The Impact of U.S. Imports from China on U.S. Consumer Prices and Expenditures

by

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Working Paper No. 66

April 2018

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Acknowledgements

The Lau Chor Tak Institute of Global Economics and Finance is grateful to the following individuals and organizations for their generous donations and sponsorship (in alphabetical order):

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The Impact of U.S. Imports from China on U.S. Consumer Prices and Expenditures[§]

Lawrence J. Lau and Junjie Tang[1]

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Abstract: The objective of this study is to estimate the extent of the benefits to U.S. consumers that may be attributable to access to imported consumer goods from China. Imported consumer goods can keep the levels and rates of increases of the prices of consumer goods in the U.S. low, thus benefitting U.S. consumers. The focus is on the effects of imports of apparel and non-oil consumer goods on their prices in the U.S. and consequently on the respective U.S. household consumption expenditures on these goods. It will be demonstrated empirically that Chinese imports into the United States have helped to keep the prices of consumer goods low in the U.S. since 1994. It is found that between 1994 and 2017, a one-percentage-point increase in the share of U.S. apparel imports from China would lower the annual rate of growth of the U.S. apparel price index by approximately 0.2 percentage point. Similarly, a one-percentage-point increase in the share of U.S. non-oil imports (which include apparel imports) from China would lower the annual rate of growth of U.S. non-oil price index by approximately 1.0 percentage point. The level of the U.S. CPI in 2017 would have been 27 percent higher if the share of U.S. non-oil imports originated from China had remained at its 1994 level of 6.2 percent. The reduced price of non-oil consumer goods has resulted in an estimated average annual saving for U.S. consumers of US$623 billion between 1994 and 2016, approximately 12 percent of the average annual U.S. non-oil consumer expenditure during the same period.

[1] Lawrence J. Lau is Ralph and Claire Landau Professor of Economics at The Chinese University of Hong Kong and Kwoh-Ting Li Professor in Economic Development, Emeritus, of Stanford University; and Junjie Tang is a Ph.D. Candidate in the Department of Economics, The Chinese University of Hong Kong. They are most grateful to Mrs. Ayesha Macpherson Lau for her helpful comments and suggestions but retain sole responsibility for all remaining errors. The opinions expressed herein are those of the authors and do not necessarily reflect the views of the Institute.

1. Introduction

An economy that trades voluntarily with the rest of the world always enjoys a positive net benefit in the aggregate. This is because with voluntary international trade, the set of consumption possibilities of the economy is always enlarged and properly contains the original set of consumption possibilities in the absence of trade. This means that, with trade, the economy can attain not only all the consumption possibilities available to it previously but also some additional consumption possibilities that are not previously attainable. The economy must therefore be better off as a whole with trade than without trade. Thus, in principle, the welfare of every citizen can be improved, if necessary, by adopting and implementing appropriate policies for the distribution and/or redistribution of the gains from trade. Moreover, the addition of more potential trading partner-countries can further enlarge the set of consumption possibilities of the economy and hence improve the overall welfare of its citizens. The same holds true for the rest of the world, so that all economies participating in world trade benefit when a previously autarkic economy opens itself up to trade.

The benefits to an economy from international trade can occur in two principal ways: first, its exporters can export more goods and hence create more GDP, profits and employment for the economy; second, its importers can also benefit as the increased demands for imports augment their revenues and profits as well as generate additional employment; and its consumers can enjoy more, cheaper and greater varieties of imported consumer goods and services, and its producers can similarly enjoy more, better and cheaper choices of imported inputs, including equipment, energy, materials and services. However, even though there is always a positive net benefit for the economy as a whole, imports can potentially disrupt domestic industries through competition with domestically produced goods and services and displacement of workers employed in these domestic industries. With international trade, losers will be created in the economy in addition to winners, unless appropriate compensation and redistribution policies are adopted and implemented by the government. The market on its own is not able to compensate the losers from international trade.

The objective of this study is to estimate the extent of the benefits to U.S. consumers that may be attributable to access to imported consumer goods from Mainland China.[2]

[2] In this paper, Mainland China and China are used interchangeably.

Imported consumer goods can keep the levels and rates of increases of the prices of consumer goods low, thus benefitting the consumers. In addition, imported consumer goods can also result in greater variety and hence more choice for the consumers. The focus of this study is on the empirical identification of the effects of imports of selected Chinese consumer goods into the U.S. on the domestic U.S. prices of these consumer goods and hence on the expenditures of U.S. households on these consumer goods.

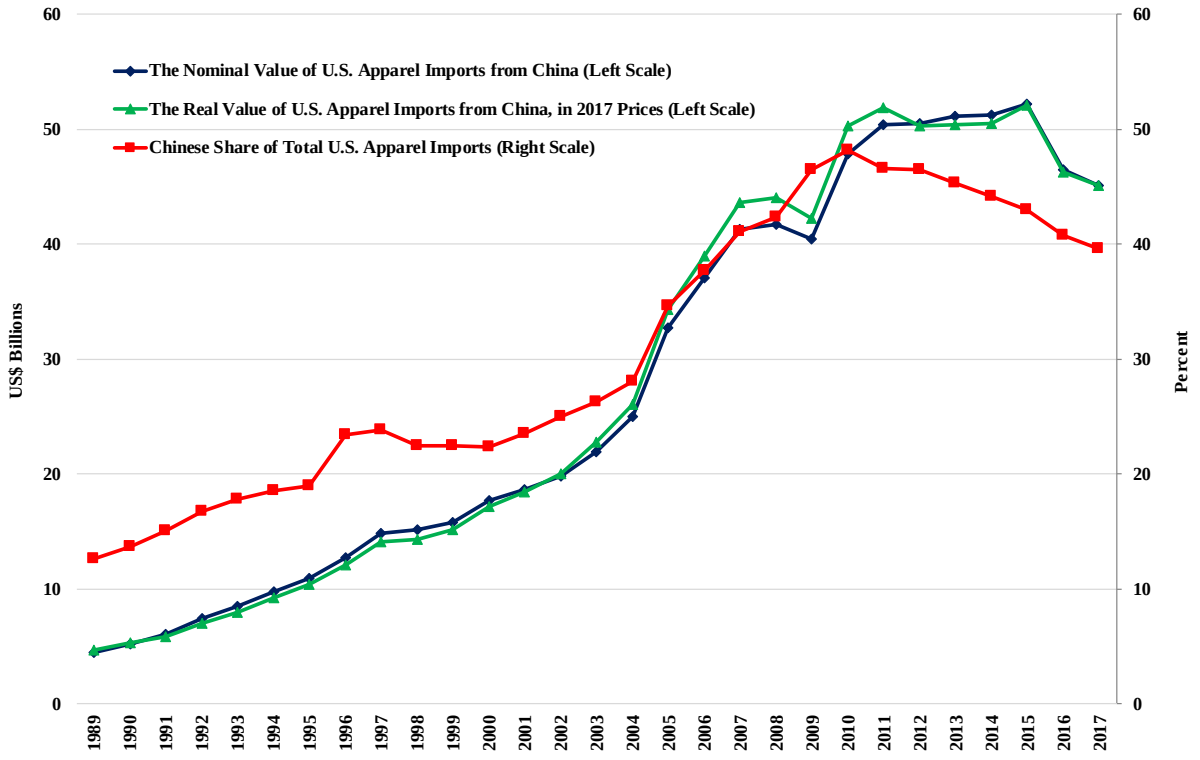
We examine the impact of apparel imports[3] from China on the price of apparel in the United States over the period from 1989 to 2017. It is found that the annual rate of increase of the U.S. apparel price index is negatively related to the share of U.S. apparel imports originated from China, other things being equal. Moreover, it is possible to attribute an average decline in the annual rate of growth of the U.S. apparel price index of 0.2 percentage point to each percentage point increase in the Chinese share of total U.S. apparel imports between 1994 and 2017. We also examine the impact of non-oil consumer goods imports from China on the annual rate of growth of the price index of non-oil consumer goods in the U.S. A similar negative impact is found: there was an estimated average decline in the annual rate of growth of the price of U.S. non-oil consumer goods of 1.0 percentage point for each percentage point increase in the Chinese share of total U.S. non-oil imports between 1994 and 2017. The reduced price of non-oil consumer goods has resulted in an estimated average annual saving for U.S. consumers of US$623 billion between 1994 and 2016, approximately 12 percent of the average annual U.S. non-oil consumer expenditure during the same period. Moreover, the reduced rates of growth of the price of non-oil consumer goods in the U.S. translated directly into a lowered rate of core CPI inflation, enabling a lower nominal as well as real rate of interest. All of these constitute concrete net benefits to U.S. consumers from the bilateral trade between China and the U.S.

[3] Apparel imports in this study include SITC 2-digit "apparel, clothing accessories", and SITC 2-digit "footwear", as reported by the U.S. Census Bureau. We use apparel as a shorthand for apparel and footwear.

2. The Growth of Chinese Apparel Imports into the United States

In Chart 1, we present the value of U.S. apparel imports from China in current as well as constant 2017 prices and its share of total U.S. apparel imports. The Chinese share rose from 12.6 percent in 1989 to a peak of 48.1 percent in 2010. It has since been in decline, falling to 39.6 percent in 2017. In terms of absolute value, U.S. apparel imports from China rose from US$4.4 billion in 1989 to a peak of US$52.2 billion in 2015, a more than tenfold increase. The rate of growth of U.S. apparel imports from China has greatly moderated since 2010. In real terms, Chinese apparel imports also reached a peak in 2011, levelled off and began to fall in 2015.

Chart 1: The Nominal and Real Values of U.S. Apparel Imports from China (2017 Prices) and Its Share of Total U.S. Apparel Imports

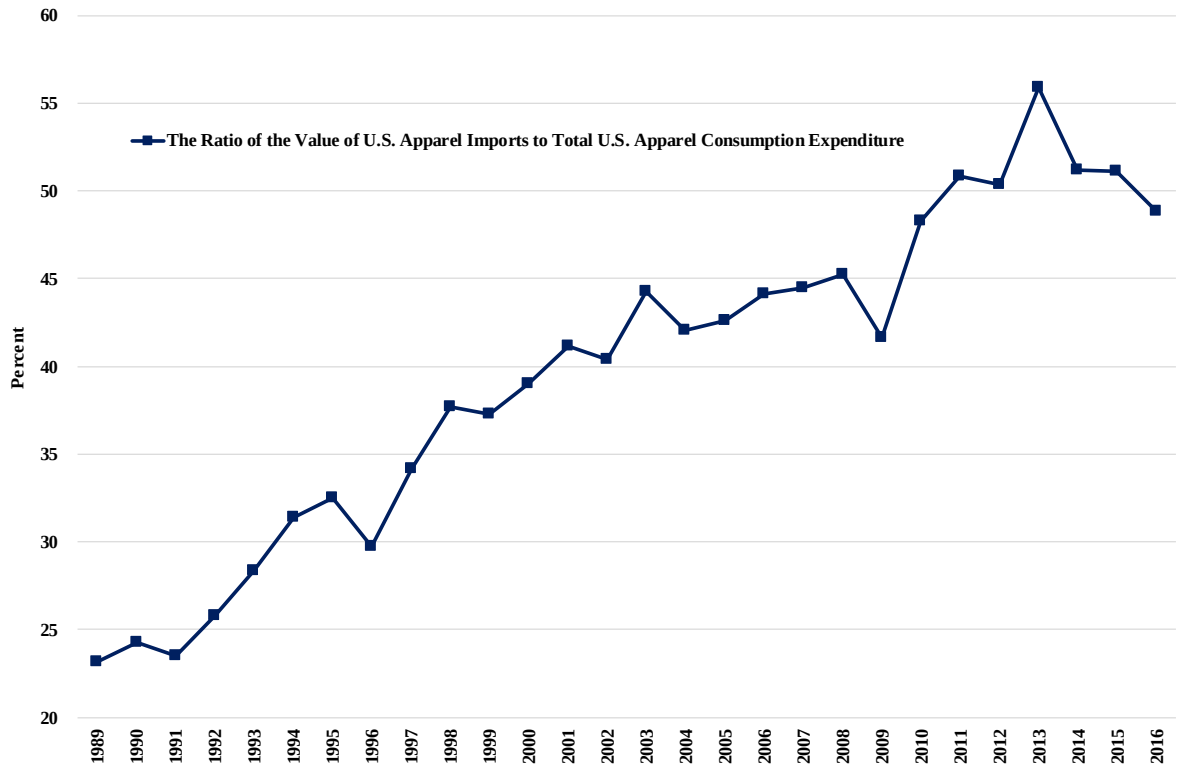


Source: U.S. Census Bureau and estimates of the authors for the years prior to 1996; the nominal values of imports are converted to real values of imports by the U.S. apparel price index (U.S. Bureau of Labor Statistics), which includes both apparel and footwear.

It is useful to examine the share of total apparel imports in total U.S. consumer expenditure on apparel. Imports of apparel into the U.S. from Asia began in the 1950s, first from Japan, and then successively from Hong Kong, Taiwan and South Korea. China is a relatively new supplier, beginning in the 1990s and becoming a major apparel exporter to the

U.S. after it acceded to the World Trade Organization (WTO) in 2001 and then only after the expiration of the Multi-Fibre Agreement in 2005. Thus, the disruption of the U.S. domestic apparel industry began a long time ago and cannot be simply attributed to Chinese imports. In fact, the share of Chinese imports has already begun to decline in 2010, replaced by imports from Vietnam, Bangladesh, Cambodia and Indonesia. Between 1989 and 2013, the ratio of the value of U.S. apparel imports to total U.S. apparel consumer expenditure grew rapidly, from 23.2 percent to a peak of 55.9 percent. Since then, it has declined to 48.8 percent in 2016 (see Chart 2). Taking into account the fact that the value of apparel imports includes only the wholesale costs and not the retail distribution margins, the share of imports in the U.S. retail apparel market must have been around 75 percent or perhaps even higher, assuming a distribution margin of at least 50 percent on imports.

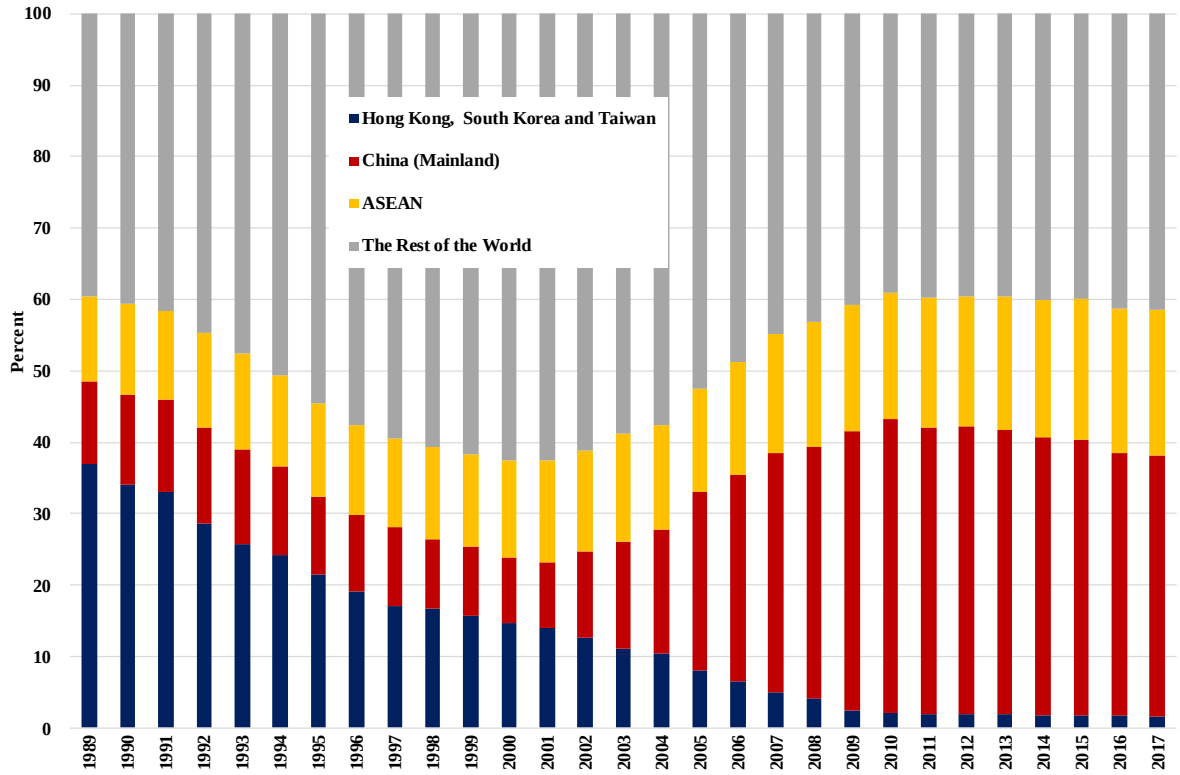
Chart 2: The Ratio of the Value of U.S. Apparel Imports to Total U.S. Apparel Consumer Expenditure



Source: U.S. Census Bureau and U.S. Bureau of Labor Statistics.

In Chart 3, we present the distribution of U.S. apparel imports by country or group of counties of origin, based on a slightly different set of data published by the Office of Textiles and Apparel (OTEXA), U.S. Department of Commerce.[4] Chart 3 shows that the growth of U.S. apparel imports from China has been mostly at the expense of Hong Kong, South Korea and Taiwan. In their peak year of 1989, Hong Kong, South Korea and Taiwan combined accounted for 36.9 percent of total U.S. apparel imports, comparable to the share of imports from China of 41.2 percent in its peak year of 2010.[5] The share of apparel imports from the Association of Southeast Asian Nations (ASEAN) has been rising steadily and reached 20.4 percent in 2017. It, perhaps together with Bangladesh, is expected to eventually supplant China to become the largest apparel exporter to the U.S. because of their lower labor costs and weaker exchange rates.

Chart 3: The Distribution of U.S. Apparel Imports by Countries of Origin



Source: The Office of Textiles and Apparel, U.S. Department of Commerce.

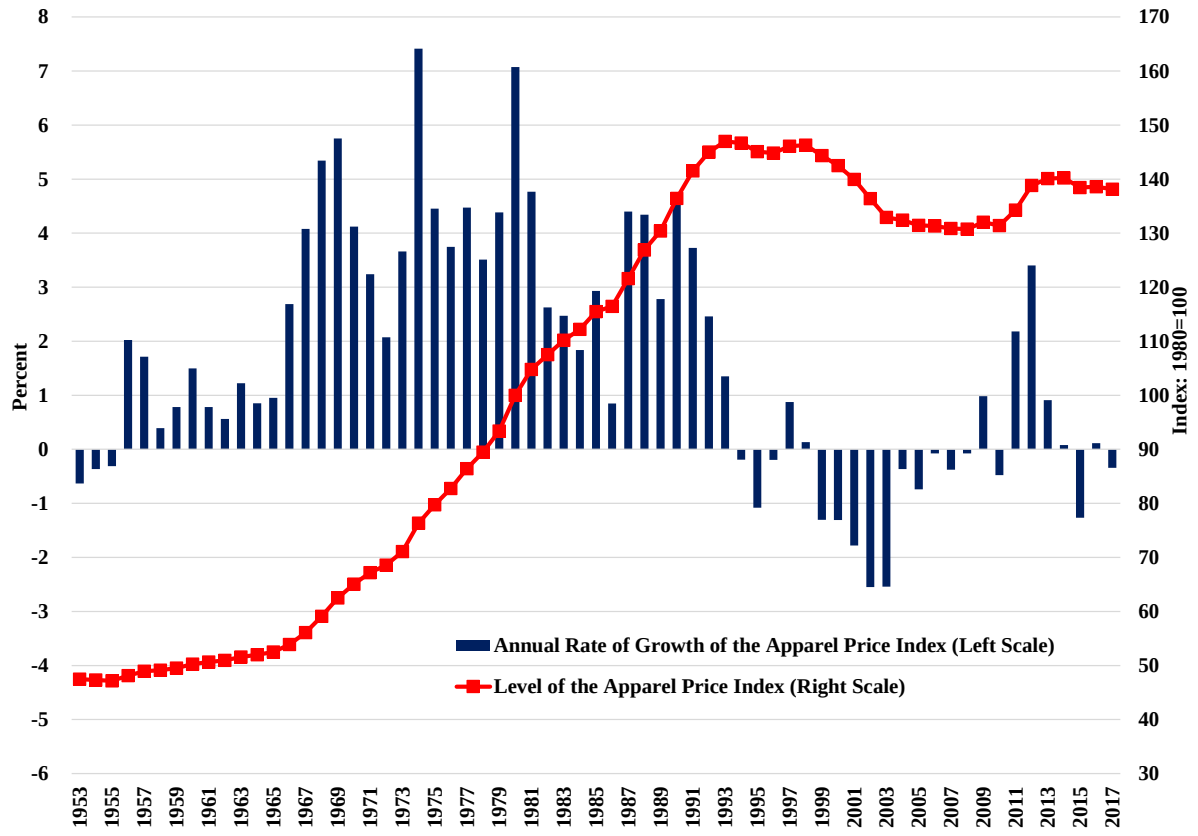
[4] For country comparisons, we turn to the data of U.S. imports of textiles and apparel reported by the Office of Textiles and Apparel (OTEXA), U.S. Department of Commerce, due to the lack of comparable SITC data series for other countries. While the OTEXA data do not include footwear imports, they show a similar pattern as the SITC data series. See http://otexa.trade.gov/msrpoint.htm.

[5] OTEXA data show that the share of apparel imports from China peaked at 41.2 percent in 2010. Likewise, the SITC data series (including both apparel and footwear) placed the Chinese peak in the same year but with a larger share, at 48.1 percent.

3. The U.S. Apparel Price Index and U.S. Apparel Imports

In Chart 4, we present the levels (the line) and the annual rates of growth (the columns) of the U.S. apparel price index (1980=100) from 1953 to 2017. The U.S. apparel price index rose rapidly between 1966 and 1991 at an average annual rate of almost 4 percent, but between 1991 and 2010, it declined at an average annual rate of 0.2 percent. The level of the U.S. apparel price index peaked in 1993, and its value in 2017 was actually below that in 1991! As discussed below, this decline may be attributed in part to the increase in the share of U.S. apparel imports from China during this period.

Chart 4: The Level and the Annual Rate of Growth of the U.S. Apparel Price Index (1980=100)

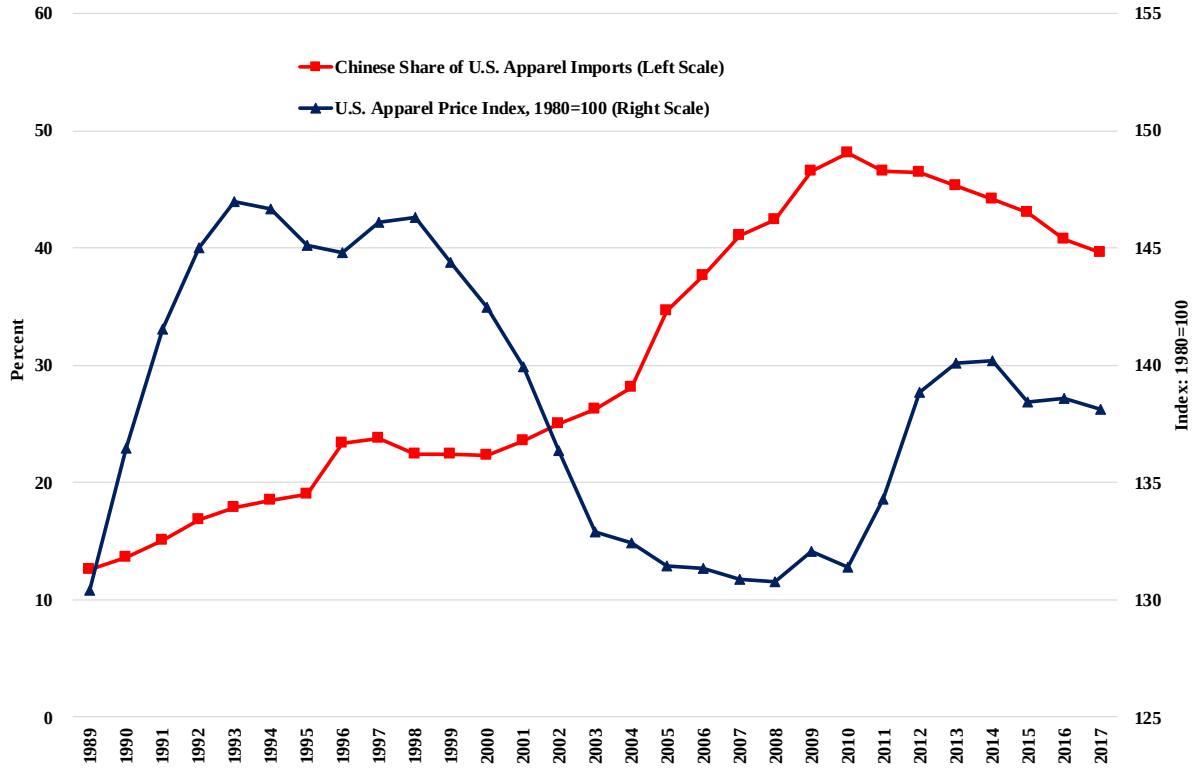


Source: U.S. Bureau of Labor Statistics.

In Chart 5, we present the level of the U.S. apparel price index (1980=100) and the Chinese share of U.S. apparel imports from 1989 to 2017. It is apparent that the higher the Chinese share of U.S. apparel imports, the lower the level of the U.S. apparel price index. Apparel imports from China have helped to keep the level of the U.S. apparel price index low. We note that the deceleration of the rate of growth of the U.S. apparel price index in 1990 coincided with the rise in the share of apparel imports from China. Beginning in 1993, the U.S. apparel price index declined almost continuously until 2010, when the Chinese share of U.S. apparel imports also reached a peak. (In terms of real value, U.S. apparel imports from China reached a peak in 2011.) After 2010, the Chinese share of U.S. apparel imports began to decline, and the U.S. apparel price index resumed its upward climb until 2014, when apparel imports from ASEAN countries began to supplant apparel imports from China. The appreciation of the Renminbi relative to the U.S. Dollar during this period also played a role.

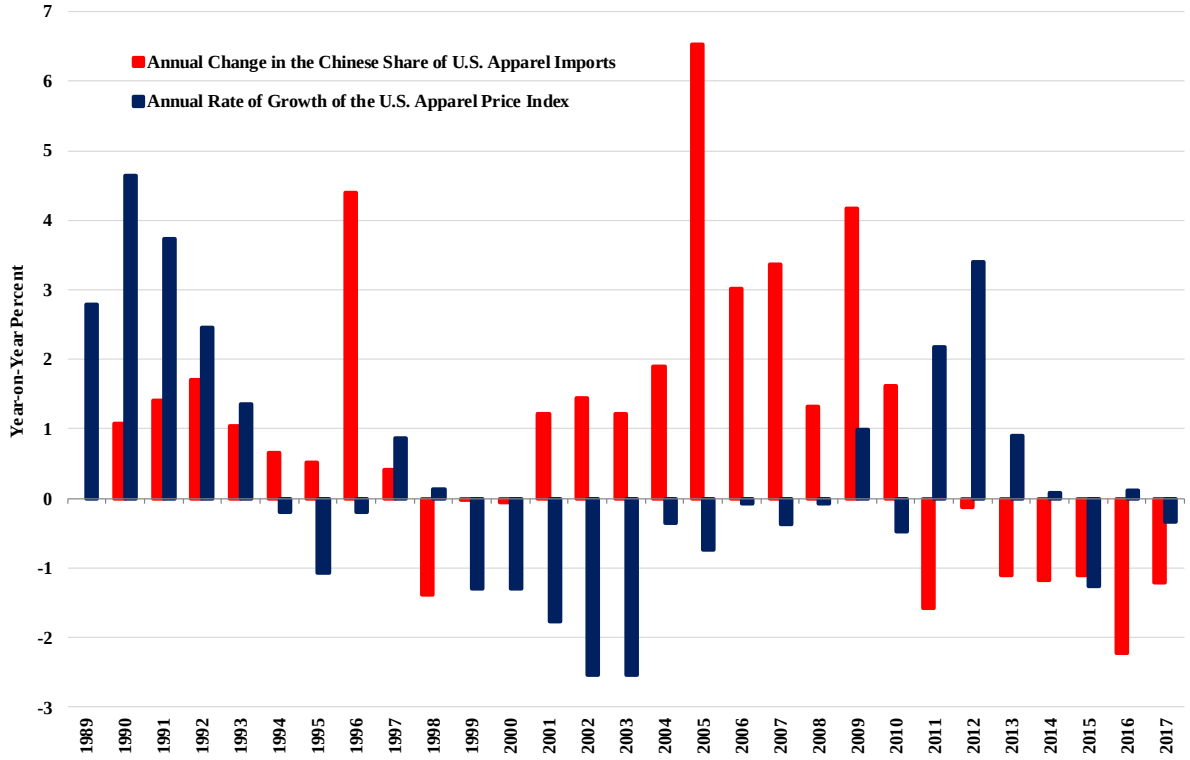
In Chart 6, we present the annual rate of growth of the U.S. apparel price index and the annual change in the share of U.S. apparel imports from China. It shows that the annual rate of growth of the U.S. apparel price index was almost always in the opposite direction to the annual change in the Chinese share of U.S. apparel imports between 1994 and 2014. During this period, whenever the Chinese share of U.S. apparel imports went up, the U.S. apparel index came down, and vice versa. Since 2014, the effect due to the decline of the Chinse share of U.S. apparel imports has begun to be offset by the rise in the ASEAN share.

Chart 5: The Level of the U.S. Apparel Price Index and the Share of U.S. Apparel Imports from China



Source: U.S. Census Bureau and U.S. Bureau of Labor Statistics.

Chart 6: The Annual Rate of Growth of the U.S. Apparel Price Index (Percent) and the Change in the Share of U.S. Apparel Imports from China (Percentage Points)



Source: U.S. Census Bureau and U.S. Bureau of Labor Statistics.

4. The Relationship between the U.S. Apparel Price Index and the Share of U.S. Apparel Imports from China

We explore econometrically the relationship between the annual rate of growth of the U.S. apparel price index and the share of U.S. apparel imports from China. Our hypothesis is that an increase in the share of a new low-cost supplier such as China would reduce the rate of growth of the U.S. apparel price index. However, an increase in the share of apparel imports from a mature supplier such as Hong Kong, South Korea and Taiwan would increase the rate of growth of the U.S. apparel price index. Thus, it is the difference between the changes in their shares over time that matter. We therefore introduce the share difference variable, "the share of apparel imports from China – the share of apparel imports from Hong Kong, South Korea and Taiwan combined". During this period, the Chinese share was rising, the combined share of apparel imports from Hong Kong, South Korea and Taiwan was falling, and the share difference was rising, thus putting downward pressure on the U.S. apparel price index.[6] Moreover, we allow the effects of the Chinese share of imports to be asymmetric, that is, to differ depending on whether the Chinese share has been on a rising or falling trend, that is, before or after 2010. Another variable that may affect the rate of growth of the U.S. apparel price index is the rate of change of the nominal Renminbi/U.S. Dollar exchange rate. In addition, we also allow the exchange rate effects to differ before and after the Chinese exchange rate reform of 1994.

The annual rate of growth of the U.S. apparel price index, measured in terms of percentage points, is regressed on the difference between the Chinese share of U.S. apparel imports and the share of Hong Kong, South Korea and Taiwan combined (measured in the form of a decimal number between zero and one), the one-year lagged percentage change of the nominal Renminbi/U.S. Dollar exchange rate, and the annual rate of change of the U.S. Consumer Price Index (CPI). The results are presented in Table 1.

[6] In the actual estimation, we take the natural logarithm of the share difference variable. Thus, it cannot be allowed to become negative. We add a constant to the share difference variable to keep it from becoming negative. This constant is chosen to be 0.2432, the value that maximizes the goodness of fit of the regression of the annual rate of growth on the share difference variable.

Table 1: Regression of the Annual Rate of Growth of the U.S. Apparel Price Index

	The Annual Rate of Growth of the U.S. Apparel Price Index	
	(1)	(2)
Difference between the share of U.S. apparel imports from China and the combined share from Hong Kong, S. Korea and Taiwan (ln)	-1.868***	-2.224***
	(0.540)	(0.522)
Difference between the share of U.S. apparel imports from China and the combined share from Hong Kong, S. Korea and Taiwan, 2011–2017 (ln)	-6.754***	-6.740***
	(1.475)	(2.072)
Annual rate of change of the nominal Renminbi/US$ exchange rate (lagged 1 year)	-0.323**	-0.273***
	(0.118)	(0.090)
Annual rate of change of the nominal Renminbi/US$ exchange rate, 1989–1994 (lagged 1 year)	0.300***	0.257**
	(0.132)	(0.098)
Annual rate of change of the U.S. CPI (lagged 1 year)	0.333	
	(0.287)	
Constant	-3.519***	-2.967***
	(0.647)	(0.850)
ρ estimated from AR(1) model		0.630
Durbin-Watson statistic	0.951	1.4542
Number of observations	28	28
R^2	0.659	0.580
Adjusted R^2	0.582	0.485
Residual standard error	1.144 (df = 22)	1.241 (df = 23)
F-statistic	8.507*** (df = 5; 22)	5.186*** (df = 5; 23)

Notes: Numbers in parentheses are estimated standard errors. ***Significant at the 1-percent level; **significant at the 5-percent level; *significant at the 10-percent level.

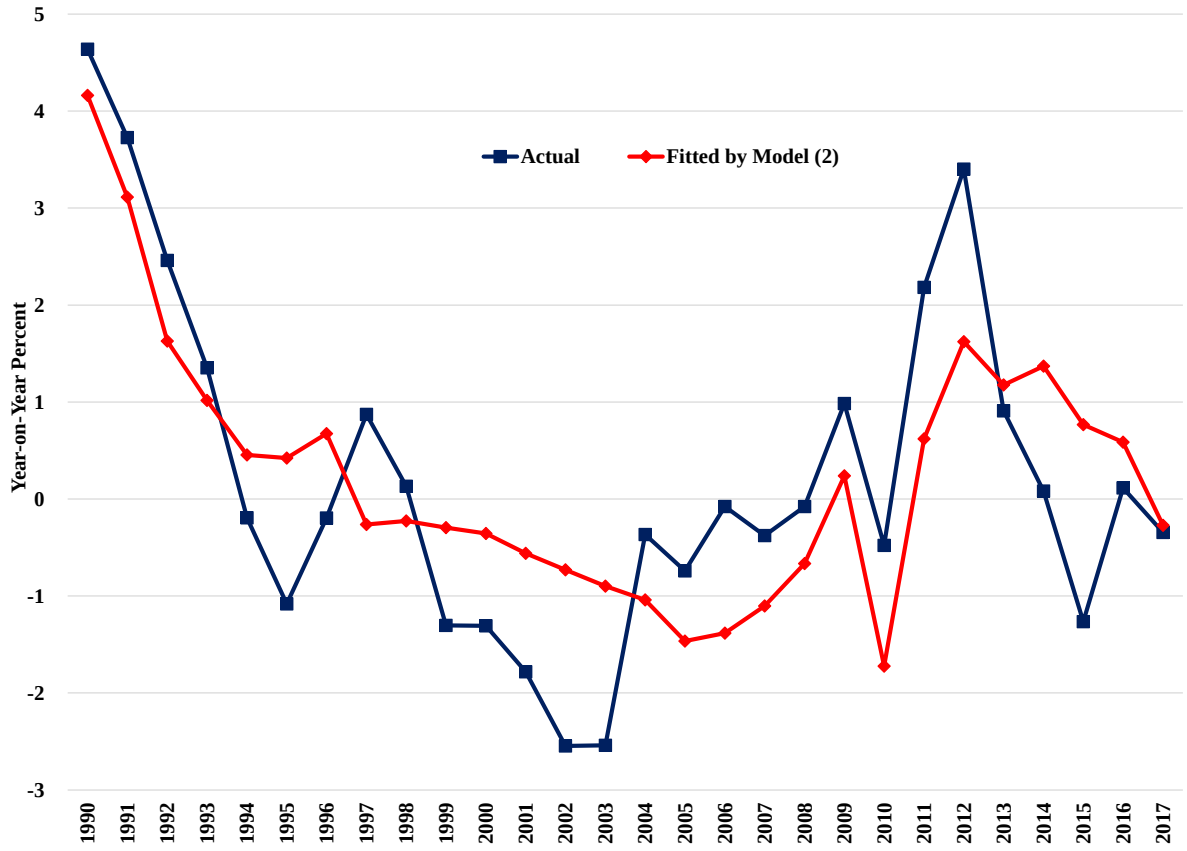
Table 1 shows that the annual rate of growth of the U.S. apparel price index is significantly negatively affected by an increase in the share of Chinese apparel imports, other things being equal. Moreover, the effect is asymmetric, depending on whether the share has been on a rising or falling trend. In addition, the rate of growth of the U.S. apparel price index

is significantly negatively affected by the lagged devaluation of the Renminbi relative to the U.S. Dollar since the exchange rate reform of 1994. However, it does not seem to be statistically significantly affected by the annual rate of change of the U.S. Consumer Price Index. The relatively low value of the Durbin-Watson statistic of model (1) suggests that there may exist positive first-order autocorrelation in the stochastic disturbance terms of the regression model. We therefore apply the Prais-Winsten (PW) procedure to correct for the serial correlation, dropping the statistically insignificant U.S. CPI variable. The results are reported as model (2) in Table 1. The Durbin-Watson statistic is substantially improved. In addition, the values of the estimated parameters in model (2) are not substantially different from those in model (1), showing that the estimation is relatively robust.[7]

We use the results of model (2) in our further analysis of the U.S. apparel price index. Between 1994 and 2017, a one-percentage-point increase in the Chinese import share would decrease the rate of growth of the U.S. apparel price index by approximately 0.2 percentage point. In Chart 7, we present the actual and fitted values of our regression of the annual rate of growth of the U.S. apparel price index as reported in Table 1 under model (2). It is clear that the annual rate of growth of the U.S. apparel price index is explained very well by the model.

[7] The Prais-Winsten procedure assumes that the stochastic disturbance terms follow a first-order autoregressive process: $\varepsilon_t = \nu_t + \rho\nu_{t-1}$, where ν_t is assumed to be independently and identically distributed with constant variance. (See, for example, J. M. Wooldridge, Introductory Econometrics: A Modern Approach, 5th ed., Mason, OH: South-Western Cengage Learning, 2013.) ρ has been estimated to be 0.63.

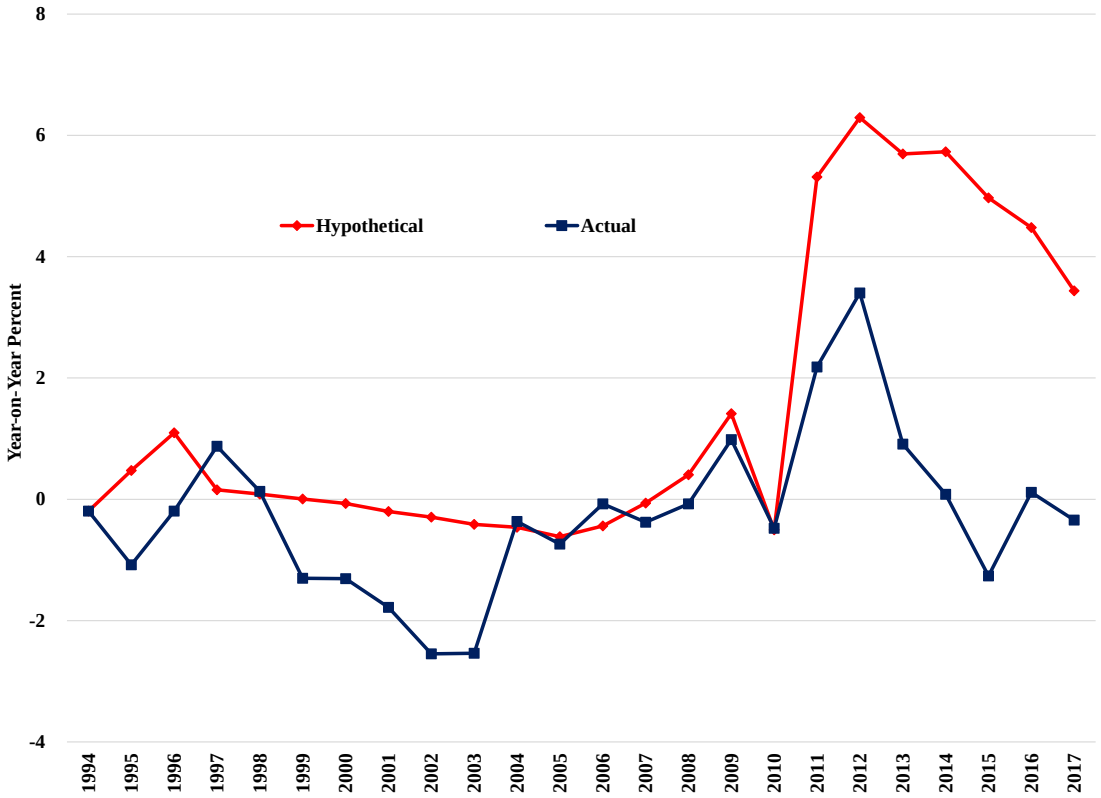
Chart 7: Actual and Fitted Values of the U.S. Apparel Price Index



Source: U.S. Census Bureau and fitted values derived from model (2) in Table 1.

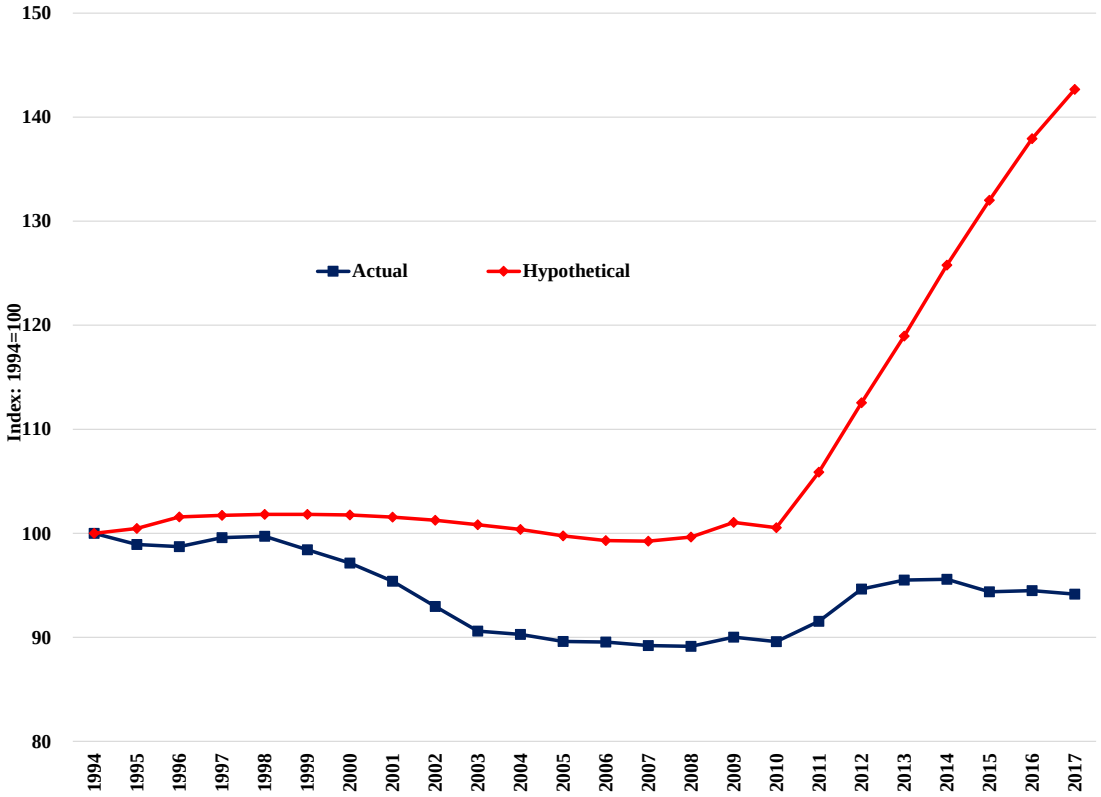
In 1994, China undertook an exchange rate reform, and the Renminbi became current account convertible. If the Chinese share of U.S. apparel imports had stayed at its 1994 level, what would have been the level of the U.S. apparel price index? The annual rates of growth and consequently the levels of the U.S. apparel price index would have been much higher. In Chart 8, we present the actual and hypothetically predicted annual rates of growth of the U.S. apparel price index, using the regression results of model (2) in Table 1 above. The hypothetical annual rates of growth are higher than the actual annual rates of growth by an average of 1.8 percentage points per annum between 1994 and 2017. In Chart 9, we present the hypothetical levels of the U.S. apparel price index based on the hypothetical annual rates of growth, beginning in 1994, and compare them with the actual levels. We note that the U.S. apparel price index in 2010 and 2017 would have been respectively 12 percent and 52 percent higher than the actual had the Chinese share of U.S. apparel imports remained at its 1994 level of 18.5 percent.

Chart 8: Actual and Hypothetical Annual Growth Rates of the U.S. Apparel Price Index



Source: Estimates of the hypothetical growth rates are based on model (2) in Table 1.

Chart 9: Actual and Hypothetical Levels of the U.S. Apparel Price Index



Source: Estimates of the hypothetical levels are based on model (2) in Table 1.

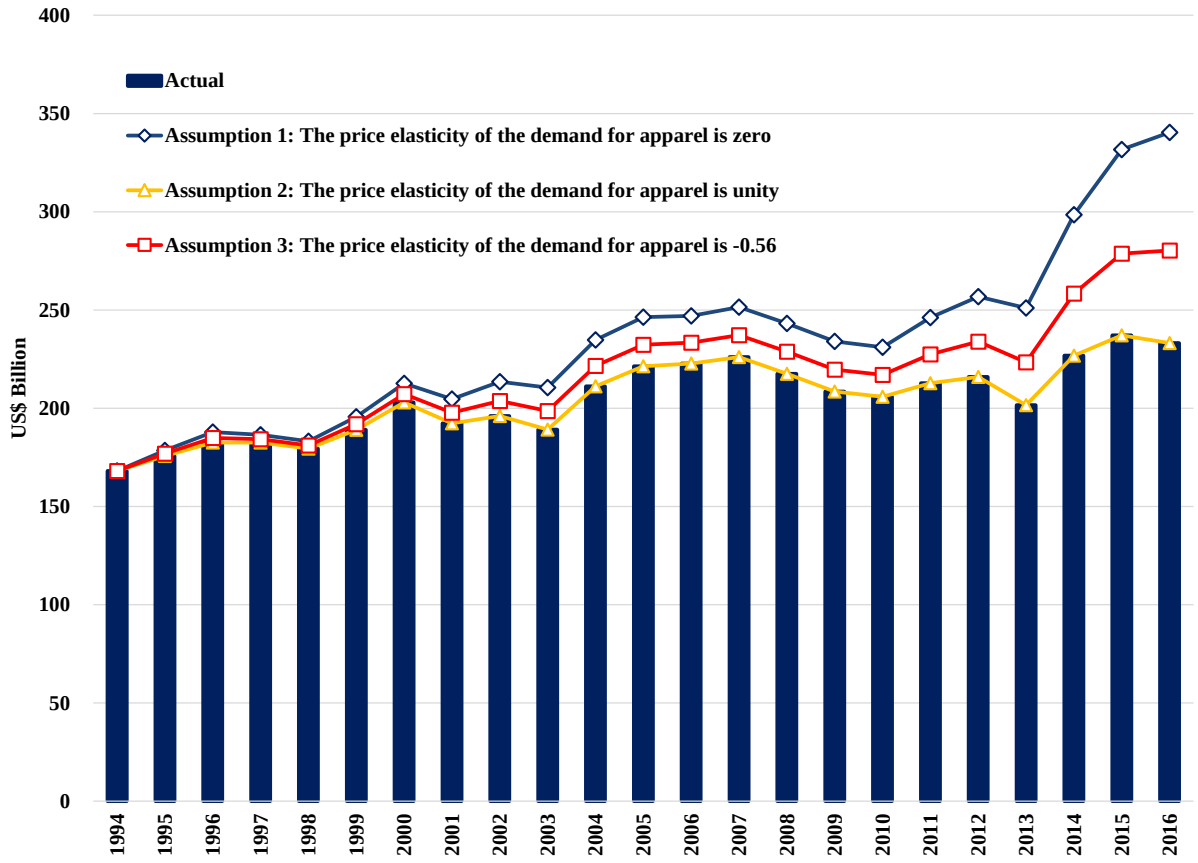
5. Estimated Savings for U.S. Consumers Attributable to Chinese Apparel Imports into the U.S.

If the level of the U.S. apparel price index were higher, so would the corresponding U.S. consumer expenditure on apparel be. There are three possible assumptions as to how U.S. consumers adjust their expenditure on apparel in response to changes in the apparel price index. "Assumption 1" is that the real expenditure on apparel would remain the same, that is, the price elasticity of the demand for apparel is zero. An alternative assumption, "Assumption 2", is that the nominal value of U.S. consumer expenditure on apparel would remain the same, that is, the price elasticity of the demand for apparel is minus one. Assumptions 1 and 2 represent the two extreme cases. Realistically, in response to an increase in the price of apparel, the real consumer expenditure on apparel will decline but not to the same extent as implied by a price elasticity of demand of minus one. An attempt is made to estimate the value of the price elasticity of the demand for apparel, which turns out to be -0.56, that is, if price increases by 1 percent, the real expenditure decreases by 0.56 percent.[8] This is then our "Assumption 3".

The actual and the hypothetical U.S. nominal consumer expenditures on apparel under each of the assumptions are presented in Chart 10.[9] Chart 10 shows that between 1994 and 2016, the value of the annual saving to U.S. consumers resulting from a lower price of U.S. apparel amounted to an average of US$28 billion under Assumption 1 and an average of US$13 billion under Assumption 3. As a comparison, the average annual U.S. nominal consumer expenditure on apparel was US$204 billion over the same period.

[8] An attempt is made to estimate the price elasticity of the U.S. demand for apparel by regressing the natural logarithm of real expenditure on apparel on the natural logarithms of the price index of apparel and the total consumer expenditure. The estimated price elasticity is -0.56. See the Appendix for the details of the estimation.
[9] We stopped with 2016 in Chart 10 because the household consumption expenditure data for 2017 were not available.

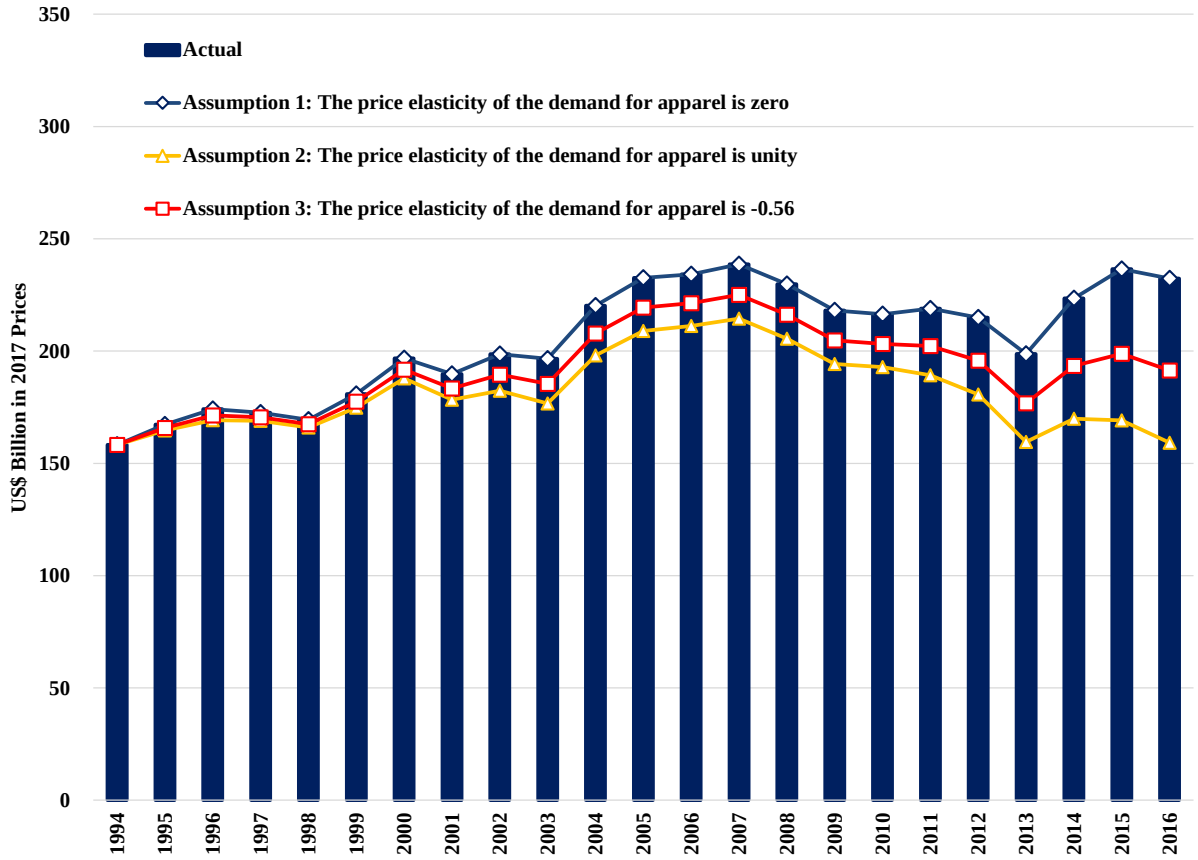
Chart 10: Actual and Hypothetical U.S. Annual Nominal Consumer Expenditures on Apparel



Source: U.S. Bureau of Labor Statistics and estimates of the authors.

An alternative way to assess the impact of the increase in the Chinese import share is to examine how the real consumer expenditure on apparel would have changed under the three alternative assumptions. The actual and the hypothetical real consumer expenditures on apparel under each of the assumptions are presented in Chart 11. Between 1994 and 2016, U.S. consumers would have reduced their real expenditure on apparel, that is, they would have to do with less, by an average of US$23 billion per annum in 2017 prices under Assumption 2 and US$13 billion per annum under Assumption 3. As a comparison, the actual average annual U.S. real consumer expenditure on apparel during this period was US$205 billion.

Chart 11: Actual and Hypothetical U.S. Annual Real Consumer Expenditures on Apparel (2017 Prices)



Source: U.S. Bureau of Labor Statistics and estimates of the authors.

6. The Impact of the U.S. Apparel Price Index on the U.S. Consumer Price Index (CPI)

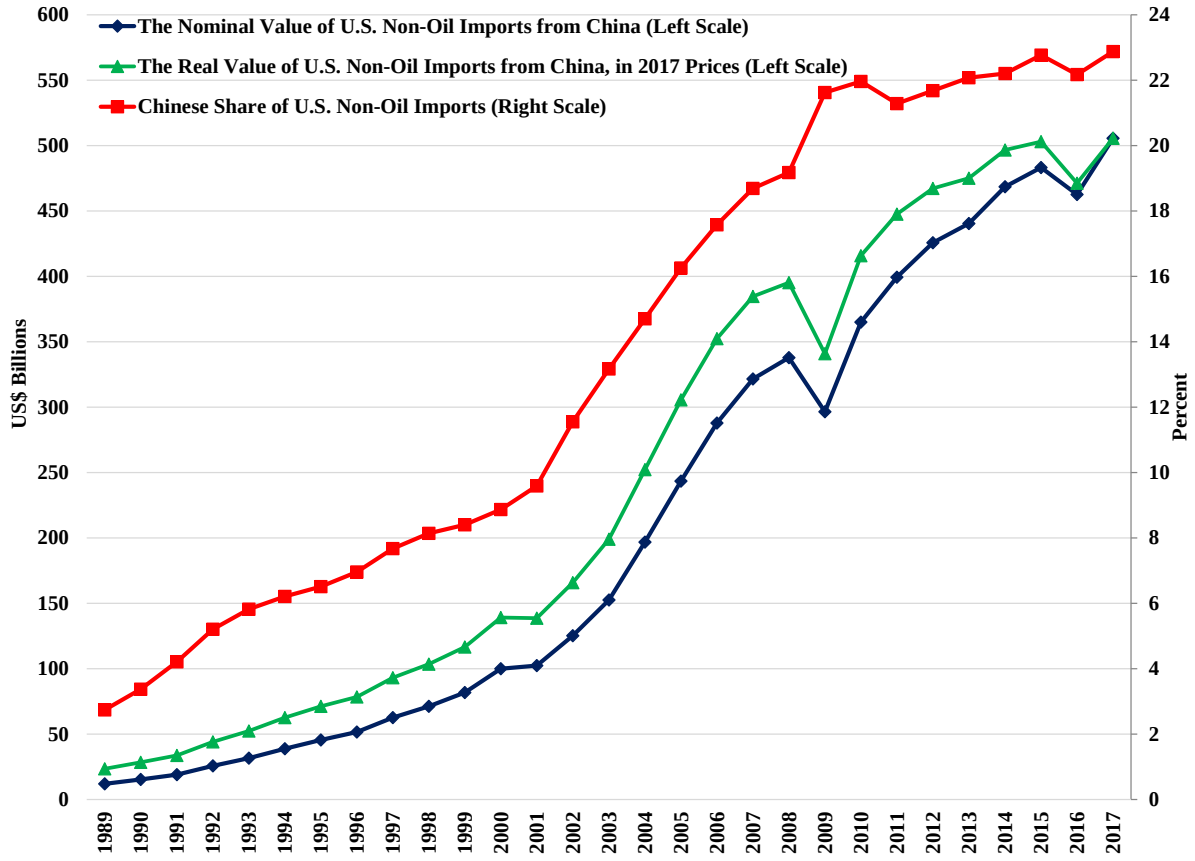
The U.S. apparel price index has an average weight of 4.1 percent over the period 1994–2017 in the U.S. Consumer Price Index (CPI).[10] Thus, a change of one percentage point in the apparel price index translates into a change of 0.041 percent in the U.S. CPI. The increase in the Chinese share of apparel imports since 1994 has reduced the annual rate of change of the U.S. apparel price index by 1.8 percentage points on average between 1994 and 2017. The U.S. annual rate of inflation as measured by the CPI would be reduced by 0.07 percentage points on average (1.8 x 0.041). Cumulatively, this translates into a 1.7-percent decrease in the level of the U.S. CPI in 2017.[11]

[10] This is calculated based on the weights used in the goods basket for the U.S. CPI, reported by the U.S. Bureau of Labor Statistics, https://www.bls.gov/cpi/data.htm.
[11] The cumulative effect is greater than -0.07 x 23 = 1.61 because of compounding.

7. An Application to U.S. Non-Oil Imports

In this section, we apply our model for the U.S. apparel price index to the U.S. non-oil price index. The results are essentially similar to what we have obtained for the U.S. apparel price index. In Chart 12, we present the value of U.S. non-oil imports from China in current prices as well as constant 2017 prices and its share of total U.S. non-oil imports. The Chinese share of total U.S. non-oil imports rose more or less continuously from 2.7 percent in 1989 to 21.6 percent in 2009, with a significant acceleration after 2001, when China acceded to the World Trade Organization. However, since 2009, the Chinese share of U.S. non-oil imports has stayed within a narrow range between 21 and 23 percent. In terms of absolute value, U.S. non-oil imports from China rose from US$12.0 billion in 1989 to US$505.6 billion in 2017, a fortyfold increase.

Chart 12: The Nominal and Real Values of U.S. Non-Oil Imports from China (2017 Prices) and Its Share of Total U.S. Non-Oil Imports



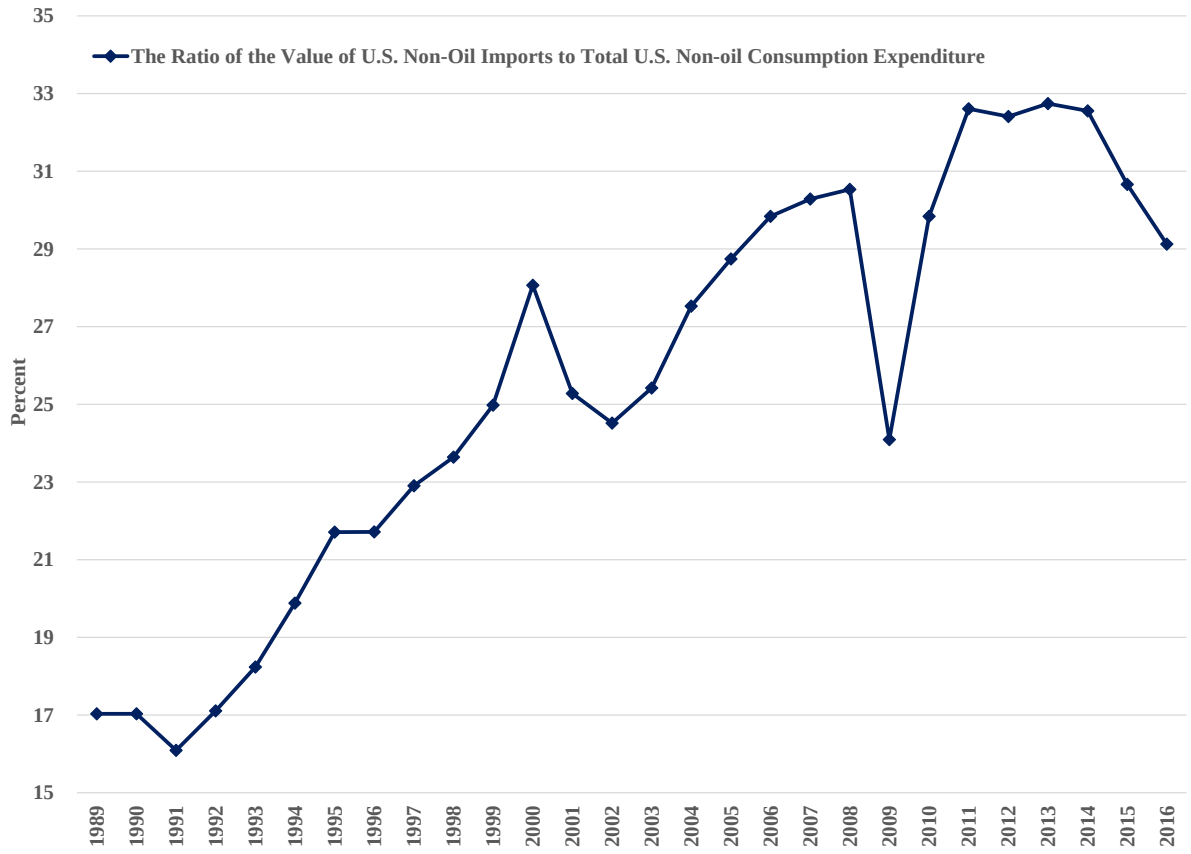
Source: U.S. Census Bureau.[12]

[12] The non-oil imports are calculated by subtracting the crude petroleum imports from customs good imports of the U.S. The data are from the U.S. Bureau of the Census.

In Chart 13, the ratio of the total value of U.S. non-oil imports to total U.S. non-oil consumer expenditure is presented. It shows the very rapid growth of total U.S. non-oil imports relative to total domestic non-oil consumer expenditure, from 17.0 percent in 1989 to 29.1 percent in 2016. Taking into account the fact that the value of non-oil imports reflects only the wholesale costs and not the retail distribution margins, the share of imports in the retail non-oil consumer goods market must have been at least 40 percent or even higher.

In Chart 14, we present the levels (the line) and the annual rates of growth (the columns) of the U.S. non-oil price index[13] from 1959 to 2017. The U.S. non-oil price index rose rapidly between 1967 and 1993, at an average annual rate of 5.8 percent, but between 1994 and 2017, the annual rate of growth remained subdued and was never above 3 percent in any year. This decline in the rate of growth of the U.S. non-oil price index may likewise be attributed in part to the increase in the share of U.S. non-oil imports from China.

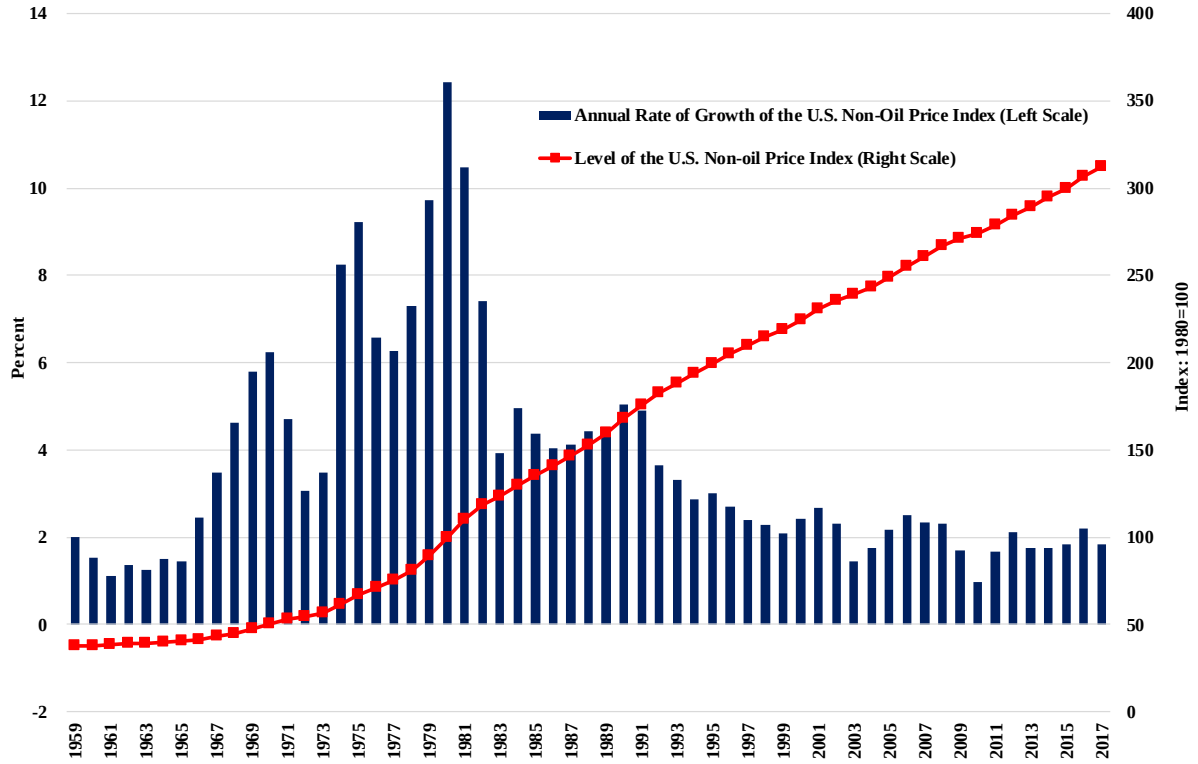
Chart 13: The Ratio of the Value of U.S. Non-Oil Imports to Total U.S. Non-Oil Consumer Expenditure



Source: U.S. Census Bureau and U.S. Bureau of Labor Statistics.

[13] We use the U.S. core CPI as reported by the U.S. Bureau of Labor Statistics to represent the U.S. non-oil price index.

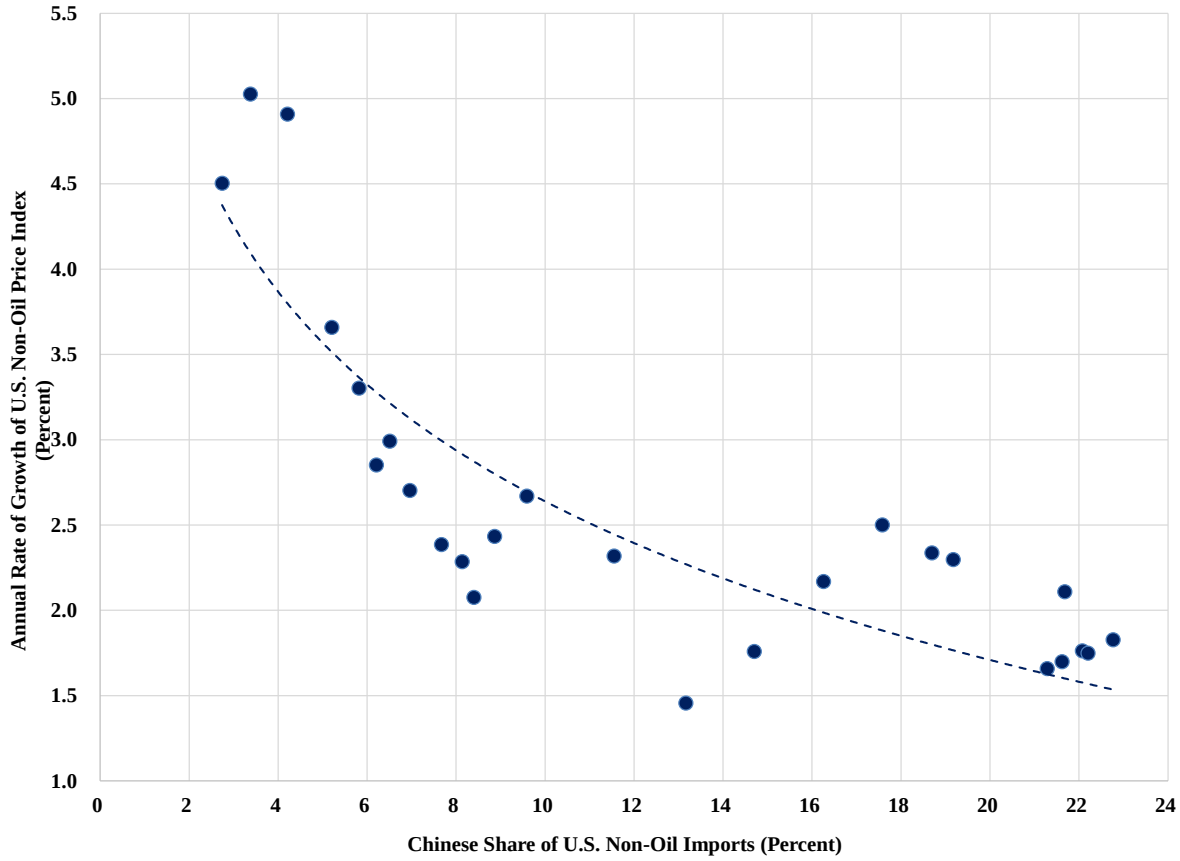
Chart 14: The Level and the Annual Rate of Growth of the U.S. Non-Oil Price Index



Source: U.S. Bureau of Labor Statistics.

In Chart 15, we present a scatter diagram between the annual rate of growth of the U.S. non-oil price index and the Chinese share of U.S. non-oil imports. It is apparent that the higher the Chinese share of U.S. non-oil imports, the lower the annual rate of growth of the U.S. non-oil price index. U.S. non-oil imports from China have helped keep the increases in the U.S. non-oil price index low.

Chart 15: A Scatter Diagram of the Annual Rate of Growth of the U.S. Non-Oil Price Index versus the Chinese Share of U.S. Non-Oil Imports (1989–2017)



Source: U.S. Bureau of Labor Statistics and U.S. Census Bureau.

8. The Relationship between the U.S. Non-Oil Price Index and U.S. Non-Oil Imports from China

We explore econometrically the relationship between the annual rate of growth of the U.S. non-oil price index and the share of U.S. non-oil imports from China. The annual rate of growth of the U.S. non-oil price index, measured in terms of percentage points, is regressed on the natural logarithm of Chinese share of U.S. non-oil imports, measured in the form of a decimal number between zero and one (again, distinguishing between the rising and the falling phases), the one-year lagged percentage change of the nominal Renminbi/U.S. Dollar exchange rate (again distinguishing between before and after the reform of 1994), and the one-year lagged annual rate of growth of the U.S. non-core price index, which is composed of food and energy price indices.[14] The results are presented in Table 2.

[14] We estimate the annual rate of growth of the U.S. non-core price index in the following way: % change of non-core price index = [% change of CPI – 0.773 x % change of core CPI] / 0.227, where 0.773 and 0.227 are the respective weights of core CPI and non-core price index in total CPI, according to the U.S. Bureau of Labor Statistics.

Table 2: Regression of the Annual Rate of Growth of the U.S. Non-Oil Price Index

	The Annual Rate of Growth of the U.S. Non-Oil Price Index	
	(1)	(2)
Share of the U.S. non-oil imports from China (ln)	-1.435***	-1.402***
	(0.215)	(0.261)
Share of the U.S. non-oil imports from China, 2011–2017 (ln)	-0.377**	-0.225
	(0.177)	(0.212)
Annual rate of change of the nominal Renminbi/US$ exchange rate (lagged 1 year)	0.026	
	(0.045)	
Annual rate of change of the nominal Renminbi/US$ exchange rate, 1989–1994 (lagged 1 year)	-0.031	
	(0.050)	
Annual rate of change of the U.S. non-core price index (lagged 1 year)	0.073**	0.046***
	(0.027)	(0.015)
Constant	-0.931*	-0.733
	(0.508)	(0.640)
ρ estimated from AR(1) model		0.671
Durbin-Watson statistic	0.7689	1.7264
Number of observations	28	29
R^2	0.794	0.789
Adjusted R^2	0.748	0.754
Residual standard error	0.459 (df = 22)	0.474 (df = 25)
F-statistic	17.004*** (df = 5; 22)	17.08*** (df = 3; 25)

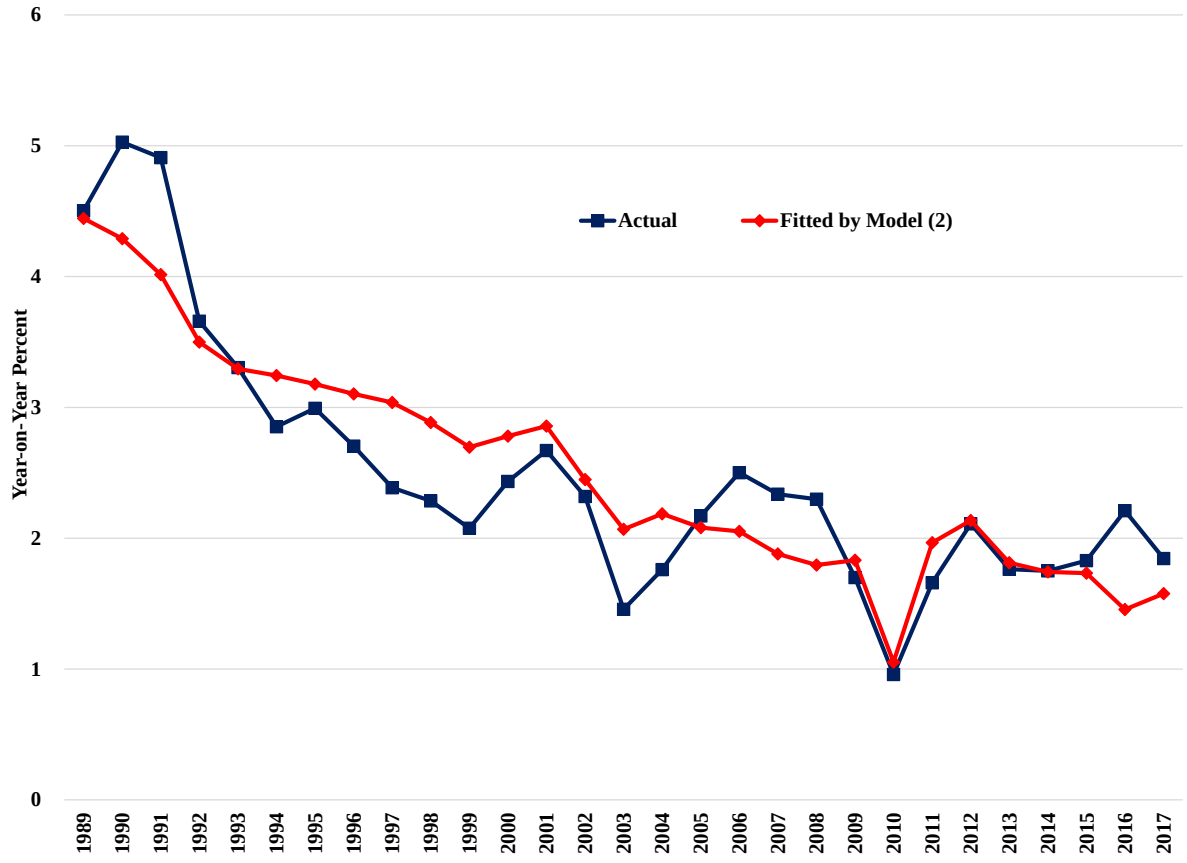
Notes: Numbers in parentheses are estimated standard errors. ***Significant at the 1-percent level; **significant at the 5-percent level; *significant at the 10-percent level.

Table 2 shows that the annual rate of change of the U.S. non-oil price index is significantly negatively affected by an increase in the Chinese share of U.S. non-oil imports. It is significantly positively affected by the annual rate of change of the U.S. non-core price index, which is composed of food and energy prices. However, it does not appear to be sensitive to the annual rate of change of the nominal Renminbi/U.S. Dollar exchange rate. This does not mean that the exchange rate has no effect—it simply means that whatever effect the exchange rate might have had is already reflected in the import share. Again, the low value of the Durbin-Watson statistic of model (1) suggests that there may exist positive first-order autocorrelation in the stochastic disturbance terms of the regression model. We apply the Prais-

Winsten procedure to correct for the serial correlation, dropping the statistically insignificant Renminbi/U.S. Dollar exchange rate variables. The results are reported as model (2) in Table 2. The Durbin-Watson statistic is substantially improved. In addition, the values of the estimated parameters in model (2) are not substantially different from those in model (1), showing that the estimation is relatively robust.[15]

We use the results of model (2) in our further analysis of the U.S. non-oil price index. Between 1994 and 2017, a one-percentage-point increase in the Chinese import share would decrease the rate of growth of the U.S. non-oil price index by approximately 1.0 percentage point. In Chart 16, we present the actual and fitted values of our regression of the annual rate of growth of the U.S. non-oil price index as reported in Table 2 under model (2). It is clear that the fit of the regression is very good.

Chart 16: Actual and Fitted Values of the Annual Rate of Growth of the U.S. Non-Oil Price Index



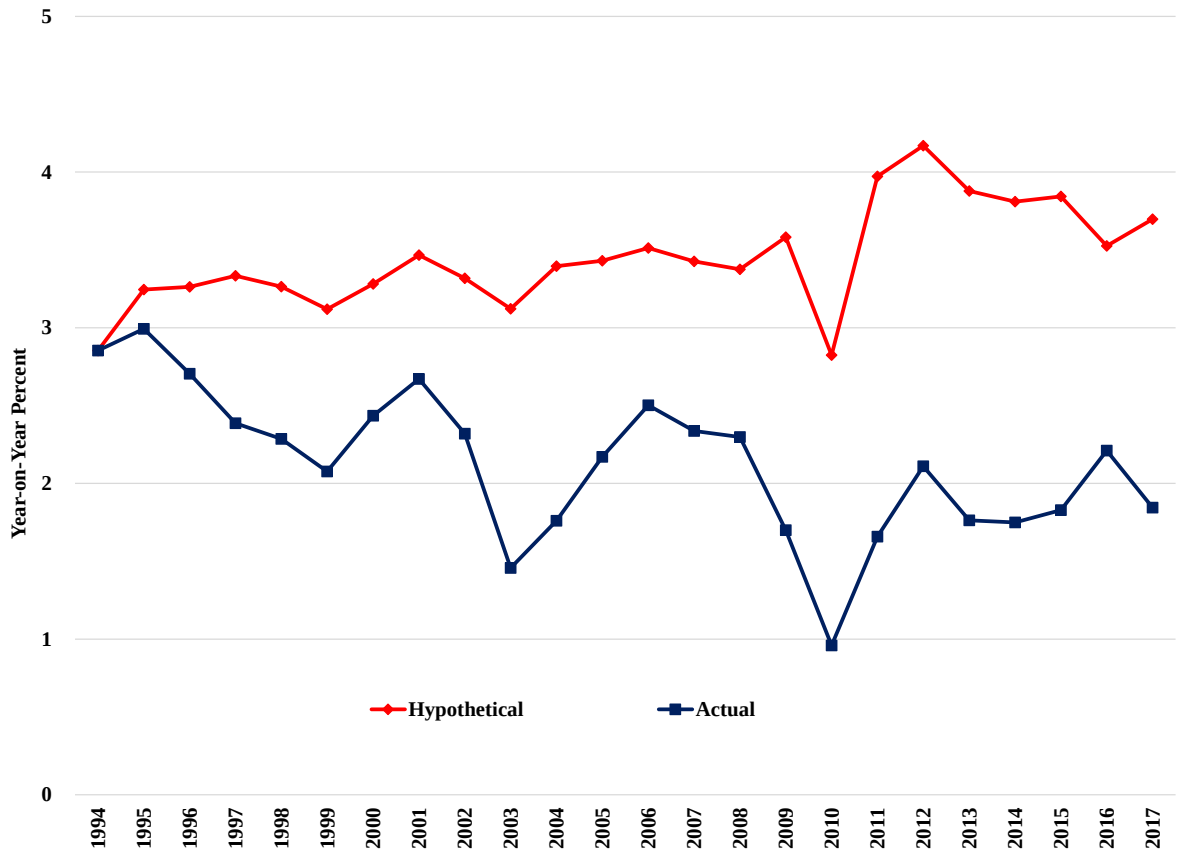
Source: U.S. Bureau of Labor Statistics and fitted values derived from model (2) in Table 2.

[15] The autoregressive coefficient, ρ, has been estimated to be 0.671.

9. Estimated Savings for U.S. Consumers Attributable to Chinese Non-Oil Imports into the U.S.

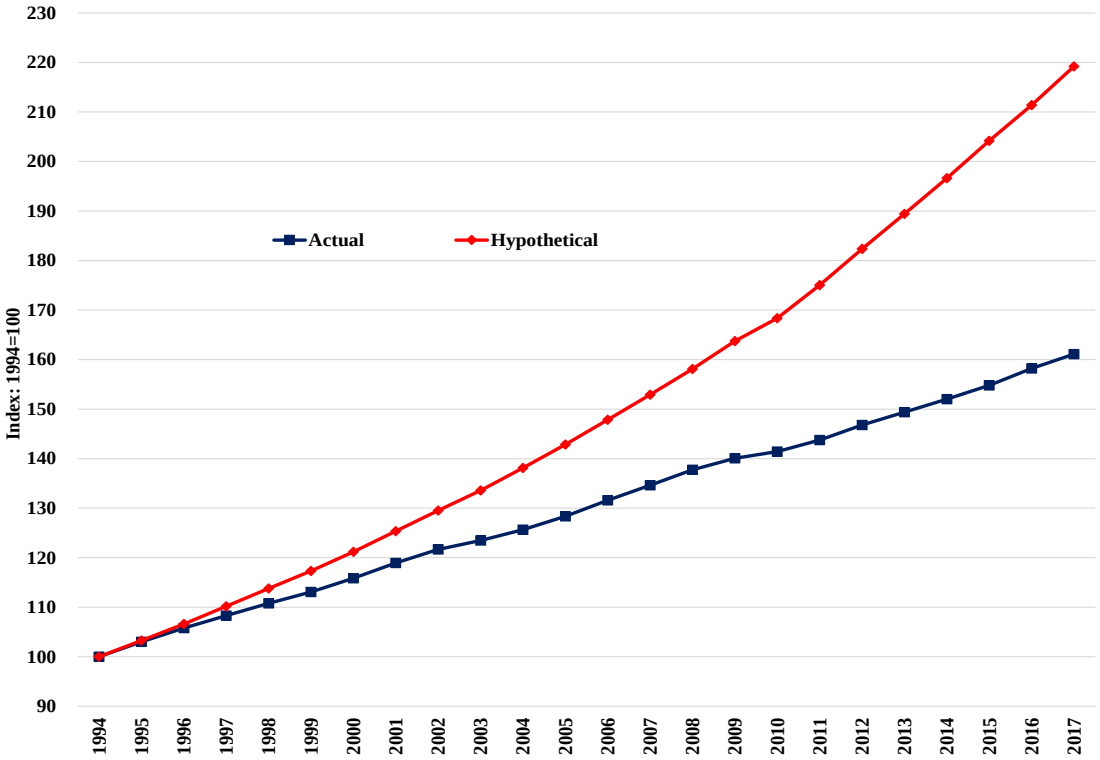
If the Chinese share of U.S. non-oil imports had stayed at its 1994 level, what would have been the level of the U.S. non-oil price index? The annual rates of growth and consequently the levels of the U.S. non-oil price index would have been much higher. In Chart 17, we present the actual and hypothetically predicted annual rates of growth of the U.S. non-oil price index, using the regression results of model (2) in Table 2 above. The hypothetical annual rates of growth would have been higher than the actual annual rates of growth by an average of 1.3 percentage points between 1994 and 2017. In Chart 18, we present the hypothetical levels of the U.S. non-oil price index based on the hypothetical annual rates of growth, beginning in 1994, and compare it with the actual level. We note that the levels of the U.S. non-oil price index in 2010 and 2017 would have been respectively 19 and 36 percent higher than the actual had the Chinese share of U.S. non-oil imports remained at its 1994 level of 6.2 percent.

Chart 17: Actual and Hypothetical Annual Rates of Growth of the U.S. Non-Oil Price Index



Source: U.S. Bureau of Labor Statistics and estimates based on model (2) in Table 2.

Chart 18: Actual and Hypothetical Levels of the U.S. Non-Oil Price Index

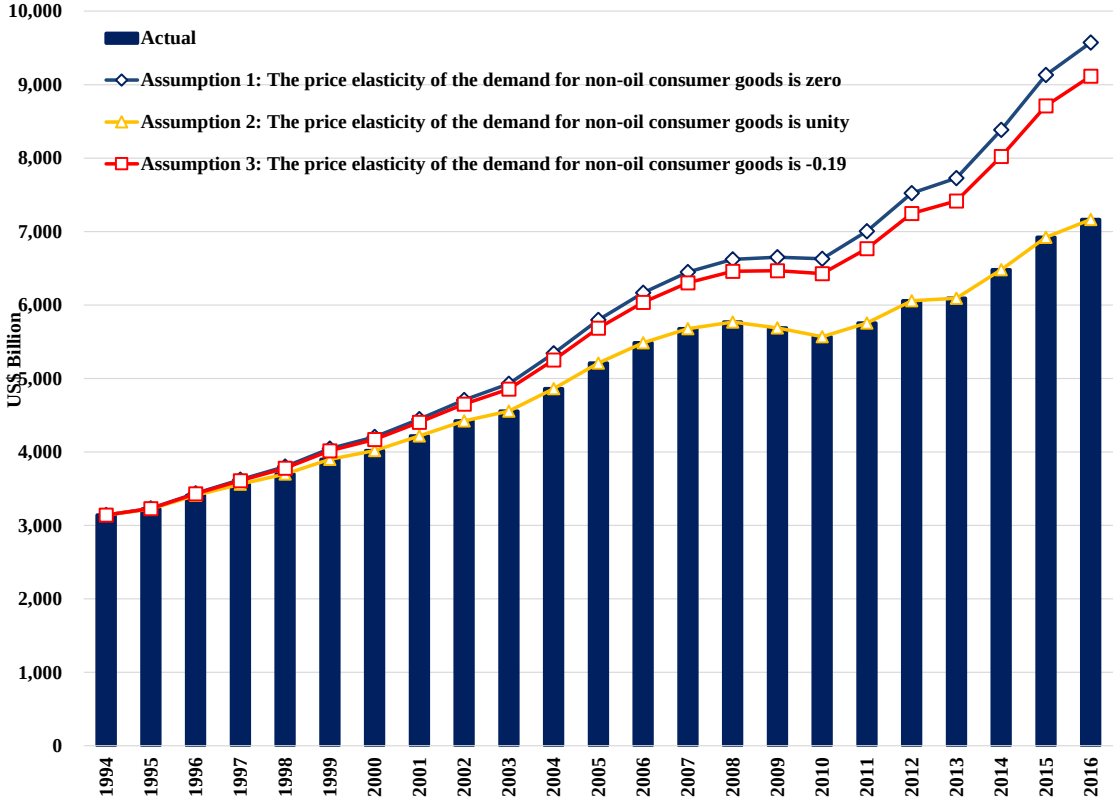


Source: U.S. Bureau of Labor Statistics and estimates based on model (2) in Table 2.

The corresponding U.S. non-oil consumer expenditure would also have been higher. In Chart 19, we present the actual and hypothetical U.S. annual nominal non-oil consumer expenditure under three alternative assumptions: (1) the price elasticity of the demand for non-oil consumer goods is zero ("Assumption 1"); (2) the price elasticity of the demand for non-oil consumer goods is minus one; and (3) the price elasticity of the demand for non-oil consumer goods is an intermediate value, say -0.19, that is, if price increases by 1 percent, the real expenditure decreases by 0.19 percent ("Assumption 3").[16] The average annual saving to U.S. consumers resulting from a lower U.S. non-oil price between 1994 and 2016 may be estimated to be US$623 billion under Assumption 3, or 12 percent of the actual average annual non-oil consumption expenditure. In Chart 20, the actual and hypothetical U.S. annual real non-oil consumer expenditures under the three alternative assumptions are presented. Between 1994 and 2016, the annual reduction in real non-oil consumer expenditure averaged US$714 billion (2017 prices) under Assumption 2 and US$136 billion under Assumption 3. As a comparison, the U.S. average annual real non-oil consumption expenditure amounted to US$6,157 billion over the same period.

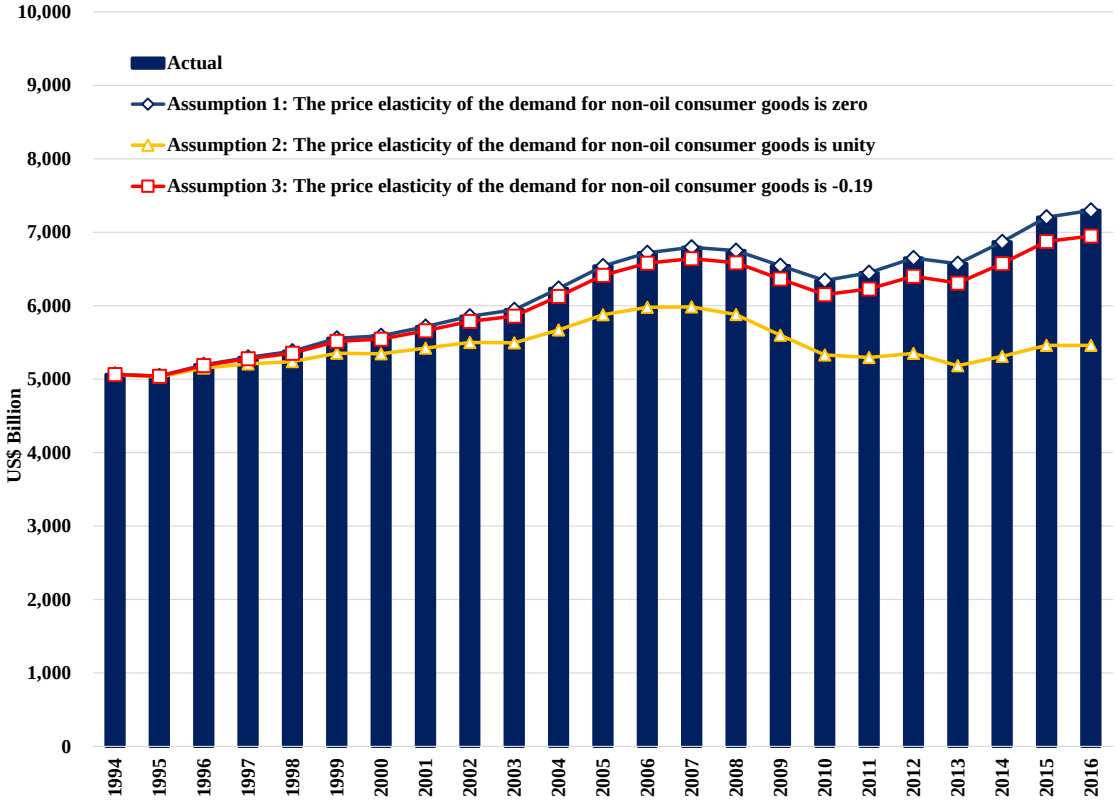
[16] An attempt is made to estimate the price elasticity of the U.S. demand for non-oil consumer goods by regressing the real expenditure on non-oil consumer goods (ln) on the U.S. non-oil price index (ln), the total consumer expenditure (ln), and a time trend. The estimated price elasticity is -0.19.

Chart 19: Actual and Hypothetical U.S. Annual Nominal Non-Oil Consumer Expenditures



Source: U.S. Bureau of Labor Statistics and estimates of the authors.

Chart 20: Actual and Hypothetical U.S. Annual Real Non-Oil Consumer Expenditures (2017 Prices)



Source: U.S. Bureau of Labor Statistics and estimates of the authors.

10. The Impact of the U.S. Non-Oil Price Index on the U.S. Consumer Price Index

The U.S. non-oil price index has a weight of 77.4 percent in the U.S. Consumer Price Index over 1994–2017. Thus, a change of one percentage point in the U.S. non-oil price index translates into a change of 0.774 percentage point in the U.S. CPI. The increase in the Chinese share of non-oil imports since 1994 has reduced the average annual rate of growth of the U.S. non-oil price index by 1.3 percentage points between 1994 and 2017. Thus, the average annual U.S. rate of inflation as measured by the CPI would be reduced by 1.0 percentage point on average (1.3 x 0.774). The level of the U.S. CPI in 2017 would have been 27 percent higher if the share of U.S. non-oil imports from China had remained at its 1994 level of 6.2 percent.

11. Concluding Remarks

While Chinese exports to the U.S. undoubtedly greatly benefitted China and the Chinese people—China would not have succeeded in lifting hundreds of millions of its people out of poverty without access to the U.S. market—these exports also benefitted the U.S. One important benefit is the lower levels of prices of consumer goods and the consequential savings for U.S. consumers. Our estimates indicate that the imports from China have resulted in an average annual reduction in the rate of inflation, as measured by the U.S. Consumer Price Index, of 1.0 percent. The level of the U.S. CPI in 2017 would have been 27 percent higher if there were no increase in the Chinese share of U.S. non-oil imports since 1994. It has also resulted in estimated average annual savings for U.S. consumers of US$623 billion between 1994 and 2016, which is 12 percent of the average annual U.S. non-oil consumer expenditure.

Looking beyond the direct benefits to U.S. consumers from Chinese imports, we may note that by helping to reduce the U.S. core rate of inflation by an annual average of 1.3 percentage point since 1994, U.S. imports from China enabled a lower U.S. nominal as well as real rate of interest, benefitting U.S. firms and households. We may also note that without these Chinese exports to the U.S. driving the growth of the Chinese economy, the Chinese people could ill afford the imports of airplanes, grains, soybeans and meat from the U.S., nor visit the U.S. as tourists or send their children to the U.S. for education. Ultimately, China-U.S. trade is win-win for both China and the United States.

Appendix: Estimation of the Price Elasticities of Demand

1. Demand Elasticity for the U.S. Real Expenditure on Apparel

We regress the U.S. annual real consumer expenditure on apparel (in 2017 prices) on both the level of the U.S. apparel price index and the total U.S. annual real consumer expenditure in 2017 prices. The results suggest that the price elasticity of demand for apparel is -0.56 during the period between 1984 and 2017.

Table 3: Regression of the U.S. Real Expenditure on Apparel

	The U.S. Annual Real Consumer Expenditure on Apparel in 2017 Prices (ln)
Level of the U.S. Apparel Price Index (ln)	-0.556***
	(0.178)
The U.S. Annual Real Consumer Expenditure in 2017 Prices (ln)	1.057***
	(0.062)
Constant	-1.390
	(1.208)
Durbin-Watson Statistic	1.5251
Number of Observations	28
R^2	0.955
Adjusted R^2	0.951
Residual Standard Error	0.032 (df = 25)
F-Statistic	264.787*** (df = 2; 25)

Notes: Numbers in parentheses are estimated standard errors. ***Significant at the 1-percent level; **significant at the 5-percent level; *significant at the 10-percent level.

2. Demand Elasticity for the U.S. Real Non-Oil Consumption Expenditure

We regress the U.S. annual real non-oil consumer expenditure (in 2017 prices) on both the level of the U.S. non-oil price index, the total U.S. annual real consumer expenditure (in 2017 prices) and a time trend. The results (model 2) suggest that the price elasticity of demand for non-oil consumer goods is -0.19 during the period between 1984 and 2017.

Table 4: Regression of the U.S. Real Non-Oil Consumption Expenditure

	The U.S. Annual Real Non-Oil Consumer Expenditure in 2017 Prices (ln)	
	(1)	(2)
Level of the U.S. Non-Oil Price Index (ln)	-0.209***	-0.185***
	(0.025)	(0.049)
The U.S. Annual Real Consumer Expenditure in 2017 Prices (ln)	0.991***	0.979***
	(0.033)	(0.039)
Time Trend	0.006***	0.005***
	(0.001)	(0.001)
Constant	0.823***	0.833**
	(0.296)	(0.377)
ρ Estimated from AR(1) Model		0.752
Durbin-Watson Statistic	0.6194	1.5573
Number of Observations	33	33
R^2	0.998	0.965
Adjusted R^2	0.998	0.960
Residual Standard Error	0.006 (df = 29)	0.023 (df = 29)
F-Statistic	5,852.756*** (df = 3; 29)	2.165e+06*** (df = 4; 29)

Notes: Numbers in parentheses are estimated standard errors. ***Significant at the 1-percent level; **significant at the 5-percent level; *significant at the 10-percent level.