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Working Paper 20-041

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Abstract

We use micro data collected at the border and the store to characterize the price impact of recent US trade policy on importers, exporters, and consumers. At the border, import tariff passthrough is much higher than exchange rate passthrough. Chinese exporters did not lower their dollar prices by much, despite the recent appreciation of the dollar. By contrast, US exporters significantly lowered prices affected by foreign retaliatory tariffs. In US stores, the price impact is more limited, suggesting that retail margins have fallen. Our results imply that, so far, the tariffs' incidence has fallen in large part on US firms.

JEL-Codes: F01, F13, F14, F04.
Keywords: trade policy, tariffs, exchange rate passthrough.

*This research was conducted with restricted access to Bureau of Labor Statistics (BLS) data. The views expressed herein are those of the authors and do not necessarily reflect the views of the BLS, the Federal Reserve Bank of Boston, the Federal Reserve System, or those of the IMF, its Executive Board, or Management. We are grateful to Rozi Ulics for her substantial efforts as BLS project coordinator, to Florencia Hnilo, Keith Barnatchez, Menglu Xu, and Augusto Ospital for excellent research assistance, and to Chad Bown and Mitali Das for helpful comments and suggestions. Alberto Cavallo is a shareholder of PriceStats LLC, a private company that provided proprietary data used in this paper without any requirements to review the findings.

1 Introduction

Since 2018, the United States has initiated a large number of significant changes to its trade policies. Most notably, it has imposed import tariffs ranging from 10 to 50 percent on goods including washing machines, solar panels, aluminum, steel, and roughly $250 billion of goods from China, and the United States has announced future tariffs affecting nearly $300 billion more goods. In response, Canada, China, the European Union (EU), and Mexico have imposed retaliatory tariffs. On a scale not seen since the 1920s, the world's largest economies have passed measures making it far more costly to buy goods from each other.[1]

This paper uses good-level data to assess the impact of these policy changes on US prices. We extend the results in the literature by comparing the degrees of tariff and exchange rate passthrough into border prices and by providing detailed information about the impact on consumer prices. The combination of border and retail prices is crucial to determine the incidence of the tariffs. If foreign exporters reduce their ex-tariff US dollar prices by an amount close to the scale of the tariffs, the tariff's incidence will fall primarily on foreign countries. If not, the US importer (who pays the ex-tariff price plus the tariff) faces higher costs to buy the foreign goods, and the response of retail prices is essential to know if that additional cost is ultimately borne by US firms or US consumers.

We start by studying US import prices using product-level data from the Bureau of Labor Statistics (BLS). We compare import (ex-tariff) price indices constructed for otherwise equivalent goods that are affected and not affected by tariffs and, as of the end of August 2019, find essentially no difference, consistent with the results obtained using Census unit values in Amiti, Redding, and Weinstein (2019) and Fajgelbaum, Goldberg, Kennedy, and Khandelwal (2019). Controlling for sectoral inflation rates, our regressions suggest that a 20 percent tariff, for example, would be associated with a 1.5 percent decline in the ex-tariff price and an 18.5 percent increase in the total price paid by the US importer.

Given that these data track the prices of individual goods and are immune to possible changes in the composition of import categories, the BLS micro data are particularly useful for comparing the passthrough rates of tariffs with those of exchange rate shocks. We estimate that the

[1]See Amiti, Redding, and Weinstein (2019), Bown and Kolb (2019), and Cavallo, Cal, and Laski (2019) for helpful overviews of the policy setting and timelines of the policy changes made.

exchange rate passthrough is 22 percent in the first 12 months, implying that a 20 percent dollar appreciation would only decrease the dollar price of imports by 4.4 percent, far less than the 18.5 percent discussed above for an equivalent sized tariff.[2] Our estimated asymmetry in the passthrough rates of exchange rates and tariffs is consistent with the results in Fitzgerald and Haller (2018) and may reflect the role of imported intermediate inputs in production and the perceived difference in the persistence of tariffs versus exchange rate changes. It also carries important implications for the consequences of policies such as fiscal devaluations and border adjustment taxes, as discussed in Farhi, Gopinath, and Itskhoki (2014) and Barbiero, Farhi, Gopinath, and Itskhoki (2019). Furthermore, it suggests that the depreciation of the Chinese renminbi against the US dollar during the summer of 2019 did little to offset the impact of the tariffs in terms of the prices paid by US importers, implying that the price incidence of the import tariffs falls largely on the United States.[3]

We then turn to BLS export prices, which we use to gauge whether US exporters maintained their prices in the face of retaliatory tariffs impacting their foreign sales. These tariffs were applied by many different governments and vary more than the US import tariffs in terms of their timing, scope, and scale. Simple comparisons of export price indices of affected and unaffected products, however, suggest that affected exporters have dropped their (pre-tariff) prices by about 7 percent in response to retaliatory tariffs that average about 15 percent. We estimate regressions for exports that are equivalent to what we did for imports and find that, controlling for sectoral inflation rates, ex-tariff export prices declined by 48.1 percent of the tariff rate after one year.

Why did US exporters choose to drop their prices so much more in the face of retaliatory tariffs than did Chinese exporters in the face of the US import tariffs? We find that the decline in the relative export price of retaliated-upon products is almost entirely driven by the pricing on US shipments of non-differentiated and agricultural goods to China, rather than on US shipments of differentiated goods and US shipments to countries other than China. A far larger share of the affected goods imported by the United States from China are differentiated goods that may be

[2]The low exchange rate pass-through estimate for the United States is in line with previous estimates such as those in Gopinath, Itskhoki, and Rigobon (2010) and is consistent with the high levels of dollar invoicing for US imports, as discussed in Gopoinath, Boz, Casas, Díez, Gourinchas, and Plagborg-Møller (2019).

[3]This result does not imply that China benefits from the policy. Even if Chinese exporters earned the same price and profit margin per unit exported to the United States, the tariffs can reduce the number of units sold.

more difficult to source elsewhere in large quantities or may be produced with imported inputs in more complex supply chains.

We then study the extent to which the import price increases were passed through into retail prices. We first consider aggregated categories such as washing machines, handbags, tires, refrigerators, and bicycles, and find mixed results. Some sectors exhibit clear price increases due to the tariffs (such as washing machines, consistent with the results in Flaaen, Hortaçsu, and Tintelnot (2019)) but others have stable price dynamics despite the tariffs. We note that it is difficult to study the impact of tariffs using such retail price indices because they are at a level of aggregation that combines meaningful shares of goods that are both affected and not affected by the tariffs.

To get around this problem, we collect millions of online prices from two large multi-channel retailers for which we have detailed information on the country of origin and HTS code classifications at the individual product level. Surprisingly, despite observing a stark increase in the overall cost paid by US importers for certain Chinese goods, we detect only a minor increase in the prices set by the two retailers for these goods relative to those unaffected by tariffs. Our estimates imply that a 20 percent tariff is associated with a 0.9 percent increase in the retail prices of affected goods. This suggests that retailers are absorbing a significant share of the increase in the cost of affected imports by earning lower profit margins.

Another possibility – discussed in Amiti, Redding, and Weinstein (2019) – is that in response to the tariffs, domestic producers raise their prices to retailers on goods that compete with the imports. Or alternatively, retailers may simply be increasing the prices of goods not directly exposed to the tariffs, compensating with higher margins on these goods. These responses would be consistent with our finding that the retail prices of goods affected by import tariffs have evolved similarly to those for goods unaffected by tariffs. However, they would also imply different price behavior for US and non-US retail prices, and we do not find strong evidence consistent with this prediction. In particular, we compare the pricing behavior of identical goods sold by one of the retailers used in our baseline analysis in both the United States and Canada, and complement the analysis with official indices and prices from other large retailers in the Appendix. We find that, so far, the tariffs only brought about moderately higher retail inflation in the United States compared to Canada.

Instead, we find clearer evidence that other margins of adjustment that may limit retail price increases. First, we use US customs micro data to show that these retailers increased their import shipments from China, significantly expanding their inventories before the tariffs were implemented. This inventory "front-running" may have moderated the extent to which retail profit margins have declined in financial reports. Second, we document that China's share of the tonnage imported by these two retailers dropped from 97 percent before the tariffs to 80 percent immediately afterward, implying that some pressure was eased by moving supply chains away from China. However, this sudden change was followed by a stable share of Chinese imports since mid-2018, suggesting that it might take longer for these firms to make larger changes to their supply chains.

Does it matter whether the higher import prices result in lower retailer margins or higher consumer prices? Among many other implications, we argue that it implies this first year of data only reveals the short-run impact of the global tariffs. We speculate that if the tariffs remain in place for much longer, pressure on these retailers will likely rise. We would expect this to result in some future combination of a larger reduction in U.S. ex-tariff import prices or greater passthrough into consumer prices. Our work supports the idea, developed theoretically in Cole and Eckel (2018), that a more complete understanding of the full supply chain, from "at-the-dock" importers through to final retailers, is required to understand the full implications of any trade policy.

2 US Border Prices

We start with our analysis of US import price data collected by the International Pricing Program at the BLS. Prices are collected monthly by survey and are used to construct import price indices. As a result, one strength of working with the BLS data relative to the Census data is the ability to trace the import price of an identical good over time.[4] Gopinath and Rigobon (2008) provides additional detail on the BLS dataset and its construction.

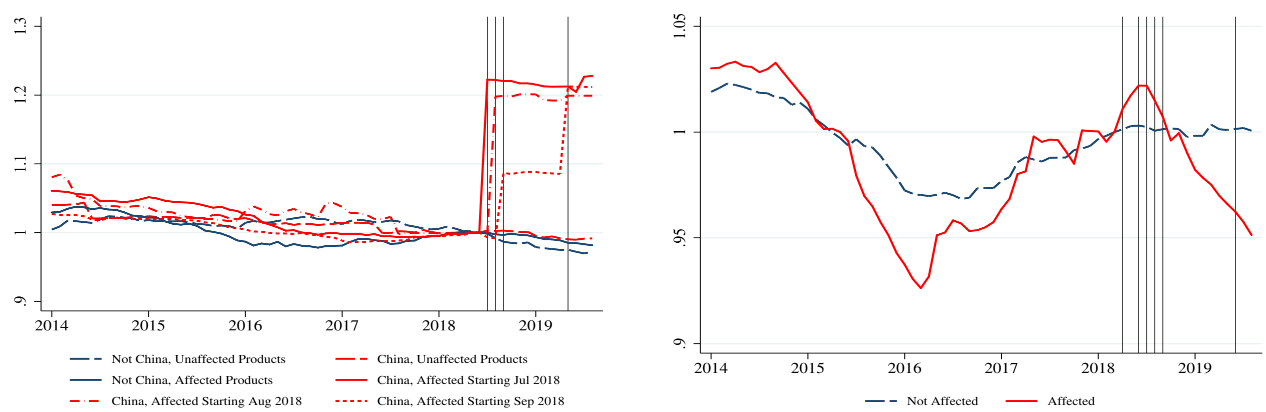
The data include many observations deemed "unusable" for BLS price indices, generally due to the lack of an actual transaction for a given good in a given month. Our baseline treatment fills forward the most recent usable price in the place of unusable observations. We further weight

[4]Some weaknesses of the BLS data are that these prices are sampled and purchase quantities are not available at the product level.

all analyses using expenditures at the "classification group" level, and begin all our analyses in 2005, the year when these weights become available. We drop all price changes that exceed 2.3 log points in magnitude and focus only on market transactions. We conduct the analysis only using prices of trades invoiced in US dollars, a group which represents over 94 percent of US trade occurring over our sample, and also exclude petroleum products. We only use data involving partner countries for which we have data on aggregate prices and exchange rates (our data on these macro variables cover 182 countries).

2.1 US Imports from China

Import tariffs were enacted on Chinese goods in three waves during 2018. First, in July, the United States imposed a 25 percent ad-valorem tariff on roughly \$34 billion of imports. Second, in August, the 25 percent tariff was extended to cover another \$16 billion in shipments. Third, in September, a 10 percent tariff was applied to roughly \$200 billion in goods. In May of 2019, the tariff on that third wave of goods was increased from 10 to 25 percent.[5] Since goods in the BLS data can be concorded with harmonized system (HS) codes and we know the provenance of each shipment, we can easily associate each good with the tariff rate that applies to it in each month.



(a) Import Price Indices by China Tariff Wave (including tariffs)

(b) Export Price Indices Affected by Foreign Tariffs (excluding tariffs)

Figure 1: US Import and Export Price Indices

Figure 1(a) plots log price indices – inclusive of tariffs – constructed for six mutually exclusive

[5]Additional tariffs have been announced that will apply to nearly all of the currently unaffected imports from China. These tariffs were not in place during the period covered by our data.

and collectively exhaustive groups of US imports. The first two groups include the set of products that are unaffected by the 2018-2019 tariff policy changes, divided into those exported by China and those exported by other countries. The third group includes products with HS codes that are affected, but which do not face the tariffs because they are not imported from China.[6] The fourth, fifth, and sixth groups, then, capture imports from China that are affected by the three waves of tariff changes. The price indices are normalized to 1 in June 2018, the last month prior to the imposition of US tariffs on China. The plots include three vertical lines in 2018 corresponding to the three waves of tariffs starting that summer. We plot a fourth vertical line in May 2019, when the tariffs on the third wave of goods increased from 10 to 25 percent.

All six categories exhibit very similar and mildly deflationary trends for the four years prior to the tariffs. Affected products imported from countries other than China had the least deflation, with prices dropping by an annual average rate only slightly above 0 percent over the period. Other goods experienced annual deflation averaging closer to 1.0 or 1.5 percent over the same period. The products never targeted by tariffs, either because they are not among the affected good types or are among the affected good types but imported from countries other than China, continue these trends through 2018 and into early 2019. By contrast, each affected good category from China saw an immediate jump in its price, inclusive of tariffs, during the month that the policy was implemented. The scale of the jumps is only slightly below the scale of the tariff rates, consistent with the fact that the ex-tariff prices did not exhibit meaningful breaks from their trends. Furthermore, in the Appendix we show that there were no significant changes in the patterns of price stickiness following the imposition of these tariffs.

We continue with a regression analysis capable of controlling for multiple factors other than tariffs and the exporter country that might matter for pricing trends. Furthermore, we can use the framework to compare the passthrough to importer prices of the tariffs with an equivalent-sized movement in the exchange rate. Motivated by the model described in the Appendix, we run a specification with all monthly observations, including periods in which there is no price

[6]Throughout the paper, we match goods to their 6-digit HS codes and assume that the associated tariff is the highest value among the corresponding 8-digit HS codes, which is the level at which the tariff code is written. Though imperfect, this assumption holds exactly for over 95 percent of the 6-digit codes.

change. We estimate:

$$\begin{aligned}\Delta \ln \left(P^{\mathcal{I}}_{i,j,k,t}\right) &= \delta^{\mathcal{I}}_k + \phi^{\mathcal{I},\Omega}_{\text{CN}} + \phi^{\mathcal{I},-\Omega}_{\text{CN}} + \sum_{l=0}^{11} \gamma^{\mathcal{I}}_{\text{CN},l} \Delta\tau_{\text{CN},k,t-l} \\ &+ \sum_{l=0}^{11} \beta^{\mathcal{I},S}_l \Delta \ln \left(S_{j,t-l}\right) + \sum_{l=0}^{11} \beta^{\mathcal{I},X}_l \Delta \ln \left(X_{j,t-l}\right) + \epsilon_{i,j,k,t}, \end{aligned} \quad (1)$$

where $P^{\mathcal{I}}_{i,j,k,t}$ is the ex-tariff price of item i imported from country j in sector k at month t and where sectors are defined as the BLS's "primary stratum lower", which is a level of disaggregation that lies between the HS4 and HS6 levels.[7] The fixed effect $\delta^{\mathcal{I}}_k$ therefore captures an average sectoral inflation rate. We let $k \in \Omega$ denote those sectors that are affected by the tariff, so the fixed effects $\phi^{\mathcal{I},\Omega}_{\text{CN}}$ and $\phi^{\mathcal{I},-\Omega}_{\text{CN}}$ allow for a constant deviation from those sectoral inflation rates for affected and unaffected goods imported from China, respectively.

The term $\Delta\tau_{\text{CN},k,t-l}$ equals the log gross additional tariff rate that is newly applied in a particular month to imports from China in sector k at time $t-l$, and would equal 0.22 ($\approx \ln(1.25)$), say, to correspond with the introduction of a 25 percent tariff. The lag structure allows monthly price changes to differentially reflect changes in tariffs that went into effect recently compared with further in the past. To evaluate the cumulative impact of the tariffs one year after they were applied, we report the point estimate and standard error of $\sum_{l=0}^{11} \gamma^{\mathcal{I}}_{\text{CN},l}$. This gives the estimate of the tariff rate passthrough after the current month plus 11 lags. Finally, $S_{j,t-l}$ is the value of country j's currency in US dollars at time $t-l$ and $X_{j,t-l}$ is the producer price index in j at $t-l$. The point estimate of $\sum_{l=0}^{11} \beta^{\mathcal{I},S}_l$ therefore constitutes our estimate of exchange rate passthrough (ERPT) after one year (i.e. the current month plus 11 lags).[8]

The first two columns in Table 1 report the results using monthly import price data from January 2005 to August 2019. Column (1) reports the cumulative impact of 12 months of tariffs in a specification that includes sectoral fixed effects and the China-specific fixed effects ϕ. The estimated coefficient of -0.076 means, for example, that a 10 percent tariff would be associated with a 0.8 percent lower ex-tariff price and a 9.2 percent higher overall price faced by the importer. Column (2) estimates the tariff impact using a specification that also controls for exchange rates and the foreign producer price index. The tariff response drops to a value that is statistically indistinguishable from zero, while the exchange rate passthrough estimate shows

[7] This is the lowest level of aggregation for which the BLS deems indices to be publishable.
[8] Additional results, including a specification using only non-zero price changes, are shown in the Appendix.

		US Imports		US Exports		US Retail	
					All Products	Household	Electronics
		(1)	(2)	(3)	(4)	(5)	(6)
Tariffs 1 yr.	$\left(\sum_{l=0}^{11}\gamma_l\right)$	-0.076	-0.018	-0.481	0.044	0.045	0.070
		(0.028)	(0.03)	(0.111)	(0.009)	(0.010)	(0.025)
ERPT 1 yr.	$\left(\sum_{l=0}^{11}\beta_l^S\right)$		0.221	0.187			
			(0.027)	(0.018)			
PPI PT 1 yr.	$\left(\sum_{l=0}^{11}\beta_l^X\right)$		0.012	0.238			
			(0.073)	(0.04)			
China Affected	$\left(\phi_{\mathrm{CN}}^{\Omega}\right)$	0.000	0.000		-0.001	-0.001	-0.001
		(0.000)	(0.000)		(0.000)	(0.000)	(0.001)
China Not-Affected	$\left(\phi_{\mathrm{CN}}^{-\Omega}\right)$	0.000	-0.001		0.000	-0.000	0.000
		(-0.001)	(-0.001)		(0.000)	(0.000)	(0.000)
Adj. R^2		0.003	0.004	0.002	0.000	0.001	0.002
Obs.		820,318	820,318	433,664	761,402	527,119	71,198
Sector FEs?		Yes	Yes	Yes	Yes	Yes	Yes

Notes: Robust standard errors in parentheses.

Table 1: Regression Analysis of Chinese Import Tariffs Using Monthly Data

that when the dollar depreciates by about 10 percent, import prices rise by about 2.19 percent.

These results suggest that ex-tariff prices do not behave differently for goods affected by trade policy compared to those that were not affected, implying the tariffs exhibited nearly complete passthrough into the total import cost and that the incidence of the tariffs lies largely with the United States. Furthermore, as a practical matter, our findings suggest that the recent depreciation of the Chinese renminbi did not offset the impact of the tariffs for US importers. In the Appendix we show similar results when focusing on the US steel import tariffs that affected multiple countries.

2.2 US Exports

In response to the US trade policies enacted in 2018, many countries – including Canada, China, the EU, and Mexico – imposed retaliatory measures on the United States. We now use data on these retaliatory tariffs from the International Trade Administration website to study the stability of ex-tariff prices set by US exporters to foreign destinations. Interestingly, unlike the case of foreign exporters, we do find evidence that US exporters have significantly reduced their prices in response to foreign tariffs. The fact that we do see declines in the ex-tariff export prices of targeted US products suggests that the retaliatory tariffs imposed on the United States have meaningful incidence in the United States as well.

Figure 1(b) plots the ex-tariff prices of US exports affected and unaffected by recently imposed foreign tariffs. The vertical lines in this figure correspond to the dates on which different countries either initiated or increased their retaliatory tariffs on US exports.[9] Of course, the affected goods are different types of goods, and exhibit greater price volatility even before the trade wars began. Nonetheless, the post-tariff period represents the first time when the price indices for the two types of goods move so differently, with the prices of unaffected goods highly stable and the prices of affected goods dropping by about 7 percent.

To elaborate on these findings, Column (3) in Table 1 reports the results from estimating equation (1) on exports. We exclude the china-specific fixed effects in this column because the sample includes exports to many other countries. There is about a 48 percent passthrough of the retaliatory tariff into ex-tariff US export prices after 12 months. That is, a 10 percent tariff imposed on US exports reduces US ex-tariff export prices by about 4.8 percent, while the cumulative one-year ERPT estimates are close to 20 percent.[10]

Why did US exporters drop their prices so much more when faced with foreign tariffs than foreign exporters did when faced with US tariffs? Differences in the types of goods affected by the trade policy played a key role. In the Appendix we use the Rauch (1999) classification to identify differentiated goods, for which substitutes are likely more difficult to locate, and find that they account for more than 90 percent of the affected imports to the United States from China but less than half of the US exports to countries that imposed retaliatory tariffs. In an accounting sense, undifferentiated goods and agricultural goods are those products driving the decline in US export prices.

3 US Retail Prices

Having established the behavior of US import prices, we now ask how the tariffs impacted prices further downstream in the US economy, such as by retailers to final consumers. Overall, while we

[9]China was the first to initiate tariffs on US products in April 2018 and expanded their tariffs in July, August, and September. The European Union, Mexico, and Turkey initiated tariffs on US goods in June 2018, followed by Canada in July 2018, Russia in August 2018, and India in June 2019.

[10]Retaliation from China accounts for about three-quarters of our observations, so in the Appendix we separately estimate the one-year cumulative effect of the retaliatory tariffs for US goods exported to China and for US goods exported elsewhere. Whereas shipments to countries other than China show no statistically significant decline in the ex-tariff export price, the effect is very strong when estimated separately for China, with an estimated one-year ex-tariff export price decline of about 63 percent.

find some evidence that the tariffs have passed through into higher retail prices, the effects are clearly more muted than what we demonstrated for total import prices, implying that – at least so far – retailers have absorbed much of the higher costs associated with the tariffs by earning lower margins on their sales.

3.1 Data from the Largest US Retailers

We start our retail-level analyses by studying daily prices for washing machines, handbags, tires, refrigerators, and bicycles, all product categories that were significantly impacted by the tariffs.[11] We obtain the data from the private firm PriceStats as well as from the Billion Prices Project (BPP), which collected them by scraping, at a daily frequency, the online web pages of over 30 large multi-channel retailers in the United States. See Cavallo and Rigobon (2016) for a full description of these and closely-related data.

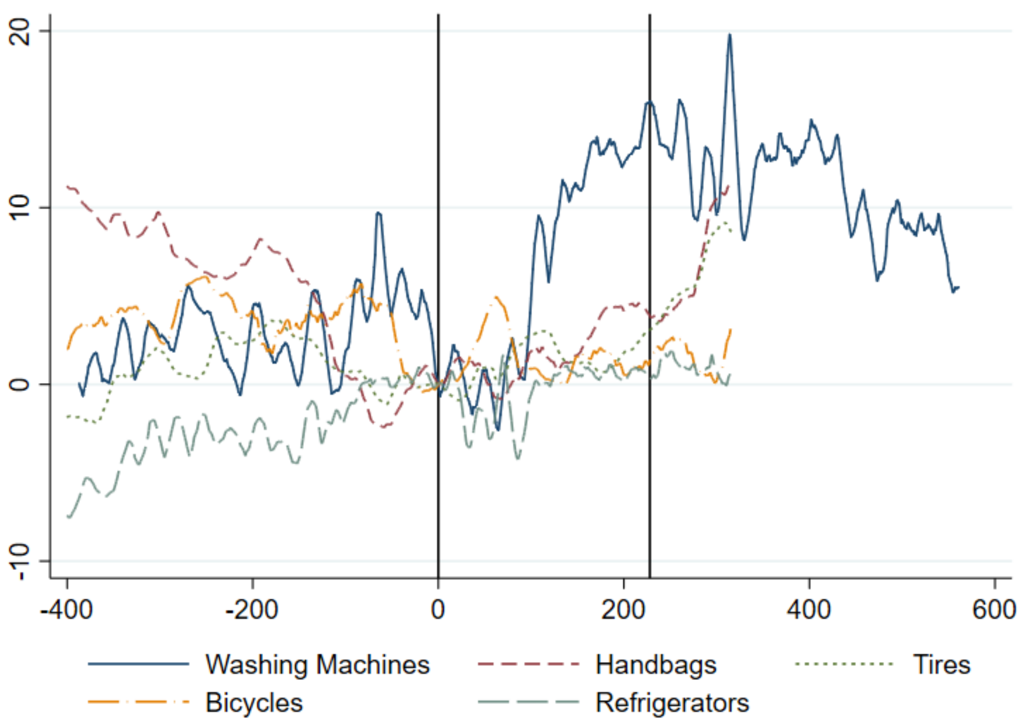


Figure 2: Annual Inflation Rates for Some Affected Consumer Goods

Figure 2 shows the inflation rates for these five types of goods, with inflation normalized

[11] In addition to the common discussion of these products in media coverage of the tariffs, we chose these products because they are included in product descriptions in lists of harmonized codes that identify tariffs and in product descriptions appearing on retailers' web pages. We study 700 washing machines from 16 retailers, 300 handbags from 12 retailers, 400 tires from 7 retailers, 5,000 refrigerators from 18 retailers, and 200 bicycles from 11 retailers.

to zero percent on the date of the first tariff increase. The plot includes two vertical lines corresponding to the dates of tariff changes. All these goods, except for washing machines, were affected by the third round of Chinese tariffs.

In the case of washing machine prices, the impact of tariffs is clear-cut, with high and rapid passthrough to retail prices. These results are consistent with Flaaen, Hortaçsu, and Tintelnot (2019). In the Appendix we find similar results with the sectoral "Laundry Equipment" consumer price index (CPI) provided by the BLS, and show that the basic pricing patterns look the same for US brands, which likely are not directly affected by the tariffs, and for imported brands, which likely are affected. But how representative is this sector? Should we expect the same response in other sectors with large shares of products that are affected by the tariffs?

Unlike washing machines, none of the other goods exhibited sharp price increases relative to trend, even nine months after the first tariffs were imposed. By the time the tariffs were increased to 25 percent, however, handbags and tires were experiencing unusually rapid price increases. Refrigerators exhibited a mild increase in inflation relative to the pre-tariff trend, but this increase appears to have started before the tariffs. Price inflation for bicycles has, if anything, decreased in the post-tariff regime.

This simple visual evidence suggests that tariffs passthrough is heterogeneous across goods. To try to reach more precise conclusions, we now move to a retail dataset that contains the country of origin and trade classification for individual goods, allowing us to know precisely which goods are affected by the tariffs.

3.2 Two Retailers with Country of Origin Information

We now turn to data collected daily from two large US retailers, both in the top 10 in the United States in terms of revenues. For "Retailer 1", our data entirely reflects what could be obtained from scraping their webpages, including a description of each product as well as its country of origin. For "Retailer 2", we combine pricing data scraped online with the country of origin, product sales rank, and a text product description that the retailer directly provided to us.

Given these data, the key challenge is to associate each product with an HS code so we can determine which are in categories affected by each wave of tariffs placed on China. We do this with a service provided by 3CE Technologies, a private company that specializes in automated commodity classifications for trade purposes.[12] In some cases, the 3CE algorithm can generate a mapping directly from the product description without any additional information. In other cases, we asked a group of research assistants to respond manually to the additional questions required by the 3CE algorithm to help refine its match, such as whether a product is made of wood or plastic. Roughly three-quarters of the total products then were classified automatically, with the remainder being done manually.

Our data includes more than 90,000 products covering nearly 2000 different 6-digit HS categories. Roughly two-thirds of the products, about 60,000, are imported from one of more than 80 countries. About 43,000 products are imported from China, with 30,000 of them in categories affected by the tariffs.[13]

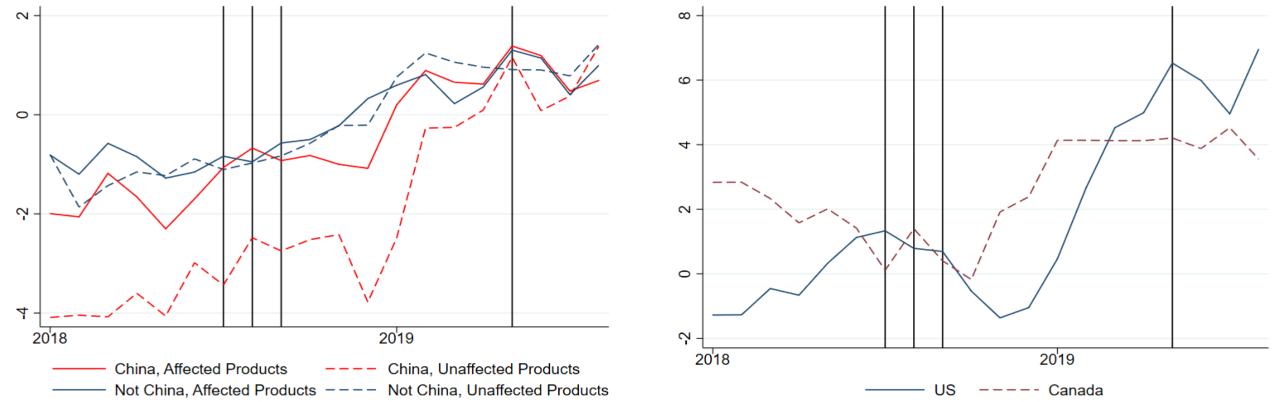
We start by creating daily retail price indices and plotting the corresponding annual retail inflation rates separately for those products imported from China that were affected by the tariffs, products imported from China that were unaffected, products not imported from China but in categories that were affected, and products not imported from China and in categories that were not affected, equivalent to the import data. Looking at the inflation rates in Figure 3(a), it is difficult to discern any quantitatively important price differences brought about by the tariffs. The inflation rates in all groups behave similarly, though the exception may be unaffected products sold by China, as this sector exhibited the largest increase in inflation rates over the sample period.

We estimate a monthly regression specification similar to equation (1). We regress the change in retail prices on current and lagged tariff changes, plus fixed effects allowing for different price trends per sector and additionally different trends for the total sets of Chinese products that are and are not affected by the tariffs, where now the sectors k are defined as 3-digit COICOP codes and where we no longer include information on producer prices nor on exchange rates.

The results, reported in Column (4) of Table 1, imply that in response to a 10 percent tariff, the price of a typical affected import from China has only increased by about 0.44 percent relative to unaffected products in the same sector after one year. When we separate products by their type, we obtain an estimate of 0.45 percent for household products and 0.70 percent for

[12] 3CE provides similar online classification tools for the US Census (https://uscensus.prod.3ceonline.com/) and Eurostat (https://eurostat.prod.3ceonline.com/).

[13] Additional details about the data are provided in the Appendix.



(a) All Products from Two US Retailers (b) Identical Products in US and Canada

Figure 3: Retail Price Response to Chinese Import Tariffs - Inflation Rates

electronics products.

One might reasonably worry that measurement error in the sectoral classification algorithm is limiting our ability to identify larger differences in the retail price dynamics between products affected and unaffected by the tariffs. Incorrectly classifying affected products as belonging to HS codes that are not affected by the tariffs, or the reverse, would by construction bias the analysis by making the groups more similar. To look for evidence of this, in the Appendix we consider two subsets of our data that are the least likely to contain sectoral classification errors. First, we exploit the fact that about one-quarter of the products were matched manually, requiring a research assistant to affirmatively check the association of a product's text description with the HS classification. Second, we obtained a list of products that were directly imported by Retailer 2, rather than purchased through an importer or wholesaler, so we can be confident that the retailer's perception of the HS code is the relevant one. The resulting plots are similar to Figure 3(a), with small differences between the affected and unaffected groups.

An alternative possibility is that retailers increased their margins on unaffected goods to partially offset the margin reduction on affected goods, muting any changes in their overall margins. Indeed, some large U.S. retailers have publicly stated that they are "spreading price increases" across good categories in response to the tariffs.[14] This would stabilize the relative prices of affected and unaffected products within narrowly defined sectors, and could explain the similar inflation patterns across goods show in Figure 3(a) after the imposition of the tariffs.

[14]See https://www.wsj.com/articles/sales-fall-at-kohls-and-j-c-penney-11558443281.

However, if this were the case, we would also expect to see the prices in affected US sectors rise relative to the prices in countries that did not impose tariffs on these goods. To find evidence, we therefore compare the prices for identical goods sold by Retailer 2 in the United States and in Canada. We identify 2,436 products that are sold by Retailer 2 in both locations and plot the price indices separately for each country, using only the retail prices for those common goods in Figure 3(b).

These price indices do not suggest any particularly unusual dynamics in the US prices for these goods relative to the Canadian goods over the period when the tariffs were imposed.[15] In the Appendix we find similar results when using CPIs for affected and unaffected sectors in both countries, as well as price indices for the same categories in six additional multi-national retailers. We therefore conclude that retailer profit margins must be absorbing a significant amount of the adjustment to the US import tariffs.

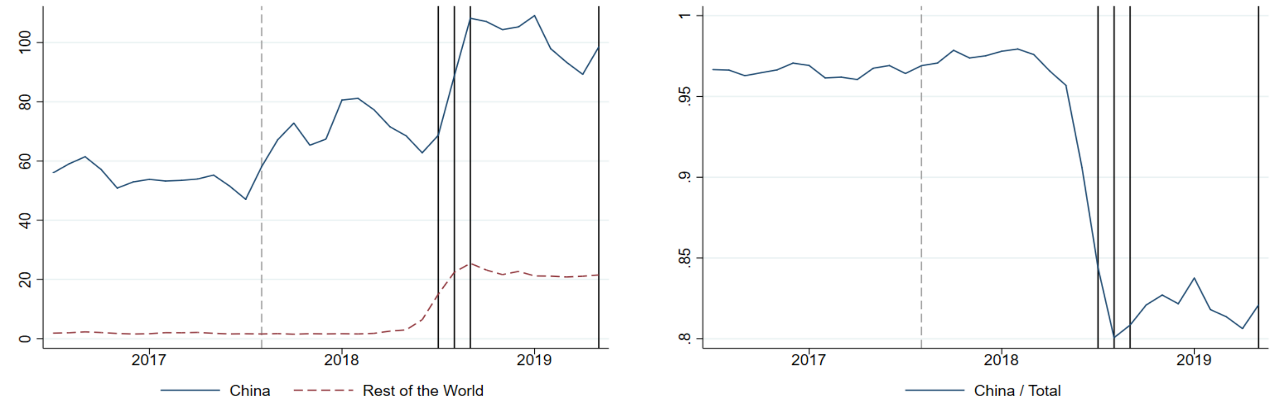
3.3 Other Adjustment Margins: Front-Running and Trade Diversion

Given the nearly-complete passthrough of tariffs to the prices of US imports from China and the relatively modest impact of those goods on consumer prices, retailer profit margins likely declined. In this subsection, we demonstrate two other margins along which retailers adjusted in response to the tariffs. First, we demonstrate that after the tariffs were announced and early in the first tariff regime, our two US retailers increased their volume of imports from China, perhaps in efforts to front-run the tariffs and build inventories of key products impacted by the tariffs before prices went up. Second, we show that whereas they imported almost entirely from China before the tariffs, they started diverting some of their orders to other countries once the tariffs were put in place.

In order to study the importing behavior of our two retailers, we make use of data provided by Datamyne, a private vendor of trade intelligence that collects maritime bills of lading.[16] We add together the tonnage imported each month by these companies and plot, in Figure 4(a), a 3-month moving average of the tonnage ordered from China and from the Rest of the World. The solid blue line, showing tonnage (in thousands) imported from China, is around 55,000 tons

[15] The exchange rate between the US and Canada barely moved in this period.

[16] We can query keywords in the data and identify our two retailers by searching for bills of lading containing their names in any field.



(a) Tons Imported, Thousands

(b) Share of Tons Imported from China

Figure 4: Front-Running and Trade Diversion by Two Major US Retailers

and remains relatively flat from the third quarter of 2016 through the second quarter of 2017, but appears to jump in August 2017, the date indicated with the dashed vertical line. The vertical line is dashed rather than solid to indicate that the US Trade Representative was directed at that date to determine whether to initiate a Section 301 investigation against China (and shortly thereafter did initiate the investigation). Imports appear to have increased roughly 20 percent at that point, presumably as firms wished to import supplies prior to the actual imposition of any tariffs. When tariffs were in fact announced, imports jumped further, before declining a bit thereafter (though by early 2019 they were still at elevated levels). Many of these goods were likely affected by the 10 percent tariff rate, and the importers may have wanted to stockpile them before the announced 25 percent tariffs on those same goods were instituted.

Figure 4(a) also shows that when the tariffs were introduced, these retailers first started importing non-trivial quantities from countries other than China. From a near-zero level, the red dashed line rises above 20,000 tons per month. As summarized in Figure 4(b), China's share of these firms' total imports was about 97 percent prior to the tariffs, then declined to about 80 percent since the late summer of 2018. Interestingly, this change took place quickly after the tariffs we imposed in mid-2018, but the level of trade diversion has remained stable since then. This suggests that it might take longer for these firms to make larger changes to their supply chains.

4 Conclusion

A rich literature theoretically characterizes the motivations behind enacting tariff policies and the potential implications they carry. Relatively little is known, however, about how economies in practice respond to tariffs, particularly when these trade policies involve large countries that have the potential to influence prices. Will the response of exporters be symmetric across countries and types of goods? How quickly will prices adjust? Will prices at the store adjust similarly to prices at the border? To answer these questions, we collect and analyze micro data on prices and characterize the reaction of importers, retailers, and exporters to US trade policy since 2018.

We find that tariffs passed-through almost fully to US import prices, implying that much of the tariffs' incidence rests with the United States. In these same data, we find far lower rates of passthrough from exchange rate shocks into import prices, suggesting that the depreciation of the Chinese renminbi against the US dollar during the summer of 2019 did little to offset the impact of the tariffs. Furthermore, we show how the response of US exporters to foreign retaliatory tariffs was not symmetric. Foreign tariffs targeted undifferentiated goods exported by the United States, and US exporters significantly reduced their ex-tariff export prices on these goods, particularly on shipments to China. Finally, despite the rapid increase in the total cost of importing goods, we find more mixed evidence regarding retail price increases, which suggests that many US retailers reduced the profit margin on their sales of the affected goods.

Should we expect these same patterns to hold for the medium or longer term if the recently installed tariffs remain in place? We offer some evidence that importers to some extent front-ran the recent changes in trade policy and document an incipient trade diversion away from China. These non-price margins of adjustment suggest that, so far, we may have only seen the short-run response to tariffs.

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