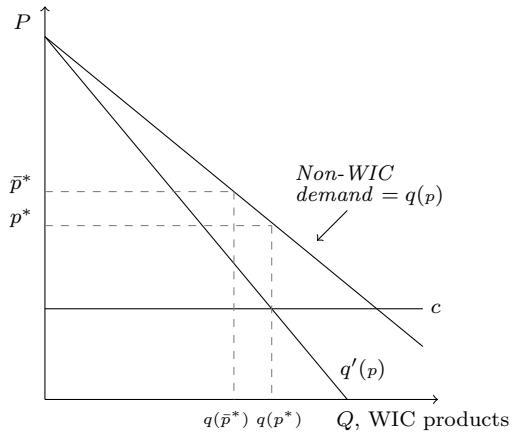
Is the Cure Worse than the Disease? Unintended Effects of Payment Reform in a Quantity-based Transfer Program

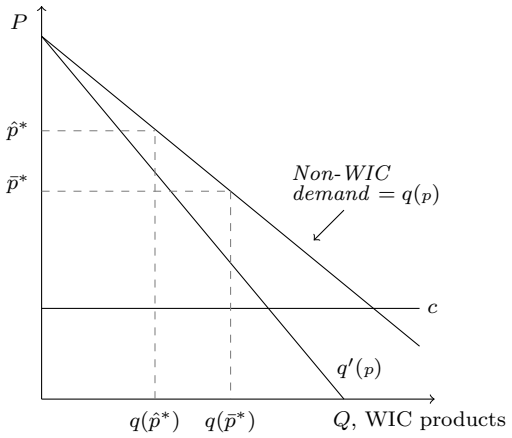
Katherine Meckel

Online Appendix

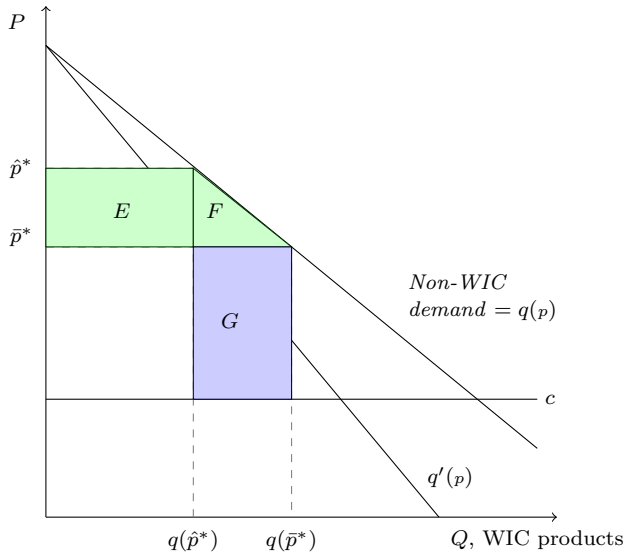
Figure 1. : Effect of EBT on Social Welfare: WIC Stores and non-WIC Consumers



(A) *Before EBT*: Stores participating in WIC charge their non-WIC customers $\bar{p}^*$ for WIC-eligible products. Stores not participating in WIC charge p^*, which is added for reference in this subfigure only. $\bar{p}^* > p^*$ because WIC sanctions μ decrease in p: $\mu = \theta(v - p)$.



(B) *After EBT*: WIC stores charge their non-WIC *and* WIC customers $\hat{p}^*$. Because $\hat{p}^*$ reflects pooled WIC and non-WIC demand, and WIC demand is inelastic, $\hat{p}^* > \bar{p}^*$.



(C) *Change in Welfare Associated with EBT*: E represents the transfer from consumers to stores, F is the loss in consumer surplus and G is the loss in store profits

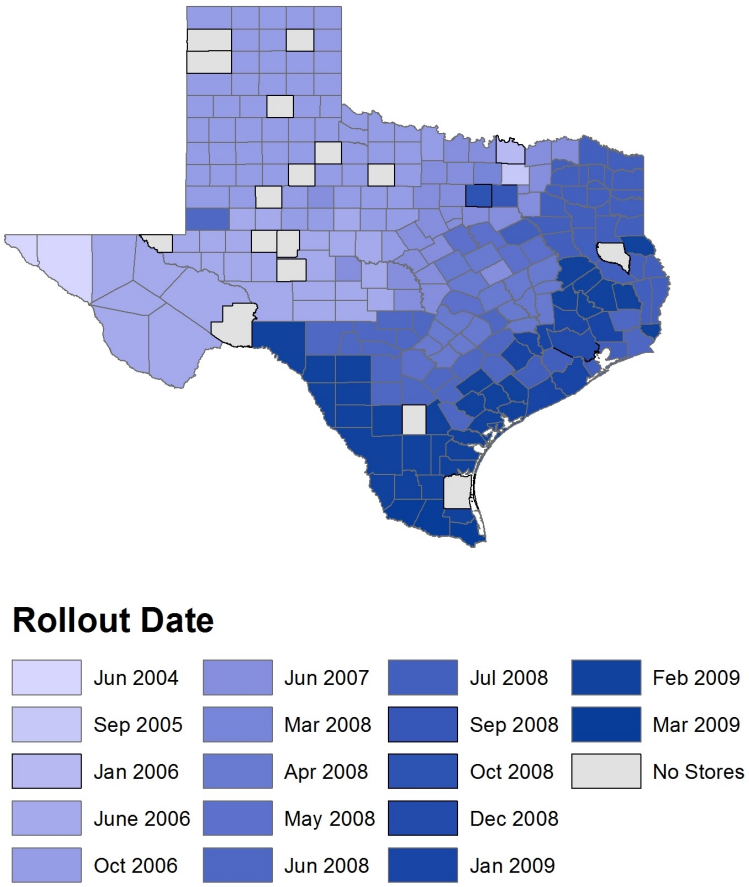


Figure 2. : EBT Rollout Schedule, Texas WIC Program

Note: Each county is shaded according to the their EBT rollout date. Counties in gray are missing an EBT date because they had no WIC stores at the time of rollout.

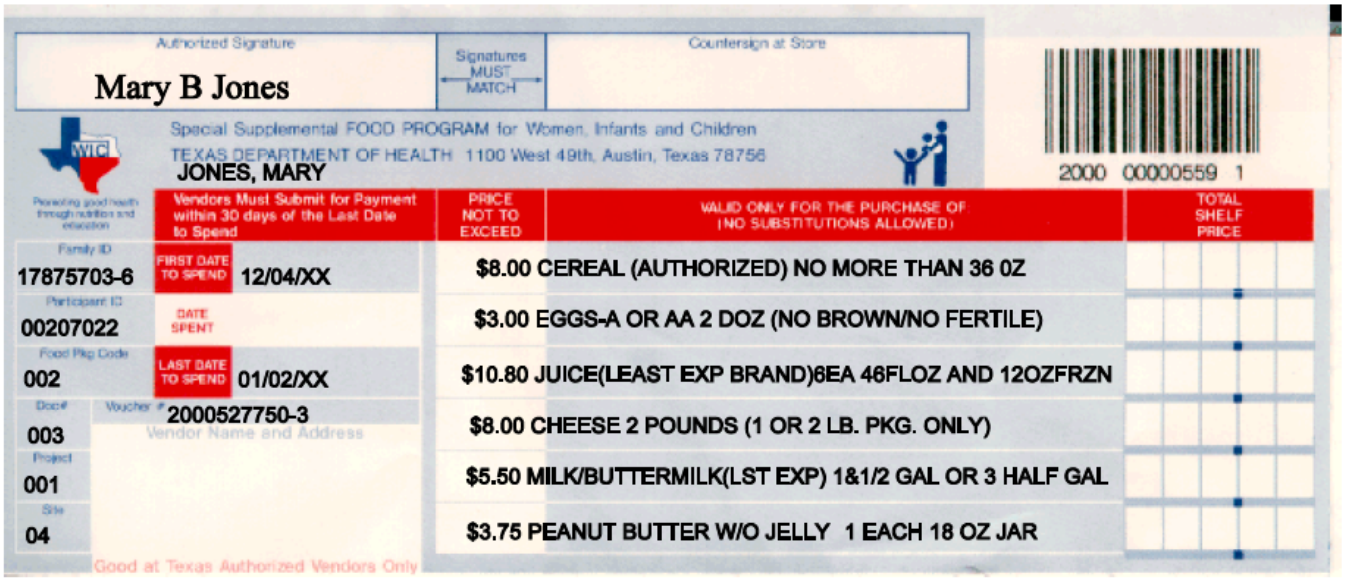


Figure 3. : Example of a Paper Voucher, Texas WIC

Source: Texas WIC Website

Figure 4. : Example of an EBT Card, Texas WIC

Source: Texas WIC Website

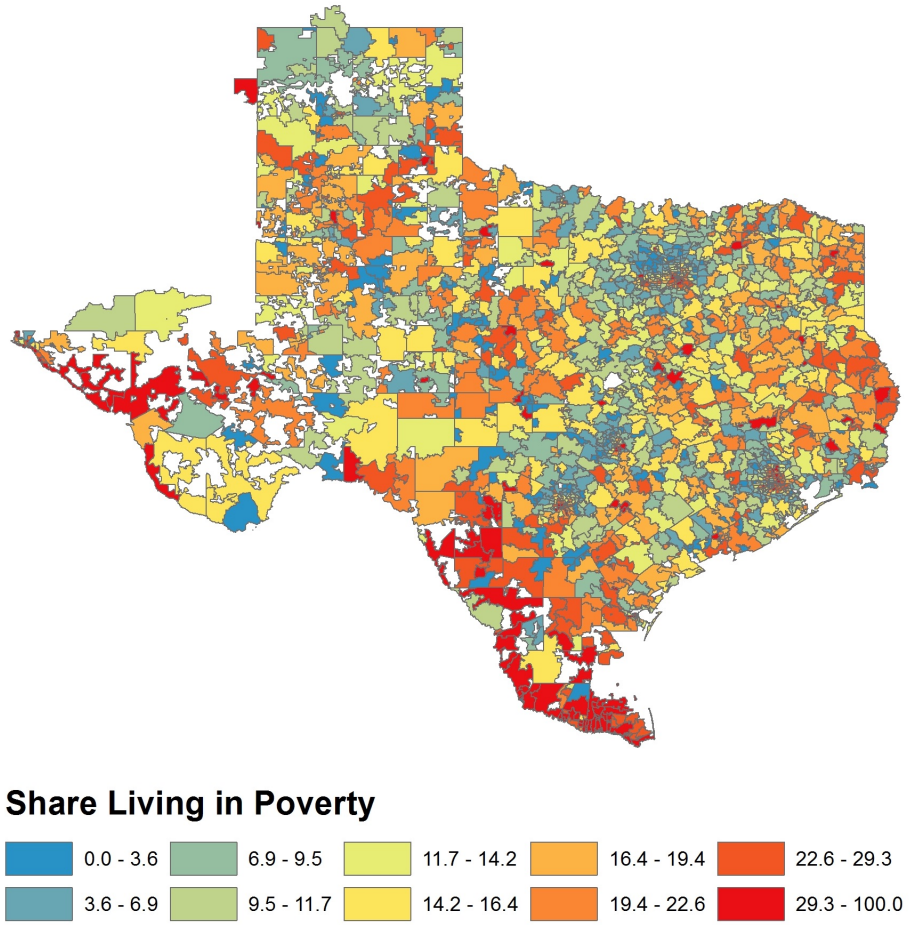


Figure 5. : Average Poverty Rate per ZIP Code, 2006 to 2010

Note: Each ZIP code is shaded according to the averaged percent of households who lived under the Federal Poverty Line during 2006-2010 (Census Bureau 2011a). Some ZIP codes are missing data and are shown as unshaded because "either no sample observations or too few sample observations were available to compute an estimate." To create the map, I match the ZIP code poverty statistics to a shapefile of U.S. ZIP codes from the Census using ArcGIS. The shapefile depicts ZIP codes for 2013 and is found here: `https://www.census.gov/geo/maps-data/data/cbf/cbf_zcta.html`.

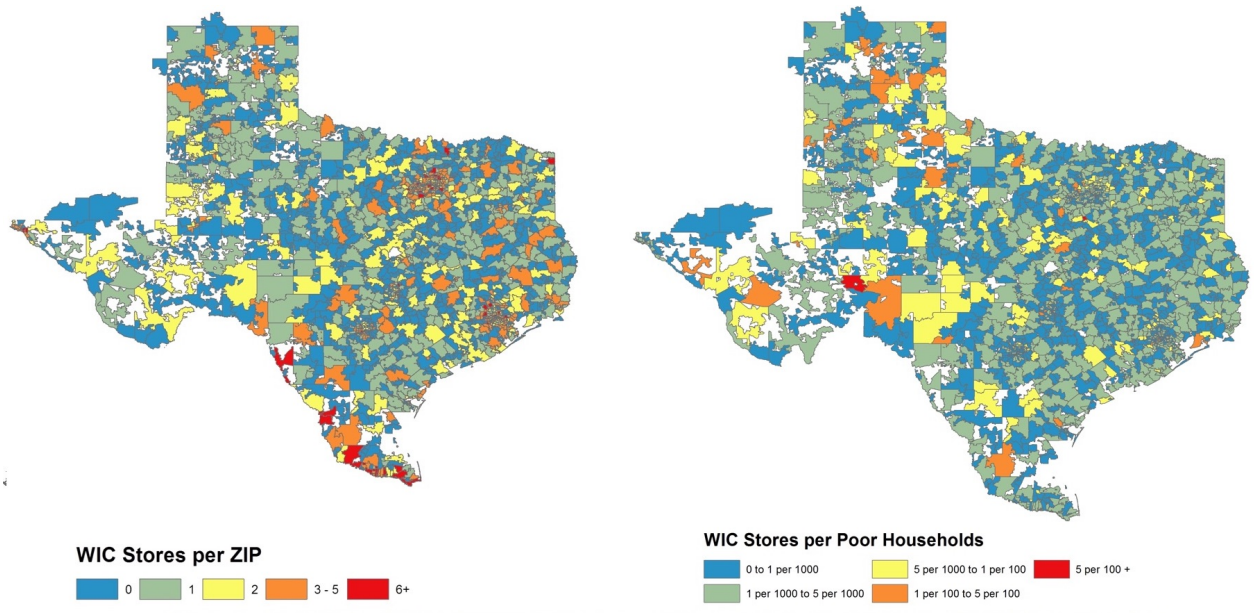


Figure 6. : WIC Stores per ZIP Code, October 2006

Notes: Left Figure: Each ZIP code is shaded according to the number of retail groceries that participated in WIC in October 2006. Right Figure: Each ZIP code is shaded according to the number of retail groceries participating in WIC in October 2006, divided by the number of households under the Federal Poverty Line (Census Bureau 2011a).

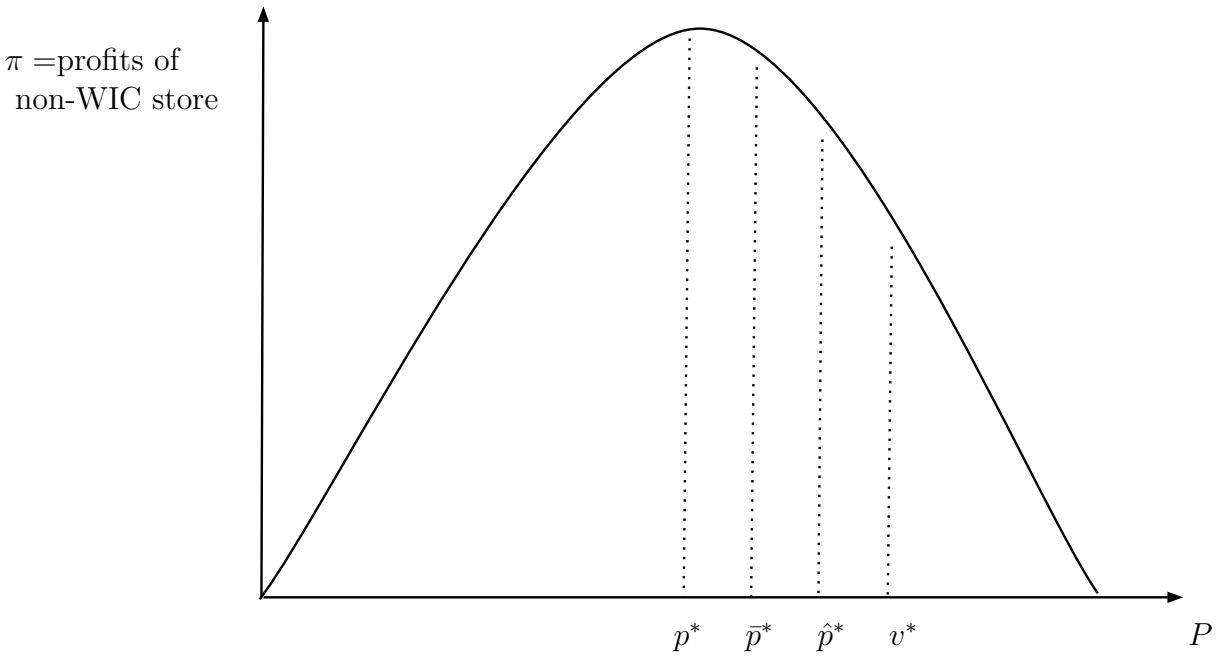


Figure 7. : Equilibrium Prices and Profits of a non-WIC Store

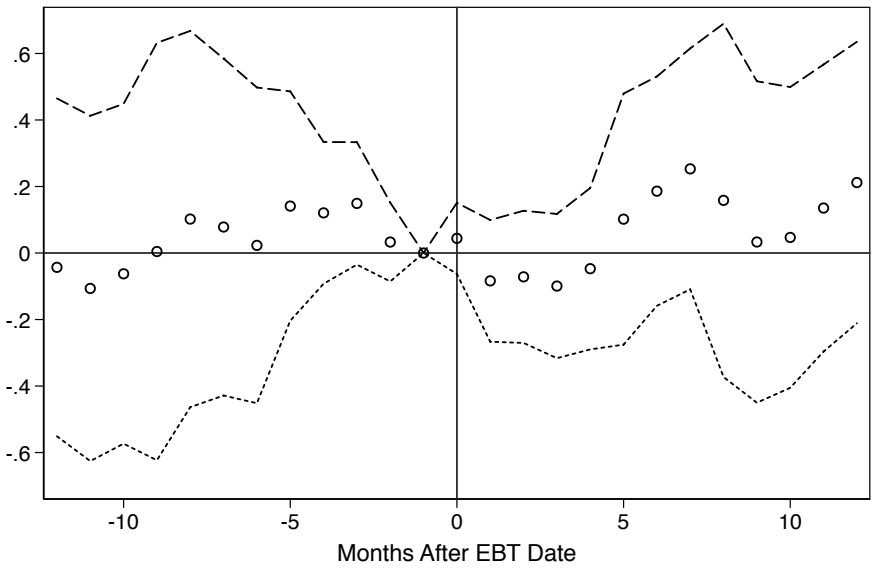


Figure 8. : EBT x Poverty and Likelihood of Dropout among Independent WIC Stores

Note: Please see notes to Table 3. Plotted are event-time coefficients from estimating an event time version of Eq. 4. Coefficients shown are from the interaction between poverty level and $AfterEBT_{ymi}$.

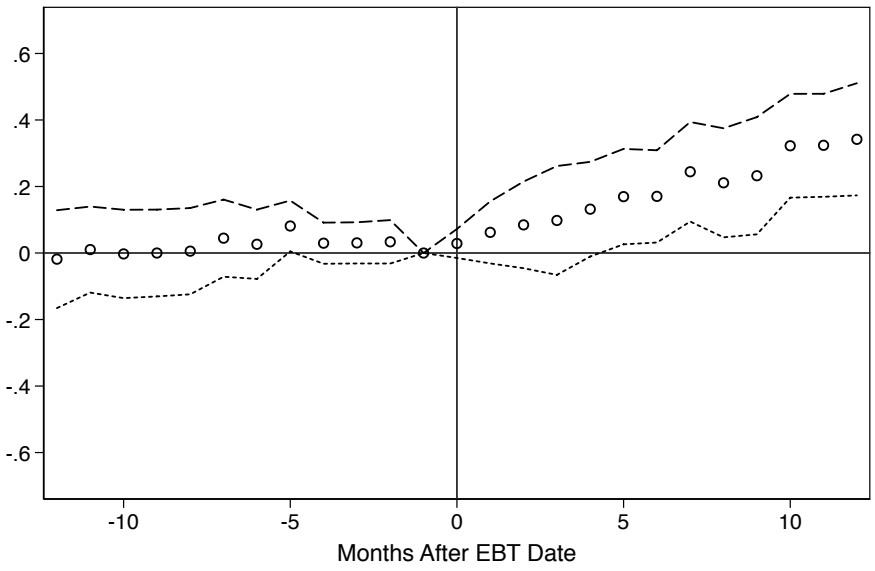


Figure 9. : EBT x Poverty and Likelihood of Dropout Among Chain WIC Stores

Note: Please see notes to Table 3. Plotted are event-time coefficients and 95% confidence intervals from estimating the event time version of Eq. 4. The coefficients shown correspond to the interaction term in Eq. 4 between $AfterEBT_{ymi}$ and the ZIP code poverty rate.

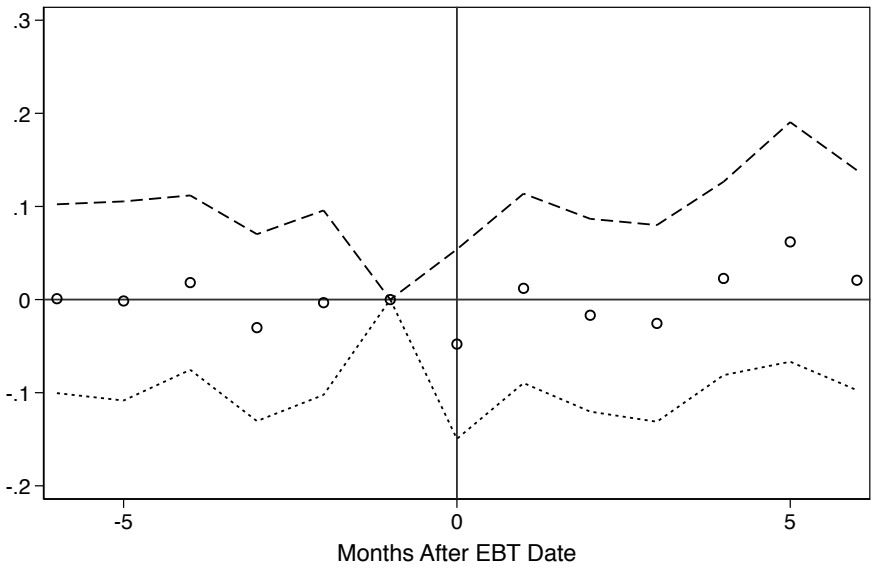


Figure 10. : EBT and Prices, Non-WIC Products in Independent WIC Stores

Note: Please see the notes to 3 for information on the data sample and the notes to Table 4 for information on the estimation strategy. Plotted are event time coefficients and 95% confidence intervals from estimating the event time version of Eq. 3.

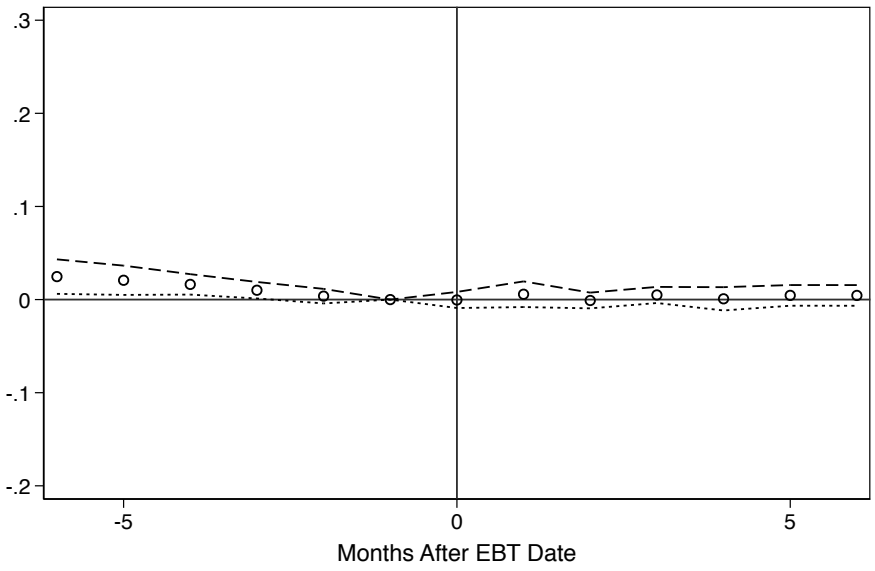


Figure 11. : EBT and Prices, Non-WIC Products in Chain WIC Stores

Note: Please see the notes to 3 for information on the data sample and the notes to Table 4 for information on the estimation strategy. Plotted are event time coefficients and 95% confidence intervals from estimating the event time version of Eq. 3.

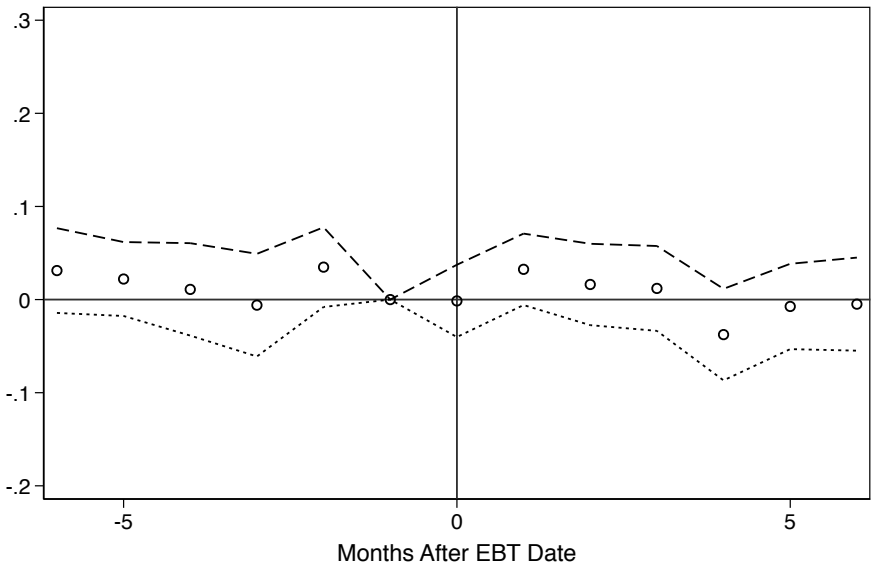


Figure 12. : EBT and Prices, WIC Products in Non-WIC Independent Stores

Note: Please see the notes to 3 for information on the data sample and the notes to Table 4 for information on the estimation strategy. Plotted are event time coefficients and 95% confidence intervals from estimating the event time version of Eq. 3.

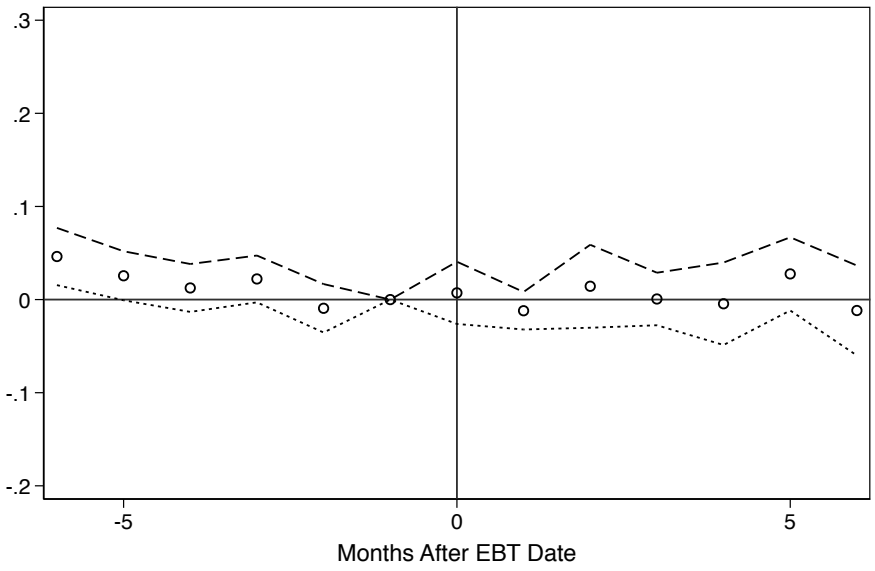


Figure 13. : EBT and Prices, WIC Products in Non-WIC Chain Stores

Note: Please see the notes to 3 for information on the data sample and the notes to Table 4 for information on the estimation strategy. Plotted are event time coefficients and 95% confidence intervals from estimating the event time version of Eq. 3.

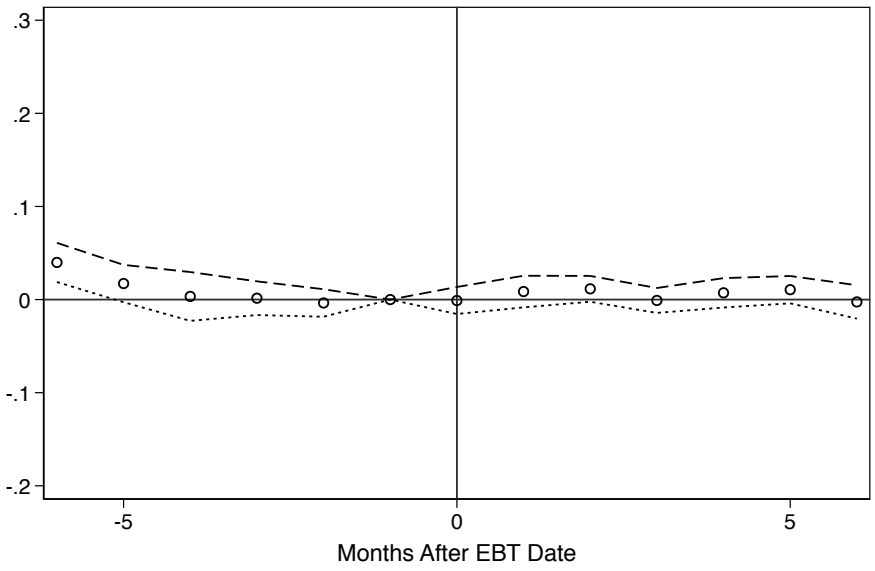


Figure 14. : EBT and Prices in Stores that leave WIC after EBT

Note: Please see the notes to 11 for information on the data and estimation strategy. Plotted are event time coefficients and 95% confidence intervals from estimating the event time version of Eq. 3.

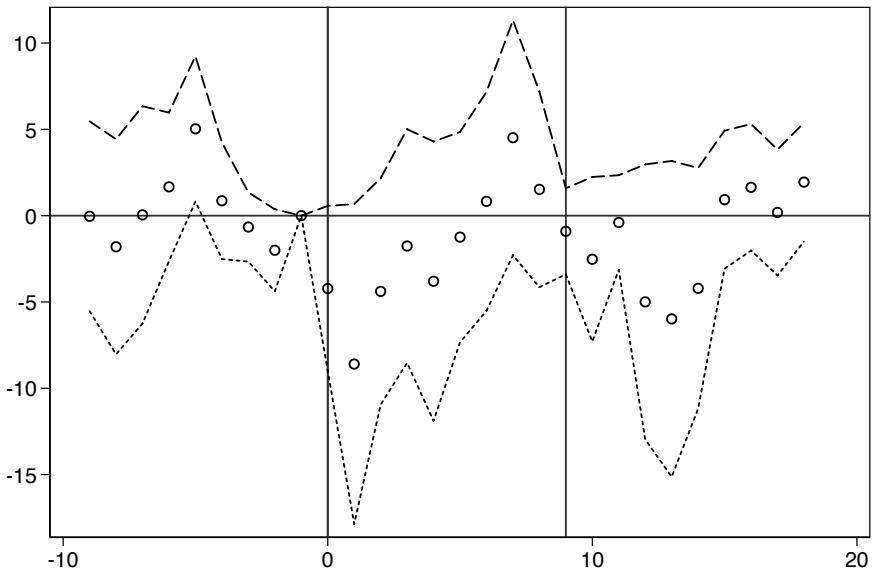


Figure 15. : EBT and WIC Participation

Note: Please see the notes to Table 5 for information on the data and estimation strategy. Plotted are event time coefficients from estimating an event time version of Eq. 3. The left panel corresponds to births born before EBT, the middle panel corresponds to births for which EBT rollout occurs during pregnancy, and the right panel corresponds to births after EBT.

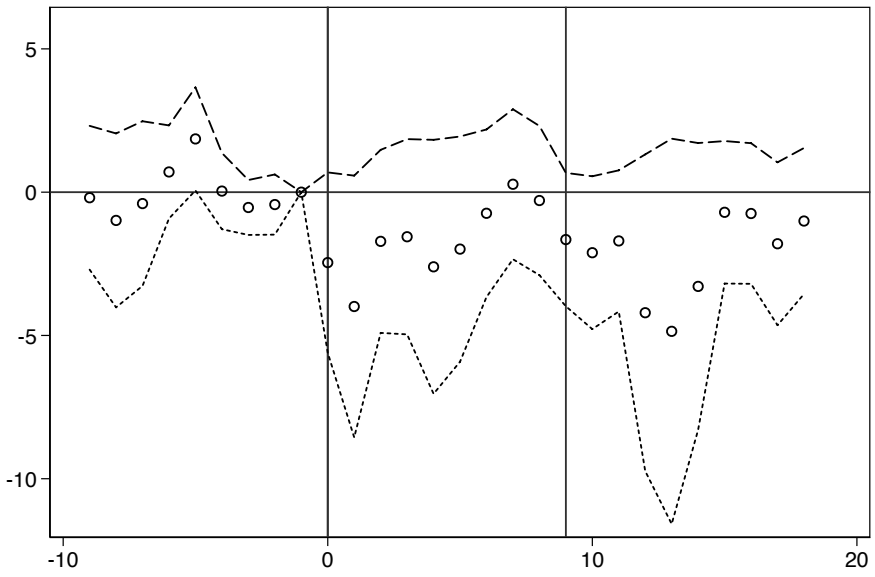


Figure 16. : EBT and WIC Participation, High-Poverty Mothers

Note: Please see the notes to Table 5 for information on the data and estimation strategy. Plotted are event time coefficients from estimating an event time version of Eq. 3. The left panel corresponds to births born before EBT, the middle panel corresponds to births for which EBT rollout occurs during pregnancy, and the right panel corresponds to births after EBT.

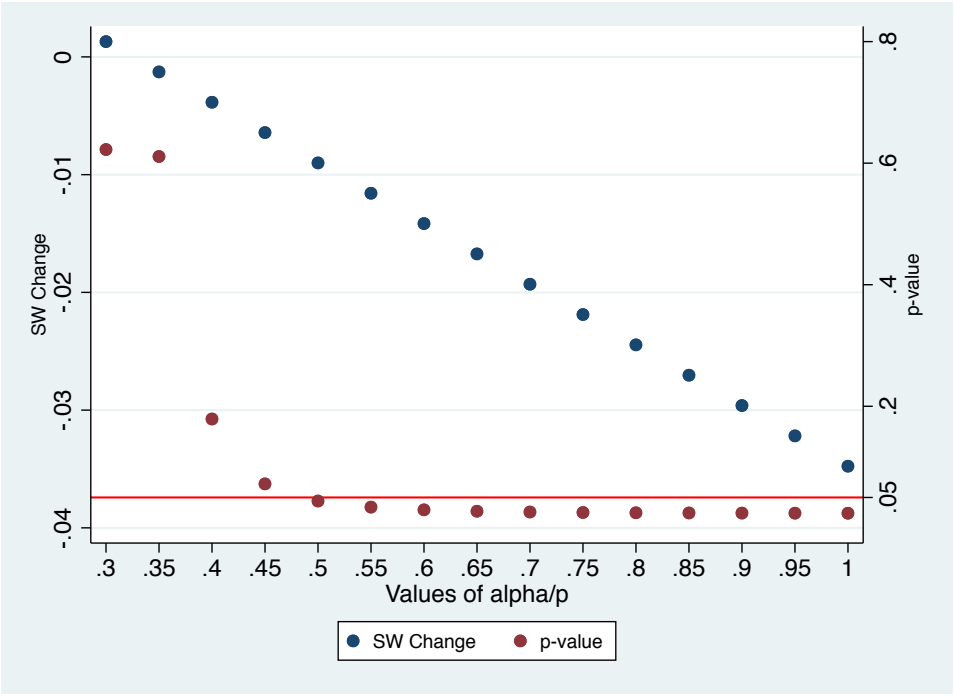


Figure 17. : Effect of EBT on Social Welfare for Different Values of $\frac{\alpha}{\bar{p}^*}$

Table 1—: WIC Food Specifications

	WIC Foods	Non-WIC Foods
Eggs	Large, Medium or Small Grade A or AA 1 dozen	Extra Large, Jumbo Grade B 6, 18 count Brown, Fertile, Free-Range, Organic
Peanut Butter	Creamy or Crunchy 18-oz. jar	With honey, jelly or candy pieces, reduced fat 28 oz., 40 oz., etc.
Beans	Dried Black beans, Navy beans, Pinto beans, Green-split peas, and Lentils 1 lb (16 oz.) package	Canned (wet) Kidney beans, Lima Beans, Cannellini Beans, Garbanzo Beans, Great Northern, etc. 32 oz., 64 oz., bulk
Infant Cereal	Gerber Brand Barley, Mixed Grain, Oatmeal, Rice 8 oz. & 16-oz. boxed only	Other Brands With fruit, DHA, Organic Cans, Bottles, Single Servings, etc.
Tuna	Tuna Chunk Light 5-6 oz. Can, Packed in Water	Albacore, Tongol, Yellowfin, Salmon Solid White, Fillet, Premium-select, Gourmet Tuna 3 oz, 12 oz, Pouches, etc., Packed in Oil
Carrots	Fresh carrots and canned sliced carrots 1 or 2 lb. bags, Fresh Carrots	Baby carrots and Carrots with tops. 14 - 16 ounces, Canned sliced carrots
Infant Formula	Similac Brand with Iron 12, 12.9, or 14.3 oz. powder, 13 oz. concentrate	Other Brands without Iron other sizes

Note: Information compiled by the author from the Texas WIC website.

Table 2—: Summary Statistics, Administrative Data on WIC Stores

	Indep. Store		Chain	
	(1)	(2)	(3)	(4)
Months of Participation	23.1	29.3	32.0	34.8
	(15.7)	(16.5)	(16.3)	(15.5)
Ever Flagged for Suspicious Redemptions	0.509	0.289	0.238	0.102
Ever Flagged for Participant Behavior	0.000	0.000	0.004	0.005
Ever Received Compliance Buys	0.148	0.098	0.080	0.063
...and Price Discrimination Found	0.200	0.059	0.097	0.038
...and Providing Ineligible Foods	0.000	0.000	0.014	0.019
ZIP Code Poverty	$> 20\%$	$< 20\%$	$> 20\%$	$< 20\%$
WIC Stores	285	173	906	1679

Note: The source of data is administrative records on WIC stores from the Texas Department of State Health Services. Each observation is a retail grocery store that participated in Texas WIC for at least one month during FY 2007 to FY 2010. "Months of Participation" is the total months a store participated from FY 2007 to FY 2010 and is therefore bounded above 48. Data on ZIP code poverty rates are from the American Community Survey (Census Bureau 2011b).

Table 3—: Summary Statistics, Nielsen Consumer Panel

	(1) Single Outlets	(2) Chains	(3) All Stores
Log(Price) per Unit	0.6591	0.4677	0.4925
	(0.7362)	(0.5206)	(0.5571)
WIC Store	0.1333	0.8220	0.7326
	(0.3399)	(0.3825)	(0.4426)
WIC Product	0.2529	0.3553	0.3420
	(0.4347)	(0.4786)	(0.4744)
WIC Store and WIC Product	0.0362	0.2937	0.2602
	(0.1869)	(0.4554)	(0.4388)
N	48,143	322,469	370,612

Note: The source of data is the Nielsen Consumer Panel. The sample consists of households that reside in Texas and purchases from FY 2007 to FY 2009 of products in the following groups: Baby Food; Eggs; Jam, Jellies, and Spreads; Seafood-Canned; Vegetables - Canned; Fresh Carrots; and Vegetables and Grains - Dried. WIC products are identified by encoding the rules shown in 1. "WIC Store" is an indicator for whether a store of the given size (chain, independent) participates in WIC in the year of the purchase and the ZIP code of residence of the panelist shopper.

Table 4—: EBT Rollout Schedule, Texas WIC

Date	Counties
Jun 2004	El Paso, Hudspeth
Sep 2005	Collin
Jan 2006	Grayson
Jun 2006	Andrews, Brewster, Coke, Coleman, Concho, Crane, Crockett, Culberson, Ector, Howard, Jeff Davis, Kimble, Martin, Mason Mcculloch, Menard, Midland, Pecos, Presidio, Reagan, Reeves, Runnels, Schleicher, Sutton, Taylor, Tom Green, Upton, Ward, Winkler
Oct 2006	Archer, Armstrong, Bailey, Baylor, Brown, Callahan, Carson, Castro, Childress, Clay, Cochran, Collingsworth, Cottle, Crosby, Dallam, Dawson, Deaf Smith, Dickens, Donley, Eastland, Floyd, Foard, Gaines, Garza, Gray, Hale, Hall, , Hansford, Hardeman, Haskell, Hemphill, Hockley, Hutchinson, Jones, Knox, Lamb, Lipscomb, Lubbock, Lynn, Mitchell, Moore, Motley, Nolan, Ochiltree, Parmer, Potter, Randall, Scurry, Shackelford, Sherman, Stephens, Stonewall Swisher, Terry, Wheeler, Wichita, Wilbarger, Yoakum, Young,
June 2007	Burnet, Comanche, Cooke, Ellis, Fannin, Fisher, Hamilton, Hood, Hunt, Jack, Johnson, Kaufman, Lamar, Lampasas, Llano, Mills, Montague, Palo Pinto, Parker, Rockwell, San Saba Somervell, Wise
Mar 2008	Denton
Apr 2008	Bastrop, Bell, Brazos, Burleson, Caldwell, Comal, Coryell, Grimes, Guadalupe, Hays, Leon, Madison, Mclennan, Milam, Robertson, Travis, Washington
May 2008	Bexar, Bosque, Freestone, Hill, Limestone, Williamson
Jun 2008	Atascosa, Bandera, Bee, Blanco, Edwards, Fayette, Frio, Gillespie, Gonzales, Hardin, Jefferson, Karnes, Kendall, Kerr, Lavaca, Lee, Medina, Real, Wilson
Jul 2008	Anderson, Angelina, Bowie, Camp, Cass, Chambers, Cherokee, Delta, Fort, Bend, Franklin, Galveston, Gregg, Harrison, Henderson, Hopkins, Jasper, Marion, Morris, Navarro, Newton, Panola, Rains, Red, River, Rusk, Sabine, San Augustine, Smith, Titus, Upshur, Van Zandt, Wharton, Wood
Sep 2008	Dallas
Oct 2008	Tarrant
Dec 2008	Harris
Jan 2009	Austin, Brazoria, Colorado, Liberty, Matagorda, Montgomery, Waller
Feb 2009	Aransas, Brooks, Calhoun, De Witt, Dimmit, Duval, Goliad, Houston, Jackson, Jim Hogg, Jim Wells, Kinney, Kleberg, La Salle, Live Oak, Maverick, Nacogdoches, Nueces, Orange, Polk, Refugio, San Jacinto, San Patricio, Shelby, Trinity, Tyler, Uvalde, Val Verde, Victoria, Walker, Webb, Willacy, Zapata, Zavala
Mar 2009	Cameron, Hidalgo, Starr

Source: WIC Program Staff, Texas Department of State Health Services

Table 5—: EBT and Maternal Demographics, Part 1

	(1) Hispanic	(2) Non-Hispanic Black	(3) Age 21-24	(4) Age 25-29	(5) Age 30-39	(6) Age 40+
After EBT	-0.0001	0.0009	0.0015	0.0001	0.0000	0.0000
	(0.0021)	(0.0008)	(0.0015)	(0.0012)	(0.0015)	(0.0005)
N	14,164	14,164	14,164	14,164	14,164	14,164
N, weighted	1,984,913	1,984,913	1,984,913	1,984,913	1,984,913	1,984,913
Mean, Dep. Var.	0.4249	0.0641	0.3320	0.2633	0.2201	0.0147

Note: Each column reports results from a separate regression estimating Eq. 3. Please see Table 5 for notes on the data source and estimation strategy. Units of observation are county-birth year-birth month cells. The outcome in each regression is the share of births for which the mother has the indicated characteristic per county, birth year, and birth month. Regressions are weighted by total births per county, year, and month. All regressions include year-month fixed effects, county fixed effects and county group-specific linear time trends. Standard errors are clustered at the level of mother's county of residence. + indicates $p < 0.10$; ** indicates $p < 0.05$; *** indicates $p < 0.01$.

Table 6—: EBT and Maternal Demographics, Part 2

	(1) Unmarried	(2) No HS Diploma	(3) HS Diploma	(4) Some College	(5) Reported Occ	(6) Poor Index
After EBT	0.0002	0.0024	-0.0040	0.0018	-0.0057	-0.0012
	(0.0026)	(0.0036)	(0.0056)	(0.0020)	(0.0067)	(0.0021)
N	14,164	14,164	14,164	14,164	14,164	14,164
N, weighted	1,984,913	1,984,913	1,984,913	1,984,913	1,984,913	1,984,913
Mean, Dep. Var.	0.4269	0.2826	0.3265	0.2638	0.5641	0.2118

Note: Please see notes to 5. "Reported Occupation" indicates that the mother lists an occupation on the birth certificate other than "homemaker."

Table 7—: EBT and Economic Indicators

	Personal Inc/Capita		Earnings/Capita		Employment/Population		SNAP/Population	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
After EBT	-0.0093	-0.0077	-0.0094	-0.0083	-0.0016	-0.0019	-0.0001	-0.0017
	(0.0063)	(0.0054)	(0.0069)	(0.0061)	(0.0015)	(0.0014)	(0.0013)	(0.0011)
N	17,208	12,189	17,208	12,189	17,208	12,189	17,208	12,189
N, weighted	1,731,914,112	1,248,715,136	1,731,914,112	1,248,715,136	1,731,914,112	1,248,715,136	1,731,914,112	1,248,715,136
Mean, dep. var.	10.4779	10.5098	10.0966	10.1189	0.5784	0.5799	0.1206	0.1262
Years	2005-2009	FY 2007-2010	2005-2009	FY 2007-2010	2005-2009	FY 2007-2010	2005-2009	FY 2007-2010

Note: Each column reports results from a separate regression estimating Eq. 3. Data on income/capita, earnings/capita, employment and population per county are from the Bureau of Economic Analysis (BEA) Regional Economic Accounts, Local Area Personal Income accounts, Series CAINC30 (BEA, 2010). Data on SNAP participation per county is from the USDA Food and Nutrition Services Department (Census Bureau 2017). I interpolate each series to be linear in month around the reporting month of each year (June for BEA data and July for SNAP data). Units of observation are county-year-month cells and regressions are weighted by total population per cell. All regressions control for year-month and county fixed effects and county group-specific linear time trends. + indicates $p < 0.10$; ** indicates $p < 0.05$; *** indicates $p < 0.01$

Table 8—: EBT and WIC Clinics per County

	(1) Clinics	(2) At Least One Clinic
After EBT	0.0002	0.0006
	(0.0173)	(0.0007)
N	9,282	9,282
Mean, Dep. Var.	2.4318	0.9626

Note: Each column reports results from a separate regression estimating Eq. 3. The data are administrative records on WIC clinics, described in Rossin-Slater (2013). The sample is restricted to WIC clinics open from 10/2006 to 12/2009 in counties with a non-missing EBT date. Units of observation are year-month-county cells. The outcome in Column (1) is total clinics per cell. The outcome in Column (2) is whether there is at least one clinic per cell. All regressions include year-month fixed effects, county fixed effects, and county group-specific linear time trends. Standard errors are clustered at the county level. + indicates $p < 0.10$; ** indicates $p < 0.05$; *** indicates $p < 0.01$

Table 9—: EBT and Non-Retail WIC Vendors

	(1) WIC Only	(2) Above 50% WIC	(3) Pharmacies	(4) Commissaries
After EBT	0.0979	0.1003	0.0057	-0.0022
	(0.0826)	(0.0827)	(0.0294)	(0.0069)
N	11,424	11,424	11,424	11,424
Mean, Dep. Var.	0.2895	0.0838	0.0404	0.0442

Note: Each column reports results from a separate regression. Please see the notes to Table 2 for information on the data and estimation strategy. Units of observation are county-year-month cells and the outcome is total WIC stores of the indicated type per cell. "WIC Only" stores are those for which WIC sales comprise 100% of their food sales. For "Above 50" stores, WIC sales comprise 50-99% of their food sales. Pharmacies are stores that provide infant formula or other WIC-eligible medical foods to WIC clinics. Commissaries are stores that are operated by the military. All regressions include year-month fixed effects, county fixed effects, and county group-specific linear time trends. Standard errors are clustered at the county level. + indicates $p < 0.10$; ** indicates $p < 0.05$; *** indicates $p < 0.01$

Table 10—: EBT and Prices, Untreated Subsamples

	Independent WIC Stores		Chain WIC Stores	
	(1)	(2)	(3)	(4)
After EBT	-0.0024	0.0060	-0.0102**	-0.0070
	(0.0207)	(0.0142)	(0.0046)	(0.0136)
N	4,671	10,431	169,295	19,866
WIC Stores	Yes	No	Yes	No
WIC UPCs	No	Yes	No	Yes

Note: Each column reports results from a separate regression. Please see the notes to Table 4 for information on the source of data and the estimation strategy. The subsamples used to estimate each regression are described in detail in the notes to 3. Each specification includes fixed effects for store, purchase year-month, and UPC, as well as county group-specific linear time trends. Standard errors are clustered at the county level. + indicates $p < 0.10$; ** indicates $p < 0.05$; *** indicates $p < 0.01$

Table 11—: EBT and Prices, Stores that Leave WIC after EBT

	(1)
After EBT	-0.0095
	(0.0061)
N	46,509

Note: Please see the notes to Table 4 for information on the data and the estimation strategy. Stores that leave WIC are defined as those that are coded as WIC stores for at least 6 months before EBT and are coded as non-WIC stores for at least 6 months after EBT. Each specification includes fixed effects for store, purchase year-month, and UPC, as well as county group-specific linear time trends. Standard errors are clustered at the county level. + indicates $p < 0.10$; ** indicates $p < 0.05$; *** indicates $p < 0.01$

Table 12—: Do Stores that Leave WIC after EBT Drop their WIC Products?

	All Products		Perishable		Non-Perishable	
	(1)	(2)	(3)	(4)	(5)	(6)
	Any WIC UPC	Any Non-WIC UPC	Any WIC UPC	Any Non-WIC UPC	Any WIC UPC	Any Non-WIC UPC
Leaves WIC*After EBT	-0.0228^{+}	0.0191**	-0.0305^{+}	-0.0221	0.0121	0.0170
	(0.0123)	(0.0078)	(0.0160)	(0.0171)	(0.0138)	(0.0129)
After EBT	0.0062	-0.0032	0.0084	0.0266**	0.0082	-0.0018
	(0.0109)	(0.0073)	(0.0159)	(0.0116)	(0.0116)	(0.0131)
N	46,760	46,760	46,760	46,760	46,760	46,760
Mean, Dep. Var.	0.7062	0.8328	0.5746	0.3802	0.5942	0.6481
UPCs	WIC	Non-WIC	WIC	Non-WIC	WIC	Non-WIC

Note: Each column reports estimates from a separate regression. Please see the notes to Table 4 for information on the data source. The empirical specification and sample definitions are described on page 19. Standard errors are clustered at the county level. + indicates $p < 0.10$; ** indicates $p < 0.05$; *** indicates $p < 0.01$

Table 13—: EBT and Prices, ZIP Codes with no Change in WIC Store Participation

	Independent WIC Stores	Chain WIC Stores
	(1)	(2)
After EBT	0.0760	-0.0006
	(0.0620)	(0.0078)
N	773	47,777
WIC Stores per ZIP	No Change over Time	No Change over Time

Note: Each column reports results from a separate regression. Please see the notes to Table 4 for information on the data and estimation strategy. The sample is restricted to ZIP codes in which WIC stores of the indicated size do not change during the sample period (i.e., no entry or exit). Each specification includes fixed effects for store, purchase year-month, and UPC, as well as county group-specific linear time trends. Standard errors are clustered at the county level. + indicates $p < 0.10$; ** indicates $p < 0.05$; *** indicates $p < 0.01$

Table 14—: EBT and Prices, Control for Entry/Exit Timing

	(1) Independent WIC Stores	(2) Chain WIC Stores
After EBT	0.0667**	0.0010
	(0.0294)	(0.0066)
Leave Next Month	-0.0237	-0.0045
	(0.0394)	(0.0100)
Enter this Month	0.0072	-0.0079
	(0.0338)	(0.0077)
N	1,745	94,106

Note: Each column reports results from a separate regression. Please see the notes to Table 4 for information on the data and estimation strategy. "Exit next month" is an indicator for the month before the last month a store appears in the Nielsen sample, unless it is the last month of the sample period (9/2009). "Entry this month" is an indicator for the first month a given store appears in the Nielsen sample, provided it is not the first month of the sample (10/2006). Each specification includes fixed effects for store, purchase year-month, and UPC, as well as county group-specific linear time trends. Standard errors are clustered at the county level. + indicates $p < 0.10$; ** indicates $p < 0.05$; *** indicates $p < 0.01$

Table 15—: EBT and Prices, Independent WIC Stores, Add'l Sample Exclusions

	(1) Independent WIC Stores	(2) Independent WIC Stores
After EBT	0.0929***	0.0805**
	(0.0334)	(0.0361)
N	1,540	907
Drop Military/Online Stores	Yes	Yes
Drop "All Other" Retailer Codes	No	Yes

Note: Each column reports results from a separate regression. Please see the notes to Table 4 for information on the data and estimation strategy. The first column replicates the main result from Table 4 for independent WIC stores, excluding purchases in Military Stores and Online Stores. The second column additionally drops stores for which the retailer code indicates a retail channel (rather than a store type). Each specification includes fixed effects for store, purchase year-month, and UPC, as well as county group-specific linear time trends. Standard errors are clustered at the county level. + indicates $p < 0.10$; ** indicates $p < 0.05$; *** indicates $p < 0.01$

Table 16—: EBT and the WIC Participation Rate

	(1) Share WIC Births	(2) Share WIC, High Poverty Births
Born after EBT	-0.0153***	-0.0218**
	(0.0047)	(0.0088)
N	14,167	12,286
Mean, Dep. Var.	0.5307	0.7934

Note: Each column reports results from a separate regression. Please see the notes to Table 5 for information on the data and estimation strategy. Units of observation are county-year-month cells. In Column (1), the outcome is WIC births as a share of all births per cell. The regression in Column (1) is weighted by total births per cell. In Column (2), the outcome is WIC births to high-poverty mothers as a share of all births to high-poverty mothers per cell. The regression in Column (2) is weighted by total high-poverty births per cell. All regressions include year-month fixed effects, county fixed effects and county group-specific linear time trends. Standard errors are clustered at the level of mother's county of residence. + indicates $p < 0.10$; ** indicates $p < 0.05$; *** indicates $p < 0.01$

Table 17—: EBT and WIC Participation, Individual-Level Controls

	(1)	(2)
Born after EBT	-0.0133***	-0.0137***
	(0.0033)	(0.0031)
N	1,984,913	1,984,913
Mean, Dep. Var.	0.5338	0.5338
Demog. Controls	No	Yes

Note: Each column reports results from a separate regression. Please see the notes to Table 5 for information on the data and estimation strategy. Each observation is an individual birth. Each regression controls for year-month fixed effects, county fixed effects and county group-specific linear time trends. The regression shown in Column (2) adds controls for maternal race (Hispanic, non-Hispanic black), mother's marital status (unmarried), maternal education (no HS diploma, high school, some college), mom's age (21-24, 25-29, 30-34, 35-39, 40+), and whether mother lists an occupation. Births with missing values of any of the demographic control variables are dropped from the sample. Standard errors are clustered at the level of mother's county of residence. + indicates $p < 0.10$; ** indicates $p < 0.05$; *** indicates $p < 0.01$

Table 18—: EBT and WIC Participation, Add Unemp. Rate

	Share WIC Births		Share WIC, High Poverty Births	
	(1)	(2)	(3)	(4)
Born after EBT	-0.0153***	-0.0160***	-0.0218**	-0.0219***
	(0.0047)	(0.0042)	(0.0088)	(0.0082)
County Unemp Rate		0.3869		0.0094
		(0.6779)		(1.0482)
N	14,167	14,167	12,286	12,286
Mean, Dep. Var.	0.5307	0.5307	0.7934	0.7934

Note: Each column reports results from a separate regression. Please see the notes to Table 5 for information on the data and estimation strategy. Data on county-level unemployment rates are from the Bureau of Economic Analysis (BEA, 2010). The unemployment data are reported annually in June, so I interpolate the series to be linear in month around June of each year. The outcome is WIC births as a share of total births per county, year and month. Regressions are weighted by total births per county, year, and month. All regressions include year-month fixed effects, county fixed effects and county group-specific linear time trends. Standard errors are clustered at the level of mother's county of residence. + indicates $p < 0.10$; ** indicates $p < 0.05$; *** indicates $p < 0.01$

Table 19—: EBT and WIC Participation, High SES Mothers

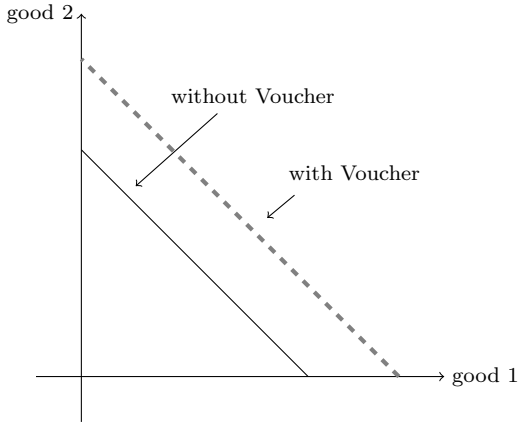
	(1)
Born after EBT	-0.0323
	(0.1412)
N	14,167
Mean, Dep. Var.	1.5826

Note: Please see the notes to Table 5 for information on the data and estimation strategy. The outcome is total WIC births to high SES mothers per county, year, and month. High SES mothers are defined as those who are white and have at least a college education. Additional controls include year-month fixed effects, county fixed effects and county group-specific linear time trends. Standard errors are clustered at the level of mother's county of residence. + indicates $p < 0.10$; ** indicates $p < 0.05$; *** indicates $p < 0.01$

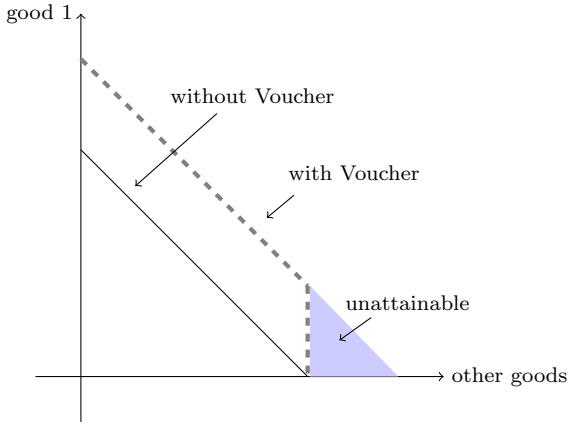
Table 20—: EBT and WIC Participation, Drop Phase I Counties

	(1) WIC Births	(2) WIC Births	(3) High Poverty WIC Births	(4) High Poverty WIC Births
Born after EBT	-3.3674**		-2.0861+	
	(1.5171)		(1.1593)	
Born 0-9 Months after EBT		-3.3780**		-2.0685+
		(1.5443)		(1.1629)
Born 10+ Months after EBT		-3.0161**		-2.6725**
		(1.1627)		(1.1371)
N	12,224	12,224	12,224	12,224
Mean, Dep. Var.	79.3115	79.3115	29.3087	29.3087

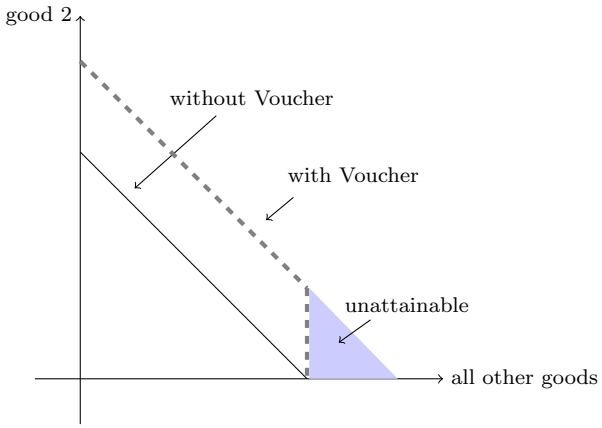
Note: Each column reports results from a separate regression. Please see the notes to Table 5 for information on the data and estimation strategy. Births in counties with an EBT date before 10/2006 are dropped from the regression sample. All regressions include year-month fixed effects, county fixed effects and county group-specific linear time trends. Standard errors are clustered at the level of mother's county of residence. + indicates $p < 0.10$; ** indicates $p < 0.05$; *** indicates $p < 0.01$



(A) Income is allocated across good 1, good 2 and other goods (plotted on third axis shown in next figure). The budgets above represent the case in which spending on other goods equals 0. The voucher is a cash transfer that can only be spent on good 1 and good 2.

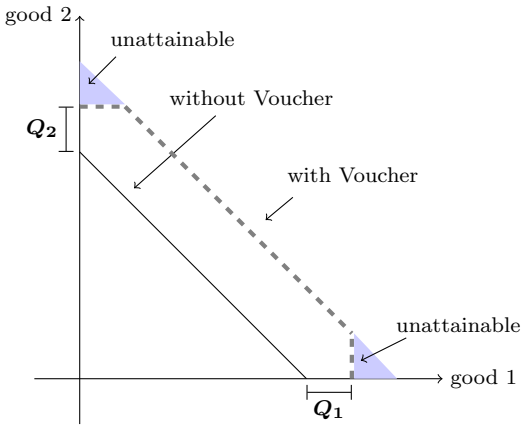


(B) The budgets above represent the case in which spending on good 2 = 0. The blue area represents bundles that are not attainable with the voucher but would be attainable with an equivalent cash transfer.

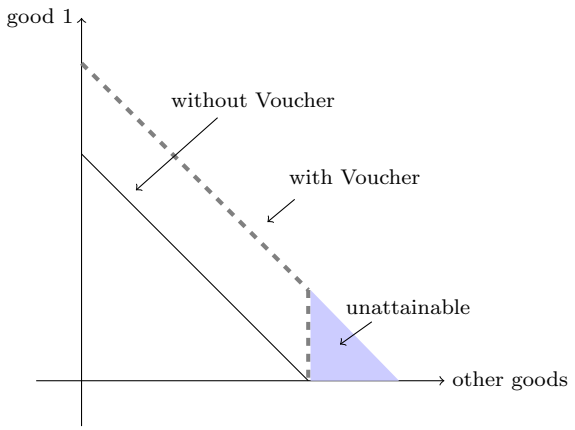


(C) The budgets above represent the case in which spending on good 1 = 0. The blue area represents bundles that are not attainable with the voucher but would be attainable with an equivalent cash transfer.

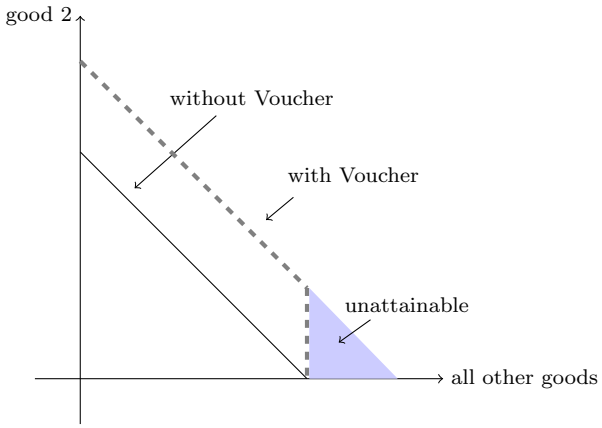
Figure A1. : Effect on Budget Constraint, Cash Value Voucher for Two Goods



(A) The household allocates income across good 1, good 2 and other goods (plotted on third axis shown in next figure). The budgets above represent the case in which spending on other goods equals 0. The voucher transfers $\boldsymbol{Q_1}$ of good 1 and $\boldsymbol{Q_2}$ of good 2. The blue area above represents bundles that are not attainable with the quantity voucher but would be attainable with a cash transfer equal to the market value of the quantity voucher ($\boldsymbol{p_1 Q_1 + p_2 Q_2}$, where p_i refers to the price of good i.)



(B) The budgets above represent the case in which spending on good 2 equals 0. The blue area represents bundles that are unattainable with the quantity voucher but would be attainable with a cash transfer equal to the market value of the quantity transfer.



(C) The budgets above represent the case in which spending on good 1 equals 0. The blue area represents bundles that are unattainable with the quantity voucher but would be attainable with a cash transfer equal to the market value of the quantity voucher.

Figure A2. : Effect on Budget Constraint, Quantity Voucher for Two Goods

Heterogeneity in Share WIC Customers

Does heterogeneity in the WIC share of customers predict store dropout following EBT? In particular, stores in high-poverty areas have a higher WIC share of customers and higher dropout after EBT, — perhaps higher WIC share, rather than fixed costs, causes dropout. I demonstrate below, however, that, all else equal, stores with a higher WIC share in fact have *less* incentive to leave WIC after EBT.

Suppose there exist two identical WIC stores, differentiated only by their share of WIC customers, $n > m$.

The conditions for these stores to drop out of WIC after EBT are as follows (I've set marginal costs = 0 for simplicity):

Store n: $n\hat{p}^{n*} - (1-n)(p^*q(p^*) - \hat{p}^{n*}q_n(\hat{p}^{n*})) > \gamma$

Store m: $m\hat{p}^{m*} - (1-m)(p^*q(p^*) - \hat{p}^{m*}q_m(\hat{p}^{m*})) > \gamma$

Store n will charge a higher EBT price ($\hat{p}^{n*} > \hat{p}^{m*}$) because it has more WIC customers, hence more inelastic demand overall. Then, $n\hat{p}^{n*} > m\hat{p}^{m*}$, and $n\hat{p}^{n*} - (1-n)(p^*q(p^*) - \hat{p}^{n*}q_n(\hat{p}^{n*})) > m\hat{p}^{m*} - (1-m)(p^*q(p^*) - \hat{p}^{m*}q_m(\hat{p}^{m*}) \rightarrow$ store n is *more* likely to drop out.

Intuition: higher b (more inelastic WIC demand) $\rightarrow$ higher $\hat{p}^*$ (pooling price), which means higher revenue *ex-post* ($\hat{p}^*b$) $\rightarrow$ stores with more WIC customers (n) are *less* likely to drop out following EBT $\rightarrow$ heterogeneity in WIC share of customers does not explain the store dropout pattern.

Short Proofs, Price Predictions

Recall that a store's profit function if it does not participate in WIC is:

$$\pi = (p - c)q(p)$$

If the store participates in WIC pre-EBT, profits are:

$$\pi^{w0} = (v - c - \theta(v)(v - p))b - \gamma + (p - c)q(p) = (v - c - \theta(v)(v - p))b - \gamma + \pi(p)$$

Similarly, post EBT:

$$\pi^{w1} = (p - c)(b + q(p)) - \gamma = (p - c)(b) - \gamma + \pi(p)$$

Define $p^* = \arg\max \pi$, the price if the store does not participate in WIC. Define $\bar{p}^*, v^* = \arg\max \pi^{w0}$, the non-WIC and WIC prices under the paper voucher regime. Define $\hat{p}^* = \arg\max \pi^{w1}$, the pooling price with EBT.

C1. $\boldsymbol{v^* > \bar{p}^*}$

From the FOC for v, we have $v^* = \bar{p}^* + \frac{1-\theta(v^*)}{\theta'(v^*)}$, so $v^* > \bar{p}^*$ **if** $\theta(v^*) < 1$ and $\theta'(v^*) > 0$ (✓, assumed).
→ *Intuition:* Inelastic WIC demand leads to a mark up over elastic non-WIC demand.

C2. $\boldsymbol{\hat{p}^* > \bar{p}^*}$

Taking the FOCs for p, $\bar{p}^*$, and $\hat{p}^*$, we have

$$\pi'(p^*) = 0$$

$$\pi'(\bar{p}^*) = -\theta(v)b$$

$$\pi'(\hat{p}^*) = -b$$

Therefore, we can easily see that, assuming a concave profit function, $\pi(p)$, $p^* < \bar{p}^* < \hat{p}^*$ **if** $0 < \theta(v) < 1$ (✓, assumed). This relationship between the prices is visualized in 7.
→ *Intuition:* Sanctions are decreasing in p, so $\bar{p}^*$ is greater than p^*; the pooling price, $\hat{p}^*$, lies above the separating price charged to non-WIC customers, $\bar{p}^*$.

C3. $\boldsymbol{v^* > \hat{p}^*}$

The FOC for v^* is $1 - \theta(v^*) - \theta'(v^*)(v^* - p) = 0$
If we were to evaluate this at the EBT price, we would have $1 - \theta(\hat{p}^*) - \theta'(hatp^*)(\hat{p}^* - p)$. Assuming WIC profits ($\pi^w$) are concave, then if $v^* > \hat{p}^*$, it must be that $1 - \theta(\hat{p}^*) - \theta'(\hat{p}^*)(\hat{p}^* - \bar{p}^*) < 0$, which implies that $\hat{p}^* - \bar{p}^* < \frac{1-\theta(\hat{p}^*)}{\theta'(\hat{p}^*)}$. Without imposing further functional form, the condition can be re-arranged as:
$f(\pi', b) < \frac{1-\theta(\hat{p}^*)}{\theta'(\hat{p}^*)}$, where $f(\pi', b) = \hat{p}^* - \bar{p}^* > 0$ (shown above).
→ *Intuition:* Additional bounds on the sanction likelihood function and its derivative at the EBT price must be established to ensure that $v^* > \hat{p}^*$ — if sanctions are too high or increase too much at $\hat{p}^*$, it will not be optimal to set WIC prices price above $\hat{p}^*$.

Change in Social Welfare, Full Derivation

Eq. 1 is given as follows.

$$\Delta\text{Social Welfare} = (\lambda v^* - \alpha)(\Delta B) + \lambda(v^* - \hat{p}^*)B(\hat{p}^*) \tag{D1}$$

As explained in the text of Section VII, I first introduce parameter ρ equal to the share of stores that price discriminate. I multiply it by the second term in Eq. 1, to adjust for the fact that not all stores price discriminate before EBT. The resulting equation is then:

$$\Delta\text{Social Welfare} = (\lambda v^* - \alpha)(\Delta B) + \rho\lambda(v^* - \hat{p}^*)B(\hat{p}^*) \tag{D2}$$

To express the change in social welfare as a percentage of the value of benefits at baseline, I divide both sides by $\bar{p}^*B$. For simplicity, I refer to $\frac{B'-B}{B}$ and $\frac{\hat{p}^*-\bar{p}^*}{\bar{p}^*}$, the percentage change in benefits distributed and non-WIC price, as $\%\Delta B$ and $\%\Delta p$, respectively. Note that $\%\Delta B + 1 = \frac{B'-B}{B} + 1 = \frac{B'-B}{B} + \frac{B}{B} = \frac{B'}{B}$ and $\%\Delta p + 1 = \frac{\hat{p}-\bar{p}}{\hat{p}} + 1 = \frac{\hat{p}-\bar{p}}{\bar{p}} + \frac{\bar{p}}{\bar{p}} = \frac{\hat{p}}{\bar{p}}$

$$\begin{aligned}
\frac{\Delta\text{Social Welfare}}{\bar{p}^*B} &= \frac{1}{\bar{p}^*}[(\lambda v^* - \alpha)\frac{\Delta B}{B} + \rho\lambda(v^* - \hat{p}^*)\frac{B(\hat{p}^*)}{B}] \\
&= \frac{1}{\bar{p}^*}[(\lambda v^* - \alpha)(-\%\Delta B) + \rho\lambda(v^* - \hat{p}^*)(\%\Delta B + 1)] \\
&= (\frac{\lambda v^*}{\bar{p}^*} - \frac{\alpha}{\bar{p}^*})(-\%\Delta B)) + \rho\lambda(\frac{v^*}{\bar{p}^*} - \frac{\hat{p}^*}{\bar{p}^*})(\%\Delta B + 1) \\
&= (\frac{\lambda v^*}{\bar{p}^*} - \frac{\alpha}{\bar{p}^*})(-\%\Delta B)) + \rho\lambda[\frac{v^*}{\bar{p}^*} - (\%\Delta p + 1)](\%\Delta B + 1)
\end{aligned} \tag{D3}$$

Note that the first term, $(\frac{\lambda v^*}{\bar{p}^*} - \frac{\alpha}{\bar{p}^*})(-\%\Delta B)$, represents the change in welfare due to the fact that fewer participants are served after EBT (by $\%\Delta B$). $\frac{\lambda v^*}{\bar{p}^*} - \frac{\alpha}{\bar{p}^*}$ is the difference between excess burden and participant welfare associated with each benefit. The second term, $\rho\lambda(\frac{v^*}{\bar{p}^*} - (\%\Delta p + 1))(\%\Delta B + 1)$, is the increase in welfare due to the reduction in the reimbursement per benefit for remaining participants, adjusted by the share of benefits for which price discrimination occurs (ρ).

It is difficult to calculate a direct estimate of α, the surplus associated with providing WIC to an additional households (as well as the welfare weight assigned by the government). Therefore, I set the expression equal to 0 and define a "break-even" value for α (i.e., the value at which the change in social welfare associated with EBT is 0). I normalize α by the pre-EBT non-WIC price of goods transferred.

$$\begin{aligned}
0 &= (\frac{\lambda v^*}{\bar{p}^*} - \frac{\alpha}{\bar{p}^*})(-\%\Delta B)) + \rho\lambda[\frac{v^*}{\bar{p}^*} - (\%\Delta p + 1)](\%\Delta B + 1) \\
(-\%\Delta B))\frac{\alpha}{\bar{p}^*} &= (\frac{\lambda v^*}{\bar{p}^*})(-\%\Delta B)) + \rho\lambda[\frac{v^*}{\bar{p}^*} - (\%\Delta p + 1)](\%\Delta B + 1) \\
\frac{\alpha}{\bar{p}^*} &= \frac{\lambda v^*}{\bar{p}^*} + \rho\lambda[\frac{v^*}{\bar{p}^*} - (\%\Delta p + 1)]\frac{(\%\Delta B + 1)}{(-\%\Delta B)}
\end{aligned} \tag{D4}$$

Now, I add in the loss in the non-WIC market due to the fact that stores can no longer price discriminate. Recall that lost surplus in the non-WIC market amounts to $\rho(0.5(\hat{p}^* + \bar{p}^*) - c)(q(\bar{p}^*) - q(\hat{p}^*))$, where I have against adjusted for the frequency of price discrimination. If we define $\epsilon_p = \frac{\delta q}{\delta p}\frac{p}{q}$ as the non-WIC consumer elasticity of demand, then $q(\bar{p}^*) - q(\hat{p}^*) = \epsilon_p(\bar{p}^* - \hat{p}^*))\frac{q(\bar{p}^*)}{\bar{p}^*} = \epsilon_p\frac{\bar{p}^*-\hat{p}^*}{\bar{p}^*}q(\bar{p}^*) = \epsilon_p(-\%\Delta p)q(\bar{p}^*)$, so that the loss in surplus becomes $\rho(0.5(\hat{p}^* + \bar{p}^*) - c)(\epsilon_p(-\%\Delta p)q(\bar{p}^*))$. Therefore, the change in social welfare is:

$$\Delta\text{Social Welfare} = (\lambda v^* - \alpha)(\Delta B) + \lambda\rho(v^* - \hat{p}^*)B(\hat{p}^*) - \rho(0.5(\hat{p}^* + \bar{p}^*) - c)(\epsilon_p(-\%\Delta p)q(\bar{p}^*)) \tag{D5}$$

Normalizing social welfare by $\bar{p}^*B$, as above, we have the following expression

$$\begin{aligned}\frac{\Delta \text{SW}}{\bar{p}^* B} &= (\frac{\lambda v^*}{\bar{p}^*} - \frac{\alpha}{\bar{p}^*})(-\%\Delta B)) + \rho\lambda[\frac{v^*}{\bar{p}^*} - (\%\Delta p + 1)](\%\Delta B + 1) - \rho\frac{(0.5(\hat{p}^* + \bar{p}^*) - c)(\epsilon_p(-\%\Delta p)q(\bar{p}^*))}{\bar{p}^* B} \\ &= (\frac{\lambda v^*}{\bar{p}^*} - \frac{\alpha}{\bar{p}^*})(-\%\Delta B)) + \rho\lambda[\frac{v^*}{\bar{p}^*} - (\%\Delta p + 1)](\%\Delta B + 1) - \rho(0.5(\frac{\hat{p}^*}{\bar{p}^*} + \frac{\bar{p}^*}{\bar{p}^*}) - \frac{c}{\bar{p}^*})(\frac{\epsilon_p(-\%\Delta p)q(\bar{p}^*)}{B}) \\ &= (\frac{\lambda v^*}{\bar{p}^*} - \frac{\alpha}{\bar{p}^*})(-\%\Delta B)) + \rho\lambda[\frac{v^*}{\bar{p}^*} - (\%\Delta p + 1)](\%\Delta B + 1) - \rho(0.5(\%\Delta p + 1) - \frac{c}{\bar{p}^*})(\frac{\epsilon_p(-\%\Delta p)q(\bar{p}^*)}{B})\end{aligned}$$

(D6)

In this case, the "break-even" value for α is:

$$0 = (\frac{\lambda v^*}{\bar{p}^*} - \frac{\alpha}{\bar{p}^*})(-\%\Delta B) + \rho\lambda[\frac{v^*}{\bar{p}^*} - (\%\Delta p + 1)](\%\Delta B + 1) - \rho((0.5\%\Delta p + 1) - \frac{c}{\bar{p}^*})(\epsilon_p(-\%\Delta p)\frac{q(\bar{p}^*)}{B})$$

$$\text{(D7)} \quad \frac{\alpha}{\bar{p}^*} = \frac{\lambda v^*}{\bar{p}^*} + \rho\lambda[\frac{v^*}{\bar{p}^*} - (\%\Delta p + 1)]\frac{(\%\Delta B + 1)}{-\%\Delta B} - \rho((0.5\%\Delta p + 1) - \frac{c}{\bar{p}^*})(\epsilon_p(-\%\Delta p)\frac{q(\bar{p}^*)}{B(-\%\Delta B)})$$

Therefore, the parameters we need to estimate the total effect on social welfare are:

- $\%\Delta p$, the percentage change in the non-WIC price after EBT
- $\%\Delta B$, the percentage change in participation after EBT
- $\frac{v^*}{\bar{p}^*}$
- $\frac{c}{\bar{p}^*}$, the ratio of cost to the non-WIC price, before EBT
- ϵ_p, the non-WIC demand elasticity
- $\frac{B}{q(\bar{p}^*)}$, the ratio of WIC to non-WIC sales for WIC-eligible products within price discriminating stores
- λ, the marginal excess burden of raising government funds