



Money Illusion and Attitudes Toward Trade

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Section 1

Introduction

“This is not some natural disaster, it’s a political and politician-made disaster . . . This is a direct affront to our founding fathers . . . They wanted this country to be strong.”

The sentiment above was expressed by then-candidate Donald Trump when he was campaigning for the Presidency of the United States of America (Time Staff 2016). What could he have been castigating with such vitriol? Social Injustice? Violence? Poverty?

None of the above, actually. Trump was criticizing U.S. participation in the global economy. In the United States, negative views toward international trade are not at all out of the ordinary. In fact, much of the discussion that surrounded the 2016 U.S. presidential election was centered around perceptions of trade. Trump ran an ultimately very successful campaign in which he regularly pontificated about the evils of trade liberalization and called for increased trade protection.¹ For example, he asserted that the North American Free Trade Agreement (NAFTA) had been a “disaster” and proclaimed it to be the “worst trade deal” in American history (Time

¹Trade liberalization refers to removing factors that limit international trade, and often reduces import prices. In contrast, trade protection refers to restricting the amount of international trade that a country can engage in, and often increases import prices.

Staff 2016).

However, the existence of negative attitudes toward international trade in America is by no means a phenomenon exclusive to the current decade. For example, in 1999 a number of protests surrounded the World Trade Organization ministerial meeting in Seattle, a meeting that was aimed at aiding the development of trade negotiations (Deardorff and Stern 2002). The widespread existence of negative attitudes toward trade among Americans serves as a natural motivation to attempt to better understand the factors potentially underlying these attitudes.

1.1 What Drives American Attitudes Toward International Trade?

Recent literature has linked a wide variety of different factors to attitudes toward international trade seen among Americans. Factors related to employment have received particular attention in recent research. For instance, Hoffman (2010) uses polling data from Gallup to demonstrate that between 1992 and 2003 unfavorable attitudes toward trade among Americans moved in accordance with the U.S. unemployment rate, as more unfavorable attitudes toward trade were seen in years with higher unemployment rates, and less favorable attitudes toward trade were observed in years with lower unemployment rates. However, this pattern seemed to largely disappear between 2003 and 2009 before reappearing after 2010 (Hoffman 2010 and Jones 2018).² Mansfield, Mutz, and Brackbill (2016) argue that changes in overall American attitudes toward trade during the Great Recession were not necessarily

²It should be noted that in 2017 and 2018, Gallup recorded the most favorable attitudes toward trade among Americans that it has ever observed since beginning the poll in 1992 (Jones 2018). However, given how polarized the current American political climate is, perhaps the uptick in reported favorable attitudes toward trade is partially a result of individuals who are opposed to the Trump administration choosing to endorse viewpoints contrary to those of the administration. Moreover, this recent uptick certainly does not change the fact that negative attitudes toward trade in America have been prevalent in recent decades and continue to be so today.

linked to increased unemployment in itself, but they also show that the development of more negative attitudes toward trade was indeed seen among workers who had become unemployed during the recession and had also been previously employed in industries that competed with imported products.

The relationship between attitudes toward trade and levels of education has also been extensively studied. For instance, Hainmueller and Hiscox (2006) show that college-educated Americans are significantly more likely to have positive views of increased international trade than are Americans who are not college-educated. In addition, they show that this result holds not just when considering Americans within the active labor force, but also when considering Americans outside of the active labor force. After conducting a thorough analysis of how college education may impact perceptions of trade, Hainmueller and Hiscox (2006) conclude that it may affect attitudes toward international trade in ways outside of just influencing the skill set of an individual³; in particular, they raise the possibility that exposure to certain information that an individual receives during college years can impact his or her attitudes toward international trade.

Various other factors unrelated to employment or education have also been shown to be related to perceptions of international trade. Hoffmann (2010) uses survey data to show that views regarding free trade among Americans are correlated with political party affiliation. Furthermore, Mansfield, Mutz, and Brackbill (2016) argue that changes in American attitudes toward international trade during the Great Recession were related to heightened levels of ethnocentrism and growing fears that international trade could potentially harm Americans in the future.

³The skill set of any particular worker in a country is thought to be related to the amount of benefits that the worker would receive if the country were to engage in trade liberalization.

1.2 Can Money Illusion Negatively Influence American Attitudes Toward Trade?

While individual attitudes toward international trade will surely vary in relation to various personal factors and viewpoints, economic theory often suggests that trade liberalization should provide significant gains to a country's population overall. However, many Americans do not seem to recognize the potential benefits of additional trade liberalization. I hypothesize that money illusion may be a major factor behind the development of negative attitudes toward trade in America. To the best of my knowledge, the effects that money illusion may have on attitudes toward trade have not been formally studied, and I aim to fill this gap in research.

1.2.1 What is Money Illusion?

As explained by Shafir, Diamond, and Tversky (1997), when an individual thinks about monetary values in nominal terms rather than in real terms, he or she is said to be demonstrating money illusion.⁴ Shafir, Diamond, and Tversky (1997) provide evidence for the existence of money illusion by using a survey-based approach: for example, they find that over half of those who responded to a specific survey question would prefer to sell a house for 23% more than its purchase price after owning it for a period in which there was an inflation rate of 25%, rather than sell a house for 23% less than its purchase price after owning it for a period in which there was a deflation rate of 25%. In the former scenario one would incur a real loss and make a nominal profit, while in the latter scenario one would make a real profit and incur a nominal loss. Therefore, to prefer the former scenario to the latter one must

⁴The nominal price of a good at a specific point in time refers to the dollar value of the good at that point in time, and similarly the nominal income of an individual at a specific point in time refers to the dollar value of that individual's income at that point in time. In contrast, a real value at a specific point in time, such as a real price or real income, is adjusted for inflation in relation to some other point in time.

think in nominal rather than real terms and thus demonstrate money illusion.

Shafir, Diamond, and Tversky (1997) employ a particularly clever strategy to demonstrate the presence of money illusion: they describe two options that are equivalent in real terms but different in nominal terms, and then ask survey respondents to indicate their preferences regarding the options. For example, they describe a hypothetical scenario in which over some six-month period “all benefits and salaries” and “the prices of all goods and services” increase by 25%, and then have survey respondents indicate whether they would be more, less, or equally likely to buy an armchair for \$500 at the end of the six-month period than they would be for \$400 at the beginning of the six-month period. The real price of the armchair remains the same at the end of the period as it was at the beginning of the period; nevertheless, 38% of respondents indicate that they would be less likely to buy the armchair for \$500 at the end of the six-month period than they would be for \$400 at the beginning of the six-month period, while only 7% of respondents indicate that they would be more likely to buy the armchair for \$500 at the end of the six-month period than they would be for \$400 at the beginning of the six-month period (Shafir, Diamond, and Tversky 1997).

Recent research has shown that studying the effects of money illusion may allow for a better understanding of various real-world phenomena. For example, Brunnermeier and Julliard (2008) explain that in an environment where individuals are susceptible to money illusion, housing price run-ups can be caused by reduced inflation rates. Dzokoto et al. (2010) also demonstrate the applicability of money illusion, as they show that changes in spending behavior seen among individuals in Ghana after the country experienced a currency redenomination were related to susceptibility to money illusion.

1.2.2 A Motivation for Considering the Effects of Money Illusion on American Attitudes Toward Trade

It is clear that a wide variety of factors may have been related to recent backlash to U.S. trade liberalization; however, given the widespread nature of negative attitudes toward international trade in America, perhaps a significant part of the motivation behind these attitudes is attributable to a source that could potentially affect almost all Americans rather than just a particular subset of the American population. Money illusion fits this criteria perfectly, as it has been shown to exist among multiple distinct groups of people. For instance, Mees and Franses (2014) replicate the research of Shafir, Diamond, and Tversky (1997), but use survey respondents from China rather than the United States, and conclude that Chinese individuals are indeed also susceptible to money illusion. Furthermore, Dzokoto et al. (2010) argue that individuals in Ghana demonstrate money illusion. Given the fact that the United States, China, and Ghana have vastly different cultures and socioeconomic conditions, it is thus reasonable to conclude that money illusion may be observed among a wide variety of demographic groups.

It is natural to expect that consumers will consider changes in prices when evaluating the consequences of trade; therefore, consumers who are susceptible to money illusion may evaluate trade policies according to observed changes in nominal prices rather than according to less obvious changes in real prices, and subsequently arrive at faulty conclusions. This idea is best illustrated by considering a simple thought experiment. Let there be some good that agents in a country derive utility from consuming. Furthermore, assume that the country imports this good from abroad. Now, also assume that the country enacts some new trade liberalization policy that decreases barriers to trade, and that as a result of this change in policy the real price of the imported good falls over some extended time period. However, also assume that because of the presence of inflation, the nominal price of the imported good either

stays the same or rises over the aforementioned time period, even while the real price falls. If some consumer is susceptible to money illusion and observes that the nominal price of the imported good has not fallen, then this consumer may not recognize that the new trade policy has led to a decrease in the real price of the imported good and thereby improved his or her ability to purchase the good. Therefore, this consumer may be unlikely to have a positive opinion regarding the trade liberalization that was caused by the recently enacted policy even though it has made him or her better off in real terms. In this paper I will show that American consumers may be demonstrating the thought process just outlined, and I will formulate how this thought process and its effects may be more rigorously represented.

1.2.3 Outlining a Strategy to Examine Money Illusion's Impact on American Attitudes Toward Trade

In this paper I employ a multi-part approach in order to argue that being susceptible to money illusion may be causing consumers within the United States to hold less favorable attitudes toward trade liberalization than they would otherwise hold if they were not susceptible to money illusion.

Section 2 examines price data in order to show that recent economic trends have contributed to the development of an atmosphere in the United States where money illusion could plausibly impact consumer attitudes toward free trade and the effects of trade liberalization. In particular, I show that in recent decades the nominal prices of many imported consumer goods have increased or remained approximately constant, while the real prices of these goods have decreased. This type of environment is exactly one in which a consumer who is susceptible to money illusion might incorrectly believe that real prices of imported consumer goods have not decreased.

Section 3 utilizes a survey-based analysis in order to show that U.S. consumers exhibit susceptibility to money illusion when evaluating the effects of economic policies,

a tendency that may be masking benefits of trade liberalization from these consumers. The given survey takes some inspiration from Diamond, Shafir, and Tversky's (1997) strategy of having respondents choose between options that are equivalent in real terms but different in nominal terms. However, the survey instrument utilized in this paper is quite distinct from any of the questions employed by Diamond, Shafir, and Tversky (1997). In particular, respondents of the survey utilized in this paper were asked to indicate their preferences between economic policies that would lead to different nominal changes in prices and income but approximately equivalent real changes in prices and income. The survey responses reveal valuable information that explains how susceptibility to money illusion may negatively influence American consumers' views toward the implementation of economic policies that would lead to trade liberalization.

Section 4 develops a mathematical model of consumer utility that describes how being susceptible to money illusion may impact the change in utility that one experiences after the implementation of a policy that leads to changes in income and price levels. In particular, the model demonstrates that if members of a country's population are susceptible to money illusion, the proportion of the population that will experience increases in utility from the enactment of a certain policy can be quite different than the proportion of the population that would experience increases in utility if members of the population were not susceptible to money illusion. Therefore, the model implies that accounting for the impact of money illusion when evaluating the effects of a proposed economic policy may allow for a more accurate analysis of the policy.

Section 5 concludes and discusses the applicability of understanding money illusion's impact on attitudes toward trade. Section 6 contains an appendix with supplementary information. Section 7 contains references.

Section 2

An Analysis of Recent U.S. Import Price Trends

A simple, yet telling potential explanation for why there exists considerable resistance to free trade within the American public is that American consumers have not consciously noticed tangible benefits of recently implemented trade liberalization policies. Consumers may evaluate a new trade liberalization policy according to how import prices change following its implementation. If consumers are susceptible to money illusion, they might pay attention to the evolution of nominal prices rather than the evolution of real prices when performing such an evaluation. Therefore, money illusion can potentially impact attitudes toward trade by leading individuals to evaluate the effects of trade liberalization through a criteria that is not necessarily representative of consumer utility. In particular, if some new trade liberalization policy leads to declines in real prices of imports but does not lead to declines in nominal prices of imports, consumers who are susceptible to money illusion may conclude that the increased free trade has been useless, even in spite of the fact that the policy has made them better off. It follows that susceptibility to money illusion has the potential to negatively influence opinions of free trade by camouflaging benefits that are

manifested in decreased real prices.

Analyzing recent price data will allow for a better understanding of how American consumers who are susceptible to money illusion may interpret the effects of trade liberalization, and examining nominal prices of apparel will be of particular importance. Not only is much of the apparel sold in the U.S. imported, but in addition there exists a trope of apparel being produced in the sweatshops of developing countries before being sold to Americans. Therefore, it is reasonable to assume that U.S. consumers are well-aware that much of the apparel that they consume is imported. It follows that when U.S. consumers evaluate the effects of trade they may pay relatively more attention to changes in prices of imported apparel than to changes in prices of other imported consumer goods. Thus, if consumers are susceptible to money illusion, the presence of rising nominal apparel prices may have significant potential to negatively influence attitudes toward trade liberalization.

Let us consider a simple example that illustrates how an American consumer may evaluate the effects of international trade in a faulty manner. Consider some hypothetical consumer who lived in Morris County, New Jersey between 1988 and 2012, and who bought a men's dress shirt in 1988 and another men's dress shirt in 2012. Assume that this consumer is susceptible to money illusion and is aware that dress shirts are often imported. According to historical price data from the Morris County Library, the consumer likely paid approximately \$15 for a men's dress shirt in 1988 and likely paid approximately \$25 for a men's dress shirt in 2012 (Morris County Library n.d.[a] and n.d.[b]). Therefore, it is plausible that the consumer would conclude that trade has not been particularly beneficial because the price of a presumably imported men's dress shirt has not decreased over time. However, such a conclusion would be inaccurate: \$15 in 1988 after being adjusted for inflation is approximately equivalent to \$29 in 2012, so in fact the real price of a men's dress shirt that the consumer faced in 2012 is less than the real price of a men's dress shirt

that the consumer faced in 1988.⁵

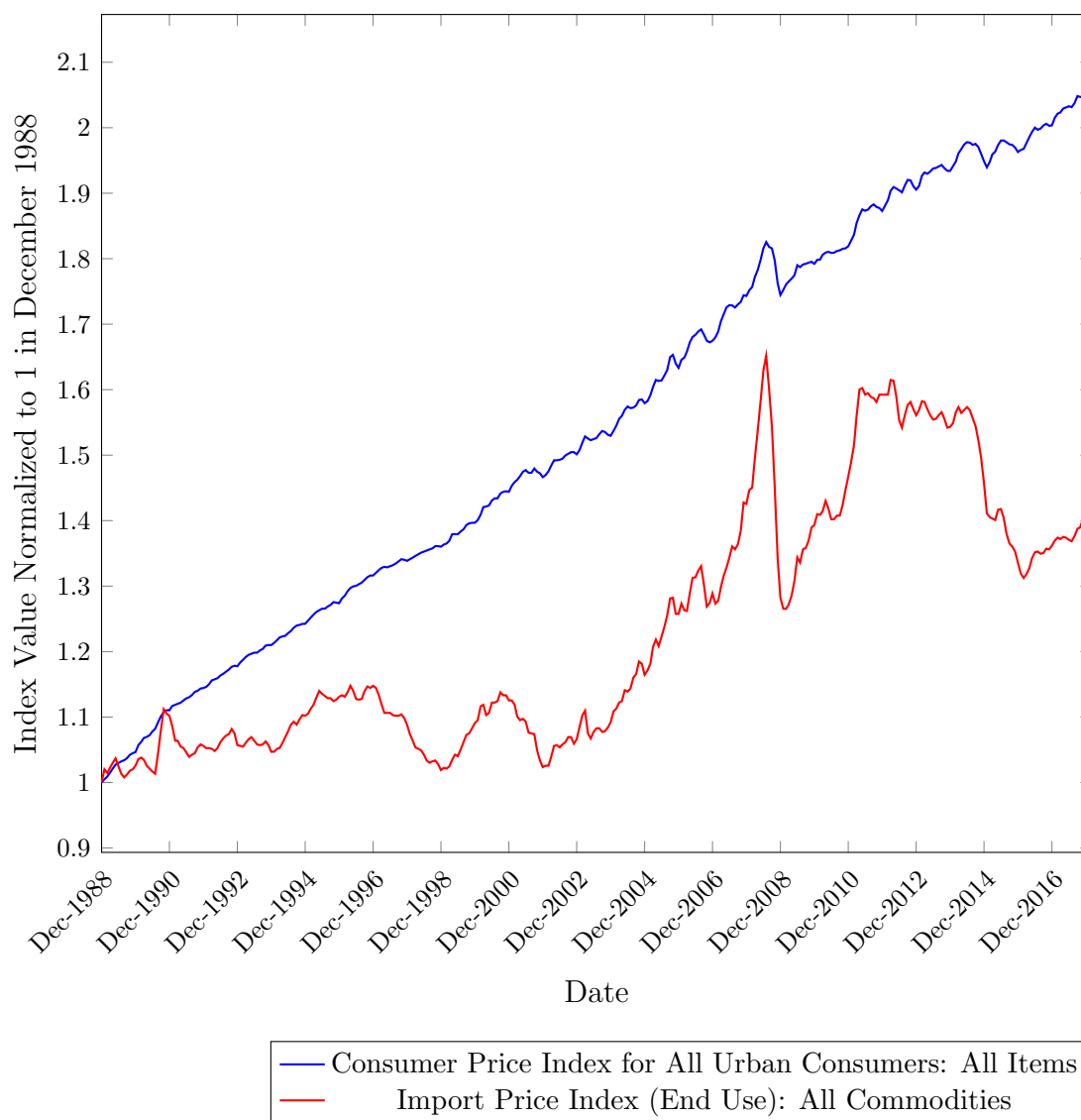
2.1 Recent Changes in the Consumer Price Index and Various Import Price Indexes

A comparison of recent changes in the Consumer Price Index for All Urban Consumers (often referred to as the CPI-U) to recent changes in the Import Price Index for all commodities suggests that in recent decades susceptibility to money illusion has had the potential to mask beneficial effects of trade liberalization from U.S. consumers.⁶ The Import Price Index for all commodities has increased between December 1988 and February 2018, but at a rate that is smaller than the rate at which the CPI-U has increased between those dates, a trend that is demonstrated in Figure 1. Therefore, over the past three decades nominal prices of imported goods have increased while real prices of imported goods have decreased, which are exactly conditions that may induce consumers who are susceptible to money illusion and who evaluate trade policies by changes in import prices to underestimate gains from trade liberalization.

⁵One can easily compare nominal monetary values from different years in real terms by using the CPI Inflation Calculator provided by U.S. Bureau of Labor Statistics (n.d.).

⁶The CPI-U is a common measure of inflation and the Import Price Index for all commodities measures changes in nominal prices of imported goods. For further information on these indexes, see U.S. Bureau of Labor Statistics (2018b) and (2017).

**Figure 1: CPI-U vs. Import Price Index for
All Commodities**



Data for Figure 1 is from U.S. Bureau of Labor Statistics (2018a) and (2018c)

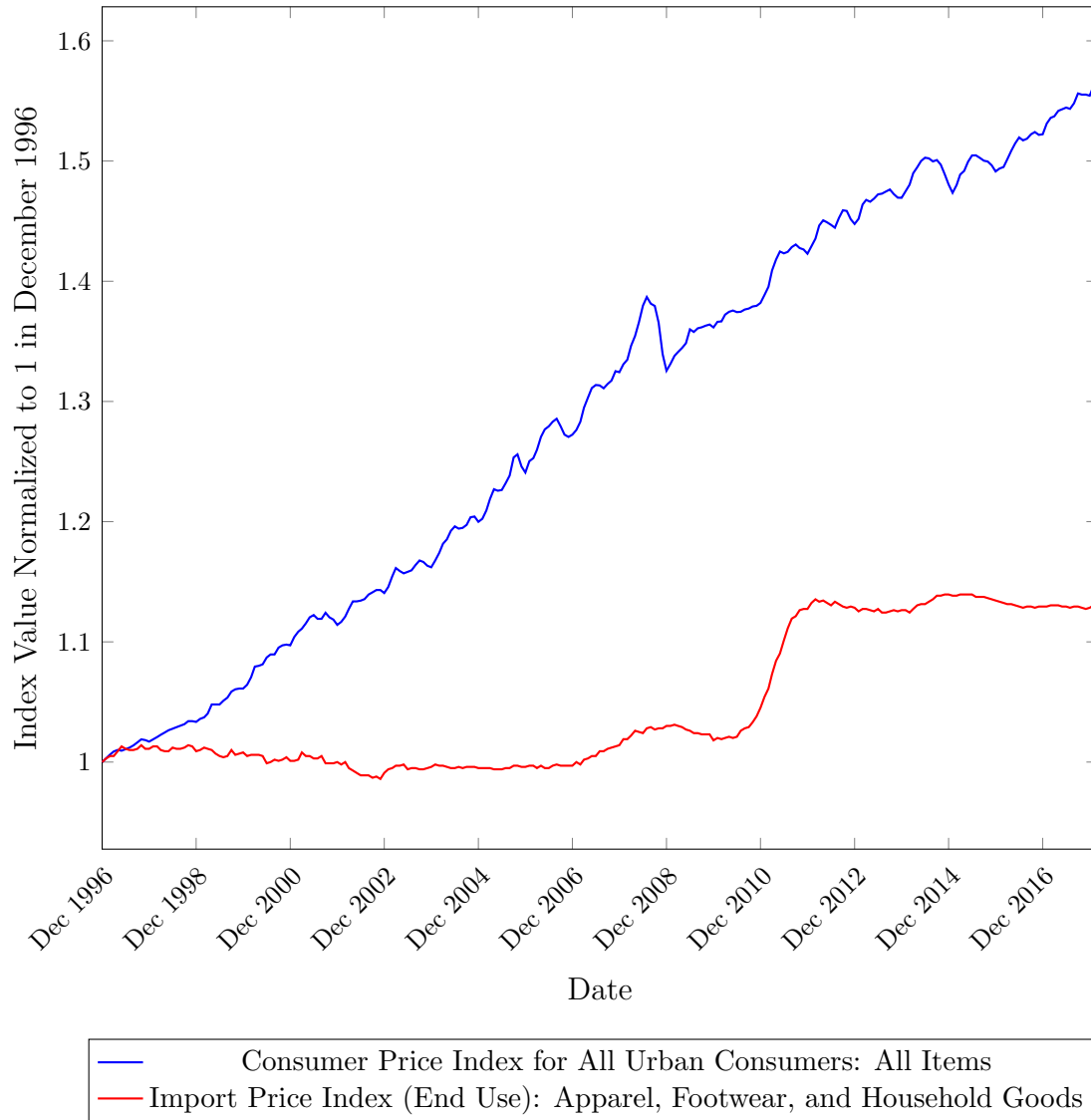
Considering Import Price Indexes for specific categories of goods yields additional evidence that money illusion has had the potential to mask beneficial effects of trade liberalization from U.S. consumers.⁷ For a number of categories of goods that are often consumed by households, the corresponding Import Price Index values have

⁷An Import Price Index for a specific category of goods measures how nominal prices of imported goods within that category have changed over time. For more information see (U.S. Bureau of Labor Statistics 2017).

increased between December 1996 and February 2018, but have done so at rates that are smaller than the rate at which the CPI-U has increased between those dates, implying that nominal prices have increased while real prices have decreased for goods in these categories.⁸ As demonstrated by Figures 2 and 3, two of the specific categories for which this trend exists are apparel, footwear, and household goods; and sporting/camping apparel and footwear. Furthermore, both of these categories of goods involve apparel, and as discussed earlier consumers may pay particular attention to changes in apparel prices when assessing the effects of international trade.

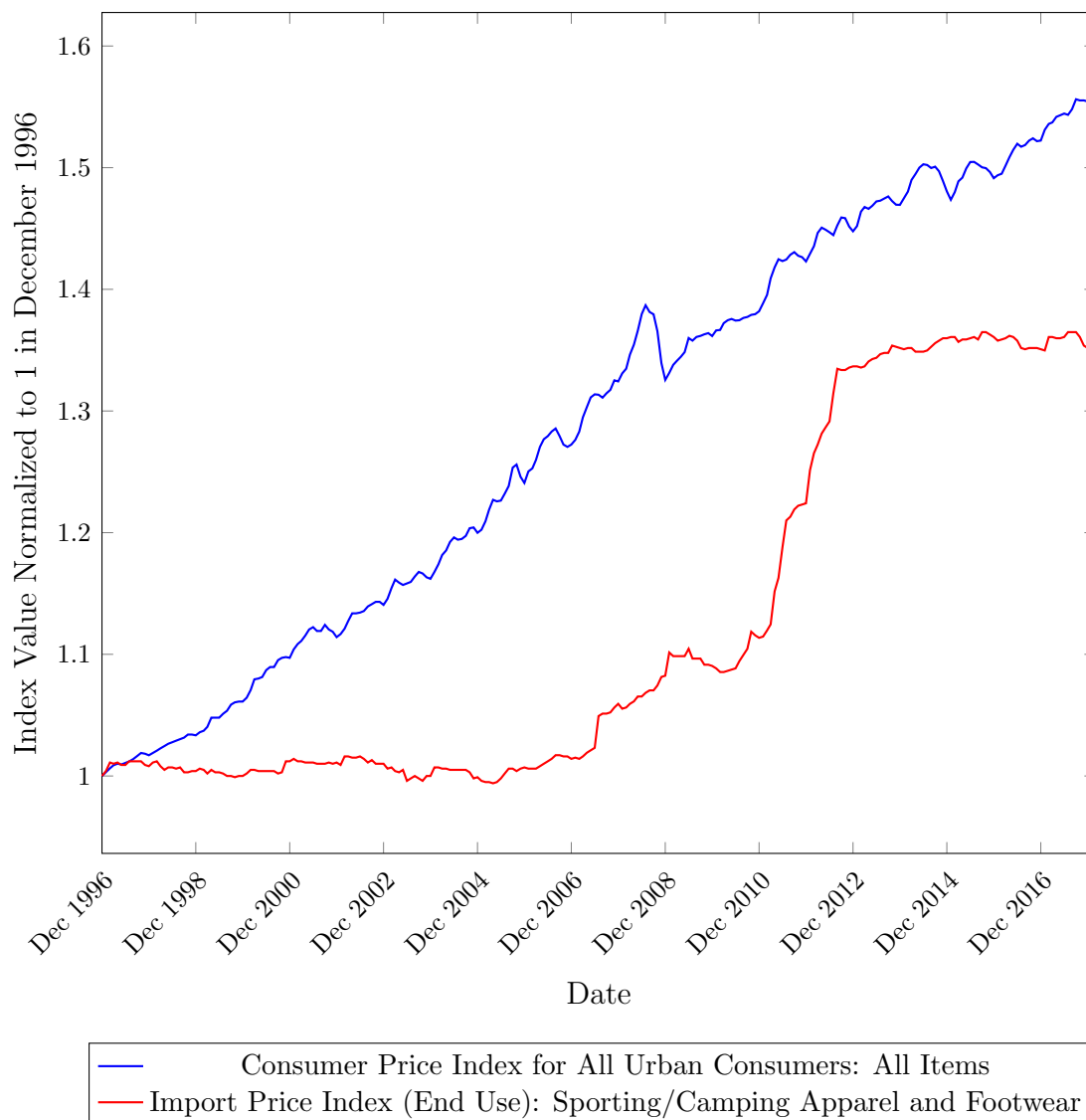
⁸Note that here December 1996 is used as the initial month of comparison because not all the different Import Price Indexes for specific categories of goods have available monthly data for months prior to December 1996.

Figure 2: CPI-U vs. Import Price Index for Apparel, Footwear, and Household Goods



Data for Figure 2 is from U.S. Bureau of Labor Statistics (2018a) and (2018e)

Figure 3: CPI-U vs. Import Price Index for Sporting/Camping Apparel and Footwear

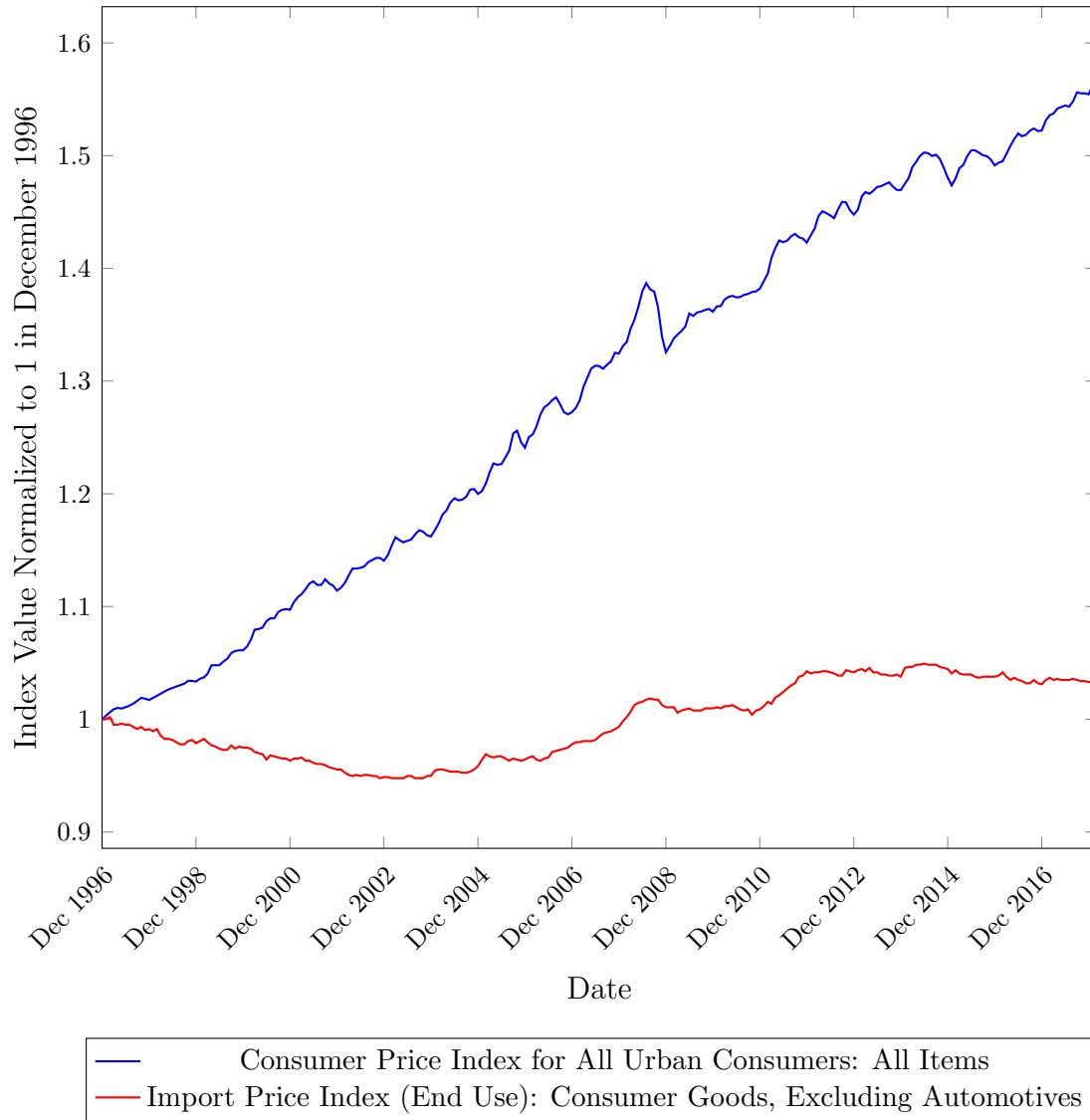


Data for Figure 3 is from U.S. Bureau of Labor Statistics (2018a) and (2018p)

We see that for some other categories of goods that are often consumed by households, the corresponding Import Price Index values have remained approximately constant between December 1996 and February 2018. As shown in Figures 4 and 5, two of the categories for which this trend is found are consumer goods, excluding automobiles; and recreational equipment and materials. Consumers who are susceptible

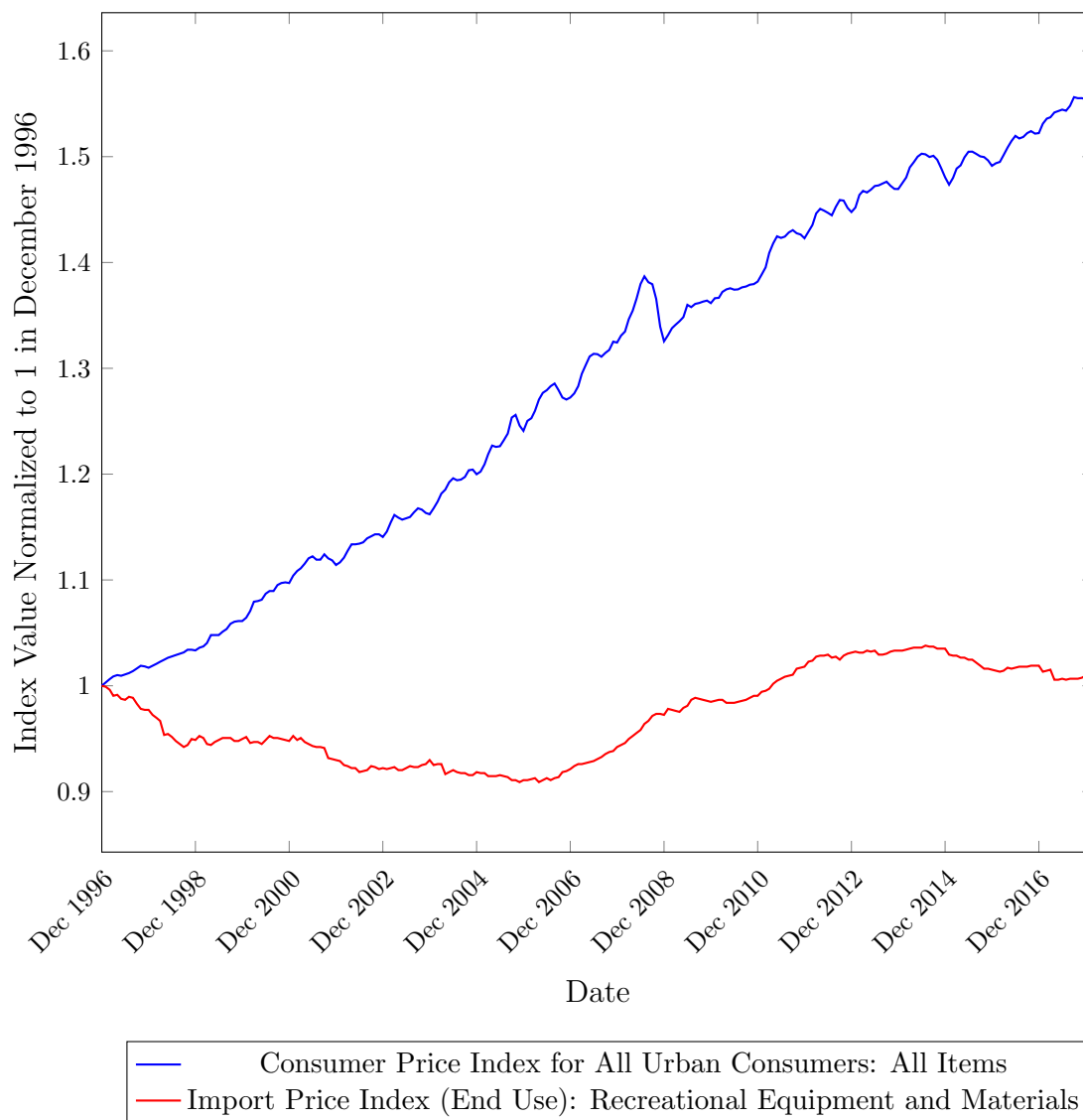
to money illusion may have failed to recognize real price decreases of goods in these categories due to a lack of easily observable nominal price changes.

Figure 4: CPI-U vs. Import Price Index for Consumer Goods, Excluding Automotives



Data for Figure 4 is from U.S. Bureau of Labor Statistics (2018a) and (2018g)

**Figure 5: CPI-U vs. Import Price Index for
Recreational Equipment and Materials**



Data for Figure 5 is from U.S. Bureau of Labor Statistics (2018a) and (2018o)

There are a number of other categories of consumer goods that also have not seen their associated Import Price Index values steadily decline between December 2016 and February 2018. Some categories of this type include apparel and household goods for other textiles; bakery and confectionery products; cotton apparel and household goods; distilled alcoholic beverages; furniture, household items; nonmanufactured consumer goods; nontextile apparel and household goods; other consumer

nondurables; passenger cars, new and used; toys, shooting and sporting goods; unmanufactured consumer durables; nonmanufactured consumer goods; and wine, beer, and related products.⁹ The fact that so many different Import Price Indexes have not demonstrated notable declines since December 1996 provides further evidence that money illusion has had the potential to negatively influence attitudes toward trade among consumers who evaluate trade policies by changes in import prices.

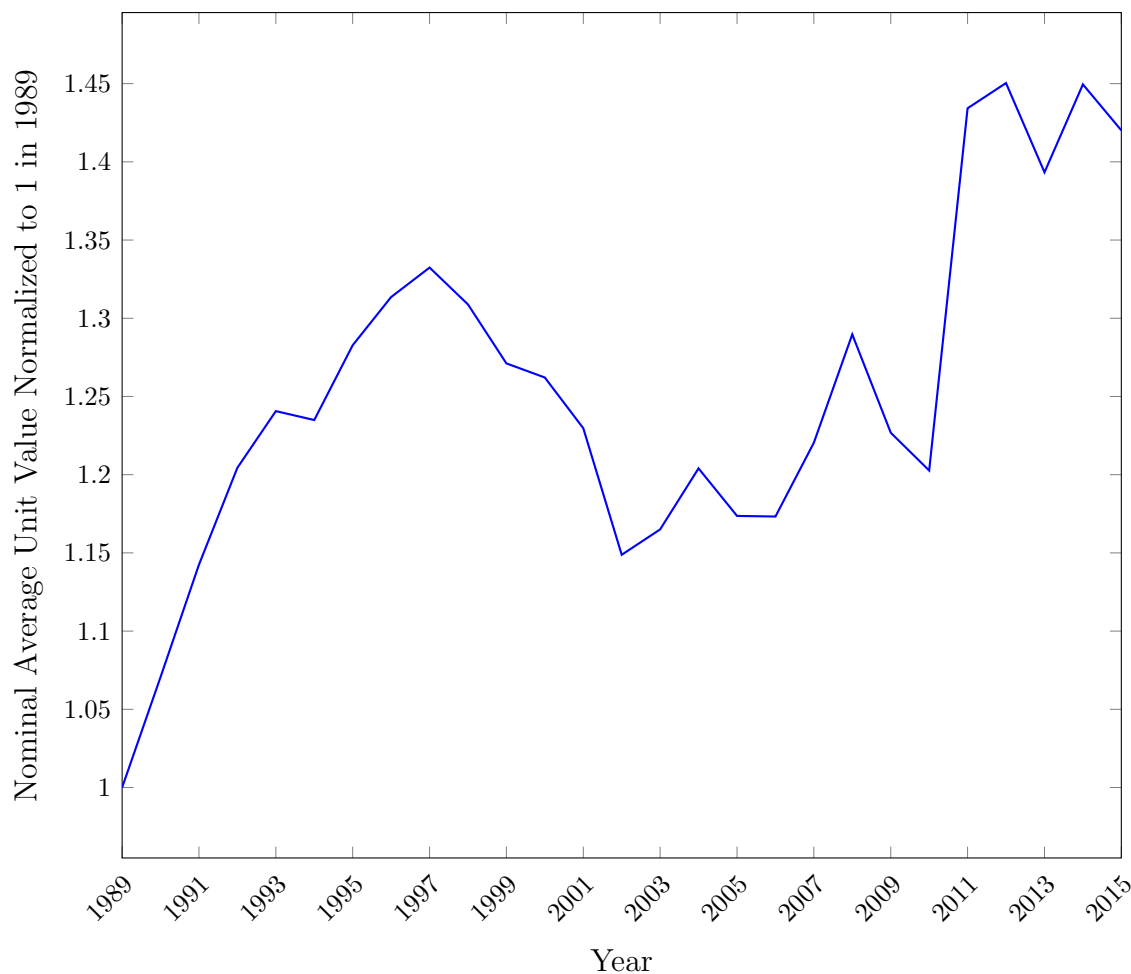
2.2 Recent Nominal Average Unit Value Trends

Let us now consider the ways in which nominal prices of common imported consumer goods have evolved at a more disaggregated level. We can do this by appealing to the HTS classification system.¹⁰ Some particularly relevant HTS categories are imported men's shirts that are not knitted or crocheted, imported men's shirts that are knitted or crocheted, imported women's shirts that are not knitted or crocheted, and imported women's shirts that are knitted or crocheted. For each of these categories, we can utilize changes in the nominal average unit value of the category as a proxy for changes in nominal prices of goods in the category.¹¹ Figure 6 shows how the nominal average unit value for men's shirts that are not knitted or crocheted has changed over time.

⁹Graphs comparing each of these Import Price Indexes to the CPI-U can be found in the Appendix.

¹⁰HTS refers to the Harmonized Tariff Schedule of the United States, which provides a categorization system for all goods imported to the United States. For more information see United States International Trade Commission (n.d.).

¹¹In this paper, the nominal average unit value for a category of imported goods in a given year is defined as the total value in dollars of all goods in that category imported within the year, divided by the total units of goods in that category imported within the year.

Figure 6: Men's Shirts (Not Knitted or Crocheted)**Nominal Average Unit Value**

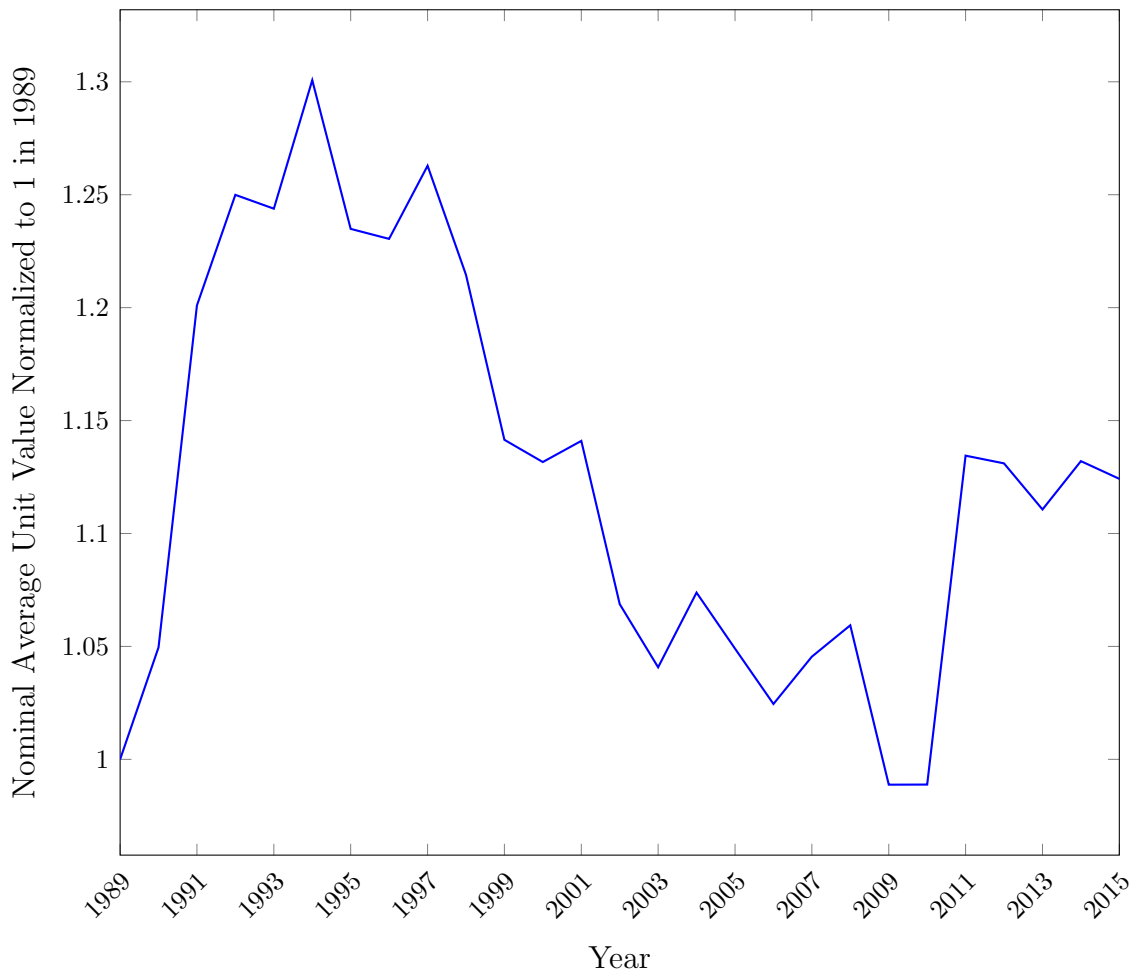
Data for Figure 6 is from Schott (2008)

Figure 6 provides additional evidence that in recent decades American consumers may not have noticed significant decreases in nominal prices of imports, as the nominal average unit value for imported men's shirts that are knitted or crocheted has not exhibited a consistent downward trend. In fact, this nominal average unit value was notably higher in 2015 than it was in 1989, and it seems to have demonstrated a largely upward trend from 1989 to 2015. If consumers are susceptible to money illusion and assess trade policies according to nominal import price changes, nominal price trends resembling the trend shown in Figure 6 may have lead consumers to

reason that because certain imported goods have seen their prices increase, recently enacted trade liberalization policies have not been effective.

Figures 7, 8, and 9 show recent changes in the nominal average unit values for men's shirts that are knitted or crocheted, women's shirts that are not knitted or crocheted, and women's shirts that are knitted or crocheted, respectively.

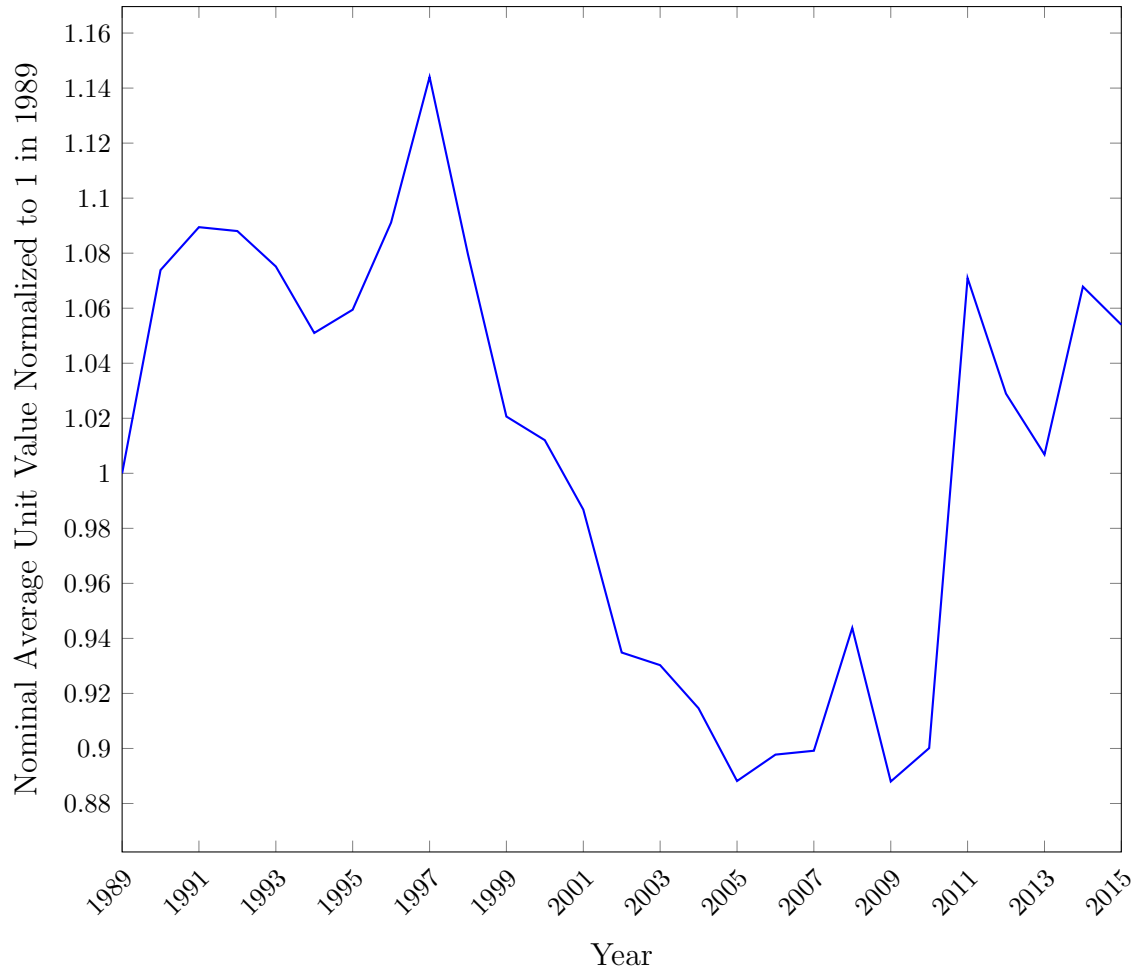
Figure 7: Men's Shirts (Knitted or Crocheted)
Nominal Average Unit Value



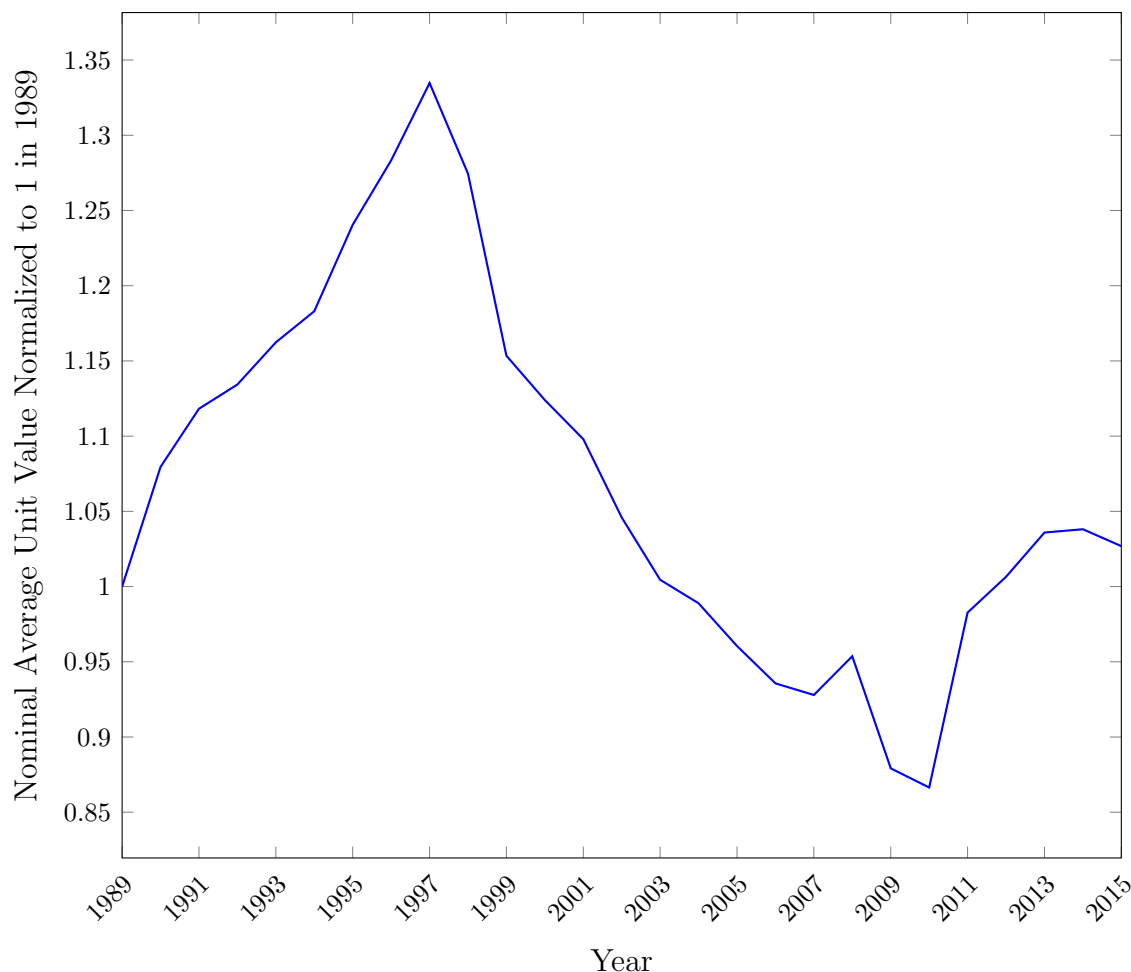
Data for Figure 7 is from Schott (2008)

Figure 8: Women's Shirts (Not Knitted or Crocheted)

Nominal Average Unit Value



Data for Figure 8 is from Schott (2008)

Figure 9: Women's Shirts (Knitted or Crocheted)**Nominal Average Unit Value**

Data for Figure 9 is from Schott (2008)

As per Figures 7, 8, and 9, we see that nominal average unit values for a variety of different imported apparel goods fluctuated quite a bit in recent years and did not exhibit steady declines from 1989 to 2015. Some declines were observed for short periods of time, but these declines were often preceded or followed by significant upward trends. Once again it is clear that if American consumers are indeed susceptible to money illusion and largely evaluate trade liberalization policies by how they impact prices of imported goods, they may not have had much reason to think that increased free trade has benefitted them in the last few decades.

Section 3

A Survey-Based Empirical Examination of Money Illusion's Impact on American Attitudes Toward Trade

3.1 Survey Motivation

As discussed in the previous section, the economic conditions seen in the U.S. in recent decades suggest that money illusion has had the potential to impact attitudes toward trade. However, the existence of these conditions is only relevant if U.S. consumers do indeed evaluate the effects of trade through changes in nominal prices of imports and demonstrate money illusion in doing so. In order to better understand the role that money illusion might play in consumer appraisals of trade, I conducted a survey. In the survey, two distinct potential policy options were described, along with the differential economic effects that each would have over the course of the next year. Survey respondents were asked to indicate which policy option they felt would be of

greater benefit to their own economic well-being.

3.2 Survey Sample

Survey responses were obtained by using Amazon Mechanical Turk and a total of 400 responses were obtained. Attention checks were used in order to ensure that all of these 400 responses were from respondents who likely paid attention to the content of the survey and did not just select answers at random. All respondents were at least 18 years old and were based in the United States. In addition, survey respondents were asked to report some basic demographic information and some information about their political views, which can be found in Table 1.

SECTION 3. A SURVEY-BASED EMPIRICAL EXAMINATION OF MONEY ILLUSION'S IMPACT ON AMERICAN ATTITUDES TOWARD TRADE

Table 1: Survey Sample Demographics and Viewpoints (N = 400)

	Total	Percentage
Gender		
Male	249	62.25%
Female	151	37.75%
Age		
18-24	60	15%
25-34	177	44.25%
35-44	94	23.5%
45-54	40	10%
55-64	23	5.75%
65+	6	1.5%
Background		
White	266	66.5%
Hispanic or Latino	25	6.25%
Black or African American	52	13%
American Indian or Alaska Native	7	1.75%
Asian	42	10.5%
Native Hawaiian or Pacific Islander	1	0.25%
Other	7	1.75%
Education		
Did not complete high school	4	1%
High school diploma or GED	107	26.75%
Associate Degree	76	19%
Bachelor's Degree	169	42.25%
Professional Degree	7	1.75%
Master's Degree	35	8.75%
Doctorate Degree	2	0.5%
Personal Income		
Less than \$25,000	126	31.5%
\$25,000 - \$49,999	151	37.75%
\$50,000 - \$99,999	103	25.75%
\$100,000 - \$149,999	17	4.25%
\$150,000 or above	3	0.75%
Political Views		
Very liberal	66	16.5%
Somewhat liberal	141	35.25%
Moderate	102	25.5%
Somewhat conservative	64	16%
Very conservative	27	6.75%

3.3 Survey Instrument

The main question of the survey was aimed at determining whether U.S. consumers would prefer a policy that would decrease nominal import prices to a policy that would increase nominal import prices, even if the two policies would lead to approximately equivalent changes in real prices. This main question is described below:

Assume that you spend 50% of your income on domestic goods (goods produced in the U.S.), and that you spend the remaining 50% of your income on foreign goods (goods imported from abroad). Assume that the U.S. government is choosing between implementing two policies.

If Policy A is implemented, then over the course of the next year:

- National income and your income will increase by 3%
- The price of all domestic goods will not change
- The price of all foreign goods will decrease by 2%

If Policy B is implemented, then over the course of the next year:

- National income and your income will increase by 6%
- The price of all domestic goods will increase by 3%
- The price of all foreign goods will increase by 1%

In which scenario do you believe that you would be economically better off a year from now?

Answer Choice 1: I believe that I would be economically better off a year from now if Policy A were implemented.

Answer Choice 2: I believe that I would be economically better off a year from now if Policy B were implemented.

Answer Choice 3: I believe that I would be equally well off economically a year from now if either Policy A or Policy B were implemented.

The two policy options described in the main question only differ in that Policy B would lead to nominal changes in national income, individual income, the price of domestic goods, and the price of foreign goods that are each 3 percentage points higher than the corresponding nominal changes that Policy A would lead to. We can think of Policy A and Policy B as being equivalent outside of the fact that Policy B would lead to 3% more inflation than would Policy A. Therefore, a respondent who is not susceptible to money illusion should consider both changes in nominal prices and changes in nominal income in order to conclude that a year in the future he or she would be equally well off in economic terms regardless of which policy is implemented. Furthermore, because both Policy A and Policy B would lead to a decrease in the real price of imported goods, both policies would cause economic changes that resemble the effects of trade liberalization.

The survey question was designed not only to examine whether American consumers demonstrate money illusion when evaluating the effects of economic policies, but also to test whether they pay relatively more attention to nominal price changes than to nominal income changes when evaluating these effects. A demonstrated preference for Policy A could plausibly be explained by survey respondents tending to focus on nominal price changes rather than nominal income changes and demonstrating money illusion in doing so. In contrast, a demonstrated preference for Policy B could potentially be explained by survey respondents tending to focus on nominal income changes rather than nominal price changes and demonstrating money illusion in doing so. I hypothesized that respondents would tend to prefer Policy A over Policy B and thus provide evidence for the former interpretation of how consumers might evaluate the effects of economic policies.

3.4 Survey Results

Table 2 describes how the main question of the survey was answered by the entire sample, and also describes how it was answered by specific subsets of the sample.

Table 2: Policy Preferences of Survey Respondents

	Policy A	Policy B	No Preference
Total	52.25%	30%	17.75%
Gender			
Male	51.81%	32.53%	15.66%
Female	52.98%	25.83%	21.19%
Age			
18-24	58.33%	33.33%	8.33%
25-34	58.19%	26.55%	15.25%
35-44	46.81%	39.36%	13.83%
45-54	40%	20%	40%
55-64	34.78%	21.74%	43.48%
65+	50%	50%	0%
Background			
White	53.01%	30.08%	16.92%
Hispanic or Latino	48%	24%	28%
Black or African American	51.92%	30.77%	17.31%
American Indian or Alaska Native	42.86%	57.14%	0%
Asian	59.52%	23.81%	16.67%
Native Hawaiian or Pacific Islander	0%	100%	0%
Other	14.29%	42.86%	42.86%
Education			
Did not complete high school	50%	50%	0%
High school diploma or GED	55.14%	26.17%	18.69%
Associate Degree	51.32%	31.58%	17.11%
Bachelor's Degree	52.66%	31.95%	15.38%
Professional Degree	0%	71.43%	28.57%
Master's Degree	54.29%	20%	25.71%
Doctorate Degree	50%	0%	50%
Personal Income			
Less than \$25,000	56.35%	27.78%	15.87%
\$25,000 - \$49,999	55.63%	25.17%	19.21%
\$50,000 - \$99,999	45.63%	35.92%	18.45%
\$100,000 - \$149,999	35.29%	47.06%	17.65%
\$150,000 or above	33.33%	66.67%	0%
Political Views			
Very liberal	68.18%	15.15%	16.67%
Somewhat liberal	48.94%	29.79%	21.28%
Moderate	52.94%	37.25%	9.8%
Somewhat conservative	46.88%	29.69%	23.44%
Very conservative	40.74%	40.74%	18.52%

3.5 Survey Discussion

It is clear that survey respondents overall largely tended to prefer Policy A to Policy B. This suggests that individuals may appraise economic policies according to how they affect nominal prices, and demonstrate susceptibility to money illusion in doing so. Therefore, inflation may in fact hinder a consumer's ability to recognize real gains from trade liberalization. Policy B would lead to a nominal increase in income and a nominal increase in the price of foreign goods, which reflect the analogous price index patterns that have been observed in the United States over the last three decades. In contrast, Policy A would lead to a smaller nominal increase in income and a decrease, rather than increase, in the nominal price of foreign goods. Policy A is likely reflective of how nominal income and nominal import prices within the United States may have evolved over the last few decades if inflation rates had been lower. Therefore, the survey responses seem to indicate that had the U.S. economy experienced less inflation in the last few decades, gains from trade may have been more apparent to U.S. consumers, which may have led to the development of more favorable opinions of trade liberalization than those that currently exist.

In spite of the overall preference for Policy A, there was some variation in the preferences shown by different demographic groups. For example, survey respondents with different political views indeed demonstrated significantly different preferences ($\chi^2 = 18.07, p < 0.05$). It appears that liberal respondents tended to favor Policy A more than conservative respondents did. Furthermore, survey respondents in different age groups also exhibited significantly different preferences ($\chi^2 = 36.21, p < 0.01$). In particular, younger respondents appeared to show a greater preference for Policy A than did older respondents.

However, regardless of the fact that some groups demonstrated different preferences, almost all groups that were well represented in the sample on average preferred Policy A over Policy B. In fact, none of the groups that preferred Policy B to Policy A

SECTION 3. A SURVEY-BASED EMPIRICAL EXAMINATION OF MONEY ILLUSION'S IMPACT ON AMERICAN ATTITUDES TOWARD TRADE

had more than 17 members. This seems to imply that Americans with a wide range of demographic characteristics are likely to evaluate economic policies according to corresponding nominal price changes and demonstrate susceptibility to money illusion in doing so. Therefore, by considering the results of the survey in tandem with the price data presented in Section 2, one may reasonably conclude that susceptibility to money illusion does in fact negatively influence the attitudes toward trade held by many Americans.

Section 4

A Model of Money Illusion's Impact on Attitudes Toward Trade

This section will develop a model of consumer utility that explores how susceptibility to money illusion may impact the utility changes that consumers receive from the implementation of policies that affect prices and incomes. The model will demonstrate that when examining the effects of a policy, accounting for the presence of money illusion within a population will alter the proportion of the population expected to benefit from implementation of the policy. Throughout the entirety of the model, all prices and incomes are assumed to be positive.

4.1 A Single Consumer

First, let us consider how susceptibility to money illusion may impact utility changes that a single consumer will face after the implementation of an economic policy. This will later allow for an easier understanding of the effects that money illusion has on a population-level.

4.1.1 A Case Without Money Illusion

Consider a consumer who experiences two time periods, namely period 0 and period 1. Let there be a domestic good and a foreign good, each of which the consumer may consume in either time period. For $j = 0, 1$, let U_j be the consumer's utility in period j , let C_{Dj} be the number of units of the domestic good consumed by the consumer in period j , let C_{Fj} be the number of units of the foreign good consumed by the consumer in period j , let P_{Dj} be the price of the domestic good in period j , let P_{Fj} be the price of the foreign good in period j , and let I_j be the income of the consumer in period j . Assume that the consumer does not save any income from period 0 to be used later in period 1. Furthermore, let α be a constant such that $0 < \alpha < 1$.

Let the consumer have a Cobb-Douglas utility function in both periods as defined in equation 1.

$$U_j = (C_{Dj})^\alpha (C_{Fj})^{(1-\alpha)}, \quad \text{for } j = 0, 1 \quad (1)$$

Assume that the consumer maximizes utility in each time period. Thus, in period j the consumer will spend αI_j on the domestic good and will spend $(1 - \alpha)I_j$ on the foreign good, for $j = 0, 1$. Therefore, we will have $C_{Dj} = \frac{\alpha I_j}{P_{Dj}}$ and $C_{Fj} = \frac{(1-\alpha)I_j}{P_{Fj}}$ for $j = 0, 1$. As defined in equation 2, let V_j be the consumer's indirect utility in period j , for $j = 0, 1$.

$$V_j = \left(\frac{\alpha I_j}{P_{Dj}} \right)^\alpha \left(\frac{(1-\alpha)I_j}{P_{Fj}} \right)^{(1-\alpha)}, \quad \text{for } j = 0, 1 \quad (2)$$

Next, suppose that some economic policy is enacted in period 0 that will change the price of the domestic good in period 1, change the price of the foreign good in period 1, and change the consumer's income in period 1. The policy will be defined by the values δ , τ , and ϕ , where $P_{D1} = (1 + \delta)P_{D0}$, $P_{F1} = (1 + \tau)P_{F0}$, and $I_1 = (1 + \phi)I_0$. In addition, let us assume that δ , τ , and ϕ are all small. The consumer's change in

indirect utility between periods, which we will call ΔV , can then be represented by equations 3 and 4:

$$\Delta V = V_1 - V_0 = \left(\frac{\alpha I_1}{P_{D1}} \right)^\alpha \left(\frac{(1-\alpha)I_1}{P_{F1}} \right)^{(1-\alpha)} - \left(\frac{\alpha I_0}{P_{D0}} \right)^\alpha \left(\frac{(1-\alpha)I_0}{P_{F0}} \right)^{(1-\alpha)} \quad (3)$$

$$\Rightarrow \Delta V = \left(\frac{\alpha I_0}{P_{D0}} \right)^\alpha \left(\frac{(1-\alpha)I_0}{P_{F0}} \right)^{(1-\alpha)} \left(\frac{1+\phi}{(1+\delta)^\alpha(1+\tau)^{(1-\alpha)}} - 1 \right) \quad (4)$$

If and only if $\Delta V > 0$, we will say that the policy will benefit the consumer.¹² The inequality $\Delta V > 0$ is equivalent to inequalities 5, 6, and 7.

$$\left(\frac{\alpha I_0}{P_{D0}} \right)^\alpha \left(\frac{(1-\alpha)I_0}{P_{F0}} \right)^{(1-\alpha)} \left(\frac{1+\phi}{(1+\delta)^\alpha(1+\tau)^{(1-\alpha)}} - 1 \right) > 0 \quad (5)$$

$$\Rightarrow 1 + \phi > (1 + \delta)^\alpha (1 + \tau)^{(1-\alpha)} \quad (6)$$

$$\Rightarrow \ln(1 + \phi) > \alpha \ln(1 + \delta) + (1 - \alpha) \ln(1 + \tau) \quad (7)$$

Because δ, τ , and ϕ are small and $\ln(1 + x) \approx x$ for small x , we can approximate that the policy will benefit the consumer if inequality 8 holds.

$$\phi > \alpha\delta + (1 - \alpha)\tau \quad (8)$$

4.1.2 A Case With Money Illusion

Let us again consider the scenario described in Section 4.1.1, but now add the additional assumption that the consumer is susceptible to money illusion. Namely, assume that while the consumer's utility in period 0 remains defined as it was in Section 4.1.1,

¹²This definition of whether a policy benefits a consumer will be used throughout Section 4.

the consumer's utility in period 1 is now affected by nominal price changes between the two periods.¹³ In comparison to the consumer's period 1 utility described in Section 4.1.1, after accounting for money illusion, an increase in the price level of the domestic good between periods would decrease the consumer's period 1 utility by λ_D , a decrease in the price level of the domestic good between periods would increase the consumer's period 1 utility by λ_D , an increase in the price level of the foreign good between periods would decrease the consumer's period 1 utility by λ_F , and a decrease in the price level of the foreign good between periods would increase the consumer's period 1 utility by λ_F .¹⁴ Assume that λ_D and λ_F are both positive. Equation 9 defines the new functional form of the consumer's period 1 indirect utility function.¹⁵

$$V_1 = \left(\frac{\alpha I_1}{P_{D1}} \right)^\alpha \left(\frac{(1-\alpha)I_1}{P_{F1}} \right)^{(1-\alpha)} - \lambda_D(\text{sgn}(\delta)) - \lambda_F(\text{sgn}(\tau)) \quad (9)$$

Therefore, ΔV is now defined as per equation 10.

$$\Delta V = \left(\frac{\alpha I_0}{P_{D0}} \right)^\alpha \left(\frac{(1-\alpha)I_0}{P_{F0}} \right)^{(1-\alpha)} \left(\frac{1+\phi}{(1+\delta)^\alpha(1+\tau)^{(1-\alpha)}} - 1 \right) - \lambda_D(\text{sgn}(\delta)) - \lambda_F(\text{sgn}(\tau)) \quad (10)$$

Once again, the consumer will benefit from the enactment of the policy if and only if $\Delta V > 0$, which is equivalent to inequalities 11 and 12.

$$\frac{1+\phi}{(1+\delta)^\alpha(1+\tau)^{(1-\alpha)}} > 1 + \frac{\lambda_D(\text{sgn}(\delta)) + \lambda_F(\text{sgn}(\tau))}{\left(\frac{\alpha I_0}{P_{D0}} \right)^\alpha \left(\frac{(1-\alpha)I_0}{P_{F0}} \right)^{(1-\alpha)}} \quad (11)$$

¹³I have chosen not to consider how nominal changes in income may affect utility in period 1 due to money illusion. If one were to include a term measuring utility changes that individuals might receive from changes in nominal income due to money illusion, the main conclusions of the model would not significantly change.

¹⁴It should be noted that in the model described in this paper, the incorporation of money illusion impacts utility in period 1, but it does not impact consumption choices in either period.

¹⁵The function $\text{sgn}(x)$ is defined in the Appendix.

$$\Rightarrow \ln(1+\phi) - \alpha \ln(1+\delta) - (1-\alpha) \ln(1+\tau) > \ln \left(1 + \frac{\lambda_D(\text{sgn}(\delta)) + \lambda_F(\text{sgn}(\tau))}{\left(\frac{\alpha I_0}{P_{D0}}\right)^\alpha \left(\frac{(1-\alpha)I_0}{P_{F0}}\right)^{(1-\alpha)}} \right) \quad (12)$$

Because δ, τ , and ϕ are small and $\ln(1+x) \approx x$ for small x , we can approximate that the policy will benefit the consumer if inequality 13 holds.

$$\phi > \alpha\delta + (1-\alpha)\tau + \ln \left(1 + \frac{\lambda_D(\text{sgn}(\delta)) + \lambda_F(\text{sgn}(\tau))}{\left(\frac{\alpha I_0}{P_{D0}}\right)^\alpha \left(\frac{(1-\alpha)I_0}{P_{F0}}\right)^{(1-\alpha)}} \right) \quad (13)$$

4.2 A Population of Consumers

Let us continue to build on the cases that were developed in Section 4.1, but rather than consider a single consumer, now consider a population of consumers who all share the same indirect utility function and have the same income in period 0. As before, there will be a policy enacted in period 0 that will cause prices to change between periods, and these changes will again be defined by the values δ and τ . However, now let us also assume that the policy enacted in period 0 will have differential impacts on income changes among consumers; in particular, while δ and τ are constant across all consumers in the population, ϕ is now a random variable that has a monotonically increasing cumulative distribution function. Any given consumer will benefit from the policy if and only if the value that ϕ takes on for the consumer is greater than a certain threshold. The value of this threshold will depend on whether the consumers in the population are susceptible to money illusion or not. Let us assume that for any policy implemented in period 0, ϕ will always be distributed such that the greatest value that it takes on is greater than the threshold value associated with the policy and the smallest value that it takes on is less than the threshold value associated with the policy.

4.2.1 A Case Without Money Illusion

First consider the case where all consumers in the population are not susceptible to money illusion, share the indirect utility function described in Section 4.1.1, and have the same income in period 0. In order for the policy to benefit a particular consumer, the value that ϕ takes on for the consumer must be greater than the threshold $\hat{\phi}$. The expression for $\hat{\phi}$ is derived from inequality 8 and defined in equation 14.

$$\hat{\phi} = \alpha\delta + (1 - \alpha)\tau \quad (14)$$

4.2.2 A Case With Money Illusion

Next, consider the case where all consumers in the population are susceptible to money illusion, share the indirect utility function described in Section 4.1.2, and have the same income in period 0. In order for the policy to benefit a particular consumer, the value that ϕ takes on for the consumer must be greater than $\hat{\phi}_M$. The expression for $\hat{\phi}_M$ is derived from inequality 13 and defined in equation 15.

$$\hat{\phi}_M = \alpha\delta + (1 - \alpha)\tau + \ln \left(1 + \frac{\lambda_D(\text{sgn}(\delta)) + \lambda_F(\text{sgn}(\tau))}{\left(\frac{\alpha I_0}{P_{D0}}\right)^\alpha \left(\frac{(1-\alpha)I_0}{P_{F0}}\right)^{(1-\alpha)}} \right) \quad (15)$$

4.2.3 A Comparison of Threshold Values

Equation 16 describes the difference between the two threshold values.¹⁶

$$\hat{\phi}_M - \hat{\phi} = \ln \left(1 + \frac{\lambda_D(\text{sgn}(\delta)) + \lambda_F(\text{sgn}(\tau))}{\left(\frac{\alpha I_0}{P_{D0}}\right)^\alpha \left(\frac{(1-\alpha)I_0}{P_{F0}}\right)^{(1-\alpha)}} \right) \quad (16)$$

Given the values of δ and τ that are associated with the policy enacted in period

¹⁶ $\hat{\phi}$ and $\hat{\phi}_M$ are actually estimates of the true thresholds. However, because we assume that all price and income changes are small, they are close enough to the true values for the purposes of the model.

0, the term $\lambda_D(\text{sgn}(\delta)) + \lambda_F(\text{sgn}(\tau))$ will take on some value. Let us define this value as Λ , which will represent the bias from money illusion exhibited by each consumer, as shown in equation 17.

$$\Lambda = \lambda_D(\text{sgn}(\delta)) + \lambda_F(\text{sgn}(\tau)) \quad (17)$$

Positive Bias Term

If the policy enacted in period 0 leads to price changes such that $\Lambda > 0$, then the following will hold:

$$\hat{\phi}_M - \hat{\phi} = \ln \left(1 + \frac{\Lambda}{\left(\frac{\alpha I_0}{P_{D0}}\right)^\alpha \left(\frac{(1-\alpha)I_0}{P_{F0}}\right)^{(1-\alpha)}} \right) > \ln(1) = 0 \quad (18)$$

It follows that for any policy with $\Lambda > 0$, we will have $\hat{\phi}_M > \hat{\phi}$, so a smaller share of the population will experience positive utility changes from implementation of the policy if consumers are susceptible to money illusion than if consumers are not susceptible to money illusion.

Negative Bias Term

If the policy enacted in period 0 leads to price changes such that $\Lambda < 0$, then the following will hold:

$$\hat{\phi}_M - \hat{\phi} = \ln \left(1 + \frac{\Lambda}{\left(\frac{\alpha I_0}{P_{D0}}\right)^\alpha \left(\frac{(1-\alpha)I_0}{P_{F0}}\right)^{(1-\alpha)}} \right) < \ln(1) = 0 \quad (19)$$

It follows that for any policy with $\Lambda < 0$, we will have $\hat{\phi}_M < \hat{\phi}$, so a larger share of the population will experience positive utility changes from implementation of the policy if consumers are susceptible to money illusion than if consumers are not susceptible to money illusion.

Bias Term of Value Zero

If the policy enacted in period 0 leads to price changes such that $\Lambda = 0$, then the following will hold:

$$\hat{\phi}_M - \hat{\phi} = \ln \left(1 + \frac{\Lambda}{\left(\frac{\alpha I_0}{P_{D0}}\right)^\alpha \left(\frac{(1-\alpha)I_0}{P_{F0}}\right)^{(1-\alpha)}} \right) = \ln(1) = 0 \quad (20)$$

It follows that for any policy with $\Lambda = 0$, we will have $\hat{\phi}_M = \hat{\phi}$, so the share of the population that will experience positive utility changes from implementation of the policy will not differ between the case where consumers are susceptible to money illusion and the case where consumers are not susceptible to money illusion.

4.3 Model Implications

The model developed in this section suggests that accounting for the presence of money illusion may allow for more accurate evaluations of the effects of different potential economic policies. The implications of the model are particularly useful within the context of examining the effects of trade liberalization policies. To illustrate this, let us analyze the model's implications for specific types of policies that resemble plausible effects of trade liberalization.

First, consider a policy that would lead to no change in the price of the domestic good and a decrease in the price of the foreign good. Such a policy may resemble the effects of trade liberalization in an environment with deflation. The policy will always be associated with $\Lambda < 0$. It follows that implementation of the policy would benefit a larger share of the population in the case where consumers are susceptible to money illusion than it would in the case where consumers are not susceptible to money illusion. Therefore, the model predicts that if we were to evaluate a real-world trade liberalization policy that would lead to no significant changes in the nominal prices

of domestic goods and decreases in the nominal prices of imported goods, neglecting to include the effects of money illusion in the analysis may lead us to underestimate utility gains from this policy.

Next, consider a policy that would lead to an increase in the price of the foreign good and an even larger increase in the price of the domestic good. This policy may resemble the effects of trade liberalization in an environment where real prices of imports fall while nominal prices of imports rise due to the presence of significant inflation. In addition, the policy will always have $\Lambda > 0$, so its institution would benefit a smaller share of the population in the case where consumers are susceptible to money illusion than it would in the case where consumers are not susceptible to money illusion. Therefore, the model predicts that if we were to analyze a real-world trade liberalization policy that would lead to increases in the nominal prices of domestic goods and relatively smaller increases in the nominal prices of imported goods, omitting the effects of money illusion may lead to an overestimation of the utility gains this policy would cause. Given that U.S. consumers appear to be susceptible to money illusion and have in recent decades often seen increases in nominal prices of both imported and domestic goods, perhaps neglecting the effects of money illusion may lead one to overestimate the proportion of American individuals who obtained increases in perceived utility due to a recently enacted trade liberalization policy, even if the policy led to decreased real prices of goods.

Section 5

Conclusion

The results discussed in this paper suggest that being susceptible to money illusion may be leading U.S. consumers to hold less favorable attitudes toward trade liberalization than they would otherwise hold if they were not susceptible to money illusion. Price data was utilized in order to show that over the last few decades conditions have existed within the United States in which money illusion could negatively influence attitudes toward international trade. A survey-based analysis was employed to argue that American consumers tend to focus on nominal price changes when evaluating the effects of economic policies and demonstrate money illusion in doing so. The survey results considered along with the price data suggest that money illusion has in fact had a negative impact on attitudes toward trade among U.S. consumers. Finally, a model was developed that shows that accounting for money illusion can significantly impact the proportion of a population that one might expect to experience increases in utility after the implementation of a new trade policy.

The research presented in this paper may have significant social value because illuminating the ways that money illusion influences attitudes toward trade has the potential to positively impact public policy. For instance, consider a country that is choosing between instituting two potential trade policies, both of which are expected

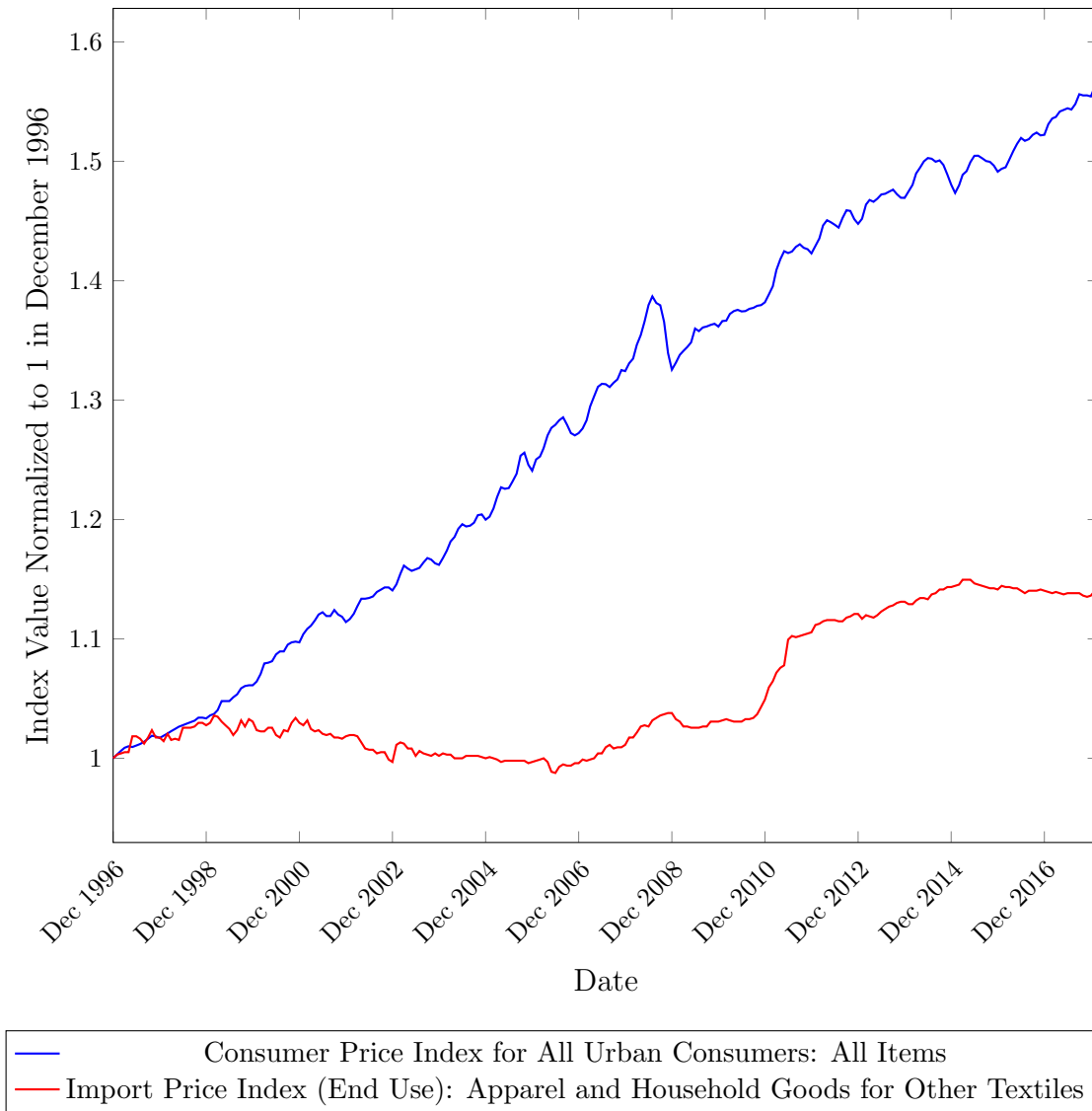
to lead to roughly equivalent real price changes. In addition, assume that after accounting for money illusion, the economic benefits from one of the policies would be more apparent to consumers than would be the economic benefits from the other policy. This might be the case if the two policies would lead to the same overall declines in real prices eventually, but one of the two would enable the real price decreases to occur within a shorter period of time: in the presence of inflation, a real price decrease would be exposed to relatively less inflation if it occurred quickly rather than slowly, and so it would be more likely to be accompanied by an observable nominal price decrease if it occurred quickly rather than slowly. The country choosing between two potential trade policies may be well-served to implement the policy that will lead to more apparent economic benefits, as doing this may lead to the development of more positive attitudes toward trade in the minds of the general public of the country. Especially if the country is a democracy, the development of these positive attitudes may ease future legislative efforts to increase welfare by decreasing barriers to trade.

Section 6

Appendix

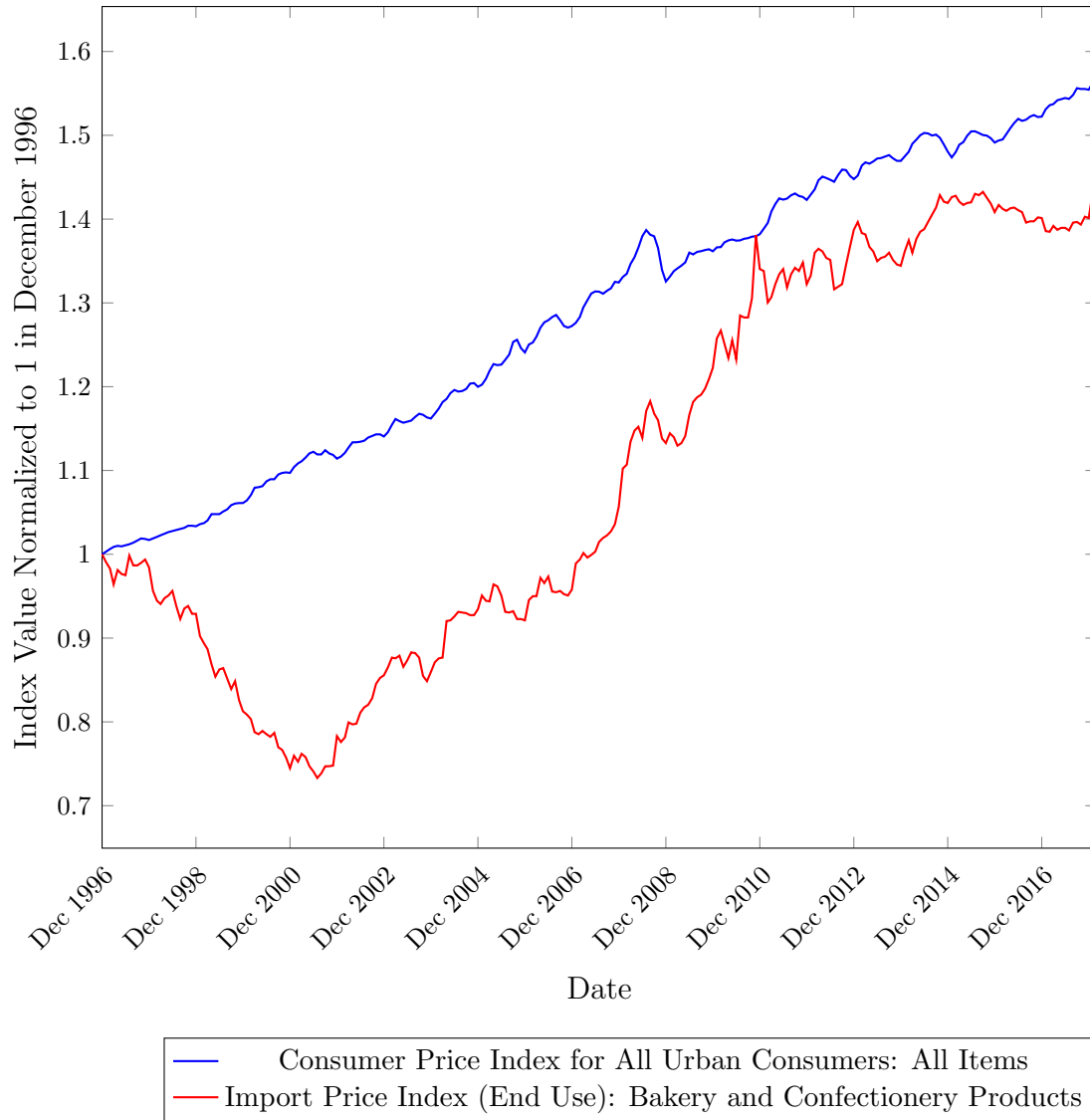
6.1 Import Price Index Trends

**Figure 10: CPI-U vs. Import Price Index (End Use):
Apparel and Household Goods for Other Textiles**



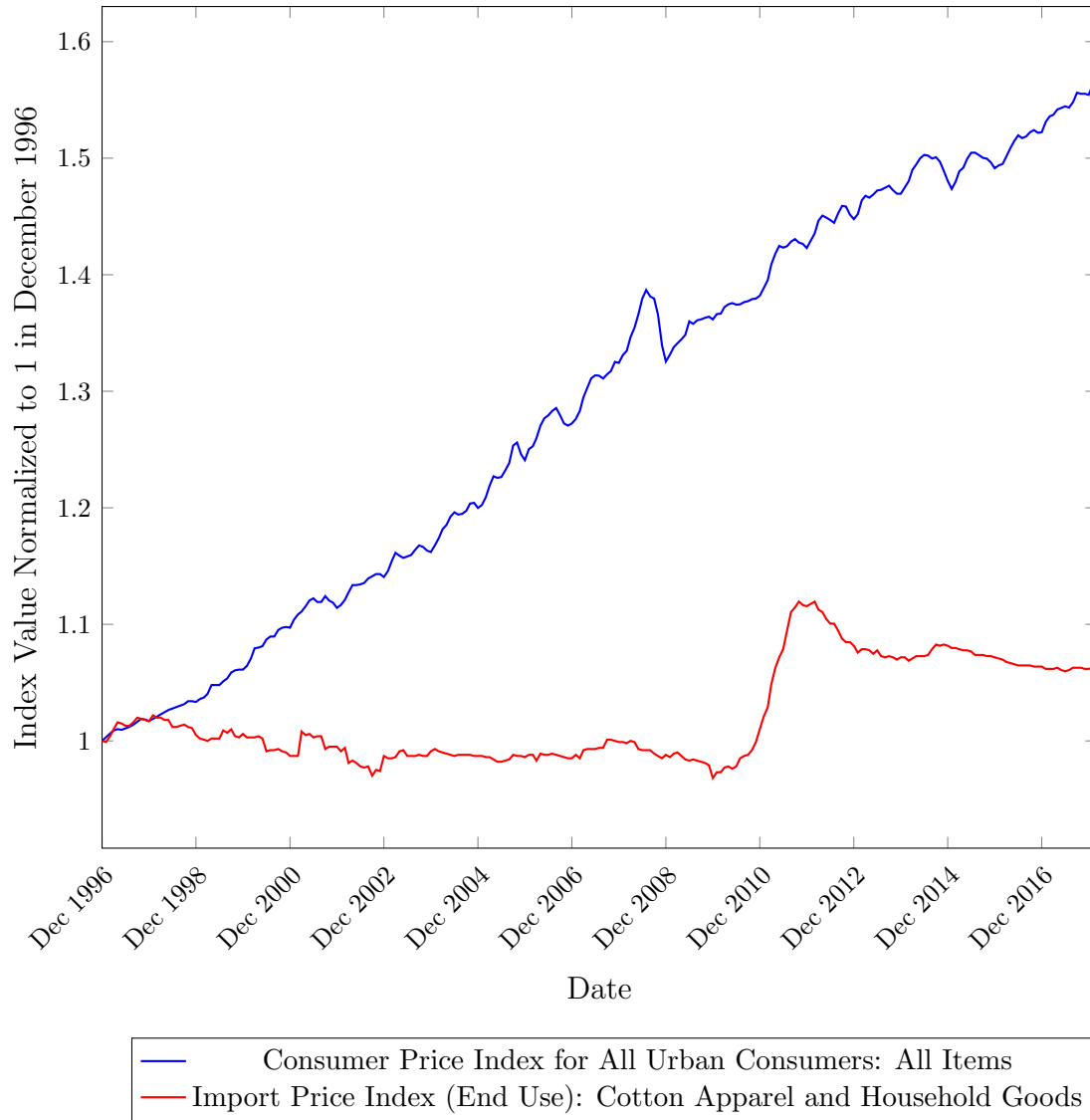
Data for Figure 10 is from U.S. Bureau of Labor Statistics (2018a) and (2018d)

**Figure 11: CPI-U vs. Import Price Index (End Use):
Bakery and Confectionery Products**



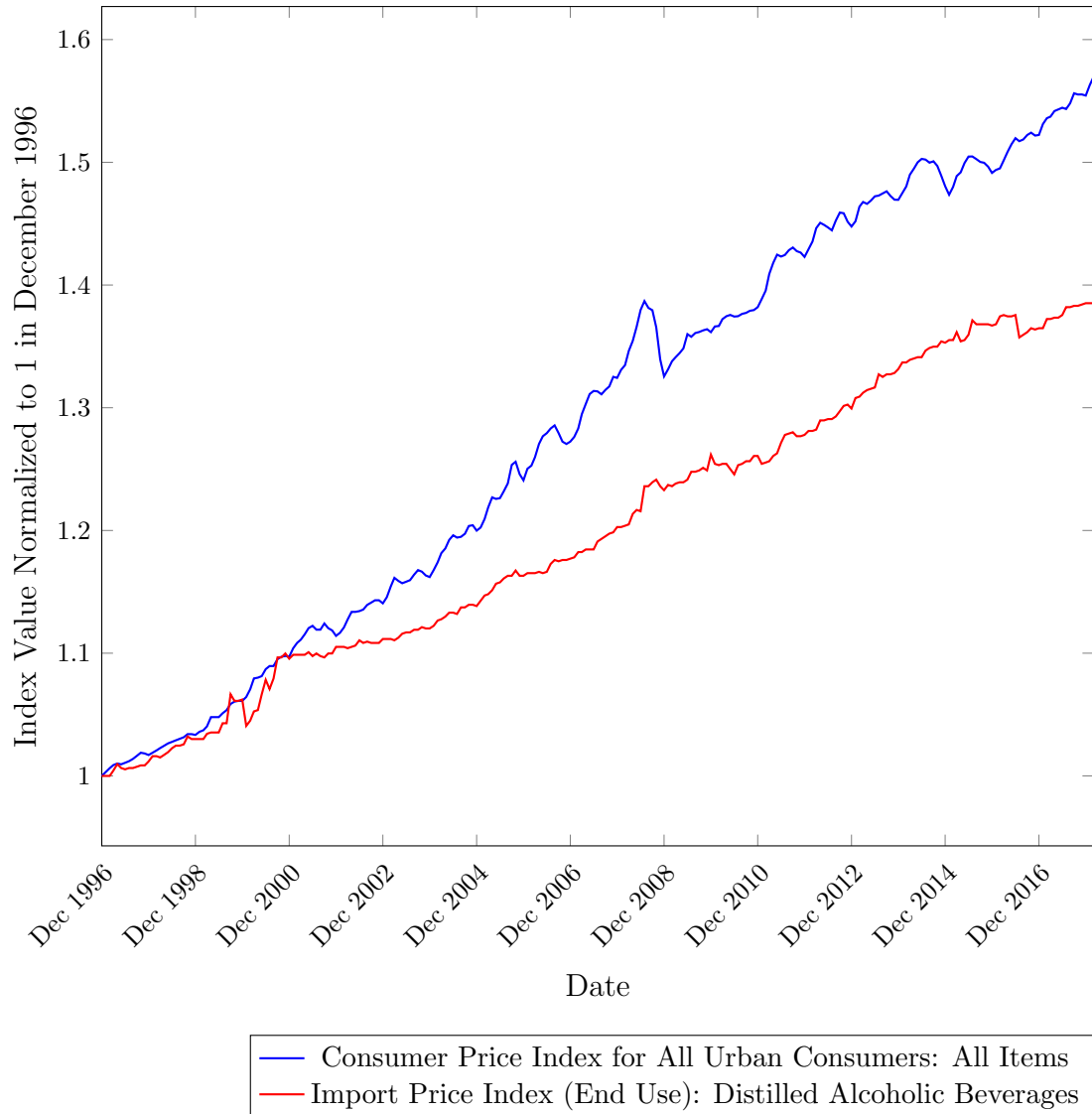
Data for Figure 11 is from U.S. Bureau of Labor Statistics (2018a) and (2018f)

**Figure 12: CPI-U vs. Import Price Index (End Use):
Cotton Apparel and Household Goods**



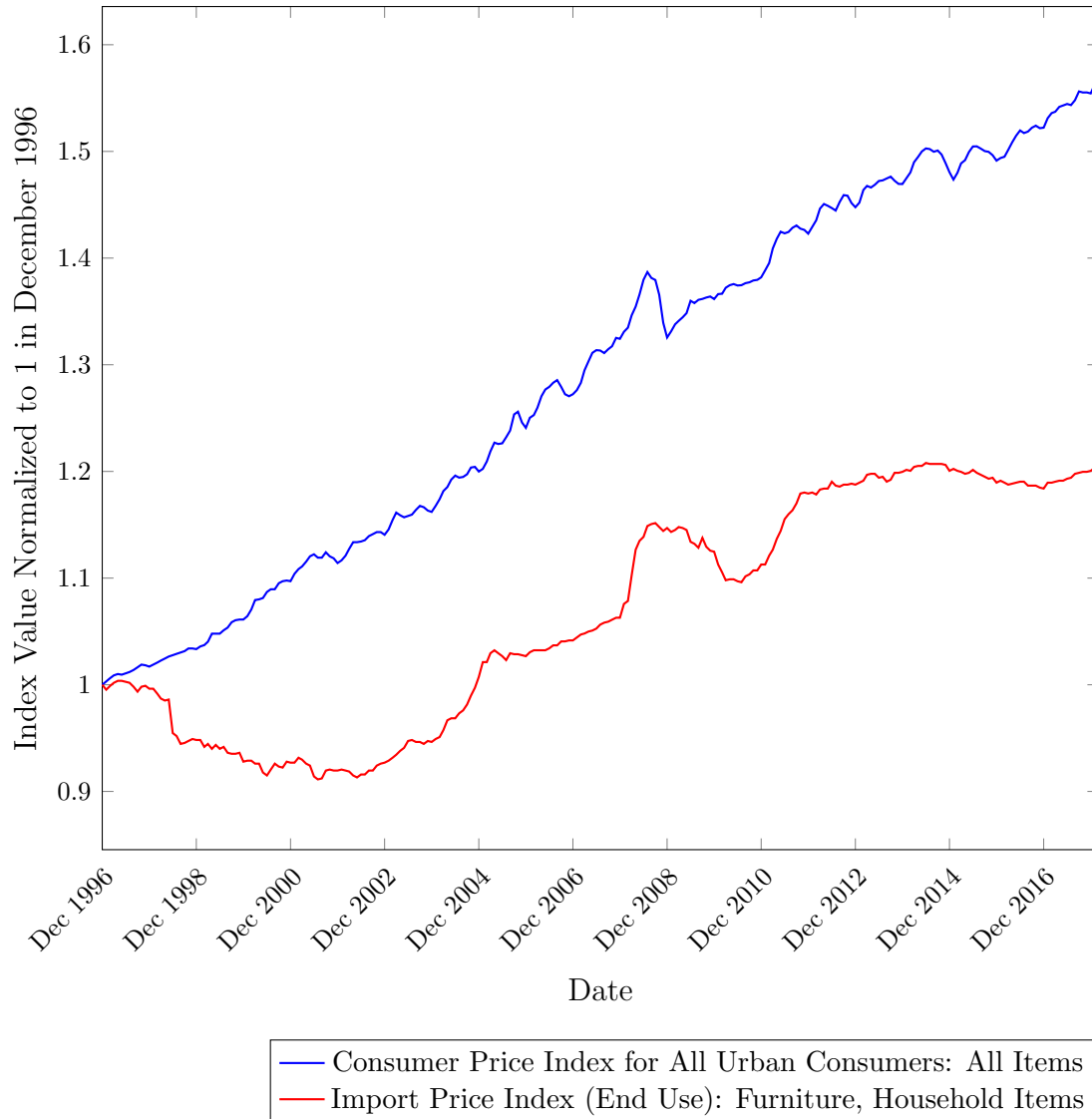
Data for Figure 12 is from U.S. Bureau of Labor Statistics (2018a) and (2018h)

**Figure 13: CPI-U vs. Import Price Index (End Use):
Distilled Alcoholic Beverages**



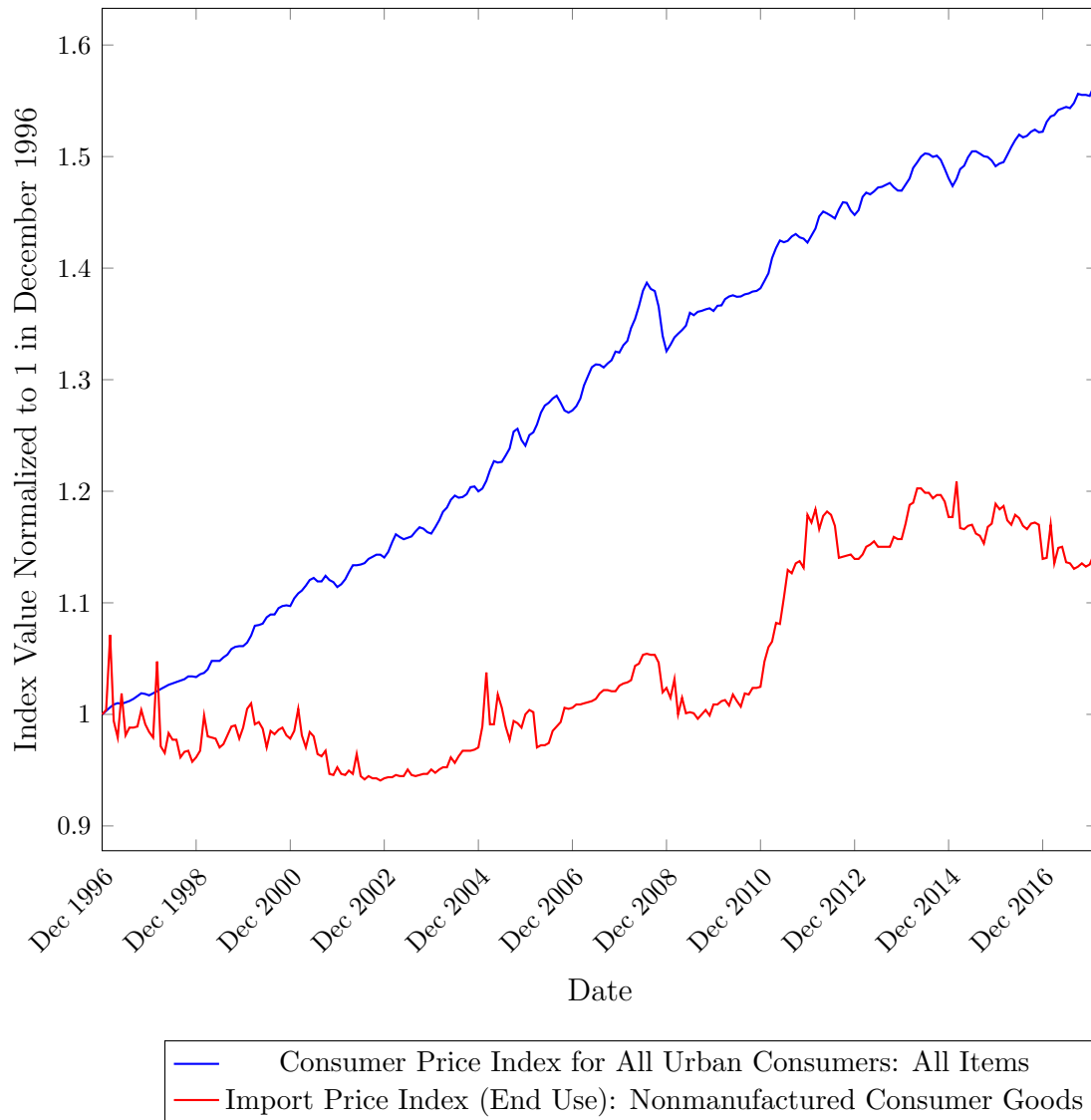
Data for Figure 13 is from U.S. Bureau of Labor Statistics (2018a) and (2018i)

**Figure 14: CPI-U vs. Import Price Index (End Use):
Furniture, Household Items**



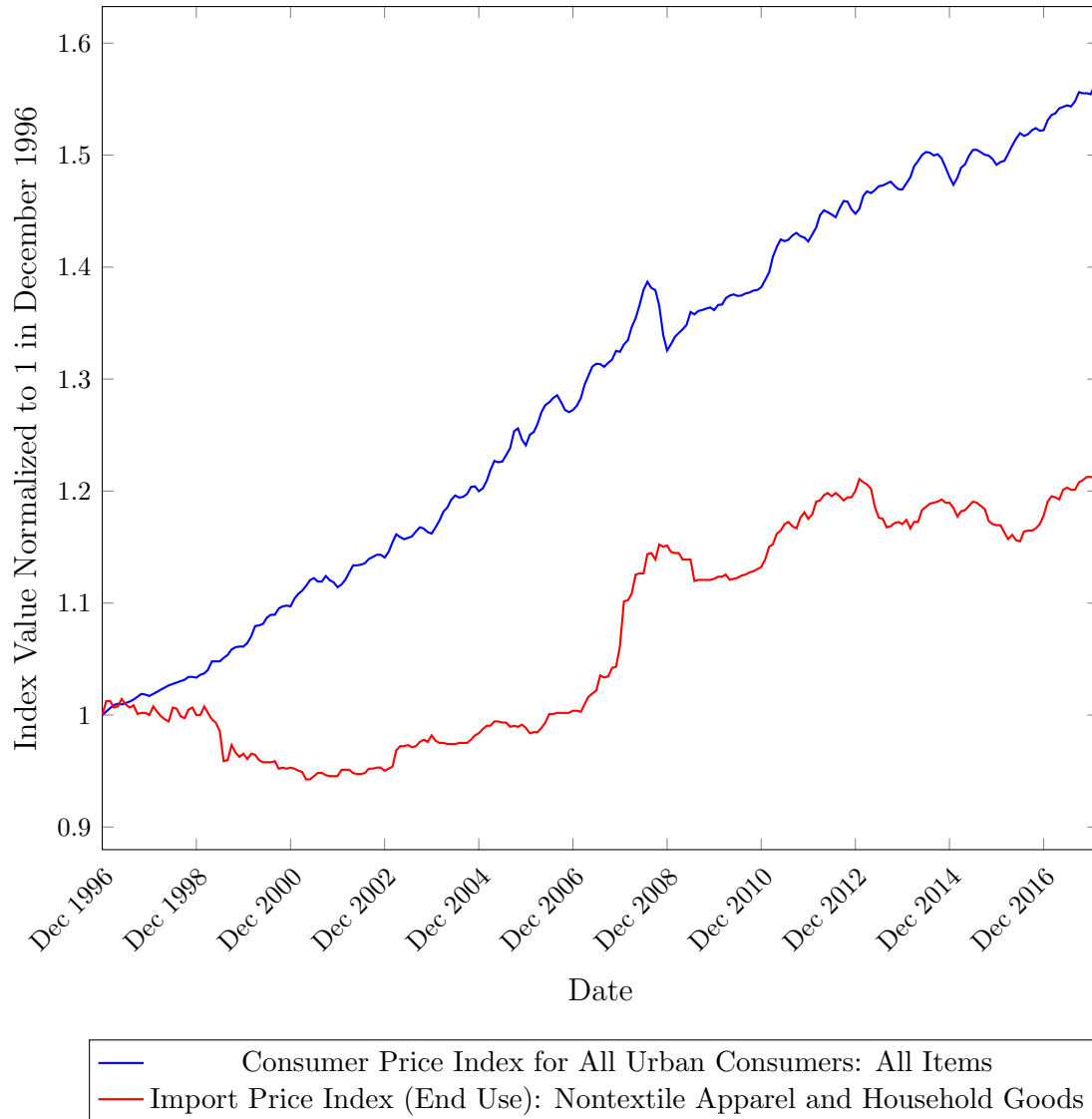
Data for Figure 14 is from U.S. Bureau of Labor Statistics (2018a) and (2018j)

**Figure 15: CPI-U vs. Import Price Index (End Use):
Nonmanufactured Consumer Goods**



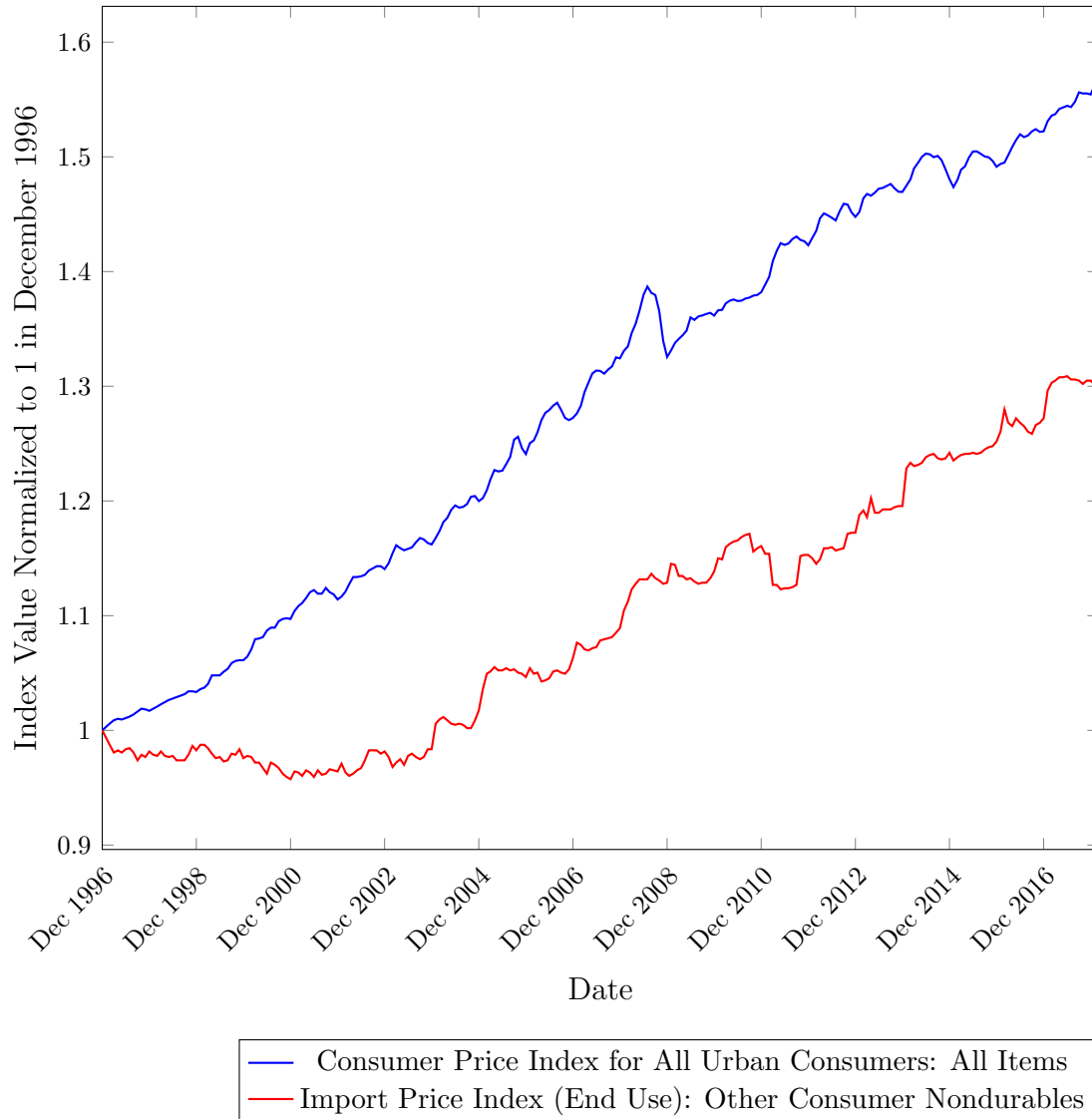
Data for Figure 15 is from U.S. Bureau of Labor Statistics (2018a) and (2018k)

**Figure 16: CPI-U vs. Import Price Index (End Use):
Nontextile Apparel and Household Goods**



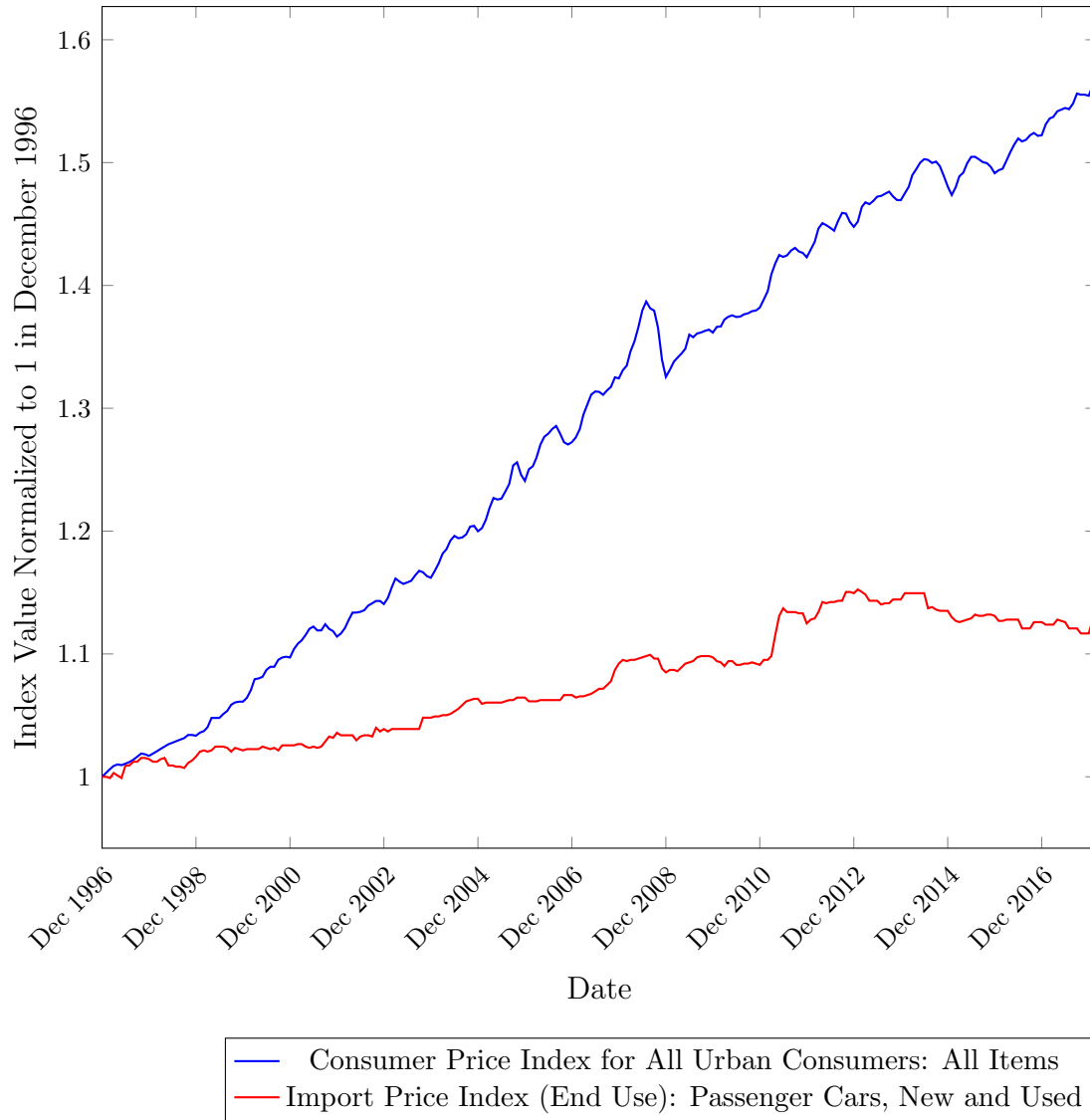
Data for Figure 16 is from U.S. Bureau of Labor Statistics (2018a) and (2018l)

**Figure 17: CPI-U vs. Import Price Index (End Use):
Other Consumer Nondurables**



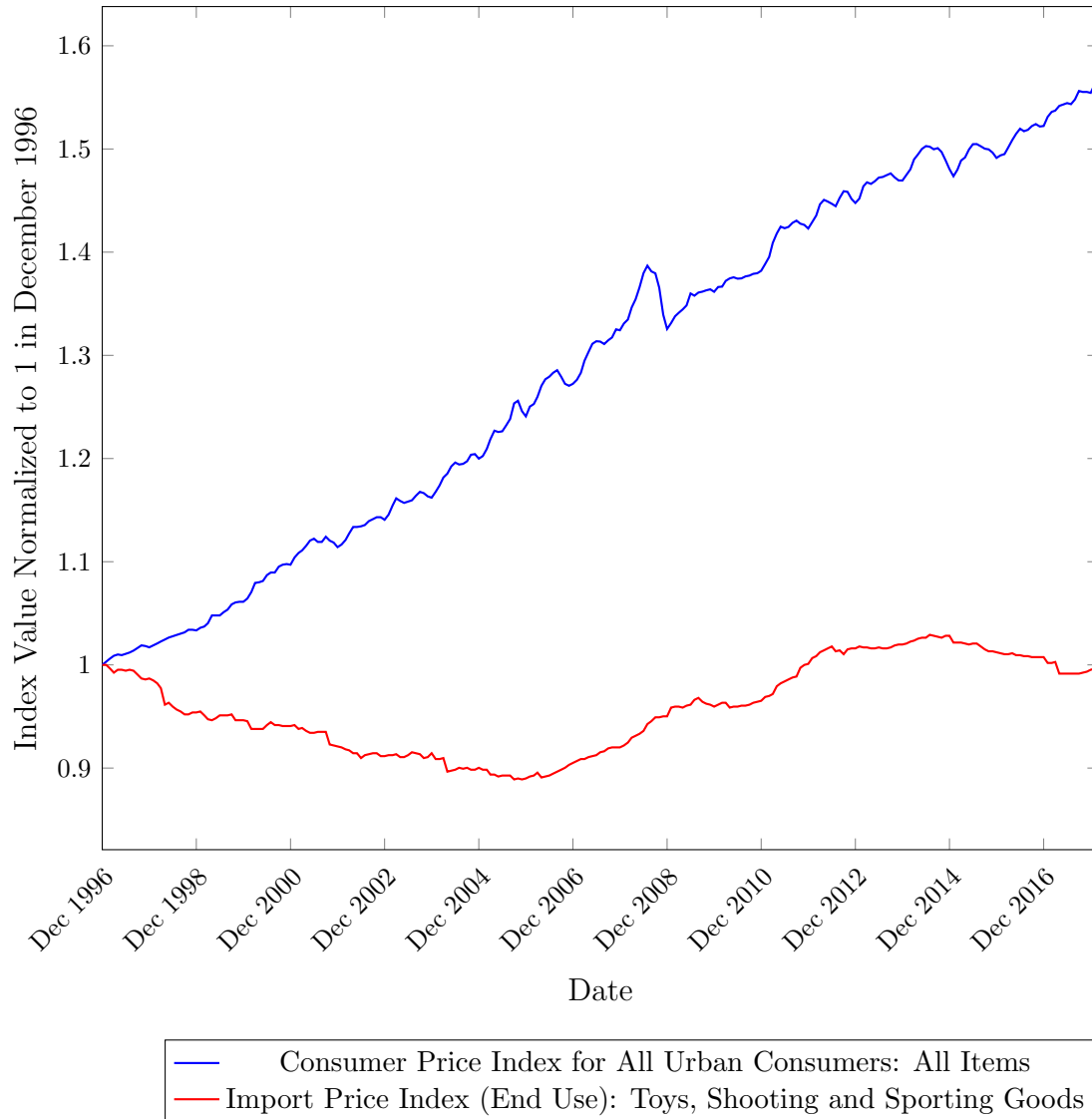
Data for Figure 17 is from U.S. Bureau of Labor Statistics (2018a) and (2018m)

**Figure 18: CPI-U vs. Import Price Index (End Use):
Passenger Cars, New and Used**



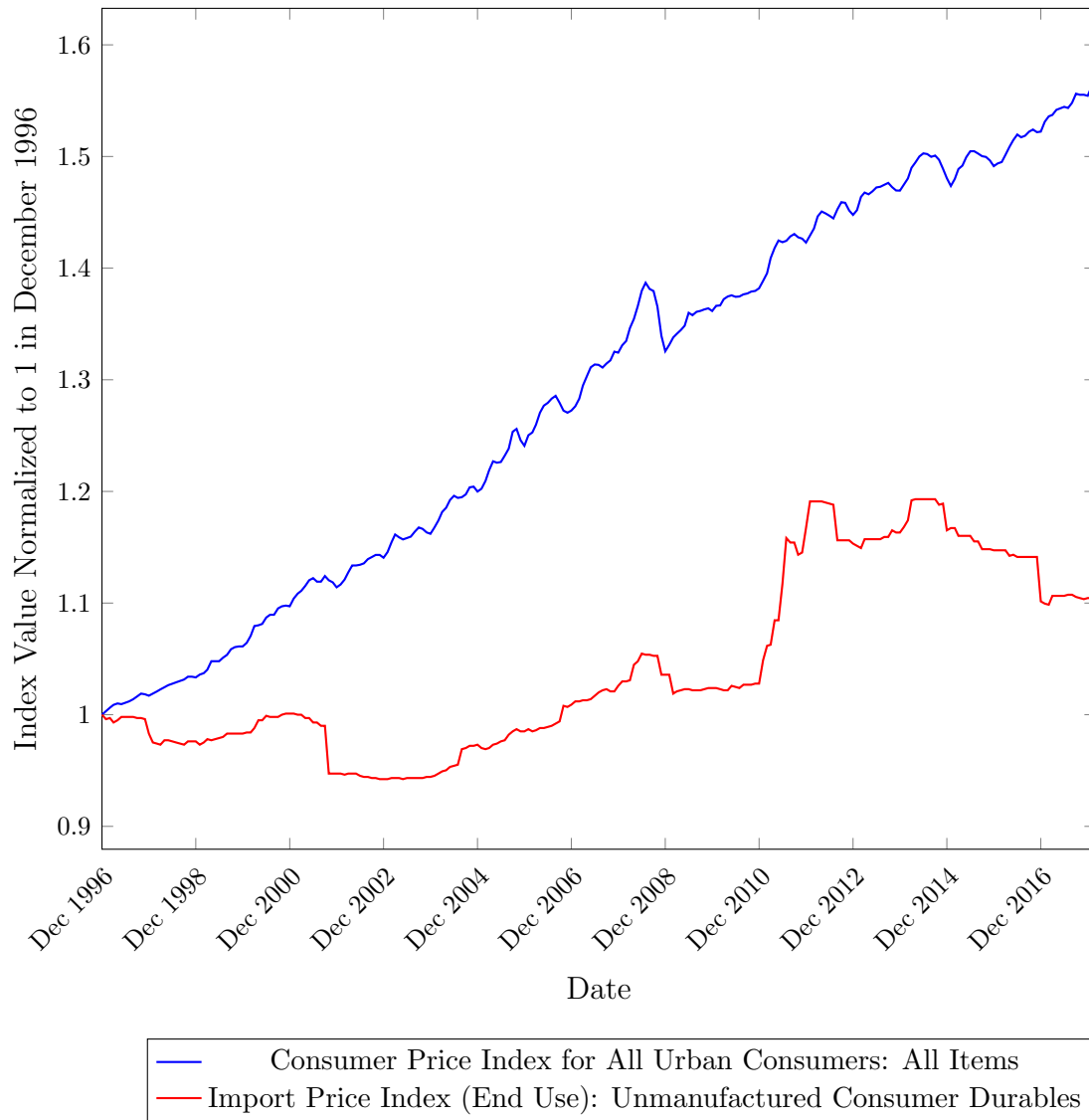
Data for Figure 18 is from U.S. Bureau of Labor Statistics (2018a) and (2018n)

**Figure 19: CPI-U vs. Import Price Index (End Use):
Toys, Shooting and Sporting Goods**



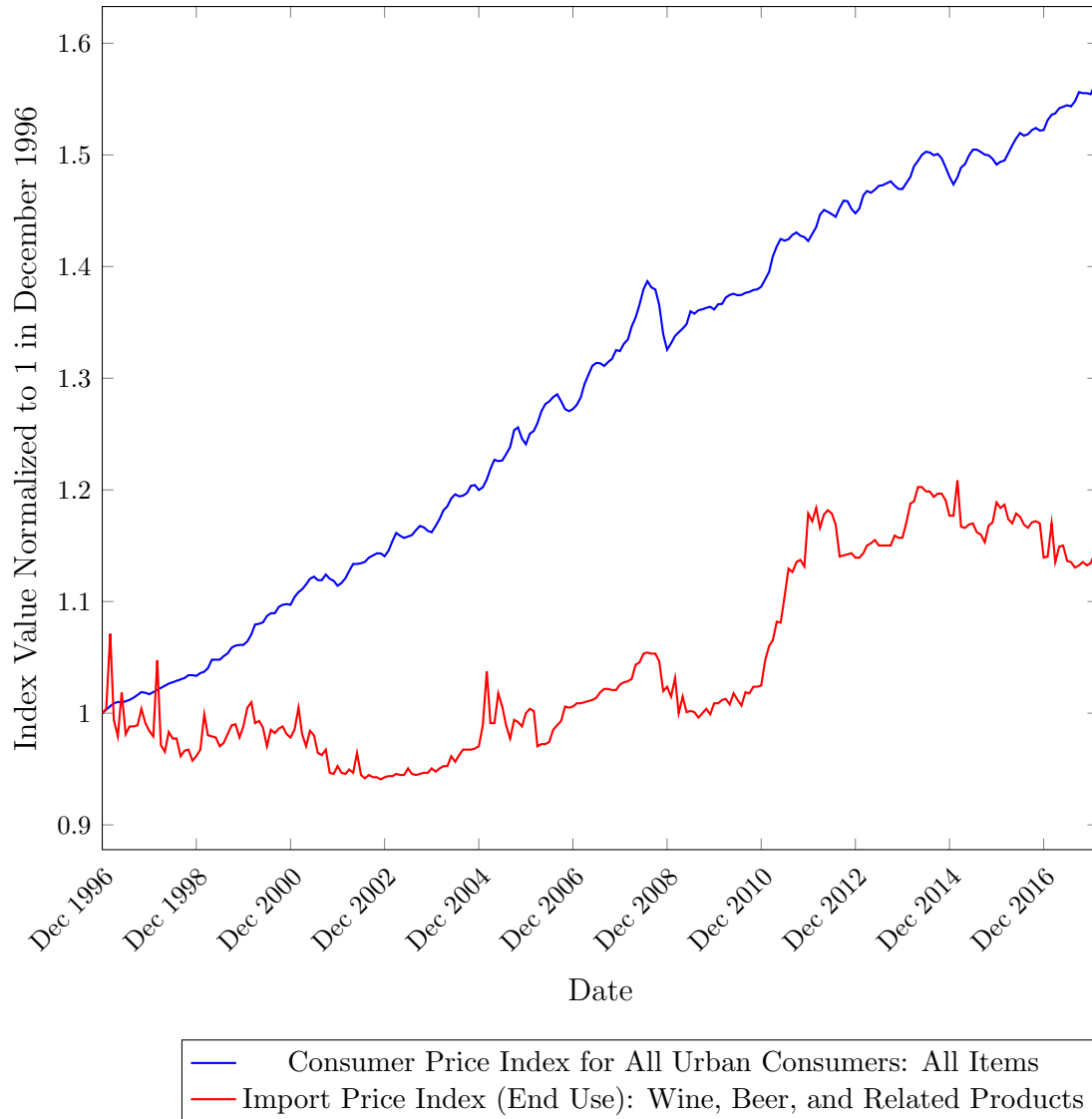
Data for Figure 19 is from U.S. Bureau of Labor Statistics (2018a) and (2018q)

**Figure 20: CPI-U vs. Import Price Index (End Use):
Unmanufactured Consumer Durables**



Data for Figure 20 is from U.S. Bureau of Labor Statistics (2018a) and (2018r)

**Figure 21: CPI-U vs. Import Price Index (End Use):
Wine, Beer, and Related Products**



Data for Figure 21 is from U.S. Bureau of Labor Statistics (2018a) and (2018s)

6.2 Function Definitions

$$\operatorname{sgn}(x) = \begin{cases} 1 & \text{if } x > 0 \\ 0 & \text{if } x = 0 \\ -1 & \text{if } x < 0 \end{cases}$$

Section 7

References

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