Gender and Income Inequality in United States Tariff Burden

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Abstract

The combination of different tariff rates across products and different consumption patterns across households results in different tariff burdens across consumer groups. We investigate the distribution of tariff burden among U.S. households of different incomes and consumers of different genders. As a share of total household consumption expenditure in 2015, the tariff burden was a nearly constant 0.25 percent across all income deciles, meaning that tariffs act as a flat consumption tax. Since a flat consumption tax is a regressive tax on income, tariffs fall disproportionately on the poor. Across genders, we find large differences in tariff burden. Focusing on apparel products, which were responsible for about 75% of the total tariff burden on U.S. households in 2015, we find that women's tariff burden is twice the men's. The gender gap exists because spending on women's apparel is higher than on men's and because the average applied tariff rate on women's clothing is higher than on men's. The gender gap in tariff burden grew about 11% in real terms between 2006 and 2016, mainly due to the faster growth of the average applies tariff rate on women's apparel than on men's. The gender difference in applied tariff rates is mostly attributed to the sourcing of imports—a much greater share of men's apparel than women's apparel comes from U.S. FTA partners.

JEL codes: F10, F14, D12, D63

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1 Introduction

Tariffs have generally been decreasing around the world in the last several decades, but still remain a sizable cost of international trade. Even in the United States, generally a low-tariff country, tariffs continue to be imposed on the majority of goods coming from most countries. In 2015, the average applied U.S. tariff was around 1.5%.[1].

Behind a relatively low average U.S. tariff, there is a great variation of tariffs across goods. For example, some apparel imported to the U.S. has applied tariffs as high as 31% while other apparel items have low or zero tariffs.[2] At the same time, consumption patterns vary across different groups of consumers. For example, men and women tend to consume different sets of products. People with different incomes also tend to consume different baskets of goods: poorer households spend a larger share of their total expenditures on necessities while wealthier households tend to purchase more luxury goods (Henry, 2014). Therefore, different groups of consumers carry different shares of the tariff burden.[3] Equivalently, different groups of consumers would get different benefits from the removal of tariffs. Across some groups, these differences are small. Across other groups, these differences are significant. In this paper, we analyze differences in tariff burdens across consumers with different incomes and genders and report large differences in tariff burden across genders in the United States.

In order to calculate tariff burdens we combine data on tariffs with information on consumption patterns of different consumer groups, specifically consumers of different incomes or genders. We then calculate the reduction in the cost of the consumption basket for each

[1]This average was obtained using the information from the DataWeb (USITC's Tariff Information System). The tariff was calculated as the ratio of all duties collected in a year over total charges, insurance, and freight (CIF) values of all imported products reported in that year. By mid-2019, the average applied U.S. tariff has increased to 2.5%, but was still low relative to other countries

[2]Highest-tariff HTS10 apparel items include 6104.29.10.50 (women's blouses, shirts and tops of artificial fibers), 6104.23.00.36 (women's blouses, shirts and tops of synthetic fibers), and 6110.30.30.25 (girls' garments imported as parts of playsuits). Lowest-tariff HTS10 apparel items include 6103.23.00.45 (men's or boys' shorts of synthetic fibers) and 6103.22.00.70 (men's or boys' cotton sweaters).

[3]"Tariff burden" and, more generally, "tax burden" are common terms used in economic analysis of the effects of tariffs on various population groups and do not express judgment.

consumer group that can be attributed to the removal of tariffs. The reduction in the cost of the consumption basket is the tariff burden. Our focus is on the consumer side, so we do not study the effects of tariff on wages.

The fact that applied U.S. tariffs rates are different for different groups of consumers has been previously documented. Gresser (2002) and Moran (2014) document that average tariffs rates are different for rich and poor U.S. consumers. Barbaro (2007) and Taylor and Dar (2015) provide an overview of the unequal U.S. tariff rates for men's and women's apparel. Fajgelbaum and Khandelwal (2016) use a structural gravity model with nonhomothetic preferences to estimate gains from trade for consumers with different incomes. They find that gains from trade are higher for poorer consumers because they spend a higher share of their income on traded goods. Furman, Russ and Shambaugh (2017) calculate tariff burden on U.S. consumers in different income groups and find that U.S. tariffs act as a regressive income tax.[4]

In this paper, we also examine the tariff burden on U.S. consumers with different levels of income. Similar to the previous literature, we find that poor consumers pay a greater share of their income as tariffs. However, unlike the previous literature we also look at tariff burden as a share of consumption spending. We find that the tariff burden as a share of consumption spending is about the same for consumers in different income deciles. Therefore, U.S. tariffs act as a flat consumption tax. Since poor consumers spend a much greater share of income than rich ones, U.S. tariffs act as a regressive tax on income, just like a sales tax.[5] Thus, we extend the existing literature by providing this additional prospective on the tariff burden.

[4]Other papers that investigate the effects of trade policy on consumers with different income levels include Nicita, Olarreaga and Porto (2014), Hottman and Monarch (2018), and Borusyak and Jaravel (2018). Note that unlike some of the other papers in the literature, we do not report whether trade in itself is pro-rich or pro-poor. Rather, we investigate the effects of U.S. tariffs on U.S. households of different income levels.

[5]A tax that falls disproportionately on the poor is called "regressive" because the tax percentage is declining with income. A tax that falls disproportionately on the rich is called "progressive" or "graduated" because the tax percentage is increasing with income. A tax with a constant percentage is called proportional or flat (true flat).

Our main contribution, however, is the analysis of tariff burden on men and women. We find large differences in tariff burden across genders. Focusing on apparel products, which were responsible for about 75% of the total tariff burden on U.S. households, we find that women's tariff burden is twice the men's. The gender gap comes from several sources. First, the average applied tariff rate on women's apparel, 15%, is higher than the average applied tariff rate on men's apparel, which is 12%. Second, U.S. consumers spend twice as much money on women's clothing than on men's and the vast majority of this clothing is imported. The combination of higher average tariff rates and greater spending on imported goods means that women carry a significantly higher share of total tariff burden compared to men.

We also find that the gender gap in tariff burden grew about 11% in real terms between 2006 and 2016, mainly due to the faster growth of the average applies tariff rate on women's apparel than on men's. The gender difference in applied tariff rates is mostly attributed to the sourcing of imports. While the share of total imports of men's apparel that comes from countries with which the U.S. has an FTA is around 28% and stable over the 2005-2016 period, this share for women's apparel was only 18% in 2006 and declined to 12% in more recent years. We also find that average applied tariffs on women's apparel from non-FTA countries is slightly higher than on man's apparel.

We use several approaches to calculating tariff burden. Our first approach is similar to Furman et al. (2017). In this approach, we use a set of assumptions about the pass-through rates of tariffs to domestic prices of imported and domestic varieties. In our second approach, which is new to the literature and our preferred one, we use a dynamic computable general equilibrium (CGE) model to estimate price changes from the removal of tariffs. In this case, price changes are endogenous and estimated by the model. Similarly to Furman et al. (2017) we combine information on price differentials due to tariffs with consumption shares for each good by different groups of consumers.

The remainder of this paper is structured as follows. Section 2 describes the methodology employed, Section 3 presents data, Section 4 describes results, and Section 5 concludes.

2 Methodology

We estimate the effects of tariff on the purchasing power of households. Tariffs increase prices, therefore reducing household purchasing power—the quantity of real goods and services that households are able to buy. Since different households may consume different bundles of goods and different products face different tariff rates, tariffs may have different effects on different households. In order to link tariffs to the consumption patterns, we link household consumption data to tariff data. Data description is provided in the next section.

2.1 Constructing expenditure shares

The Consumer Expenditure Survey provides us with an expenditure of household h on good j in year t, X_{hjt}, and the weight of each household h in the sample, ω_{ht}.[6] We calculate the expenditure by an average household belonging to group D on some group of goods G:

$$\bar{X}_{DGt} = \frac{\sum\limits_{h \in D, j \in G} (\omega_{ht} X_{hjt})}{\sum\limits_{h \in D} \omega_{ht}}. \tag{1}$$

We then calculate the expenditure by an average household belonging to group D on all goods:

$$\bar{X}_{Dt} = \frac{\sum\limits_{h \in D} (\omega_{ht} X_{ht})}{\sum\limits_{h \in D} \omega_{ht}}, \tag{2}$$

[6] We use BLS-provided population weight of each household called F21.

where X_{ht} is the total expenditure of household h in year t. Equation 1 is then divided by equation 2 for each year to derive the share of household expenditures on each group of goods G:

$$s_{DGt} = \frac{\bar{X}_{DGt}}{\bar{X}_{Dt}} \tag{3}$$

In Section 4.1, we use this expression with household groups D being households in different income deciles. In Section 4.2, we split all items into two groups: those consumed by men (product group M) and those consumed by women (product group W). Each of these two product groups is further divided into three groups: gender-specific imported items, non-gender-specific imported items, and domestically produced items.[7] Since domestically produced items face no tariffs, it is not relevant for us to distinguish domestically produced gender-specific items. Men's and women's gender-specific imported items can have different tariffs.

Therefore, we end up with 6 product groups: $j \in M_{gs}$ are men's gender-specific imported items, $j \in W_{gs}$ are women's gender-specific imported items, $j \in M_{ng}$ are non-gendered imported items consumed by men, $j \in W_{ng}$ are non-gendered imported items consumed by women, $j \in M_d$ are men's domestic items, $j \in W_d$ are women's domestic items.

The gender-specific imported product groups can have their own tariff rates. For example, men-specific imported items M_{gs} face a tariff rate τ_{Mgs}. Non-gender specific imported men's and women's products have the same tariff rates. Table 1 summarizes how we distinguish consumption for men and women. Tariff rates τ_{Mgs}, τ_{Wgs}, and τ_{ng} are taken from tariff data (see Section 3.1).

The total spending on men's consumption products is X_M while the total spending on women's products is X_W. These values are obtained from the Consumer Expenditure (CE)

[7]We use HTS subheadings to identify gender-specific and non-gender-specific items. For example, many accessories, such as gloves and scarves, are non-gender-specific in the HTS.

Table 1: Classification of men's and women's consumption products and corresponding tariff rates

	Gender-specific Imported	Non-gender specific Imported	Domestic
Men's consumption	M_{gs}, τ_{Mgs}	M_{ng}, τ_{ng}	M_d
Women's consumption	W_{gs}, τ_{Wgs}	W_{ng}, τ_{ng}	W_d

Table entries are product sets, tariff rates.

survey (see Section 3.2). The values of gender-specific imported consumption products, X_{Mgs} and X_{Wgs}, are obtained from the trade data (see Section 3.1).

The values of non-gender-specific imported consumption products are obtained as $X_{Mng} = IPR_M * X_M - X_{Mgs}$ and $X_{Wng} = IPR_W * X_W - X_{Wgs}$, where IPR_M and IPR_W are import penetration ratios, taken from the USAGE model dataset (see Section 2.4.2).

2.2 Constructing price indexes

The unit cost of a consumption basket of a household group D in a baseline is given by

$$\sum_G p_{G,0} s_{DG} \tag{4}$$

where p is the price of product group G (the average price of products within the group) and the sum is over all consumption goods. The cost of the same basket in a counterfactual scenario is

$$\sum_G p_{G,1} s_{DG} \tag{5}$$

Finally, the change in the consumer price index for a household group D between the baseline and counterfactual is given by

$$\Delta CPI_D = \sum_G \frac{p_{G,1}}{p_{G,0}} s_{DG} \tag{6}$$

This change in CPI represents the change in purchasing power of household group D due to tariff. It also measures the share of tariff in household expenditure. The next section explains how we obtain the price change $p_{G,1}/p_{G,0}$ due to tariffs.

2.3 Calculating the tariff burden

We calculate the tariff burden, expressed in dollars, as a compensating differential: a change in household total expenditure that is needed to completely offset an increase in product prices due to tariffs. The total household expenditure is $\bar{X}_{DGt} = \bar{X}_{Dt} s_{DGt} = C_{DGt} p_{Gt}$, where C_{DGt} is the real consumption of product group G by household group D. The tariff burden is the change in $\bar{X}_{DGt}$ that is needed to compensate for a change in p_{Gt} due to tariff imposition, holding share s_{DGt} and real consumption C_{DGt} constant.

2.4 Obtaining price changes due to tariffs

We use two approaches to estimating price changes dues to tariffs. The first approach follows Furman et al. (2017) in making several alternative assumptions about the pass-through of tariffs to prices. Our second approach uses a computable general equilibrium model to estimate price changes due to tariff reductions. The first approach requires minimal assumptions about the structure of the economy while the second approach imposes more structure.

2.4.1 Exogenous price changes

We assume that the pass-through rate of tariffs to the prices of imported goods is 1. This means that a 10% reduction of tariffs $(1 + \tau)$ results in a 10% reduction of the prices of

imported goods.

We make two alternative assumptions about the effects of tariff changes on the prices of domestic goods. Under the first assumption, there is no effect, which means that the prices of domestic goods do not react to changes in tariffs. Under the second assumption, the change in prices of domestic goods is half the change in tariff, which means a 10% reduction in tariffs $(1 + \tau)$ reduces the prices of domestic goods by 5%.

2.4.2 Comparative static analysis using a general equilibrium model

We use the U.S. Applied General Equilibrium (USAGE) model to solve for price changes due to the removal of U.S. tariffs. The USAGE model is a computable general equilibrium (CGE) model that describes consumption, production, and trade in over 400 U.S. sectors. The USAGE model has been developed at the Centre of Policy Studies in Melbourne, Australia, in collaboration with the U.S. International Trade Commission. For a complete specification of the model see Dixon and Rimmer (2002) and Dixon and Rimmer (2010). For purposes of this study, some sectors of interest are identified at a level of aggregation that is more narrow than that of the standard USAGE model. The current USAGE model is calibrated to the 2007 benchmark input-output (I-O) table published by the Bureau of Economic Analysis (BEA) of the U.S. Department of Commerce.

The USAGE model framework has three components: (1) I-O accounts for approximately 400 sectors and commodities, (2) behavioral parameters, and (3) a system of equations that constitute the model specification or theory. The I-O accounts specify the transactions among U.S. households, firms, and the U.S. government; they are derived from the I-O accounts for U.S. industries and types of final demand (e.g., imports; private and government consumption and investment expenditures; and inventory changes) published by the BEA.

While the I-O accounts provide information on the initial equilibrium of the U.S. economy, a set of elasticities help the framework determine how the economy would respond to a

policy change. The types of elasticities used by the USAGE model include elasticities of substitution between imported and domestic goods, elasticities of import supply, elasticities of export demand, elasticities of substitution between inputs in production, and income elasticities.

Where possible, some of these parameters have been estimated using time series data that show how consumers and firms have responded to given changes in the past; otherwise, it has relied on published studies for estimates. With the exception of textiles and apparel, the elasticities of substitution between imported and domestic goods (known as Armington elasticities) are documented in the research note by Donnelly, Johnson, Tsigas and Ingersoll (2004). The Armington elasticities for the textile and apparel sectors are based on Hertel, Hummels, Ivanic and Keeney (2007).

The final component of the USAGE framework is the system of equations that model the U.S. economy. These equations characterize three general conditions that together determine a general equilibrium solution. First, activities are characterized by constant returns, so firms must earn zero real economic profits at the margin, and all the production technologies and preferences are derived from theoretical formulations constrained by these zero-profit conditions. Second, the quantity supplied must equal the quantity demanded for each good and service in the economy. Third, all income must be accounted for either by spending on goods and services or by saving (spending can be on foreign or domestic goods and services, and savings can be on domestic or foreign saving instruments).

The effect of tariff changes on consumption good prices in the model is determined by model equations and parameter values. The model would typically predict a less than perfect pass-through of tariff changes to domestic prices of imported goods, which is consistent with the existing literature on this topic. The effect of tariff changes on consumption good prices in the model can also be through intermediate goods.

3 Data

We link household consumption data, tariff data, and USAGE model data in order to study the effect of tariffs on different households. This is accomplished by creating a detailed product-level concordance between the product classification systems used in these three datasets. We concord CE, HTS, and USAGE classification systems to Personal Consumption Expenditure (PCE) categories.[8] The apparel product category, which is the focus of our gender-specific tariff burden, is separated into three categories: men's and boys', women's and girls', and non-gendered. Our product classification has 152 product categories, presented in the appendix.

In our analysis of tariff burden we focus on 20 final consumer goods that are subject to significant U.S. tariffs.[9] These sectors are responsible for the vast majority of U.S. tariffs.[10] For the analysis of the gender differences in tariff burden we focus on apparel products since the majority of gender-specific products with different tariff rates are apparel products. Since we are not covering the universe of products, our estimate of gender differences in tariff burden may be biased downwards.

3.1 Tariff data

We use the official Harmonized Tariff Schedule (HTS) maintained by the USITC and available to the public through the DataWeb database.[11] We calculate the average applied tariff rate for all products as the value of duties collected divided by the value of cost, insurance, and

[8] We use the UCC to PCE concordance provided by the BLS `https://www.bls.gov/cex/cecomparison.htm`.

[9] In total, 23 sectors were identified in U.S. International Trade Commission (2017) as having significant tariffs. These sectors are reproduced in Appendix table A2. Of these 23 sectors, households do not report consumption in 3 sectors: ball and roller bearings, pesticides and agricultural chemicals, and synthetic organic dyes. These 3 sectors are included in the USAGE model simulations, but do not directly feed into household consumption.

[10] These sectors are responsible for about 80% of the tariff burden (compare our estimates with Furman et al. (2017)).

[11] `https://www.usitc.gov/tata/hts/index.htm`

freight (CIF). For example, an average tariff of 1.5% in 2015 is calculated as the sum of all import duties collected over the sum of the CIF of all U.S. imports in 2015.

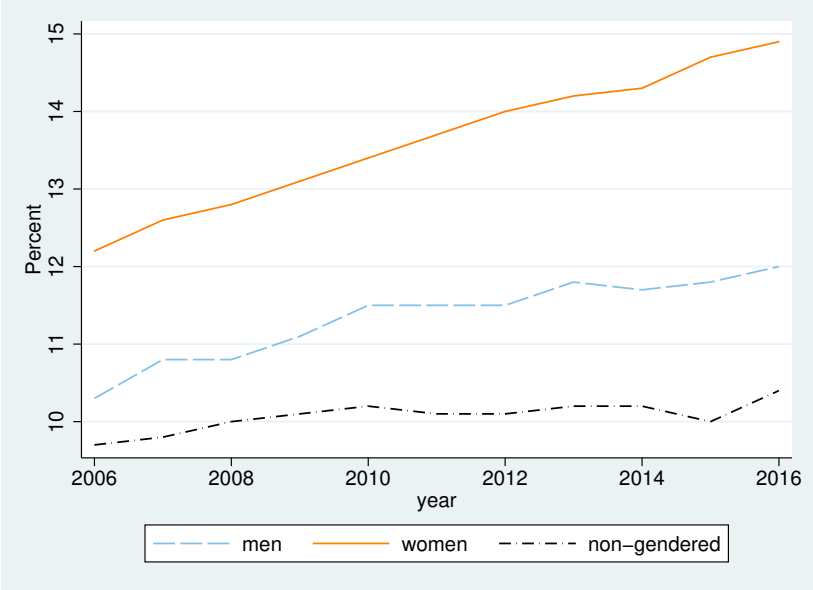
To calculate gender-specific tariff rates we select all subheadings of chapters 61 and 62 of the HTS that are listed specifically as men's or women's.[12] There are 155 HTS categories of men-specific apparel and 160 categories of women-specific apparel listed in HTS, with gendered split occurring at HTS-4 level for some categories and at HTS-10 level for others. For example, "suits, ensembles, suit-type jackets, blazers, trousers, bib and brace overalls, breeches and shorts (other than swimwear)" are split into two subheadings: HTS 6103 for "men's or boys"' and HTS 6104 for "women's or girls"'. All non-gender specific apparel, that is all subheadings in chapters 61 and 62 of the HTS that do not mention men's or women's items specifically, is included in non-gendered category. We then calculate average applied tariffs for each of the three categories.

Figure 1 presents averages of duties collected over CIF value of imports for men's, women's, and non-gendered imported apparel between 2006 and 2016.[13] As evident from the figure, the average tariffs on all three categories of apparel increased between 2006 and 2016. This was not due to increases in MFN or preferential tariff rates, but due to changes in sourcing decisions. For example, there was a decline in Mexico's share in U.S. apparel imports and an increase in China's and Vietnam's share in U.S. apparel imports. Figure 1 also shows that the average tariff on women's apparel increased at a faster rate than the average tariff on men's and non-gendered apparel. In 2006, the average tariff collected on men's apparel was 10.3%, compared to the average tariff on women's apparel of 12.2%, a gap of 1.9 percentage points. By 2016, the gap increased to 2.9 percentage points. Average tariff collected on men's apparel in 2016 was 12.0%, compared to women's apparel average tariff of 14.9%.

[12]Apparel items are listed in chapters 61 and 62 of the HTS.

[13]These rates correspond to τ_{Mgs}, τ_{Wgs}, and τ_{ng} described Section 2.1.

Figure 1: Average tariffs on apparel as a percent of CIF value, by gender



3.2 CE data

To examine purchasing patterns of the U.S. consumers, we use the Consumer Expenditure (CE) survey, a data set collected by the U.S. Bureau of Labor Statistics with the explicit purpose of tracking income and expenditures of the U.S. households.[14] The CE is designed to provide information on a wide range of consumers' expenditures for households in different socio-economic groups representative of the general U.S. population. Data on household expenditures are collected using two separate surveys: the Interview Survey and the Diary Survey. Together, the two surveys collect information from over 40,000 households representing the civilian non-institutional population of the United States (U.S. Bureau of Labor Statistics (BLS), 2016). A special feature of the CE dataset is that consumption expenditure of the households is recorded at a very granular level in both Interview and Diary surveys, allowing us to examine consumption patterns of the U.S. consumers across income and gen-

[14]For more information and to obtain the data, see `https://www.bls.gov/cex/`

der groups.[15] The CE records household purchases at the level of Uniform Commercial Code (UCC).[16] There are 637 unique UCC items reported in the 2015 CE survey.

Households with different incomes often have different consumption patterns: poorer households spend a larger share of their total expenditures on necessities while wealthier households tend to purchase more luxury goods (Henry, 2014). This difference in consumption patterns may lead to differential household-specific effects of policies that cause price changes, for example trade liberalization.

To examine the effects of changes in tariff rates on U.S. households, we split the U.S. population into ten income deciles. Table 2 shows income cutoffs and average expenditure for each decile, using 2015 CE data. Note that the CE data measures income exclusive of in-kind and government transfers, therefore households in lower income deciles often report spending greater than their income.

Table 2: Household income and expenditure, by decile

Decile	Lowest Income	Highest Income	Average Income	Average Expenditure
1	—	$12,100	$5,894	$18,633
2	$12,101	$19,746	$15,627	$19,254
3	$19,747	$28,400	$23,830	$25,586
4	$28,401	$38,300	$32,804	$29,939
5	$38,301	$50,000	$43,298	$33,156
6	$50,001	$64,500	$56,095	$38,676
7	$64,501	$82,000	$71,320	$45,811
8	$82,001	$106,000	$91,604	$55,137
9	$106,001	$150,570	$122,131	$69,912
10	$150,571	—	$231,885	$101,789

Source: The U.S. Consumer Expenditure Survey for 2015.

In addition to differences in expenditure patterns by various income deciles, we also

[15] Note that as a result of this level of granularity in data collection, expenditure shares s_{Djt} exhibit year-to-year fluctuations due to sampling and measurement error. Therefore, we use the average expenditure shares over 2013–2015.

[16] `https://www.law.cornell.edu/ucc`

document differences in consumption across genders. Apparel sector has high gender differentiation of products. It is also a sector where households spend a significant portion of their total annual expenditure. In 2015, an average U.S. household spent $1,092 on adults' and children's apparel. Of that, $427 was spent on apparel for men and boys (less than 40% of total annual apparel expenditure), while $665 (over 60% of total annual apparel expenditure) was spent on women's and girls' apparel (U.S. Bureau of Labor Statistics (BLS), 2016).

4 Results

In this section, we present the results of our analysis of the tariff burden across households with different income levels. We also present the results of our analysis of the tariff burden across genders.

4.1 Tariff burden across income deciles

We begin by replicating the results of Furman et al. (2017) using our data. We analyze the effects of tariff reduction on 20 final consumer goods that are subject to significant U.S. tariffs. We calculate the burden of tariffs on households in ten income deciles using the methodology described in Section 2.3 and assumptions about price responses described in Section 2.4.1. Our results are similar to Furman et al. (2017), but about 20% smaller since we focus only on products with significant tariffs.[17] Our tariff burden estimates are shown on Figure 2 as blue bars. The bars show the tariff burden for each of the ten household deciles under the two alternative assumptions about price changes for domestic goods, with the top end representing a 50% response of domestic prices to tariffs and the bottom end representing a no response.

In addition to assuming exogenous price changes, we also solve for price changes using

[17]Furman et al. (2017) match 381 consumption goods to their respective tariff rates.

a CGE model, as explained in Section 2.4.2. The counterfactual experiment simulated by the CGE model involves eliminating tariffs on 23 goods (20 consumption goods and 3 intermediate goods). The experiment is a comparative static one. The resulting estimated tariff burdens are shown as orange dots on Figure 2. As evident from this figure, tariff burden estimates from the CGE model are lower than the estimates from our two assumptions about exogenous price changes because the tariff pass-through to prices of imported goods in the USAGE model is below 100%, which is consistent with the literature.

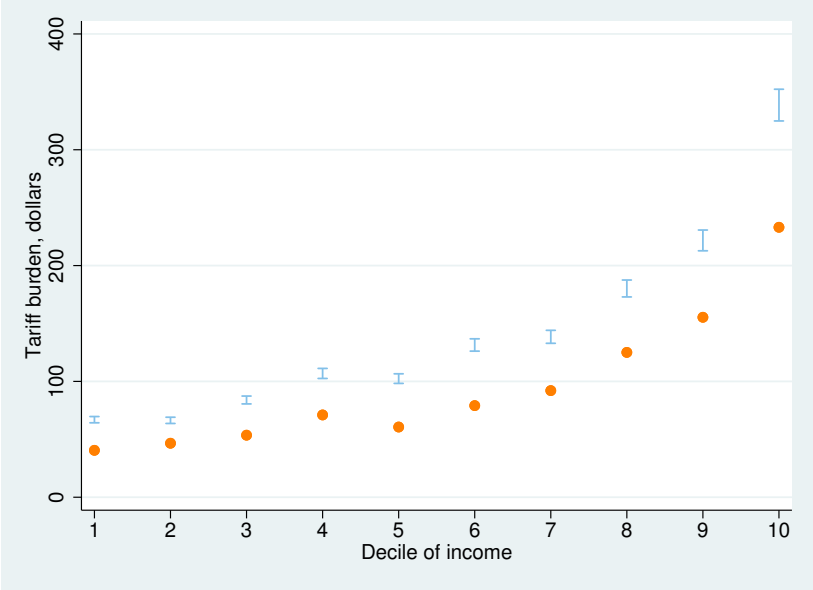
The annual tariff burden, calculated using the price changes estimated by the CGE model, varies from $41 for the poorest households to $233 for the richest households. Therefore, the tariff burden, in dollars, is increasing in income: wealthier households pay more due to tariffs because they spend more than poorer households. On average, each U.S. household pays $96 in tariffs per year. For the U.S. population, the poorest 10% of the U.S. households face a $525 million tariff burden. The burden of the richest 10% is nearly $3 billion. Total tariff burden for all U.S. households is $12.3 billion, which represents slightly less than a half of all U.S. tariff revenue. Table C1 shows the distribution of tariff burden across all income deciles.

We also calculate the effects of tariffs on the consumer price index faced by households in different income deciles. We use the methodology described in Section 2.2 and price changes estimated by the comparative static analysis from the USAGE model. The change in the price index represents the change in the purchasing power of the households. It also represents the share of tariff in household expenditure. The results are shown as the blue bars on Figure 3. They show that as a share of total household consumption expenditure, the tariff burden is flat at about 0.25 percent across all income deciles.[18]

This information provides a new view of tariff burden across income deciles. Previous literature found that tariffs act as a regressive (income) tax. Our results show that U.S.

[18]For more details, see Appendix Table C1.

Figure 2: Tariff burden for households of different income levels, 2015 dollars



Note: blue vertical bars represent a range of tariff burdens obtained under various assumptions about exogenous price changes. The orange points represent tariff burdens obtained using price changes estimated by the CGE model.

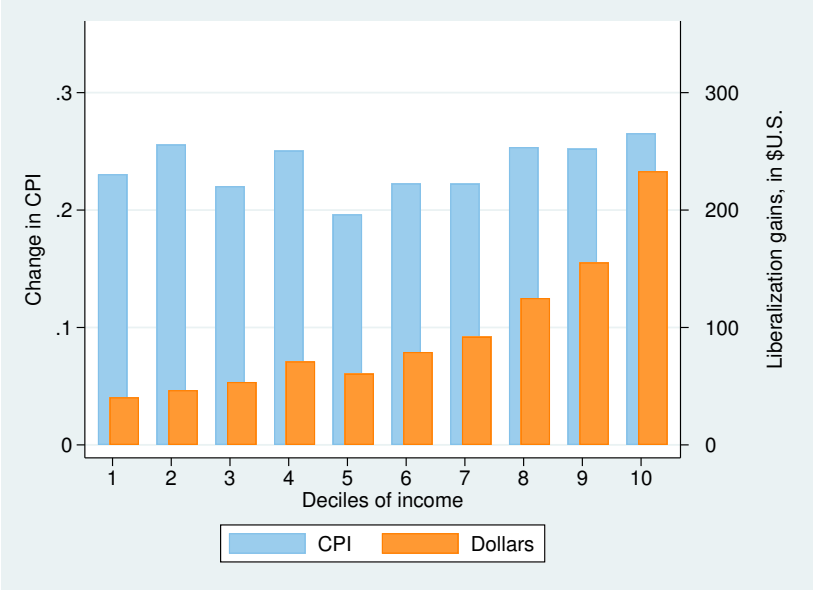
tariffs act as a flat consumption tax. Since a flat consumption tax is a regressive tax on income, our results do not contradict existing literature, but provide additional information for the analysis.

4.2 Tariff burden across genders

In this analysis we focus on the apparel sector since we observe significant differences in tariff rates on gender-specific products in that sector and because about 95% of all tariff burden on apparel products comes from gender-specific products. In 2015 the average applied tariff rate for women's apparel was 14.9%, but it was only 12.0% on men's apparel.[19] At the same time, households spend about 0.7% of their total annual expenditure on men's apparel, while spending over 1.2% on women's apparel (U.S. Bureau of Labor Statistics (BLS), 2016).

[19]In another study, Taylor and Dar (2015) estimate a 15.1% tariff on women's apparel and 11.9% on men's.

Figure 3: Effects of tariffs on households of different income levels

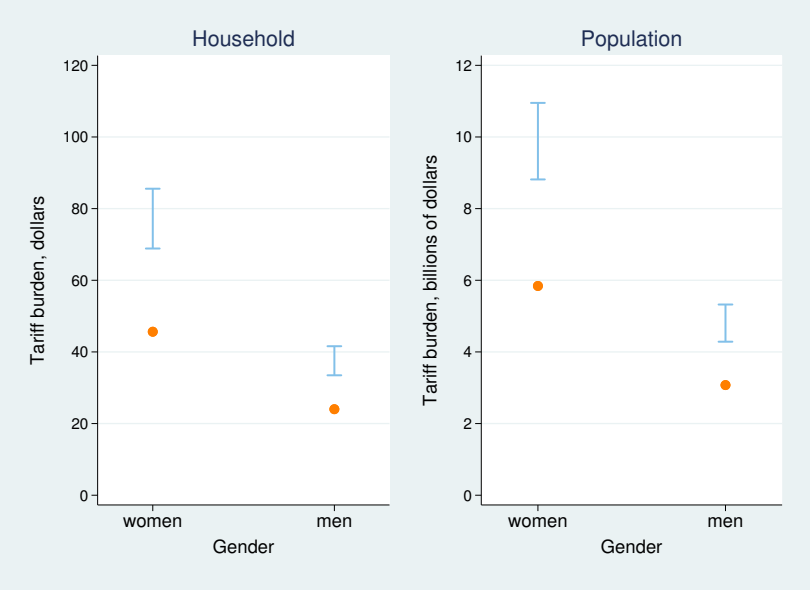


The bars represent the effects of tariffs on the cost of the consumption basket of households in 10 income deciles. The poorest households are on the left. We show the change in the cost of the consumption baskets in dollars and as a price index. The dollar values are the same as the points on Figure 2.

As in the previous section, we estimate tariff burdens using the methodology described in Section 2.3 and either exogenous price changes, calculated under two alternative assumptions about the effects of tariffs on domestic goods prices, described in Section 2.4.1, or endogenous price changes, estimated by the CGE model in a comparative static simulation.

Total tariff burden on apparel products (using CGE model results) is $8.9 billion, nearly 75% of the total tariff burden of the U.S. households. However, this burden is not equally distributed between men and women. Tariff burden on women's apparel is $5.8 billion (66% of total apparel burden), compared to men's apparel burden of $3.1 billion. In other words, the burden of women-specific apparel tariff is nearly twice the amount of the burden of mens-specific apparel tariff. The orange points on the right panel of Figure 4 shows that in 2015 alone, U.S. consumers paid nearly $2.77 billion more due to tariffs when purchasing women's clothing than men's.

Figure 4: Tariff burden on men's and women's apparel purchases in 2015

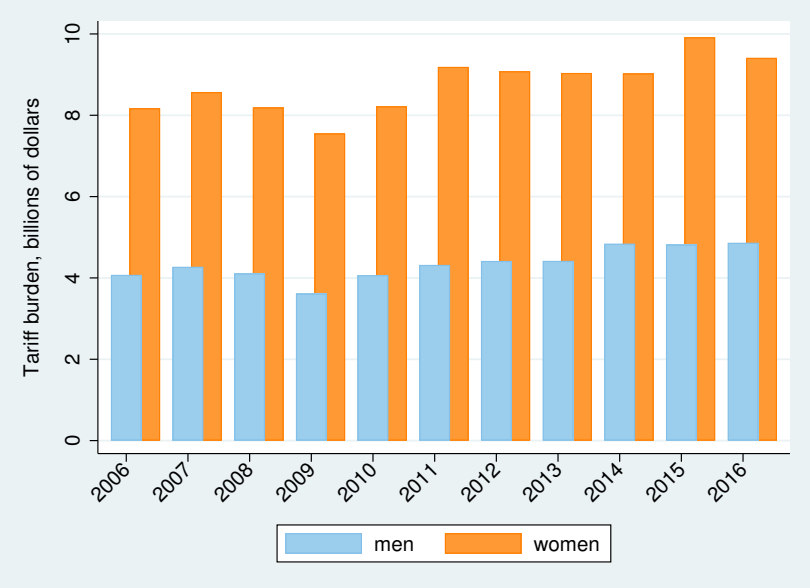


Note: The left panel shows the tariff burden per household, whereas the right panel shows the tariff burden for the U.S. population. The scale on the right panel is billions of dollars. The blue vertical bars represent a range of tariff burdens obtained under various assumptions about exogenous price changes. The orange points represent tariff burdens obtained using price changes estimated by the CGE model.

The tariff burdens estimated using exogenous price changes are shown on Figure 4 as blue bars, with the top end representing a 50% response of domestic goods' prices to tariffs and the bottom end representing a no response (imported goods have a pass-through rate of 1). As in Section 4.1, CGE results imply a pass-through rate of tariffs to imported goods of less than 1.

The tariff burden on women's apparel ranges between $69 and $86 per household, while the tariff burden on men's apparel ranges between $33 and $42 per household in 2015. For U.S. population, the tariff burden on women's apparel averages $9.9 billion and ranges between $8.8 billion and $11.0 billion, while the tariff burden on men's apparel averages $4.8 billion and ranges between $4.3 billion and $5.3 billion dollars. As in the CGE simulation results, the tariff burden from women's apparel is about twice the tariff burden from men's. The dollar value of the gender gap is calculated to be higher than in the CGE simulation

Figure 5: Population tariff burden on men's and women's apparel



Note: The bars represent population tariff burdens from men's and women's apparel, in constant 2015 dollars. They are calculated assuming pass-through rates of tariff equal to 1 for imported goods and 0.25 for domestic goods, as explained in Section 2.4.1.

results, about $5.1 billion.

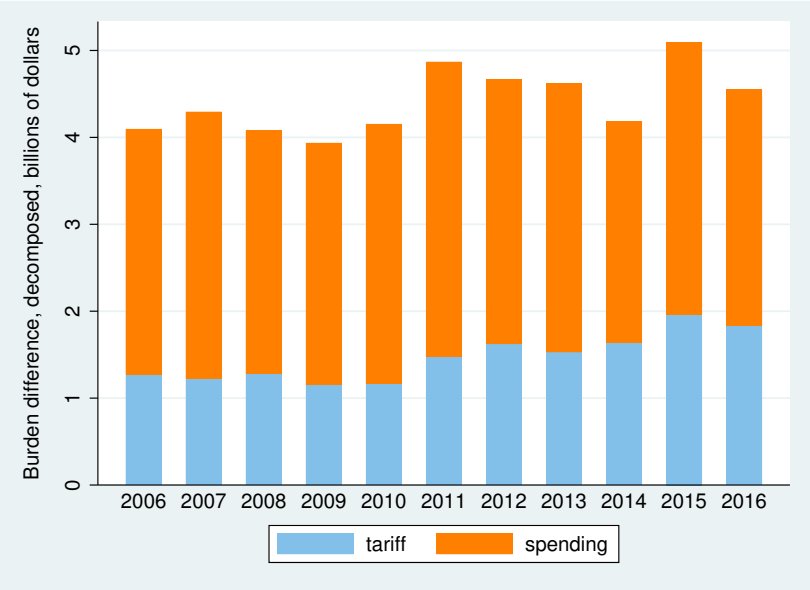
Next, we study the evolution of tariff burden by gender over time. We combine 2006-2016 data on tariff rates, shown in Figure 1, with the 2006-2016 CE survey data to calculate historical trends in men's and women's tariff burden from apparel. We calculate the tariff burdens over the years using the set of assumptions about price changes described in Section 2.4.1 (CGE results for these years are not available). We use the midpoint between the two alternative assumptions about the response of domestic goods' prices to tariffs described in that section.

Figure 5 shows that the tariff burden from apparel has been increasing during these 11 years for both men and women, in real terms. This is due to average apparel tariff increase and spending increase.[20]

Even though the tariff burden has been growing for both genders, it has been growing

[20]Note that the real value of apparel imports stayed nearly the same over the period in question.

Figure 6: Contribution of spending and tariff rates differences to the gender gap in tariff burden



Note: Vertical bars show the differences between population tariff burdens on women's and men's apparel, in constant 2015 dollars. They are calculated assuming pass-through rates of tariff equal to 1 for imported goods and 0.25 for domestic goods, as explained in Section 2.4.1. The differences in tariff burdens are decomposed into those due to differences in tariff rates and those due to differences in spending.

faster for women. The difference between women's and men's tariff burden has grown from 4.1 billion in 2006 to 4.6 billion in 2016, a change of 11 percent. This growth can be seen in Figure 6.

As we mentioned before, there are two reasons for the difference in tariff burden on women's and men's apparel: the average applied tariff rate on women's apparel is higher than on men's and women spend more than men on apparel. In Figure 6 we decompose the women-men tariff burden difference into a part that is due to tariff rate differences and a part that is due to spending differences. As evident from the figure, the growth of the gender gap in tariff burden is mainly due to the faster growth of the average applied tariff rate on women's apparel.

We next examine why the average applied tariff rate on women's apparel is increasing

over time. To address this question, we look at source countries for apparel imports. China is the largest supplier of both men's and women's apparel, but shares of total apparel imports from China vary by gender. Between 2005 and 2016, China was the source of 17–26% of men's apparel imports and 33–46% of women's apparel imports. Other large sources for men's apparel were Mexico (7–12%), Bangladesh (5–10%), and more recently Vietnam (4–13%). Other main sources of women's apparel were Vietnam (4–14%) and Indonesia (5–8%). Concentration of apparel imports by source also increased over time. In 2005, top nine source countries were responsible for 57% of men's apparel imports and 65% of women's apparel imports.[21] By 2016, these same countries provided 69% of imported men's apparel and 78% of imported women's apparel.

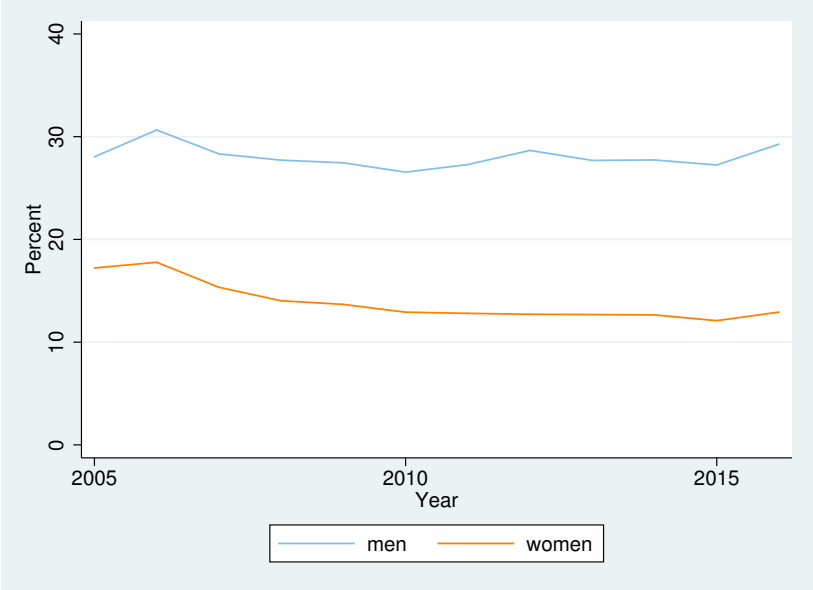
Figure 7 presents the shares of total men's and women's apparel imports sourced from countries with which the United States has a Free Trade Agreement (FTA).[22] As can be seen in the figure, a much higher share of total imports of men's apparel comes from countries with which the U.S. has an FTA. This share is stable over the period of 2005–2016 at around 28%. During the same period, a much lower share of women's apparel was imported from FTA partners. On average, over the years of 2005–2016, the import share of women's apparel from FTA partners was 14%, but there is a clear downward trend in FTA imports. The share of imports from FTA countries went down from a high of nearly 18% in 2006 to below 13% by 2010 and remained between 12% and 13% ever since.

Controlling for FTA vs non-FTA sources, there is only a small difference between men's and women's applied tariffs. Figure 8 shows men's and women's average applied apparel tariffs for FTA and non-FTA countries. The highest tariffs are applied to women's apparel

[21] A source country was selected if it was a top-5 source of either men's or women's apparel in any year between 2005 and 2016. The nine countries are: Bangladesh, Cambodia, China, Hong Kong, Honduras, India, Indonesia, Mexico, and Vietnam.

[22] These countries are Australia, Bahrain, Canada, Chile, Colombia, Costa Rica, Dominican Republic, El Salvador, Guatemala, Honduras, Israel, Jordan, Morocco, Mexico, Nicaragua, Oman, Panama, Peru, Singapore, and South Korea. Source country is considered an FTA partner starting in the year in which an FTA with that country enters into force.

Figure 7: Share of imports from FTA countries

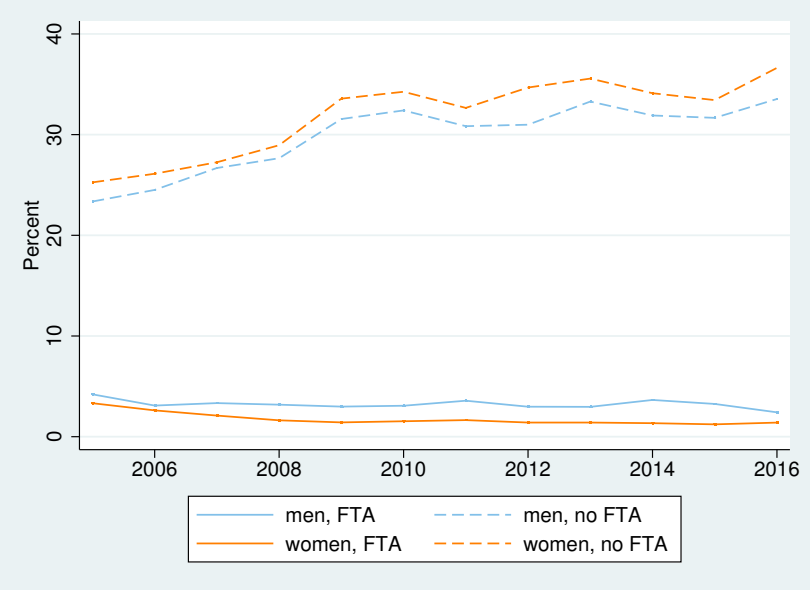


Note: Lines show share of imports of men's and women's apparel that come from FTA countries.

sourced from non-FTA partners. On average, women's apparel from non-FTA sources is subject to a 32% applied tariff, compared to a 30% average applied tariff for men's apparel. However, women's apparel sourced from FTA partners is subject to an average 2% applied tariff, compared to 3% applied tariff collected on men's apparel sourced from the same countries.

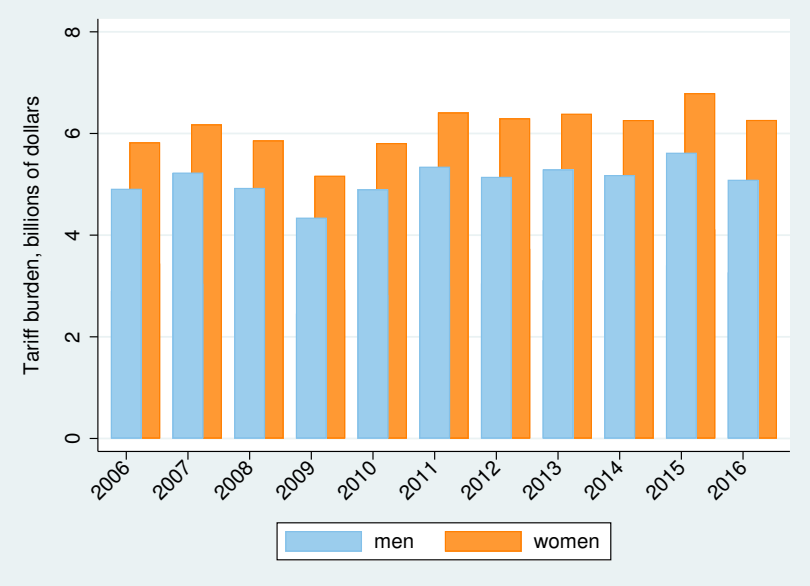
Figure 9 shows the portion of total tariff burden that can be attributed to sourcing apparel from non-FTA sources. Tariff burden on women's apparel imported from non-FTA partners is about $1 billion higher than burden on men's apparel. The combination of higher share of women's apparel sourced from non-FTA partners, higher average applied tariffs on non-FTA sourced women's apparel, and higher expenditure on women's apparel overall leads to a higher tariff burden on women's apparel, compared to men's.

Figure 8: Average tariffs on apparel from FTA and non-FTA countries



Note: Lines represent average applied tariff paid on men's and women's apparel imported from FTA and non-FTA countries.

Figure 9: Population tariff burden on non-FTA sourced apparel



Note: Vertical bars represent population tariff burden on men's and women's apparel imported from non-FTA countries.

5 Conclusion

We investigate the distribution of tariff burden among U.S. households of different incomes and consumers of different genders. To calculate the tariff burden we combine data on tariffs with with information obtained from consumption surveys. Price changes due to tariffs are estimated using either a simple set of assumptions about pass-through rates of tariffs to prices or a computable general equilibrium model, which produces our preferred set of estimates.

We begin by calculating the tariff burden on households in ten income deciles. Since richer households spend more, they also pay more in tariffs. For the U.S. population the poorest 10% of U.S. households pay $535 million in tariff per year while the richest 10% pay $3 billion. As a share of total household consumption expenditure, the tariff burden is a nearly constant 0.25 percent across all income deciles. Therefore, tariffs act as a flat consumption tax. Since a flat consumption tax is a regressive tax on income, tariffs fall disproportionately on the poor.

We then analyze the tariff burden on men's and women's products. Since a great portion of gender-specific products are apparel products and apparel products face some of the highest tariffs among U.S. imports, we focus on apparel in our analysis. We find that the total tariff burden from apparel products is about 75% of the total tariff burden on U.S. households. The majority, 66%, of the tariff burden from apparel is from women's apparel products.

In 2015, the tariff burden for U.S. households on women's clothing was $2.77 billion more than on men's clothing. This gender gap has grown about 11% in real terms between 2006 and 2016. We find that two facts are responsible for this gender gap: women spend more on apparel than men and women's apparel faces higher average applied tariff than men's. While the difference in spending contributes more to the overall gender gap in tariff burden,

it is the difference in the average applied tariff rate that caused the gap to grow during the recent years. We find that the gender difference in applied tariff rates is mostly attributed to the sourcing of imports. While the share of total imports of men's apparel that comes from countries with which the U.S. has an FTA is around 28% and stable over the 2005-2016 period, this share for women's apparel was only 18% in 2006 and declined to 12% in more recent years.

Appendix A Additional data information

Table A1: Personal consumption expenditure categories

Accessories and parts
Alcohol in purchased meals
All non-health insurance
All other professional medical services
Amusement parks, campgrounds, and related recreational services
Audio equipment
Auto leasing
Bakery products
Beef and veal
Beer
Bicycles and accessories
Butter
Cable and satellite television and radio services
Canned tuna
Carpets and other floor coverings
Cellular telephone services
Cereals
Cheese
Child care
Cigarettes
Clocks, lamps, lighting fixtures, and other household decorative items
Clothing materials
Coffee, tea, and other beverage materials
Commercial and vocational schools
Community food and housing/emergency/other relief services
Computer software and accessories
Corrective eyeglasses and contact lenses
Cosmetic/perfumes/bath/nail preparations and implements
Day care and nursery schools
Dental services
Dishes and flatware
Domestic services
Educational books
Eggs
Electric appliances for personal care

Continued on next page

Table A1 – continued from previous page

Electricity
Elementary and secondary schools
Fats and oils
Film and photographic supplies
Financial services
First-class postal service (by U.S. Postal Service)
Fish and seafood
Flowers, seeds, and potted plants
Foundations and grantmaking and giving services to households
Fresh milk
Fruit (fresh)
Fuel oil
Funeral and burial services
Furniture
Gambling
Games, toys, and hobbies
Garbage and trash collection
Gasoline and other motor fuel
Hairdressing salons and personal grooming establishments
Higher education
Home health care
Hospitals
Household cleaning products
Household linens
Household paper products
Intercity buses
Internet access
Intracity mass transit
Jewelry
Laundry and drycleaning services
Legal services
Lubricants and fluids
Luggage and similar personal items
Maintenance and repair of recreational vehicles and sports equipment
Major household appliances
Medical care and hospitalization
Medical laboratories
Membership clubs and participant sports centers
Men's and boys' clothing
Mineral waters, soft drinks, and vegetable juices

Continued on next page

Table A1 – continued from previous page

Miscellaneous household products
Motor vehicle maintenance and repair
Motor vehicle rental
Motorcycles
Moving, storage, and freight services
Musical instruments
Natural gas
New autos
New light trucks
Newspapers and periodicals
Non-gendered apparel
Nonelectric cookware and tableware
Nursing homes
Other delivery services (by non-U.S. postal facilities)
Other Entertainment
Other fuels
Other household services
Other meats
Other medical products
Other personal business services
Other personal care goods and services
Other purchased meals
Other recreational vehicles
Other video equipment
Outdoor equipment and supplies
Parking fees and tolls
Personal computers and peripheral equipment
Pets and related products
Pharmaceutical products
Photo processing
Photo studios
Photographic equipment
Physician services
Pork
Poultry
Prerecorded and blank audio discs/tapes/digital files/downloads
Processed dairy products
Processed fruits and vegetables
Railway transportation
Recreational books

Continued on next page

Table A1 – continued from previous page

Religious organizations' services to households
Repair and hire of footwear
Repair of audio-visual, photographic, and information processing equipment
Repair of furniture, furnishings, and floor coverings
Repair of household appliances
Shoes and footwear
Small electric household appliances
Social advocacy and civic and social organizations
Social assistance
Specialty outpatient care facilities and health and allied services
Spectator sports
Spirits
Sporting equipment, supplies, guns, and ammunition
Stationery and miscellaneous printed materials
Sugar
Sweets
Tax preparation and other related services
Taxicabs
Telecommunication services
Telephone and facsimile equipment
Televisions
Therapeutic medical equipment
Tires
Tobacco
Tools, hardware, and supplies
Travel and vacation services
Used autos
Used light trucks
Vegetables (fresh)
Veterinary and other services for pets
Video cassettes and discs, blank and prerecorded
Video media rental
Watches
Water supply and sewage maintenance
Window coverings
Wine
Women's and girls' clothing

Table A2: Sectors with significant U.S. tariffs

Sector	U.S. tariff[a]	U.S. TRQ[b]	Total
Food and agriculture			
Cheese	7.3	8	15.3
Butter	5.8	15	20.8
Raw cane sugar	1.3	28	29.3
Refined sugar	1.6	55	56.6
Beef	1.0	0	1.0
Canned tuna	12.3	0	12.3
All textiles and apparel			
Fiber, yarn, and threads	5.2	0	5.2
Fabrics	5.0	0	5.0
Carpets and rugs	6.3	0	6.3
Other textile products	5.5	0	5.5
Apparel	12.8	0	12.8
Other manufacturing sectors			
Ball and roller bearings*	5.8	0	5.8
Cellulosic organic fibers	4.7	0	4.7
Ceramic wall and floor tiles	6.2	0	6.2
China, fine earthenware, other pottery products	5.3	0	5.3
Cigarettes	6.7	0	6.7
Costume jewelry and novelties	7.5	0	7.5
Leather and allied product manufacturing	10.1	0	10.1
Other pressed and blown glass and glassware	5.3	0	5.3
Pens and mechanical pencils	5.2	0	5.2
Pesticides and agricultural chemicals (excluding fertilizers)*	4.6	0	4.6
Residential electric lighting fixtures	5.0	0	5.0
Synthetic organic dyes and pigments*	5.1	0	5.1

Reproduced from Table 1.1 of U.S. International Trade Commission (2017). See the report for details.

[a] Measured as an ad valorem equivalent share of the CIF value of imports.

[b] Measured as an export tax equivalent.

* Not included in this analysis.

Appendix B Consumption patterns across income deciles

To illustrate the difference in consumption patterns of households in different income deciles, we calculate a ratio of expenditure shares of the richest and poorest household group for all consumption categories in CE. In Table B1 we show top-5 and bottom-5 ratios of expenditure shares for two groups of consumers. Column 2 of Table B1 shows the ratios of expenditure shares of households in the 90^{th} percentile of income distribution to expenditure shares of households in the 10^{th} percentile of income distribution, sorted in a descending order. We can see that the richest decile spends an 11-times greater share of total expenditure on photo studios than the poorest decile. The richest decile also spends a much greater share of total expenditure on watches, domestic services, and footwear repair. The poorest decile spends a much greater share of total expenditure on cigarettes, social assistance, funeral services, and home health care than the richest decile. Households in the bottom decile of income distribution spend 20 times more on health care than households in the top decile, as a share of their total expenditure. Column 3 of Table B1 compares households in the bottom of the income distribution to the median household. Expenditure patterns here are similar to the previous case: median households spend a higher share of their total expenditure on luxuries, while poor households spend a higher share on necessities.

Table B1: Household expenditure on certain items, by decile

Decile	90/10 Ratio	50/10 Ratio
1	Photo studios (10.77)	Photo studios (6.80)
2	Watches (8.95)	Footwear repair (5.68)
3	Domestic services (7.97)	Jewelry (4.66)
4	Footwear repair (7.91)	Therapeutic medical equipment (4.02)
5	Commercial and vocational schools (7.64)	New autos (3.62)
74	Men's apparel (1.13)	
77	Women's apparel (1.12)	
104		Women's apparel (0.79)
110		Men's apparel (0.76)
147	Tobacco (0.23)	Nursing homes (0.21)
148	Cigarettes (0.18)	Funeral and burial services (0.18)
149	Social assistance (0.14)	Higher education (0.15)
150	Funeral and burial services (0.12)	Social assistance (0.13)
151	Home health care (0.05)	Home health care (0.01)

Source: The U.S. Consumer Expenditure Survey for 2015.

Appendix C Details on the U.S. tariff burden estimates

Table C1: U.S. tariff burdens, by decile

		Tariff burden			
	CPI	Household			Population
Decile	change, %	endogenous	exogenous, low	exogenous, high	in billions
1	0.23	$40.52	$64.26	$69.67	0.52
2	0.26	$46.61	$63.70	$69.07	0.60
3	0.22	$53.57	$80.56	$87.36	0.69
4	0.25	$71.05	$102.55	$111.20	0.91
5	0.20	$60.61	$98.29	$106.57	0.78
6	0.22	$79.11	$126.14	$136.78	1.01
7	0.22	$92.07	$132.91	$144.12	1.18
8	0.25	$125.06	$172.94	$187.52	1.60
9	0.25	$155.37	$212.75	$230.70	1.99
10	0.26	$233.06	$324.87	$352.26	2.98

Source: The U.S. Consumer Expenditure Survey for 2015. Price changes and associated CPI changes are calculated using methodology described above in Section 3.2.

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