

Product Quality and International Price Dynamics over the Business Cycle: Online Appendix

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A DATA FOR INTERNATIONAL CORRELATION FACTS

Data in Tables 1 and 3 in the paper are taken from the OECD's Quarterly National Accounts database. We obtain series for the countries listed in Table 1 in current prices (CPCARSA) as well as volume estimates (VPVOBARSA) in US dollars at PPP adjusted prices, and use the OECD's reference year. The series are total private consumption, investment in gross fixed capital formation, exports of goods and services, and imports of goods and services. We define GDP to match the definition of the model, that is the sum of consumption, investment, and the trade balance. Net exports are defined as exports minus imports as a share of GDP. Price deflators are calculated as the ratio of imports (exports) in current prices and their corresponding value in real terms. Terms of trade are defined as the ratio of the price deflator for imports and

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the price deflator for exports. To construct the real exchange rate we obtain nominal exchange rates and consumer price indexes from the Federal Reserve Bank of St. Louis (Federal Reserve Economic Data (FRED)). Hours worked series are constructed from the OECD-MEI civilian employment index. “Rest of the world” aggregates are constructed using data from all countries in Table 1 other than the US. Real exchange rates between the US and this fictional country are computed using trade-weighted averages, and hours worked are population-weighted averages. Weights correspond to 1995-2005 averages. Finally, to compute standard deviations and correlations we take logarithms of each of the series (except for net exports, which can be negative) and apply a Hodrick-Prescott filter to detrend them.

Columns 2 and 3 of Table 1 report the correlations between the terms of trade and output and between relative consumption and real exchange rate for eleven of the largest economies in the OECD between 1971 and 1998. In most cases the correlation between output and the terms of trade is negative or close to zero, while US consumption relative to other countries typically rises following a drop in the real exchange rate. Columns 4-7 of Table 1 show the same correlations for the period 1999-2019 and the changes experienced. The correlation between output and the terms of trade is now strongly positive for most countries, except for Canada. The Backus-Smith puzzle is weaker for all but one of the eleven OECD economies in our sample (Australia).

All the listed countries introduced relevant changes in the way they adjust quality in their CPIs during the nineties and beginning of 2000s. Moreover, all of them, except Japan and Germany turned to geometric formulas (Jevon) between 1995 and 2003. This change allows to account for household short-run substitution between goods of the same subcategory and, therefore, helps controlling for quality variations in the basket of consumption (see the discussion in the paper). One exception is the Netherlands

who applied this change only in 2010. Therefore, the countries we list, although not all of them at the same time, followed the wave of changes in CPI methodology to account for quality variations. Indeed, the Boskin Commission Report Boskin et al. (1996) was not the unique research deepening in the consequences of the treatment of quality changes on CPIs. Around these years, some other authors were concerned with this issue and tried to make statistical agencies reflect on it (See, for instance, Crawford (1998), Cunningham (1996), and Eurostat (1999)). Hence, this pressure made agencies start introducing changes on their CPI computations.

B DETERMINE SUITABLE ρ

The Standard Occupational Classification 2000 (SOC 2000) of the Bureau of Labor Statistics, provides with a detailed classification of employees based on their working tasks (See http://www.bls.gov/oes/2009/may/oes_nat.htm#11-0000). It considers 821 detailed occupations and lists the tasks for every category. Data is collected annually, but the classification changes over time. SOC 2000 finishes in 2009. However, the changes from the immediately previous year, 1999, are not dramatic and we can homogenize them to compare 2009 and 1999 (we cannot claim the same for 1998 data).

After revising the definitions for every occupation, we construct two measures of quality tasks employees. We select occupations that imply the design, creation, invention, customization for specific clients or group of clients, research (and similar tasks) on/of products and services, as well as the direct control of quality and its improvement. We also include those occupations involved in the enhancement of the interest of the public on goods and services (i.e., marketing activities). The first measure, called *broad measure*, includes 53 categories. These categories are: Advertising and

Promotions Managers, Marketing Managers, Sales Managers, Public Relations Managers, Engineering Managers, Computer and Information Scientists (Research), Computer Programmers, Computer Software Engineers (Applications), Computer Software Engineers (Systems Software), Architects, Landscape Architects, Aerospace Engineers, Agricultural Engineers, Biomedical Engineers, Chemical Engineers, Civil Engineers, Computer Hardware Engineers, Electrical Engineers, Electronics Engineers (Except Computer), Environmental Engineers, Health and Safety Engineers (Except Mining Safety Engineers and Inspectors), Industrial Engineers, Marine Engineers and Naval Architects, Materials Engineers, Mechanical Engineers, Petroleum Engineers, Engineers (All Other: Mining, Geological and Nuclear are not included), Food Scientists and Technologists, Chemists, Materials Scientists, Market Research Analysts, Agricultural and Food Science Technicians, Commercial and Industrial Designers, Fashion Designers, Floral Designers, Graphic Designers, Interior Designers, Merchandise Displayers and Window Trimmers, Set and Exhibit Designers, Designers (All Other), Sound Engineering Technicians, Chefs and Head Cooks, First-Line Supervisors/Managers of Retail Sales Workers, First-Line Supervisors/Managers of Non-Retail Sales Workers, Advertising Sales Agents, Sales Representatives (Services, All Other), Sales Representatives (Wholesale and Manufacturing, Technical and Scientific Products), Sales Representatives (Wholesale and Manufacturing, Except Technical and Scientific Products), Demonstrators and Product Promoters, Sales Engineers, Agricultural Inspectors, First-Line Supervisors/Managers of Construction Trades and Extraction Workers, and First-Line Supervisors/Managers of Mechanics (Installers, and Repairers). All of them together represent a 6.57% of total employment in 2009 and a 5.74% in 1999.

The *conservative measure* is more restrictive. It includes 25 categories and it requires the appearance of the words creation, design, conversion, product safety, conservation,

new uses, discovery, quality, marketing or advertising in the definition. Moreover we are cautious with a broad category labeled *Industrial Engineers*, which specifies that they: “*Design, develop, test, and evaluate integrated systems for managing industrial production processes including human work factors, quality control, inventory control, logistics and material flow, cost analysis, and production coordination.*” Therefore, they are actually involved in the enhancement and control of quality and in some design. However, the latter are not the only tasks they perform. We decided to include only 1/4 of industrial engineers in our conservative measure. The other 24 categories are: Advertising and Promotions Managers, Marketing Managers, Computer and Information Scientists (Research), Computer Programmers, Computer Software Engineers (Applications), Computer Software Engineers (Systems Software), Aerospace Engineers, Agricultural Engineers, Biomedical Engineers, Chemical Engineers, Civil Engineers, Computer Hardware Engineers, Electrical Engineers, Electronics Engineers (Except Computer), Health and Safety Engineers (Except Mining Safety Engineers and Inspectors), Materials Engineers, Food Scientists and Technologists, Materials Scientists, Commercial and Industrial Designers, Fashion Designers, Graphic Designers, Set and Exhibit Designers, Advertising Sales Agents and Demonstrators and Product Promoters. This measure implies a 2.33% and a 2.12% of the work force devoted to quality tasks in 2009 and 1999 respectively.

C GHH PREFERENCES

Raffo (2008) and Raffo (2010) shows that many of the inconsistencies between the theory and the data stem from the low volatility of consumption implied by the standard model. He argues that the introduction of an alternative specification of household preferences

increases consumption volatility, eliminating some of the model inconsistencies with the data. We briefly explore this possibility. GHH preferences, introduced by Greenwood, Hercowitz, and Huffman (1988), have the property that the marginal rate of substitution between consumption and leisure is independent of the consumption level within the period. This implies that there is no income effect on labor supply and therefore hours worked respond more strongly to productivity changes, which in turn generates volatility of consumption more in line with the data. GHH preferences are characterized by the following utility function:

$$U(c, 1 - n) = \frac{[c_t - \lambda n_t^\mu]^\theta}{\theta}.$$

For this exercise we set $\mu = 1.5$ to match a Frisch elasticity of 2,¹ consistent with macroeconomic estimates in Smets and Wouters (2007) (see Reichling and Whalen (2017) for a discussion about micro and macro estimates for this elasticity), and $\lambda = 1.3$ to match a share of hours worked of 0.34. We leave all other parameters unchanged with respect to the benchmark model.

GHH preferences solve the contradiction we had in cross-country correlations for labor, that are now positive, as in the data. Moreover, the model improved some results when quality adjustments are not considered. For instance, it now matches labor input volatility, and the volatility of terms of trade, better. It also produces cross-country correlations of investment more in line with data. However, the output-consumption anomaly reappears, and the correlation between relative consumption and real exchange rate (RER), although negative, is too small.

When we consider quality adjustments, GHH version fails in several aspects: it generates a volatility that more than doubles that of the non-adjusted scenario and

volatility close to 0 for TOT; the change in the correlation between relative consumption and RER goes in the opposite direction compared to data; it misses the change of sign in the correlation between TOT and output; the consumption-output anomaly is still there; and domestic correlations are too high (see Table E.1).

TABLE E.1 HERE

D EMPIRICAL EVIDENCE FOR THE ROLE OF QUALITY

This Section revises the literature addressing the impact of quality-adjustment methodology introduction on international relative CPI movements; Provides further details on the data used in the panel analysis; And explores the role of quality in US CPI trend.

D.1 Brief review on the impact of CPI methodological changes on the index

As Hoven (1999) establishes, quality change is commonly regarded as the biggest problem in price index compilation. It is also regarded by many as the most important potential source of bias in the consumer price index and as the most important potential source of non-comparability between CPIs of different countries. At present, there exists no single universally accepted method which can be applied in all circumstances. Statistical offices apply a range of methods and procedures, each of which has its own advantages and disadvantages. The author analyses quality adjustment considerations and methods in Dutch CPI by 1998. He focuses on cars, clothing and washing machines and describes the specific difficulties encountered for each of these categories,

and reflects on services subcategories. The main conclusion in Hoven (1999) is that the quality adjustments made do have a significant impact on the CPI.

Bover and Izquierdo (2003) offer a survey that highlights the consequences of different CPI calculations methodologies on real terms aggregate variables like GDP, imports and exports. They concentrate their efforts in the ample range of quality adjustment methods and aggregating formula used by national statistical agencies and, specifically, on cars, housing and computers subcategories. They mention, for instance, that investment, exports and imports increase at annual rates of between 0.4% and 1% more, if quality changes are properly discounted, in countries like U.S, France, Japan or the Netherlands. The effect on investment is so significant because incorrectly measuring it has consequences on the measurement of capital stock and on the evolution of total factor productivity. The part of this effect transmitted to real GDP depends, of course, on the trade balance of each country.

There are several reasons that difficult the international comparison of CPI. Some of them are different construction of the indexes, different composition of the baskets of consumption, the means of measuring housing costs and, of course, the way quality adjustments are tackled. Tysklind (2020) develops an international comparison of CPI evolution from 2000 to 2018 focusing on the latter issue. The CPI subcategories that suffer from quality changes show significant differences among west European countries. Given that, many of the goods in this category are highly tradable, the relative price movements are difficult to explain, once controlling for exchange rate variations. Moreover, the differences are so large that they do have an effect on the aggregate CPI indexes. Clothing and shoes, furniture, household equipment and white goods, cars, telephony, and home electronics (including personal computers) are the groups comprised in the quality adjusted sub-indices and represent an average of 20% of total CPI

for Sweden.

Wells and Restieaux (2014) identify the Boskin Commission Report and similar studies for Canada and U.K. as the departure point for the internationally move towards the use of hedonics to quality adjust Information and Technology Communication (ICT) products. They conduct a survey on ten National Statistics Institutes about the current and planned use of hedonics for their CPI indexes and provide a list of CPI goods or categories that use hedonics by country, with its year of introduction.²

D.2 Data for the panel data analysis

The complete list of items subject to quality change adjustments in US CPI-U is available in <https://www.bls.gov/cpi/quality-adjustment/> . There is no detailed list pairing this item list and the date of quality adjustment introduction. We collected this information from the following sources: Wells and Restieaux (2014), Stewart and Reed (1999) and BLS (2020). Moreover, the list of items subject to quality adjustments are coded by the BLS Consumer Price Index Entry Level Items (ELIs), whereas CPI-U has its own coding, which is not as disaggregated. We have paired them based on the definitions of CPI-U categories.

We follow Johnson (2017) to classify every subcategory as tradable or as non-tradable. He uses *total commodity output* from Input-Output tables provided by the Bureau of Economic Analysis and defines a threshold over which a commodity becomes tradable. To choose the threshold, he measures tradable-non-tradable classification stability as the number of industries that changed their condition owing to a 1-percentage-point increase or decrease from the threshold. For example, if the threshold in question was 15 percent, the stability measure was the number of industries that went from tradable to nontradable, and vice versa, as a result of moving the threshold to 14 percent

or 16 percent. After a robustness check, he concludes that the suitable threshold for US is 11% of GDP. Table A-1 in his appendix provides the full list of items classified. Once a CPI category is identified as tradable, our trade dummy variable turns to 1 for the whole time span.

Monthly unemployment rate is extracted from US Bureau of Labor Statistics, Unemployment Rate [UNRATENSA], retrieved from FRED, Federal Reserve Bank of St. Louis (<https://fred.stlouisfed.org/series/UNRATENSA>); annual Import and Export data is from United States Census Bureau;³ US GDP is from Leading Indicators OECD: Reference series: Gross Domestic Product (GDP): Normalized for the United States [USALORSGPNOSTSAM], retrieved from FRED, Federal Reserve Bank of St. Louis (<https://fred.stlouisfed.org/series/USALORSGPNOSTSAM>).

Table E.2 lists the CPI categories with both coding system, their classification as tradable or non tradable, the date of new quality adjustments if any, and the length of the time series.

TABLE E.2 HERE

D.3 Quality adjustments and trend changes

We check whether a trend change is present coinciding with the introduction of quality adjustments methods by category. Figure F shows the time trend coefficients and their 95% confidence intervals for the natural log of CPI categories affected by the introduction of quality adjustments methods. Trend coefficients are significantly different for almost every category. However, this figure only indicates that time trend has changed over time for the categories. We then run per category Swald tests to search for unknown trend breaks. Only two of the CPI series affected by quality adjustment methods

contain a break point close after the date of introduction of quality adjustments. These categories are televisions and new vehicles. Therefore, we conclude that changes in the accountability of quality variations do not cause changes in CPI trend.

One concern the reader may have is the possible coincidence in time of globalization upsurge and quality adjustment methods in CPI. If this was the case, we could erroneously conclude on the relevance of quality changes consideration, while part of the hidden effects could come, instead, from trade openness. Literature locates most relevant regulatory changes which favor openness between 1970 and 1995 (see, for instance, Krugman (1995) and Sachs and Warner (1995)). Ben-David and Papell (1997) develop a detailed cross-country time series analysis testing for structural breaks in imports and exports over GDP ratios. They find 1972 and 1973 as breaking points for US imports and exports over GDP ratios. All of the 47 analyzed countries suffered the break in 1986 the latest and there is quite a lot of variety in the break date. A more recent paper, Husein and Pier (2019), look for structural breaks for US exports and imports endogenously and find them around 2007. Finally, we run a simple analysis for annual import and export data from 1960 to 2019 and systematically reject the hypothesis of a structural break in their trends around years close to 1998, where major quality adjustment changes were introduced in CPI. We use Stata to test for unknown structural breaks in the logs of total exports and total imports for US and the logs of exports and imports over GDP. The tests report 1973, 1988 and 2008 as breaks.

To explore the effects of globalization on CPI volatility, we run regressions for both volatility measures and for the first difference of them on the trade dummy variable for our panel of categories. Trade results not significant at any level of confidence in all the cases.

E TABLES

Table E.1: GHH simulation results.

<i>Standard deviations^a</i>	<i>Data^b</i>		<i>Model</i>	
	71-98	99-19	Non-adjusted	Adjusted
Output	1.00	0.81	1.00	2.47
Hours	1.22	1.45	1.83	0.68
Consumption	0.84	0.67	0.65	0.84
Investment	2.81	2.87	3.99	2.19
Net exports	0.34	0.39	0.23	0.29
Terms of trade	1.78	1.17	1.85	0.05
<i>Corr. with domestic output</i>				
Hours	0.86	0.92	0.94	0.99
Consumption	0.93	0.91	0.95	0.99
Investment	0.94	0.95	0.92	0.98
Net exports	−0.41	−0.60	−0.43	−0.47
Terms of trade	−0.26	0.44	−0.41	−0.35
<i>Cross-country correlations</i>				
Output	0.58	0.77	0.49	0.52
Hours	0.42	0.86	0.52	0.51
Consumption	0.36	0.74	0.52	0.57
Investment	0.30	0.80	0.28	0.35
Rel. consumption-RER	−0.71	−0.13	−0.45	−0.75

^a Relative to the standard deviation of output. Output volatility is relative to that of 1971-98.

^b Source: OECD and FRED.

Table E.2: CPI-U Categories.

ELI code	US city average Label	CPI-U code	Trade	Q	ini-end
A0	All items	CUUR000SA0	0	1999	<i>entire</i>
AA	Apparel	CUUR000SAA	1	1991	<i>entire</i>
AE21	Info. and info. processing	CUUR000SAE21	1	1998	1993M1–
AF	Food and beverages	CUUR000SAF	0	<i>none</i>	1967M1–
AF1	Food	CUUR000SAF1	0	<i>none</i>	<i>entire</i>
AF11	Food at home	CUUR000SAF11	0	<i>none</i>	<i>entire</i>
AF111	Cereals and bakery products	CUUR000SAF111	0	<i>none</i>	<i>entire</i>
AF112	Meats, poultry, fish, and eggs	CUUR000SAF112	0	<i>none</i>	1967M01–
AF1121	Meats, poultry, and fish	CUUR000SAF1121	0	<i>none</i>	<i>entire</i>
AF113	Fruits and vegetables	CUUR000SAF113	1	<i>none</i>	<i>entire</i>
AF1131	Fresh fruits and vegetables	CUUR000SAF1131	1	<i>none</i>	<i>entire</i>
AF114	Nonalcoh. beverages, beverage materials	CUUR000SAF114	0	<i>none</i>	<i>entire</i>
AF115	Other food at home	CUUR000SAF115	0	<i>none</i>	1967M01–
AF116	Alcoholic beverages	CUUR000SAF116	0	<i>none</i>	1967M01–
AH1	Shelter	CUUR000SAH1	0	1994	1952M12–
AH3	Household furnishings and operations	CUUR000SAH3	1	<i>none</i>	1967M01–
AR	Recreation	CUUR000SAR	0	<i>none</i>	1993M1–
EAE	Footwear	CUUR000SEAE	1	1991	<i>entire</i>
EAG	Jewelry and watches	CUUR000SEAG	0	<i>none</i>	1986M12–
EEC	Postage and delivery services	CUUR000SEEC	0	<i>none</i>	1997M12–
EEE	Information technology, hardw. and serv.	CUUR000SEEE	1	1998	1988M12–
EEE02	Computer software and accessories	CUUR000SEEE02	1	1998	1997M12–
EEE04	Phone hardw., calcul., other consumer info items	CUUR000SEEE04	1	<i>none</i>	1997M12–
EFA	Cereals and cereal products	CUUR000SEFA	0	<i>none</i>	1977M12–
EFA03	Rice, pasta, cornmeal	CUUR000SEFA03	1	<i>none</i>	1977M12–
EFB	Bakery products	CUUR000SEFB	0	<i>none</i>	1977M12–
EFB01	Bread	CUUR000SEFB01	0	<i>none</i>	1977M12–
EFB02	Fresh biscuits, rolls, muffins	CUUR000SEFB02	0	<i>none</i>	1997M12–
EFB03	Cakes, cupcakes, and cookies	CUUR000SEFB03	0	<i>none</i>	1978M01–
EFB04	Other bakery products	CUUR000SEFB04	0	<i>none</i>	1978M01–

ELI code	U.S. city average Label	CPI-U code	Trade	Q	ini-end
EFF	Poultry	CUUR0000SEFF	0	none	entire
EFF01	Chicken	CUUR0000SEFF01	0	none	1997M12—
EFG	Fish and seafood	CUUR0000SEFG	1	none	entire
EFG01	Fresh fish and seafood	CUUR0000SEFG01	1	none	1997M12—
EFG02	Processed fish and seafood	CUUR0000SEFG02	1	none	1997M12—
EFH	Eggs	CUUR0000SEFH	0	none	entire
EFJ01	Milk	CUUR0000SEFJ01	0	none	1997M12—
EFJ02	Cheese and related products	CUUR0000SEFJ02	0	none	1977M12—
EFJ03	Ice cream and related products	CUUR0000SEFJ03	0	none	1977M12—
EFK	Fresh fruits	CUUR0000SEFK	1	none	entire
EFL	Fresh vegetables	CUUR0000SEFL	1	none	entire
EFM	Processed fruits and vegetables	CUUR0000SEFM	1	none	1997M12—
EFM02	Frozen fruits and vegetables	CUUR0000SEFM02	0	none	1997M12—
EFM03	Other proc. fruits,vegetables incl. dried	CUUR0000SEFM03	1	none	1997M12—
EFN01	Carbonated drinks	CUUR0000SEFN01	0	none	1978M01—
EFP	Beverage materials incl. coffee, tea	CUUR0000SEFP	1	none	1997M12—
EFP01	Coffee	CUUR0000SEFP01	1	none	1967M01—
EFP02	Other beverage materials including tea	CUUR0000SEFP02	0	none	1997M12—
EFR	Sugar and sweets	CUUR0000SEFR	1	none	entire
EFS	Fats and oils	CUUR0000SEFS	0	none	1967M12—
EFS01	Butter and margarine	CUUR0000SEFS01	0	none	1997M12—
EFS02	Salad dressing	CUUR0000SEFS02	1	none	1997M12—
EFS03	Other fats, oils incl. peanut butter	CUUR0000SEFS03	0	none	1997M12—
EFT01	Soups	CUUR0000SEFT01	1	none	1977M12—
EFT03	Snacks	CUUR0000SEFT03	0	none	1977M12—
EFT04	Spices, seasonings, condiments, sauces	CUUR0000SEFT04	1	none	1978M01—
EFT05	Baby food	CUUR0000SEFT05	1	none	1997M12—
EFV	Food away from home	CUUR0000SEFV	0	none	1953M01—
EFW	Alcoholic beverages at home	CUUR0000SEFW	1	none	1977M12—
EFW02	Distilled spirits at home	CUUR0000SEFW02	1	none	1978M01—

ELI code	U.S. city average Label	CPI-U code	Trade	Q	ini-end
EFW03	Wine at home	CUUR0000SEFW03	1	none	1969M01–
EFX	Alcoholic beverages away from home	CUUR0000SEFX	0	none	1977M12–
EGA	Tobacco and smoking products	CUUR0000SEGA	0	none	1967M01–
EGC	Personal care services	CUUR0000SEGC	0	none	1967M01–
EGC01	Haircuts, other personal care serv.	CUUR0000SEGC01	0	none	1997M12–
EGD05	Financial services	CUUR0000SEGD05	0	none	1986M12–
EHA	Rent of primary residence	CUUR0000SEHA	0	1994	<i>entire</i>
EHC	Owners' equivalent rent of residences	CUUR0000SEHC	0	1994	1982M12–
EHD	Tenants' and household insurance	CUUR0000SEHD	0	1994	1997M12–
EHE	Fuel oil and other fuels	CUUR0000SEHE	1	none	<i>entire</i>
EHE01	Fuel oil	CUUR0000SEHE01	1	none	1952M01–
EHF	Energy services	CUUR0000SEHF	0	none	<i>entire</i>
EHF01	Electricity	CUUR0000SEHF01	0	none	1952M01–
EHG	Water-sewer, trash collect. services	CUUR0000SEHG	0	none	1997M12–
EHH01	Floor coverings	CUUR0000SEHH01	1	none	1997M12–
EHH02	Window coverings	CUUR0000SEHH02	1	none	1997M12–
EHJ	Furniture and bedding	CUUR0000SEHJ	1	none	1969M01–
EHK	Appliances	CUUR0000SEHK	1	none	1997M12–
EHK01	Major appliances	CUUR0000SEHK01	1	2000M10	1997M12–
EHL01	Clocks, lamps, and decorator items	CUUR0000SEHL01	1	none	1977M12–
EHL03	Dishes and flatware	CUUR0000SEHL03	1	none	1997M12–
EHL04	Electric cookware and tableware	CUUR0000SEHL04	1	none	1997M12–
EHN	Housekeeping supplies	CUUR0000SEHN	1	none	1967M01–
EHP01	Domestic services	CUUR0000SEHP01	0	none	1997M12 – 2015M08
EMC02	Dental services	CUUR0000SEMC02	0	none	1969M01–
EMF01	Prescription drugs	CUUR0000SEMF01	1	none	1969M01–
EMF02	Nonprescription drugs	CUUR0000SEMF02	1	none	2009M12–
EMG	Medical equipment and supplies	CUUR0000SEMG	1	none	2009M12–
ERA	Video and audio	CUUR0000SERA	1	2000	1993M01–

ELI code	U.S. city average Label	CPI-U code	Trade	Q	ini-end
ERA01	Televisions	CUUR0000SERA01	1	1999	1967M01–
ERA02	Cable and satellite tv serv.	CUUR0000SERA02	0	1999	1983M12–
ERA04	Video discs,other media,incl.rent.vid.	CUUR0000SERA04	1	2000	1997M12–
ERA05	Audio equipment	CUUR0000SERA05	1	2000	1977M12–
ERD01	Photographic equipment and supplies	CUUR0000SERD01	1	2000	1977M12–
ERE01	Toys	CUUR0000SERE01	1	<i>none</i>	1977M12–
ERE03	Music instruments and accessories	CUUR0000SERE03	1	<i>none</i>	1997M12–
ETA01	New vehicles	CUUR0000SETA01	1	1992	1953M01–
ETA02	Used cars and trucks	CUUR0000SETA02	1	1992	1969M01–
ETB	Motor fuel	CUUR0000SETB	1	<i>none</i>	1967M01–
ETC	Motor vehicle parts and equipment	CUUR0000SETC	1	<i>none</i>	1977M12–
ETD	Motor vehicle maintenance and repair	CUUR0000SETD	0	<i>none</i>	1967M01–
ETE	Motor vehicle insurance	CUUR0000SETE	0	<i>none</i>	1969M01–
ETG	Public transportation	CUUR0000SETG	0	<i>none</i>	<i>entire</i>
ETG01	Airline fares	CUUR0000SETG01	1	<i>none</i>	1969M01–
S18064	Prepared salads	CUUR0000SS18064	0	<i>none</i>	2007M12–
S30021	Laundry equipment	CUUR0000SS30021	1	2000M10	1977M12–
S53023	Ship fare	CUUR0000SS53023	0	<i>none</i>	1997M12–
S61023	Photographic equipment	CUUR0000SS61023	1	2000	1997M12–
S62054	Veterinarian services	CUUR0000SS62054	0	<i>none</i>	1997M12–

Sources: BLS, BEA. Series are not seasonally adjusted. Column *ini-end* indicates the time span the series cover: when the maximum length is covered (1950M01-2020M09), we indicate *entire*; when ending date is not written, the series ends in 2020M09.

If it is not differently stated, the quality adjustment was introduced in January of the indicated year.

F FIGURES

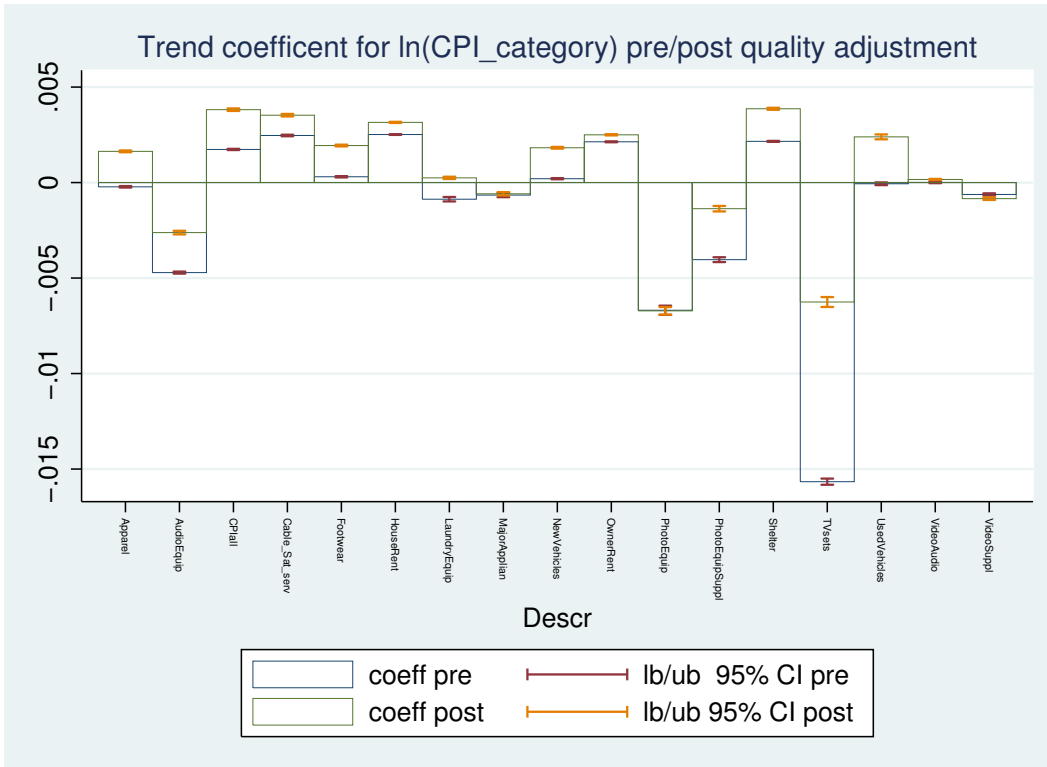


Figure F.1: Comparison between pre and post time trend coefficient of the log of CPI categories affected by the introduction of quality adjustment methods.

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Notes

¹the Frisch elasticity for this setup is $\frac{1}{\mu-1}$.

²However, this list is not exhaustive and, for example, it does not include the use of hedonic method for used cars in the Netherlands (See Hoven (1999)).

³<https://www.census.gov/foreign-trade/statistics/historical/index.html>