population growth. This effect is partially reduced when accounting for the county AVE in column 2, suggesting that part of the decline we estimate may be attributable to declines in population in heavily protected regions. Beginning with column 3, we include controls for agricultural employment and manufacturing employment, as well as their interaction with a dummy for the 1930s. Here, and in all remaining specifications, we observe no migratory responses. Thus, it seems that differential population trends in agricultural regions relative to manufacturing -intensive regions largely explains migration patterns during our sample, rather than local exposure to trade.

Table 7: County Log Import Growth and Population Growth

Panel A	$\Delta Ln(Population)_{ct,t+1}$					
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta Ln(Imports)_{ct,t+1}$	-0.150**	-0.216**	-0.044	-0.036	-0.053	-0.156
	(0.060)	(0.098)	(0.140)	(0.142)	(0.137)	(0.126)
R^2	.111	.111	.132	.140	.195	.226
Panel B	$\Delta Ln(Population)_{ct,t+1}$					
$\Delta Ln(Imports)_{ct,t+1}$	-0.142**	-0.212**	-0.030	-0.043	-0.051	-0.166
	(0.066)	(0.104)	(0.145)	(0.144)	(0.138)	(0.121)
$\Delta Ln(Population)_{ct-1,t}$	0.247***	0.246***	0.248***	0.255***	0.208***	0.225***
	(0.046)	(0.047)	(0.048)	(0.060)	(0.052)	(0.052)
R^2	.189	.186	.212	.216	.248	.290
Year FE	Y	Y	Y	Y	Y	Y
Region FE	N	N	N	N	Y	N
Region-Year FE	N	N	N	N	N	Y
Obs	11892	11892	11892	11892	11892	11892

Notes: Dependent variable is change in log population at 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). Columns sequentially include controls from Table 3: (1) STS (2) AVE (3) Agriculture and Manufacturing Controls (4) Demographic Controls. Unless otherwise indicated data controls are measured at start of decade. Import growth is instrumented by $\Delta EP_{ct,t+1}$ as equation 4. Regressions weighted by start of period population. Standard errors clustered at the state level. *, **, *** indicate $p < .1$, $p < .05$, $p < .01$ respectively.

Finally, work by Greenland et al. (2019) points out the masking effect of secular migratory trends on the migratory responses to labor market shocks. In this spirit, in Panel B we repeat each of the aforementioned specifications, additionally accounting for lagged population growth. The results are largely unchanged: import competition does not appear to have driven migratory patterns during our sample.

There are several potential explanations for this finding. First, during our sample labor market integration is low and transportation costs are high. This likely makes population adjustments to trade shocks costly, both due to information acquisition and due to the spatial clustering of economic activity. One might have to travel a considerable distance to find labor markets with substantially different exposure to changes in effective protection than one's own labor market. Second, given the potentially transitory nature of our shock (prices may increase one decade and decrease the next) and the sunk costs associated with migration, workers may be less inclined to leave a labor market if they expect that prices may revert in some future period. In continuing work we are further investigating this issue by looking at linked Census data in which we directly observe individual migration decisions.

4.2 Who Bears the Costs of Import Growth?

Finally, we consider which groups are most exposed to changes in import competition, replicating both our labor force participation and occupational income results across various subgroups. We find important differences by age, race, and across the urban rural divide. We begin with labor force participation in Table 8.

Overall the table indicates that it is the youngest workers who bear the costs of rising import competition, with the effect among the individuals age 15-34 twice the size of our baseline result. Individuals ages 35-54 seem to be unaffected, while those 55 and older exit the labor force in response to trade shocks, albeit at a much lower rate than the youngest individuals. The effects are similar in magnitude for black and white men, while the effect on rural workers is four times as larger as their urban counterparts. Given the sizeable reliance of agriculture on specific tariffs, it is perhaps not surprising that rural workers experience the largest loss in labor force attachment.

In Table 9, we turn to income scores by group. As before, we condition on a positive income, so that those who leave the labor force will by definition not be included. The effects we observe here are noticeably different from those for employment. We observe no occupational switching among the youngest individuals, and the largest response among the middle age group. Similarly, we find large effects among the urban population and no statistically significant effect for rural individuals. This suggests that as import competition rises, there is a general diminishing of labor market opportunities. Those at the bottom end of the income distribution – the very young and those in less vibrant economic locales – reduce attachment to the labor force entirely. Those at higher levels of the income distribution remain in the labor force, but see their occupational standing reduced. We intend to further explore these results in linked Census data in the future.

Table 8: County Import Penetration and Labor Force Participation by Subgroups

	$\frac{\Delta LaborForce_{ct,t+1}}{Population_{ct}}$							
	15-34	35-54	55-64	White	Black	Foreign Born	Urban	Rural
$\Delta Ln(Imports)_{ct,t+1}$	-0.211***	0.005	-0.074***	-0.109***	-0.078***	-0.021	-0.037*	-0.145***
	(-15.39)	(0.55)	(-6.28)	(-10.30)	(-3.41)	(-0.78)	(-1.90)	(-10.49)
STS_{ct}	-0.080***	-0.002	-0.018	-0.043***	-0.049**	-0.034*	-0.016	-0.070***
	(-5.32)	(-0.18)	(-1.32)	(-3.70)	(-2.34)	(-1.93)	(-0.74)	(-5.87)
AVE_{ct}	0.220***	-0.118*	-0.086	0.037	-0.084	-0.249**	-0.125	0.216***
	(3.62)	(-1.85)	(-0.99)	(0.59)	(-1.09)	(-1.96)	(-1.40)	(4.59)
Share Literate$_{ct}$	-0.072**	-0.059	-0.123**	-0.067	0.030	-0.144	-0.148	-0.046***
	(-2.57)	(-1.45)	(-2.15)	(-1.51)	(1.39)	(-1.37)	(-1.25)	(-3.07)
Share Foreign Born$_{ct}$	-0.015**	-0.004	-0.028**	-0.017***	0.039***	-0.025**	-0.013	-0.027***
	(-2.09)	(-0.83)	(-2.32)	(-2.76)	(3.07)	(-2.57)	(-0.97)	(-3.47)
Share Non-White$_{ct}$	-0.027***	-0.018	-0.036**	-0.020	0.003	-0.053*	-0.054	-0.016***
	(-2.94)	(-1.47)	(-2.16)	(-1.59)	(0.38)	(-1.66)	(-1.61)	(-3.43)
Share Under 35$_{ct}$	-0.122***	0.000	0.017	-0.017	-0.040*	0.036	-0.059	-0.010
	(-5.43)	(0.02)	(0.54)	(-0.77)	(-1.78)	(1.25)	(-1.17)	(-0.66)
Farm Share$_{ct}$	0.066***	0.012	0.032***	0.044***	0.063***	0.049***	0.030*	0.044***
	(4.64)	(1.31)	(3.29)	(4.61)	(4.49)	(2.88)	(1.75)	(6.78)
MFG Share$_{ct}$	0.009	0.020*	0.023	0.016	0.022	0.035**	0.020	0.010
	(0.53)	(1.95)	(1.29)	(1.42)	(1.43)	(2.09)	(1.17)	(1.15)
Farm Share$_{ct}$	-0.058***	0.013	-0.024*	-0.028**	0.004	0.046**	0.018	-0.033***
$\times I(1930-1940)$	(-2.64)	(1.07)	(-1.78)	(-2.14)	(0.29)	(2.15)	(0.81)	(-2.73)
MFG Share$_{ct}$	-0.053	0.022	-0.004	-0.018	0.017	0.042	0.020	-0.048***
$\times I(1930-1940)$	(-1.52)	(1.27)	(-0.16)	(-0.93)	(0.61)	(1.33)	(0.60)	(-2.96)
Year FE	Y	Y	Y	Y	Y	Y	Y	Y
Region FE	Y	Y	Y	Y	Y	Y	Y	Y
Obs	11892	11890	11852	11892	9277	10646	5571	11759
R^2	0.288	0.162	0.219	0.129	0.283	0.145	0.062	0.188

Notes: Dependent variable change in labor force participation among men ages 16-64 by demographic group 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). Unless otherwise indicated data controls are measured at start of decade. Import growth is instrumented by $\Delta EP_{ct,t+1}$ as equation 4. Regressions weighted by start of period population. Standard errors clustered at the state level. *, **, *** indicate $p < .1$, $p < .05$, $p < .01$ respectively.

Table 9: County Import Penetration and Income, Subgroups

	15-34	35-54	55-64	White	Black	Foreign Born	Urban	Rural
$\Delta Ln(Imports)_{ct,t+1}$	-0.012	-0.093***	-0.045***	-0.042***	-0.045**	-0.116***	-0.122***	-0.035
	(-0.65)	(-11.40)	(-4.06)	(-2.99)	(-2.22)	(-5.75)	(-6.17)	(-1.20)
STS_{ct}	0.028*	-0.023**	0.019	0.007	-0.089***	-0.127***	-0.039**	-0.102***
	(1.74)	(-2.39)	(1.52)	(0.54)	(-3.02)	(-6.48)	(-1.98)	(-3.31)
AVE_{ct}	-0.005	0.353***	0.269***	0.109*	0.292***	0.476***	0.164**	0.618***
	(-0.07)	(5.23)	(3.25)	(1.75)	(3.08)	(3.97)	(2.17)	(4.17)
Share Literate$_{ct}$	0.025	-0.062***	-0.027	0.003	-0.021	-0.164***	0.008	0.004
	(0.88)	(-3.48)	(-0.98)	(0.14)	(-0.89)	(-2.77)	(0.35)	(0.22)
Share Foreign Born$_{ct}$	-0.047***	-0.036***	-0.022	-0.040***	-0.028*	-0.046***	-0.005	-0.038***
	(-4.28)	(-3.64)	(-1.45)	(-5.33)	(-1.74)	(-2.92)	(-0.66)	(-4.02)
Share Non-White$_{ct}$	-0.013	-0.027***	-0.007	-0.024**	-0.021**	-0.040*	0.011	-0.012
	(-1.27)	(-3.36)	(-0.66)	(-2.28)	(-2.26)	(-1.87)	(1.08)	(-1.61)
Share Under 35$_{ct}$	-0.028	-0.027	0.001	0.075**	-0.065**	0.030	0.068*	0.050*
	(-0.72)	(-0.92)	(0.02)	(2.20)	(-1.99)	(0.77)	(1.87)	(1.68)
Farm Share$_{ct}$	0.023*	0.021*	-0.005	0.028***	0.032	0.091***	0.056***	-0.005
	(1.84)	(1.95)	(-0.38)	(2.71)	(1.35)	(6.46)	(5.77)	(-0.34)
MFG Share$_{ct}$	0.053***	0.024**	0.025*	0.043***	-0.074***	0.027*	0.035***	0.021
	(4.24)	(1.98)	(1.77)	(4.64)	(-3.51)	(1.65)	(2.71)	(0.83)
Farm Share$_{ct}$ $\times I(1930-1940)$	0.187***	0.060***	0.044***	0.121***	0.058***	-0.016	-0.052***	0.010
	(11.59)	(6.11)	(3.51)	(9.81)	(3.08)	(-1.34)	(-3.46)	(0.47)
MFG Share$_{ct}$ $\times I(1930-1940)$	-0.042	-0.030	-0.018	-0.027	0.148***	-0.104***	-0.042	-0.018
	(-1.31)	(-1.42)	(-0.73)	(-1.16)	(2.61)	(-4.62)	(-1.59)	(-0.50)
Year FE	Y	Y	Y	Y	Y	Y	Y	Y
Region FE	Y	Y	Y	Y	Y	Y	Y	Y
Obs	11889	11887	11848	11889	9171	10572	5567	11756
R^2	0.389	0.374	0.277	0.423	0.157	0.208	0.379	0.394

Notes: Dependent variable is log change in occupational income score among men ages 16-64 at the county level from 1900-1910, 1910-1920, 1920-1930, 1930-1940 by demographic group.. 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). Unless otherwise indicated data controls are measured at start of decade. Import growth is instrumented by $\Delta EP_{ct,t+1}$ as equation 4. Regressions weighted by start of period population. Standard errors clustered at the state level. *, **, *** indicate $p < .1$, $p < .05$, $p < .01$ respectively.

5 Conclusion

In this paper we develop a novel approach to measuring exposure to import competition. By interacting price changes with a measure of the pre-existing variation in the prevalence of specific rather than ad valorem tariffss, we construct a measure of tariff exposure at the industry and county level that varies substantially over time even in the absence of changes to policy. We show that our measure predicts import growth at the industry and local level, and predicts subsequent county-level labor market outcomes. Labor force participation and occupational income declines in response to import competition, particularly in tradable sectors.

We are currently pursuing several extensions of this approach. First, we intend to take advantage of the availability of linked Census data during this period to explore the response to import exposure at the individual level over the very long run. As a part of this, we hope to explore the intergenerational effect of trade shocks by linking sons to their fathers. Second, we are currently exploring the effect of exogenous variation in trade exposure on Congressional voting on trade bills throughout the twentieth century. This is a particularly attractive possibility given the ability of our measure to avoid standard concerns related to the endogeneity of trade policy. Finally, we hope to expand our approach to modern data, taking advantage of more complete micro data to explore the response to exogenous trade variation in the absence of major policy shifts.

We believe this is a small set of the potential applications for this approach. Numerous countries, not just the early 20^{th} century US, employ specific tariffs. And even within the US, the inflationary effects of trade shocks are exploitable well beyond the 1940s, as specific tariffs were fixed in 1930 and have since remained unaltered.[24] Finally, this period is a particuarly rich policy environment in which to explore the relationship of trade to a variety of government activities. The ability of governments to alleviate the negative consequences of trade is of first order importance for trade economists. Policy movements during 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 additional effects of a a rich set of coincident policy interventions.

[24] Of course, various GATT/WTO rounds and regional trade agreements provide for an additional source of variation.

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