

# Appendix to “Product Creation and Destruction: Evidence and Price Implications” Broda and Weinstein (2007)

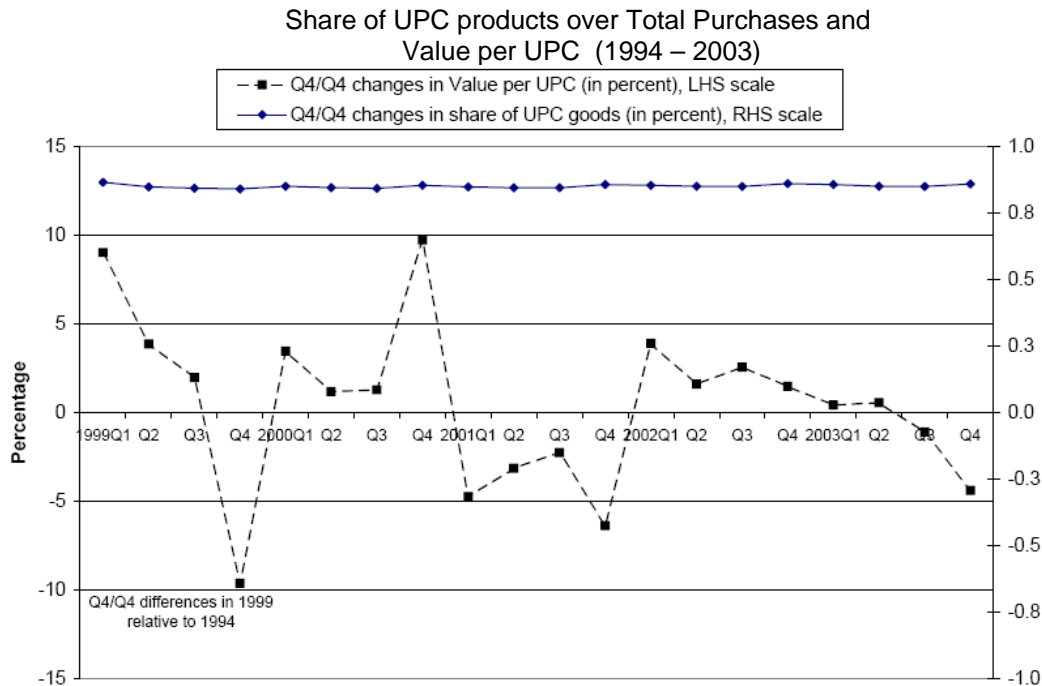
## Appendix A: Sample List of 400 Modules (out of over 1000)

Description for 400 modules (out of over 1000)			
ABRASIVE CLEANSERS-LIQUID	BUCKETS & PAILS	COOKING SAUCE	DRY DINNERS - REMAINING
ABRASIVE CLEANSERS-POWDERED	BURNER AND RANGE APPLIANCE	COOKING SPRAYS	DRY DINNERS - RICE
ACNE REMEDIES	BUTTER	COOKING WINE & SHERRY	DRY ERASE BULLETIN BOARD AND A
ADHESIVE BANDAGES	BUTTER-FRUIT & HONEY	COOKWARE PRODUCT	DUMPLINGS-CANNED
ADHESIVE BANDAGES - LIQUID - P	CAKE DECORATIONS & ICING	COOLERS - REMAINING	DUSTPANS
ADHESIVE NOTE PADS	CAMERAS	CORDIALS & PROPRIETARY LIQUEUR	DYE AND DYE REMOVER
ADHESIVE TAPE	CAN OPENER APPLIANCE	CORN DOGS-FROZEN/REFRIGERATED	EAR DROPS
ADULT-INCONTINENCE	CANADIAN WHISKEY	CORN MEAL	EGG COLORING KITS/DYE
AFTER SHAVE COSMETICS - MEN'S	CANDLE AND CANDLE IN HOLDER	CORN/POTATO STARCH	EGG MIXES-DRY
AIR CONDITIONER APPLIANCE	CANDLE HOLDER AND ACCESSORY	CORNEO BEEF - CANNED	EGGNOG - FRESH & CANNED
AIR PURIFIER AND CLEANER APPLI	CANDY-CHOCOLATE	CORNEO BEEF HASH-CANNED	EGGS-FRESH
AIR/SPECIALTY FRESHENERS - REM	CANDY-CHOCOLATE-MINIATURES	CORRECTION FLUID AND ERASERS	ELECTRIC KNIFE AND PEELER APPL
AIR/SPECIALTY FRESHENERS - SOL	CANDY-CHOCOLATE-SPECIAL	COSMETIC AND NAIL GROOMING ACC	ENEMAS-READY-TO-USE
AIR/SPECIALTY FRESHENERS - AERO	CANDY-DIETETIC - CHOCOLATE	COSMETIC KITS	ENGINE TREATMENT AND ADDITIVE
ALCOHOLIC COCKTAILS	CANDY-DIETETIC - NON-CHOCOLATE	COSMETICS - APPLICATOR BRUSHES	ENTREES - ITALIAN - 1 FOOD - F
ALE	CANDY-HARD ROLLED	COSMETICS - CONCEALERS	ENTREES - ITALIAN - 2 FOOD - F
ALUMINIUM FOIL	CANDY-KITS	COSMETICS - NONCOTTON APLCTRS/	ENTREES - MEAT - 1 FOOD - FROZ
AMMONIA	CANDY-LOLLIPOPS	COSMETICS-BLUSHERS	ENTREES - MEAT - 2 FOOD - FROZ
ANALGESIC & CHEST RUBS	CANDY-NON-CHOCOLATE	COSMETICS-EYE SHADOWS	ENTREES - MEXICAN - 1 FOOD - F
ANCHOVY PASTE	CANDY-NON-CHOCOLATE-MINIATURES	COSMETICS-EYEBROW & EYE LINER	ENTREES - MEXICAN - 2 FOOD - F
ANTACIDS	CANNED AIR	COSMETICS-FACE POWDER	ENTREES - MULTI PACK - FROZEN
ANTI-GAS PRODUCTS	CAPERS	COSMETICS-FOUNDATION-CREAM AND	ENTREES - ORIENTAL - 1 FOOD -
ANTI-SLEEP PRODUCTS	CAT & DOG LITTER	COSMETICS-FOUNDATION-LIQUID	ENTREES - ORIENTAL - 2 FOOD -
ANTI-SMOKING PRODUCTS	CAT AND DOG LITTER	COSMETICS-LIPSTICKS	ENTREES - POULTRY - 1 FOOD - F
ARTIST AND HOBBY PAINT AND SUP	CAT FOOD - DRY TYPE	COSMETICS-MASCARA	ENTREES - POULTRY - 2 FOOD - F
AUTOMATIC DISHWASHER COMPOUND	CAT FOOD - MOIST TYPE	COSMETICS-NAIL POLISH	ENTREES - REMAINING - 1 FOOD -
AUTOMOTIVE COMBINATIONS	CAT FOOD - WET TYPE	COSMETICS-NAIL POLISH REMOVER	ENTREES - REMAINING - 2 FOOD -
BABY ACCESSORY	CATSUP	COSMETICS-REMAINING	ENTREES - SEAFOOD - 1 FOOD - F
BABY BIS AND BURP CLOTH	CEREAL - GRANOLA & NATURAL TYP	COTTON - SWABS/BALLS/ROLLS/APL	ENTREES - SEAFOOD - 2 FOOD - F
BABY BOTTLES & NIPPLES	CEREAL - HOT	COUGH AND COLD THROAT SPRAYS	ENTREES-REFRIGERATED
BABY CARE PRODUCTS-BATH	CEREAL - READY TO EAT	COUGH DROPS	ENTREES/SIDE DISHES - SHELF ST
BABY CARE PRODUCTS-LOTIONS	CHARCOAL	COUGH SYRUPS & TABLETS	EXTRACTS
BABY CARE PRODUCTS-OIL	CHARCOAL/WOOD LIGHTERS	CRACKERS - CHEESE	EYE CARE - REMAINING
BABY CARE PRODUCTS-OINTMENTS	CHEESE - COTTAGE	CRACKERS - FLAKED SODA	EYE DROPS & LOTIONS
BABY CARE PRODUCTS-POWDER	CHEESE - FARMERS	CRACKERS - FLAVORED SNACK	FABRIC FINISHERS
BABY CEREAL & BISCUITS	CHEESE - GRATED	CRACKERS - GRAHAM	FABRIC PROTECTORS
BABY FOOD - JUNIOR	CHEESE - NATURAL - AMERICAN CH	CRACKERS - OYSTER	FABRIC SOFTENERS-AEROSOL
BABY FOOD - STRAINED	CHEESE - NATURAL - AMERICAN CO	CRACKERS - REMAINING	FABRIC SOFTENERS-DRY
BABY JUICE	CHEESE - NATURAL - BRICK	CRACKERS - SANDWICH & SNACK PA	FABRIC SOFTENERS-LIQUID
BABY MILK AND MILK FLAVORING	CHEESE - NATURAL - MOZZARELLA	CRACKERS - SPRAYED BUTTER	FABRIC WASHES - SPECIAL
BABY PACFRUITEETHR & BOTTLE/NIP	CHEESE - NATURAL - REMAINING	CRACKERS - SPRAYED FLAKE	FACE CLEANSERS & CREAMS & LOTI
BACON-BEEF & CANNED	CHEESE - NATURAL - VARIETY PAC	CRACKLINS - REFRIGERATED	FACIAL TISSUE
BACON-REFRIGERATED	CHEESE - PROCESSED - CREAM CHE	CRANBERRIES - SHELF STABLE	FALSE EYELASH AND ACCESSORY
BAGS - FOOD STORAGE	CHEESE - PROCESSED - LOAVES	CRAYONS	FALSE NAIL AND NAIL DECORATION
BAGS - FREEZER	CHEESE - PROCESSED - SNACK	CREAMERS - POWDERED	FAN AND CEILING FAN APPLIANCE
BAGS - LAWN & LEAF	CHEESE - PROCESSED SLICES - RE	CREAMERS-LIQUID	FEATHER DUSTERS
BAGS - OVEN	CHEESE - RICOTTA	CREME RINSES & CONDITIONERS	FEMININE HYGIENE-DEODORANT SPR
BAGS - PAPER - LUNCH	CHEESE - SHREDDED	CROUTONS	FEMININE HYGIENE-DOUCHES
BAGS - SANDWICH	CHEESE - SPECIALTY/IMPORTED	DAIRY - DIP - REFRIGERATED & F	FEMININE HYGIENE-MISCELLANEOUS
BAGS - TALL KITCHEN	CHEESE-NATURAL-MUENSTER	DAIRY - POTATO TOPPING - REFRI	FEMININE HYGIENE-TOWELETTES
BAGS - TRASH/TRASH COMPACTOR	CHEESE-NATURAL-SWISS	DAIRY - SOUR CREAM - REFRIGERA	FILM
BAGS - WASTE	CHEESE-PROCESSED SLICES-AMERIC	DAIRY DIGESTIVE AIDS	FIREPLACE LOGS
BARBECUE SAUCES	CHERRIES-MARASCHINO	DAIRY-BUTTERMILK-REFRIGERATED	FIRST AID - GAUZE - ROLLS
BARBECUED BEEF & PORK-CANNED	CHICKEN - SHELF STABLE	DAIRY-CREAM-REFRIGERATED	FIRST AID - GAUZE PADS
BARLEY-DRY	CHILDREN'S COLOGNE & GIFT SETS	DAIRY-FLAVORED MILK-REFRIGERAT	FIRST AID - HYDROCORTISONES
BATH ADDITIVES - DRY	CHILI SAUCE	DAIRY-MILK-REFRIGERATED	FIRST AID - ICE AND HEAT PACK
BATH ADDITIVES - LIQUID	CHILI-REFRIGERATED	DATES	FIRST AID - THERMOMETERS
BATH OIL - DRY	CHILI-SHELF STABLE	DENTAL ACCESSORIES	FIRST AID - TREATMENTS
BATH OIL - LIQUIDS	CHILIES	DENTAL FLOSS	FISH & SEAFOOD & COCKTAIL SAUC
BATHROOM ACCESSORY	CHOCOLATE CHIPS & MORSELS	DENTAL ADHESIVES	FLASHLIGHT BULBS
BATHROOM SCALE	CIGARETTES	DENTURE CLEANSERS	FLASHLIGHTS
BATTERIES	CIGARS	DEODORANTS - COLOGNE TYPE	FLOOR CARE - WAXES
BATTERY CHARGERS	CLAM JUICE	DEODORANTS - PERSONAL	FLOOR CARE-CLEANERS
BEAN SPROUTS-CANNED	CLEANERS - BATHROOM	DEPILATORIES - MEN'S	FLOUR - ALL PURPOSE - REMAININ
BEANS-DRY	CLEANERS - DISINFECTANTS	DEPILATORIES - WOMEN'S	FLOUR - SINGLE PURPOSE
BEER	CLEANERS - NON-DISINFECTANT	DESSERTS - RTS SINGLE SERVINGS	FLOUR-ALL PURPOSE-WHITE WHEAT
BEER & WINE MAKING KITS	CLEANERS - POWDERS	DETERGENT BOOSTERS	FONDUE SAUCE
BEVERAGE STORAGE CONTAINER	CLEANERS - WINDOW	DETERGENTS - HEAVY DUTY - LIQU	FOOD COLORING
BLANK AUDIO PRODUCT	CLEANERS-HUMIDIFIERS/VAPORIZER	DETERGENTS - LIGHT DUTY	FOOD PROCESSOR AND GRINDER APP
BLANK VIDEO PRODUCT	CLEANERS-METAL	DETERGENTS-PACKAGED	FOOD STORAGE CONTAINERS
BLEACH - DRY	CLEANERS-PASTE & JELLY	DEVILED HAM - CANNED	FOOT COMFORTS PRODUCTS
BLEACH - LIQUID/GEL	CLEANERS-SEPTIC TANK	DIARRHEA REMEDIES	FOOT PREPARATIONS-ATHLETE'S FO
BLENDER APPLIANCE	CLOTH-POLISHING/CLEANING	DIETING AIDS - APPETITE SUPPRE	FOOT PREPARATIONS-REMAINING
BLOOD PRESSURE KIT AND ACCESSO	CLOTHERSPINS	DIETING AIDS-COMplete NUTRITIO	FRANKFURTERS-REFRIGERATED
BLOOD URINE STOOL TEST PRODUCT	COCKTAIL MIXES-DRY	DINNERS-FROZEN	FRANKS-COCKTAIL-REFRIGERATED
BLUINGS	COCKTAIL MIXES-LIQUID	DIP - CANNED	FREEZER SUPPLIES
BODY MASSAGER APPLIANCE AND AC	COCKTAIL ONIONS	DIP - MIXES	FRUIT DRINKS & JUICES-CRANBERR
BODY WARMERS	COCKTAIL PRODUCTS-BITTERS & HE	DISHWASHER RINSING AIDS	FRUIT DRINKS & MIXES - FROZEN
BORATEEM	COCOA	DISHWASHING ACCESSORY PRODUCT	FRUIT DRINKS - ORANGE - FROZEN
BOULLION	COCONUT	DISINFECTANTS	FRUIT DRINKS-CANNED
BOURBON-BLENDED	COFFEE - LIQUID	DISK DISKETTE AND DATA CARTRID	FRUIT DRINKS-OTHER CONTAINER
BOURBON-STRAIGHT/BONDED	COFFEE - SOLUBLE	DISPOSABLE CUPS	FRUIT JUICE - APPLE
BRANDY/COGNAC	COFFEE - SOLUBLE FLAVORED	DISPOSABLE DIAPERS	FRUIT JUICE - APPLE - FROZEN
BRATWURST & KNOCKWURST	COFFEE AND TEA MAKER APPLIANCE	DISPOSABLE DISHES	FRUIT JUICE - GRAPE
BREAD-SPECIALTY-CANNED	COFFEE FILTERS - DISPOSABLE	DIURETIC REMEDIES	FRUIT JUICE - GRAPE - FROZEN
BREADING PRODUCTS	COFFEE SUBSTITUTES	DIVIDERS TABS LABELS AND TAGS	FRUIT JUICE - GRAPEFRUIT - FRO
BREADMAKER APPLIANCE	COLD REMEDIES - ADULT	DOG & CAT TREATS	FRUIT JUICE - ORANGE - FROZEN
BREAKFAST BARS	COLD REMEDIES - CHILDREN	DOG FOOD - DRY TYPE	FRUIT JUICE - ORANGE - OTHER C
BREAKFAST DRINKS - POWDERED	COLOGNE & PERFUME-WOMEN'S	DOG FOOD - MOIST TYPE	FRUIT JUICE - REMAINING - FROZ
BREATH FRESHENERS	COLOGNE/LOTION-MEN'S	DOG FOOD - WET TYPE	FRUIT JUICE - UNCONCENTRATED -
BREATH SWEETENERS	COMBINATION LUNCHES	DOUGH PRODUCTS - COOKIES & BRO	FRUIT JUICE-GRAPEFRUIT-CANNED
BREATHING AIDS EXTERNAL	COMPLETE NUTRITIONAL PRODUCTS	DOUGH PRODUCTS-BISCUITS-REFRIG	FRUIT JUICE-ORANGE-CANNED
BRONCHIAL REMEDIES	COMPUTER SOFTWARE	DOUGH PRODUCTS-BREAD-FROZEN	FRUIT JUICE-PRUNE
BROOMS/ MOPS & WAX APPLICATORS	CONFECTIONERY PASTE	DOUGH PRODUCTS-DINNER ROLLS-RE	FRUIT PECTINS
BRUSHES - AUTOMOTIVE	CONTACT LENS SOLUTION	DOUGH PRODUCTS-REMAINING-REFRI	FRUIT PROTECTORS
BRUSHES - MISCELLANEOUS	CONTRACEPTIVES-FEMALE	DOUGH PRODUCTS-SWEET ROLLS-REF	FRUIT PUNCH BASES & SYRUPS
BRUSHES-BATHROOM	CONTRACEPTIVES-MALE	DRAIN PIPE OPENERS	FRUIT SALADS-REFRIGERATED
BRUSHES-KITCHEN & SCRUB	COOKER STEAMER AND DEHYDRATOR	DRIED BEEF-SHELF STABLE	FRUIT SPREADS
BUCKETS & PAILS	COOKIES	DRINKWARE CONTAINER SET	FRUIT-DRIED AND SNACKS
BURNER AND RANGE APPLIANCE	COOKING BAGS W/SEASONING	DRY DINNERS - PASTA	FRUIT-GLAZED

## Appendix B Value per UPC and non-barcode goods




One concern about the database is that results might be driven by the growth in the number of barcodes *per se*. Fortunately, ACNielsen has provided us with data on the overall purchases of products with and without barcodes in the same expenditure categories for each quarter. If it has become easier for firms to obtain a barcode over the period we investigate, we would expect the share of goods with a barcode over total sales to rise over time. In Figure 1, we plot (solid line, right hand side scale) the share of sales of goods with barcodes relative to total shopping expenditures over time. Unfortunately, we cannot do this in 1994 due to an error in the sampling of total purchases. However, the share of goods purchased with a barcode relative to total shopping purchases stood at an almost constant value of 0.85 between the first quarter of 1999 and the fourth quarter of 2003 which indicates that there was no movement in the share of goods with barcodes over this time period.

Another way of checking that the ratio of goods with barcodes relative to those without barcode has remained relatively unchanged over the sample period is to check the average expenditure per UPC over time. Observing a declining expenditure per UPC would be suggestive of a fall in the cost of obtaining a UPC over the sample period. In Figure 1, we plot (dashed line, right hand scale) movements in the average expenditure per UPC deflated by the food and beverages component of the CPI at the quarterly frequency. As one can see, while there are some small fluctuations in the average amount of expenditure per UPC, overall the series is remarkably flat. This indicates that over the four years for which we have data growth in total sales moved approximately proportionally with the number of UPCs.



## Appendix C Levels of Aggregation in the ACNielsen Database

Below is an example of UPCs, Modules and Product Groups in our database. UPC numbers are illustrative and not the actual codes.

Product Description	UPC	Brand / Module	Product Group
100-count Multi-Vitamins from A-to-Zinc in tablets.	 1 23456 78901 2	Centrum / Adult Multivitamins	Nutritional Supplements
A-to-Zinc Multi-vitamin for people over 50 in tablets.	 1 23456 78902 2		
60-count Sponge Bob chewable children supplement	 1 23456 78901 2	Centrum Kids/ Kids Multivitamins	

## Appendix D Product Creation and Destruction excluding UPCs with low number of “raw buyers”

Some of the UPCs in our data are purchased by only a small fraction of the overall number of households. In order to show that the main effects in the paper are not driven by these UPCs we replicate Table 3 in the paper but exclude those UPCs with less than 20 households purchasing them. The levels of entry and exit are marginally smaller than those in table 3 suggesting that this correction has only a minor effect on the level of product churning.

Appendix Table 3: Product Entry and Exit in the U.S. dropping UPCs with less than 20 "raw buyers"

Period	9-year 1994 - 2003	4-year 1999 - 2003	1-year Median
Entry Rate	0.75	0.49	0.25
Creation	0.64	0.37	0.10
Entrant Relative Size	0.57	0.60	0.35
Exit Rate	0.69	0.43	0.23
Destruction	0.42	0.22	0.05
Exiter Relative Size	0.32	0.32	0.17
Ratio Share Common (t/t-1)	0.63	0.81	0.94

Notes: All UPCs with less than 20 households buying it are dropped from the table.

### Appendix E Product Creation and Destruction due to size and flavor only

For roughly 20 percent of the products that were purchased in Q4 2003 we have detailed information about the characteristics of the UPC, including the package size and the flavor of the product. This allows us to proxy the extent of product creation that is driven primarily from changes in sizes and flavors of existing products. For instance, a new UPC can be a "200-count Centrum Multi-Vitamins From A-to-Zinc in tablets" which differs from the UPC described in section 2 only in the amount of vitamins included in the bottle. Thus we can calculate how much of overall creation is due to innovations in size and how much is due to innovations in flavor. We find that for this sample of goods the overall creation is 35.3 percent, which is very similar to that in the overall sample. Creation from new sizes is 1.9 percent or roughly 5 percent of overall creation. Adding new flavors raises creation to 2.3 percent, which still is a small proportion of overall creation.

Share of Entry and Creation due to New Sizes and Flavors	
1999-2003	
Creation	35.3%
Creation due to New Size	1.9%
Creation due to New Size&Flavor	2.3%

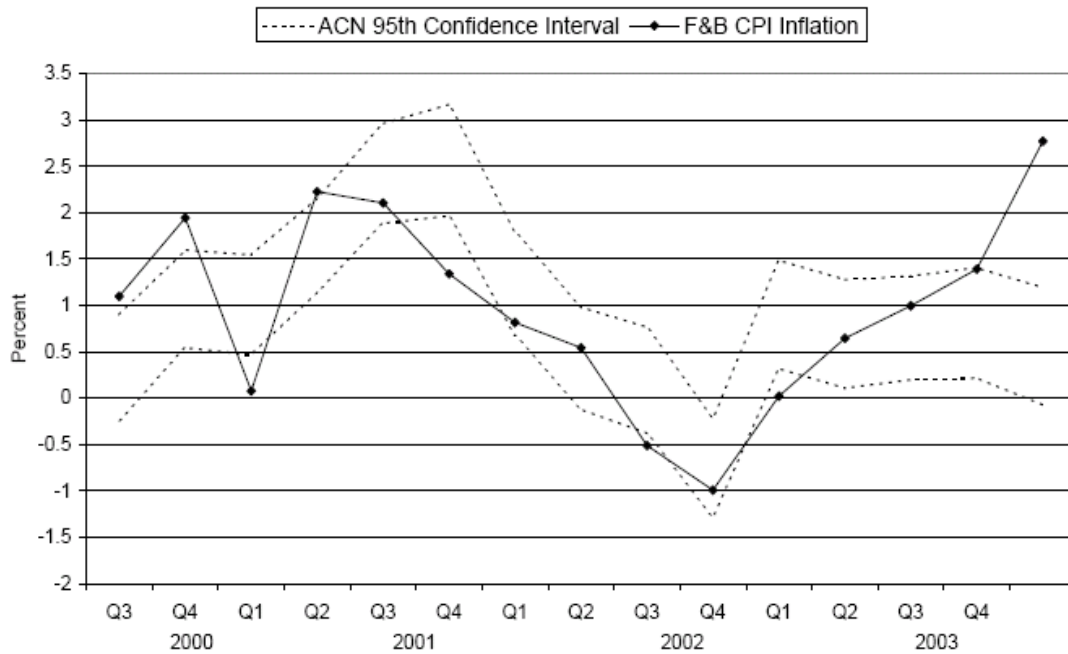
\* This includes a sample of 20% of all goods in Q4 2003 for which size and flavor data is available.

## Appendix F

### Bootstrapped Standard Errors by quarter and Food and Beverage CPI

The figure below shows the 90<sup>th</sup> confidence interval for inflation using ACNielsen common set of goods and the actual inflation rate from the BLS for the Food and Beverage component of the CPI. As discussed in the paper, the ACNielsen includes a larger set of goods than that included in the CPI's Food and Beverage component.

1-Quarter Inflation Seasonally Adjusted Random Draws and  
"Food and Beverage" CPI (Annualized rate), 2003 - 1999



**Appendix G**  
**Per year Substitution Bias relative to Tornqvist (in percent)**

<b>Sample and Weights 1994</b>					
Avg Lower	Laspayres	Paasche	Geometric	Geometric	Ideal CES
Avg Upper	Laspayres	Paasche	Laspayres*	Tornqvist**	Ideal CES
03Q4-94Q4	0.36	-0.37	0.14	0.00	0.00
03Q4-99Q4	0.31	-0.14	0.17	0.00	0.00
99Q4-94Q4	0.36	-0.52	0.10	0.00	0.00

<b>Sample and Weights 1999</b>					
Avg Lower	Laspeyres	Paasche	Geometric	Geometric	Ideal CES
Avg Upper	Laspeyres	Paasche	Laspeyres	Tornqvist	Ideal CES
03Q4-99Q4	0.25	-0.25	0.07	0.00	0.00

\* Closest to the CPI methodology.

\*\* Closest to the C-CPI methodology

**Appendix H**  
**Product Group with the largest contribution to the Quality/New Goods Bias**

Product Group Name	Weight in Consumption	Contribution to Quality Bias
ELECTRONICS, RECORDS, TAPES	3.04%	12.40%
PREPARED FOODS-FROZEN-READY TO SERVE	2.80%	7.06%
DRUGS, REMEDIES (NON-PAIN), MEDICAL ACCESSORIES	1.87%	4.75%
SNACKS	2.62%	4.20%
HOUSEWARES, APPLIANCES	1.86%	3.68%
PAIN REMEDIES	0.65%	3.48%
DEODORANT	0.39%	3.15%
LAUNDRY SUPPLIES	0.86%	3.01%
ICE CREAM, NOVELTIES	1.19%	2.47%
COFFEE	0.88%	2.37%
PAPER PRODUCTS	2.55%	2.25%
HAIR CARE	1.13%	2.16%
CEREAL	2.36%	1.92%
FROZEN NOVELTIES	0.55%	1.86%
KITCHEN GADGETS	0.53%	1.84%
HOUSEHOLD SUPPLIES	0.83%	1.72%
CHEESE	2.14%	1.60%
DRESSINGS/SALADS/PREP FOODS-DELI	1.44%	1.60%
SOFT DRINKS - LOW CALORIES	0.61%	1.54%

## Appendix I CPI Inflation (1996-2006)

Extrapolating the quality bias and the sampling error to the entire CPI suggests that over the last 10 years, we cannot sign inflation precisely almost 30 percent of the time. The density below the red density function between the dotted lines ( $\pm 0.98$  percent) is equal to 28 percent.

