What is the Impact of Food Stamps on Prices and Products Variety? The Importance of the Supply Response*

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Abstract

This paper investigates the effect of expanding food stamp enrollment on prices and product variety over the long-run (several years). Comparing U.S. states during a period when policies generated state-specific variation in the take-up rate for food stamps, I find that food stamp eligible households experienced lower inflation in states with a larger increase in take-up (and hence with higher demand from the eligible population). Falsification tests support a causal interpretation: the relationship between inflation and changes in take-up is driven specifically by food products with strong local brands and there is no such pattern when considering inflation for ineligible households across the income distribution. Consistent with the view that a larger market size induces entry and more competition, I find sizable increases in product variety as well as declines in retailer margins in states with a higher increase in take-up. These results show that by changing demand across the product space, government transfers affect the incentives of suppliers to enter and compete in different markets, which matters for the cost-benefit analysis of these transfers through changes in prices and product variety.

JEL codes: L11, O31, O38, E64

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I Introduction

Do supply dynamics alter the cost-benefit analysis of government transfer programs? Conceptually, government transfers can affect the relative size of different product markets by redistributing purchasing power across income groups with different preferences or by encouraging the purchase of specific products. By changing demand across the product space, government transfers affect the incentives of suppliers to enter and compete in different markets. As demand for a given product increases, so do the incentives of suppliers to enter this market and compete for its customers, for instance by introducing new goods or by lowering prices. Theoretically, transfers increasing demand in a market could lead to either higher or lower prices in this market in general equilibrium. In a standard perfect competition environment with increasing marginal cost of production, increased demand should lead to higher prices because the supply curve slopes upward (e.g., Mankiw (2014)). But with monopolistic or oligopolistic competition, higher demand can lead to lower prices because a larger market size induces innovations (which increase product variety and reduce marginal cost, as in e.g. Jaravel (2017) and Acemoglu and Linn (2004)), entry of more productive suppliers (e.g., Melitz (2003)) and lower markups via increased competition (e.g., Bresnahan and Reiss (1991)).

This paper examines this question empirically in the context of a transfer program in the United States providing benefits to low-income households to help pay for the cost of food. The Supplemental Nutrition Assistance Program, popularly known as the food stamp program, cost over 70 billion in fiscal year 2016 and provided over 40 million Americans (14% of the population) with an average of $125 per person per month. Hastings and Washington (2010) document that stores increase prices on the specific days when food stamp recipients receive their benefits, which characterizes the effect of food stamps on prices in the very short run. In contrast, I examine the impact of changes in food stamp enrolment on prices and product variety over several years, thus taking into account the potential response of supply over the long run.[1]

To obtain variation in food stamp transfers plausibly orthogonal to other factors that may affect prices and product variety, I use variation in state policies that were implemented between 2001 and 2007 and made it easier to apply and continue receiving food stamps. As shown by Ganong and Liebman (2017), these policies had a large impact on the take-up rate for food stamps and their adoption is not correlated with economic fundamentals such as unemployment.

This research design delivers three results. First, I find that food stamp eligible households

[1] In recent work, Leung and Seo (2017) document that increases in food stamp benefits lead to higher prices for about 12 months.

experienced relatively lower inflation in states with a larger increase in the take-up rate for food stamps, compared with ineligible households. To assuage potential identification concerns, I show that (i) the negative relationship between inflation and changes in take-up is entirely driven by food product groups with strong local brands, which is consistent with the notion that the pattern results from changes in local demand induced by food stamps; (ii) there is no effect when comparing households in other ranges of the income distribution, such as the middle class relative to high-income households, who are all ineligible; (iii) the results are robust to introducing controls such as unemployment, employment growth and population. The second finding of the paper is that food stamp eligible households experienced a higher increase in product variety in states with a larger increase in take-up. These states are also characterized by a faster decline in retailer margins, which is the third result of the analysis.

Taken together, these patterns show the importance of taking into account the long-term response of supply to market size effects induced by transfer programs; they lend support to several mechanisms resulting in a downward-sloping long-term supply curve (entry, product variety, and markups).

II Sample and Variable Definitions

The analysis is based on three data sources: data on changes in the take-up rate for food stamps between 2001 and 2007 from Ganong and Liebman (2017); scanner data from The Nielsen Corporation; and data on retailer margins for a subset of products in the scanner data.

The number of people on food stamps depends on enrolment procedures which are partly set by states, although food stamps are a federal program. Ganong and Liebman (2017) show that most of the variation in the take-up rate for food stamps between 2001 and 2007 came from the introduction of various state-level policies, which made it easier to enroll and continue receiving benefits, for instance with the introduction of simplified reporting, shorter recertification lengths, and interview waivers. Different states adopted different policies, generating variation in take-up.[2] From 2001 to 2007, the average increase in take-up was 10.62 percentage points, with a standard deviation of 6.33 percentage points across states.

To measure the response of prices and product variety, I use the Homescan Consumer Panel

[2] As explained by Ganong and Liebman (2017), "The states adopting the largest number of policies by 2007 – Washington, Texas, Massachusetts, Pennsylvania, and South Carolina – are spread across the country geographically, and are a mix of Republican- and Democratic-leaning states, suggesting that political ideology was not an overriding factor in these policy choices."

dataset from The Nielsen Corporation from 2004 to 2008, which provides barcode-level price data for 125 product groups covering food, alcohol, health and beauty, household supplies and general merchandize in 49 states (see Broda and Weinstein (2010) for a complete description).[3] I build a proxy for food stamp eligibility based on household annual income and household size;[4] using this proxy, the average share of eligible households in overall spending in the scanner data is 18.64%, with a standard deviation of 4.93% across states.

I measure inflation on continued goods (available across consecutive years) using a CES exact price index, repeating the procedure separately for eligible and ineligible household groups in each state. While inflation for non-eligible households was on average 2.57% per year, it was 62 basis points higher for eligible households (Online Appendix Figure A1 reports the distribution of inflation rates across states and groups).

Next, I measure changes in product variety following Feenstra (1994). For each eligibility group, I compute the share of spending in year t on goods that are new relative to $t-1$ (s_t^N) and the share of spending in year $t-1$ on goods that were discontinued in year t (s_{t-1}^D). The change in product variety between $t-1$ and t is given by $s_t^N - s_{t-1}^D$. Repeating the procedure for each eligibility group in each state, I find that the average yearly increase in product variety was 1.03 percentage points larger for ineligible households.[5]

Finally, I measure retailer gross margins for a subsample of barcodes for which data is available on both consumer prices p and wholesale costs c_w in 20 states (see Gopinath et al. (2011) for a complete description). The gross margin is defined as $\frac{p-c_w}{p}$ and the average margin is 44.19%.

III The Price Effects of Food Stamps

This section presents the main result of the paper, the impact of changes in take-up for food stamps across states on inflation for eligible households.

As previously mentioned, the change in food stamp take-up rates between 2001 and 2007 varied substantially across states, because different states adopted different enrolment policies (Ganong and Liebman (2017)). These policies generated variation in purchasing power for food products

[3] 2004 is the earliest year for which the data is available. Conceptually, starting to measure prices and product variety later than the first year of introduction of the policies (2001) may be desirable because these policies are implemented gradually across states and it may take a few years for suppliers to start responding.

[4] In fact, food stamp eligibility is primarily determined by a household's *monthly* income and its size; eligibility also depends on additional factors which are not measured in the Nielsen data, such as assets.

[5] A given barcode in a given state is defined as "new" in year t if nobody in that state purchased it in year $t-1$ (likewise for discontinued products). An alternative is to define a product as "new" for a given eligibility group if nobody *in this group* purchased in year t, but this would introduce measurement error because of the uneven sizes of eligibility groups across states, as pointed out in a different context by Handbury and Weinstein (2014).

at the bottom of the income distribution, in a way that may be orthogonal to price dynamics across the product space and across states. To test this identification assumption, I implement three falsification tests. First, although in principle recipients could treat food stamps as fungible income, Hastings and Shapiro (2017) show that in practice the marginal propensity to spend food stamp benefits on food products is much higher than on other products; therefore, if there is an effect it should exist primarily for food products. Second, many products are partly non-tradable because of the strength of local brand preferences (Bronnenberg et al. (2012)). The strength of local brand preferences varies across product groups and inflation should respond to changes in local market size induced by food stamps primarily in product groups for which brand preferences are more local. Third, a similar analysis can be conducted for ineligible households of different income levels to check that the inflation patterns are specific to the recipient population and not a broader feature of inflation across the income distribution. Conceptually, these three tests use subsamples or outcomes for which I expect to find no effect if the identification assumption is valid.

I compare the difference inflation rates of eligible and ineligible households by estimating

$$\pi_{si}^{E} - \pi_{si}^{I} = \beta \Delta \tau_s + \alpha_i + \epsilon_s, \tag{1}$$

where s indexes states, i product groups, $\pi_{si}^{E/I}$ is the average CES inflation rate for eligible/ineligible households in product group i between 2004 and 2008, $\Delta\tau_s$ is the change in take-up between 2001 and 2007, and α_i is a product group fixed effect.[6] Standard errors are clustered by states.

To identify product groups with stronger local brand preferences, I use a random effects model as in Jaravel (2017). For each product group, the market share of brand b in state s at time t (s_{bst}) is modeled as the sum of a "national preference" (λ_b), a "local preference" (μ_{bs}) and a shock (ϵ_{bst}). The signal standard deviations of national (σ_λ) and local (σ_μ) preferences are recovered as follows:

$$\begin{aligned}
s_{bst} &= \lambda_b + \mu_{bs} + \epsilon_{bst}, \\
\widehat{\sigma_\lambda} &= \sqrt{Cov(\bar{s}_{bs}, \bar{s}_{b(s+1)})} \\
\widehat{\sigma_\epsilon} &= \sqrt{Var(s_{bst} - \bar{s}_{bs})}, \\
\widehat{\sigma_\mu} &= \sqrt{Var(s_{bst})} - \widehat{\sigma_\lambda} - \widehat{\sigma_\epsilon},
\end{aligned}$$

where $\bar{s}_{bs}$ is the average market share of brand b in state s over all years. The covariance between brand average shares $\bar{s}_{bs}$ across states gives a consistent and unbiased estimate of σ_λ. The variance in brand shares within a state over time gives the residual variance σ_ϵ, which in turn makes it possible

[6] The results are virtually identical when product fixed effects are omitted (not reported).

to recover the local component σ_μ. Intuitively, preferences must be more "local" for product groups in which a lot of variation in brand market shares is observed across different states.[7] Finally, I rank product groups by $\frac{\hat{\sigma}_\mu}{\hat{\sigma}_\lambda}$ and label those above (below) median as having strong local (national) preferences.[8]

The results are reported in Table 1. Panel A shows that inflation is lower for eligible households in states with a higher increase in take-up (column 1); as expected, the share of eligible households in total spending is larger in those states (column 2). Panel B shows that the effect is entirely driven by food product groups with stronger local preferences. The regression coefficients are precisely estimated zeros for non-food products or food product groups with stronger national preferences. In contrast, the effect is large for food products with local preferences: a 10 percentage point increase in take-up (the average change across states in this period) leads to a 19.8 basis points fall in inflation for eligible households, which is about a third of the overall inflation gap between eligible and ineligible households.

The Online Appendix shows the robustness of these results. Appendix Figure A2 depicts the main result graphically. Appendix Table A1 shows robustness to the introduction of controls such as unemployment and employment growth (Panel A) and reports that the inflation difference between other income groups is a precisely estimated zero in all parts of the product space (Panel B). Therefore, if omitted variables drive the results in Table 1, they would have to be specific to food products with strong local brands, not strongly correlated with employment dynamics, and specific to households that are eligible for food stamps.

IV Mechanisms

This section investigates two channels that may explain the fall in prices in response to increasing demand from food stamp recipients: increasing product variety and a fall in retailer margins. Both of these mechanisms were emphasized in Jaravel (2017) when studying the response of supply to changes in the income distribution over time.

Table 2 reports the results for changes product variety. I run a specification analogous to (1) with the difference in the rate of increase in product varity across eligible and ineligible households as the outcome (using the measure defined in Section II). Product variety increases more for eligible

[7] The random effect model provides a way to conduct this comparison systematically and to handle noise efficiently.

[8] The results are intuitive: sanitary protection, canning supplies, detergent, flour and deodorant are the five product groups for which local preferences are the weakest, while liquor, wine, beer, apparel and fresh meat are those with the strongest local preferences.

households relative to ineligible households in states with a larger increase in take-up. The effect is driven by food products (column 2) and product groups with stronger local preferences (column 4). A 10 percentage point increase in take-up leads to a 14.3 basis point increase in product variety for eligible households, close to 15% of the overall gap in increasing product variety between eligible and ineligible groups. A faster increase in product variety for eligible households has a direct effect on cost-of-living through love of variety, as well as a potential indirect effect through margins for continued products via increased competition.

Table 3 documents the response of retailer margins. I run a specification analogous to (1) at the barcode level, with retailer margin as the outcome. For a 10 percentage point increase in take-up, retailer margins fall by 28 basis points on average (column 1) and this effect is entirely driven by food products (columns 2 and 3). These large effects indicate that it is plausible for increased competition (induced by additional entry) to generate the fall in prices for eligible households documented in Table 1.[9]

V Conclusion

This paper documented the effect of expanding food stamp enrolment on prices and product variety over the long-run (several years). There are substantial declines in prices and increases in product variety for eligible households when enrolment (and thus demand) increases, which increases the impact of food stamp expansions on the welfare of eligible households. Therefore the long-run supply response to changes in demand from food stamp recipients has a first-order impact on the cost-benefit analysis of the program. The time horizon matters: focusing on the short run, Hastings and Washington (2010) documented price increases induced by food stamps. Extending the analysis to other government programs and other industries is a useful avenue for future work.

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[9]The magnitude of the estimates in Table 3 cannot be perfectly compared with those in Table 1 because retailer margins are observed in a sample with only 20 states and without information on customer income; but the estimates in Table 1 and Table 3 are certainly of similar magnitudes.

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Table 1: The Effect of Changes in Take-Up for Food Stamps on Inflation

Panel A: In Full Sample

	Inflation Difference b/w Eligible and Ineligible HH, pp (1)	Share of Eligible HH in Total Spending, pp (2)
Change in take-up rate, 2001 to 2007, pp	-0.0078026*	0.206364***
	(0.0041204)	(0.0757597)
Product group fixed effects	Yes	Yes
Observations	4,856	4,856

Panel B: In Subsamples

	Inflation Difference b/w Eligible and Ineligible HH, pp			
	Food Product Groups		Non-Food Product Groups	
	Local (1)	National (2)	Local (3)	National (4)
Change in take-up rate, 2001 to 2007, pp	-0.0198453***	0.0020867	-0.007024	-0.0097536
	(0.0055633)	(0.0065311)	(0.0085525)	(0.0135336)
Product group fixed effects	Yes	Yes	Yes	Yes
Observations	1,074	1,786	1,160	787

Notes: This table presents the results from specification (1). In both panels, each observation is at the level of product groups by state and all regressions use spending weights. The inflation difference is the average annual difference from 2004 to 2008 between eligibility groups. In Panel B, local and national product groups are defined based on the estimates of the random effects model presented in Section III. Standard errors are clustered by state. *$p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 2: The Effect of Changes in Take-Up for Food Stamps on Product Variety

	Differential Change in Product Variety b/w Eligible and Ineligible HH, pp				
	Full Sample	Food	Non-Food	Local Brands	National Brands
	(1)	(2)	(3)	(4)	(5)
Change in take-up rate,	0.0089079*	0.0143542***	-0.0046595	0.0105038*	0.007025
2001 to 2007, pp	(0.0049189)	(0.0048838)	(0.011482)	(0.0058191)	(0.0061231)
Product group fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	2,997	1,979	1,018	1,228	1,731

Notes: This table presents the results from specification (1) with the average change in product variety between 2004 and 2008, differenced across eligibility groups, as the outcome. Each observation is at the level of product groups by state and all regressions use spending weights. Standard errors are clustered by state. *$p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 3: The Effect of Changes in Take-Up for Food Stamps on Retailer Gross Margins

	Change in Retailer Gross Margins, pp		
	Full Sample	Food	Non-Food
	(1)	(2)	(3)
Change in take-up rate,	-0.0289324***	-0.0391377***	0.0106899
2001 to 2007, pp	(0.0117693)	(0.0146433)	(0.0290296)
Product group fixed effects	Yes	Yes	Yes
Observations	5,734,840	4,488,368	1,246,472

Notes: This table presents the results from specification (1) with the change in retailer gross margin between 2004 and 2007 as the outcome. Each observation is a barcode by store by year and all regressions use spending weights. Standard errors are clustered by state. *$p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Online Appendix

Table A1: Falsification Tests on the Effect of Changes in Take-Up for Food Stamps on Inflation

Panel A: Introducing Controls

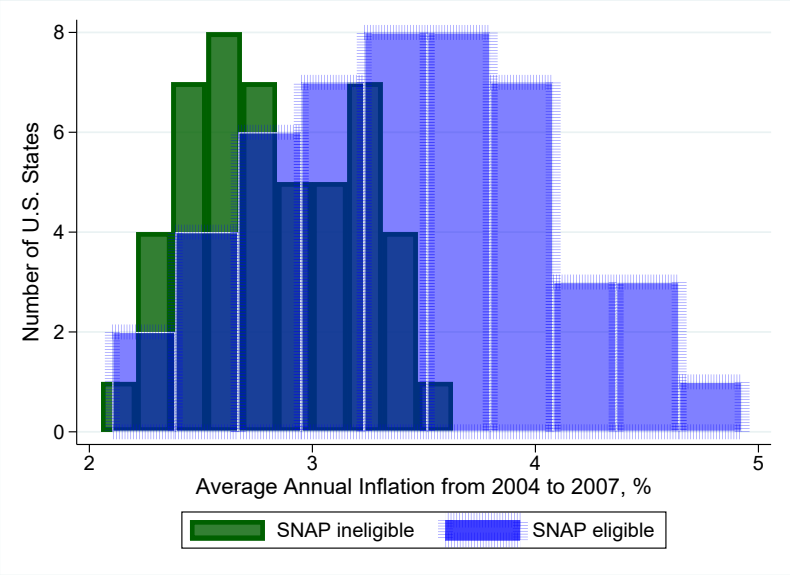
	Inflation Difference b/w Eligible and Ineligible HH, pp		
	(1)	(2)	(3)
Change in take-up rate,	-0.0079502*	-0.0090482**	-0.0074593*
2001 to 2007, pp	(0.0046903)	(0.0046005)	(0.0041905)
2001 take-up rate	0.0003596		
	(0.005408)		
2001 unemployment rate		-0.1430964*	
		(0.0829455)	
Employment growth, 2001 to 2007			0.0153036
			(0.0584327)
Product group fixed effects	Yes	Yes	Yes
Observations	4,856	4,856	4,856

Panel B: Inflation Difference between Middle Class and High-Income Households

	Inflation Difference b/w Middle Class and High-Income HH, pp				
	Full Sample	Food Product Groups		Non-Food Product Groups	
		Local	National	Local	National
	(1)	(2)	(3)	(4)	(5)
Change in take-up rate,	-0.0006	-0.009	0.004	0.004	0.0009
2001 to 2007, pp	(0.006)	(0.01)	(0.006)	(0.008)	(0.01)
Product group fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	4,570	1,021	1,714	1,048	739

Notes: In both panels of this Table, each observation is at the level of product groups by state and all regressions use spending weights. Panel A presents the results from specification (1) when introducing additional controls. In Panel B, the outcome variable is the average annual inflation difference from 2004 to 2008 between households earning between $30,000 and $100,000 ("middle class") and households making above $100,000 ("high income"). Local and national product groups are defined based on the estimates of the random effects model presented in Section III. Standard errors are clustered by state. *$p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

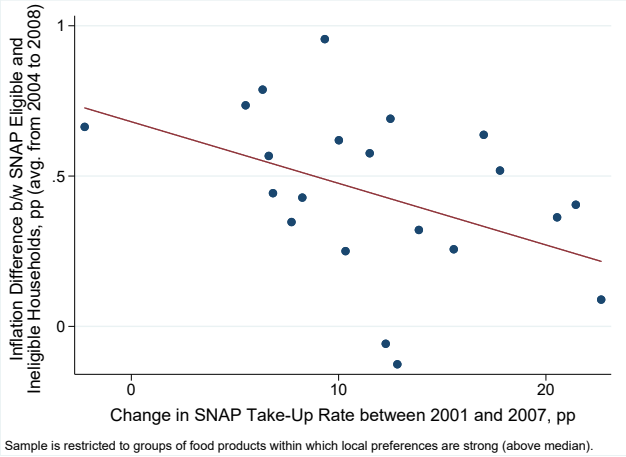
Figure A1: Inflation for Eligible and Ineligible Households across US States



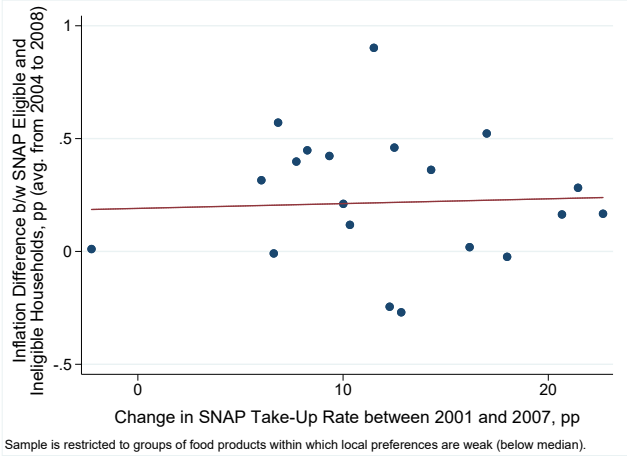
Notes: This figure reports the distributions of inflation rates across U.S. states for households that are eligible or ineligible for food stamps, using the proxy for eligibility described in Section II. The inflation rates are computed using CES price indices for each eligibility group in each state.

Figure A2: The Effect of Changes in Take-Up for Food Stamps on Food Inflation

(a) Product Groups with Stronger Local Preferences



(b) Product Groups with Stronger National Preferences



Notes: This figures provides a graphical depiction of the data underlying the estimates in Columns (1) and (2) of Panel B of Table 1. Each dot represents 4% of the data; the underlying observations are at the level of product groups by state. OLS best-fit lines are also reported, using spending weights. Local and national product groups are defined based on the estimates of the random effects model presented in Section III.