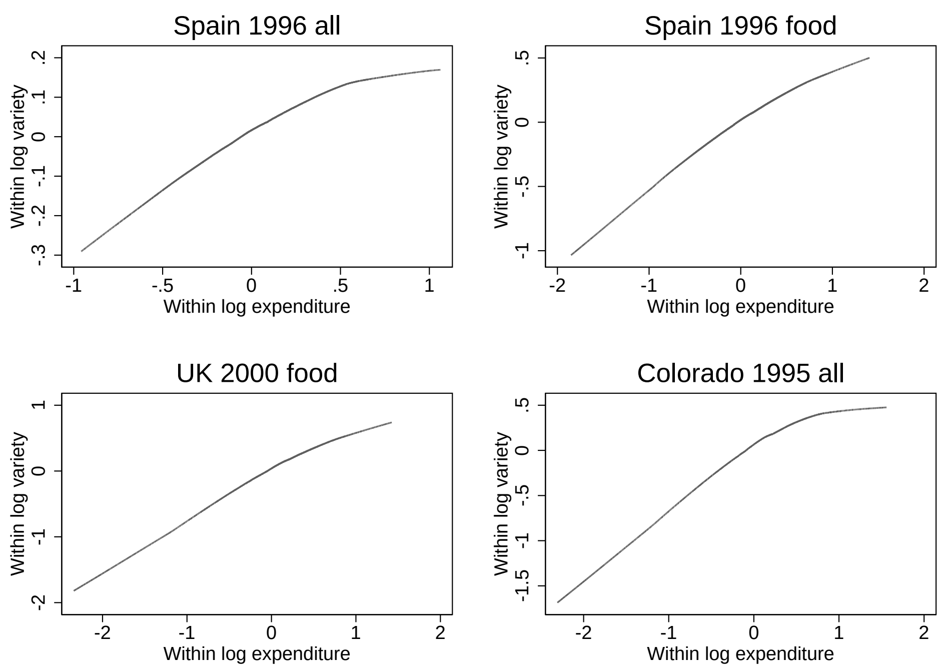
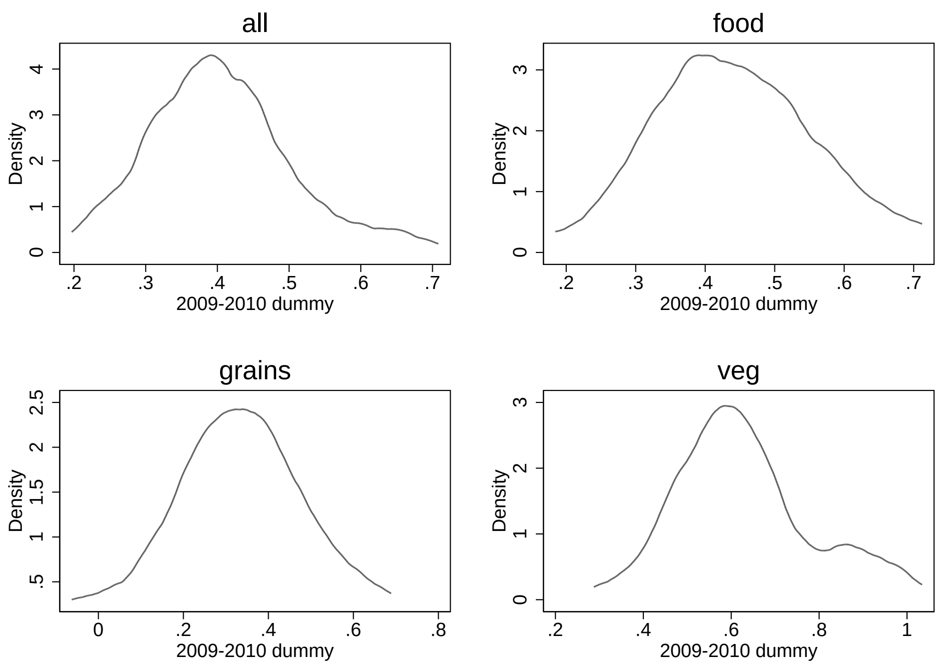
A Web Appendix for “An Engel Curve for Variety” by Nicholas Li

Figure A.1: Fact 1: Other countries



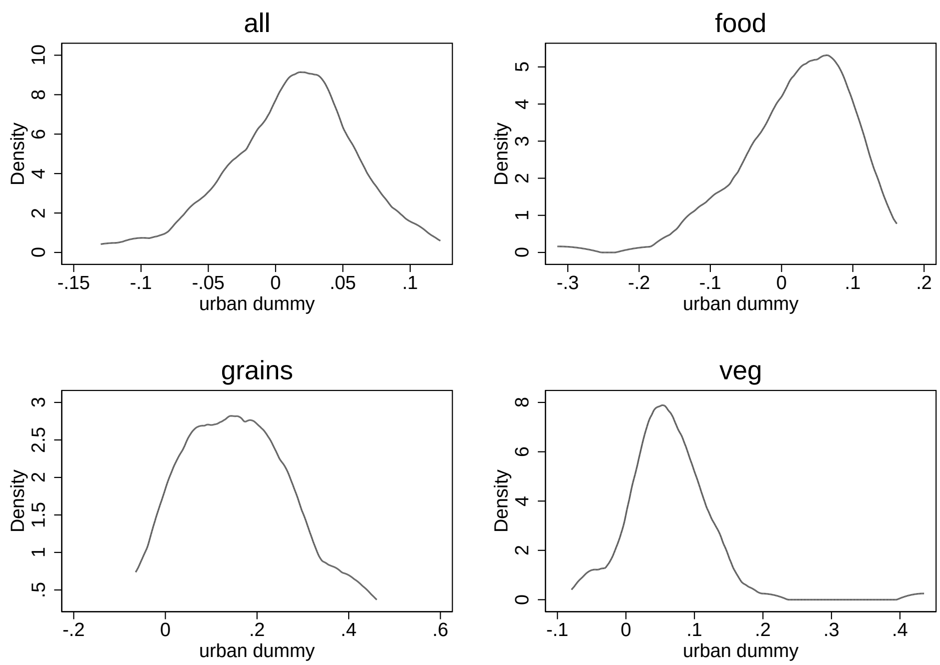
Note: Spanish data from Encuesta Continua de Presupuestos Familares (one week diary, variety=survey item, 290 total surveys items and 77 food items), UK data from National Food Survey (one week diary, variety=survey item, 242 food items), Colorado data from Nielsen Homescan (trip-level scanner data, variety=UPC, 15890 UPCs total). Plotted are residuals from regression with most disaggregated location fixed effects.

Figure A.2: Fact 2: Distribution of increase in variety 1983-2009 across regions (conditional on real expenditures)



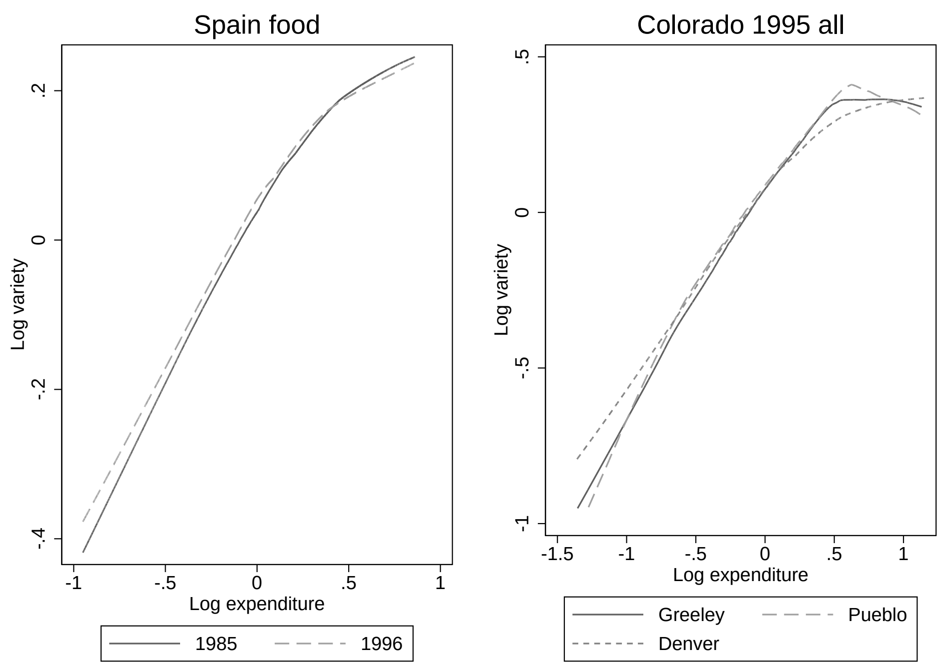
Note: For each NSS region I pool data from 1983 and 2009-2010 and regress log variety on log real expenditure and a 2009-2010 dummy. The figure plots the distribution of the 2009-2010 dummies across the 75 regions.

Figure A.3: Fact 2: Distribution of urban vs. rural variety gap across regions in 2009 (conditional on real expenditures)



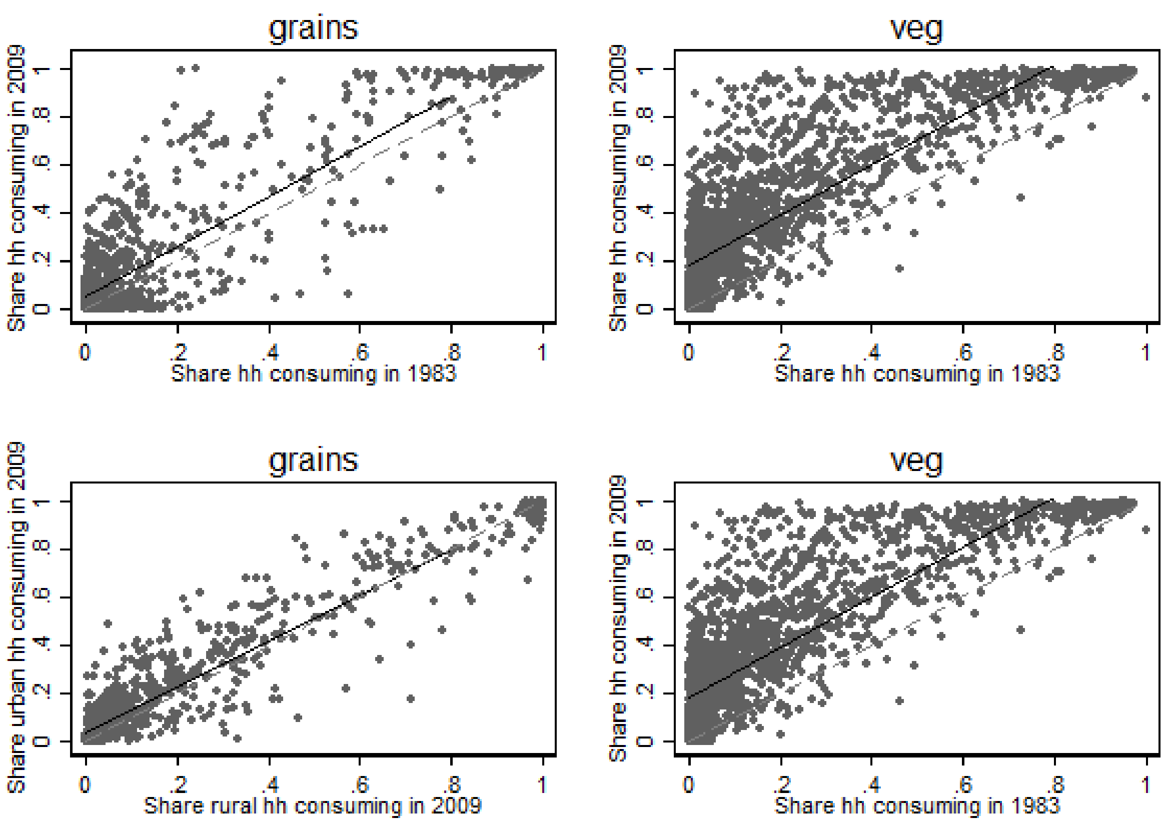
Note: For each NSS region I pool data from rural and urban locations in 2009-2010 and regress log variety on log real expenditure and a dummy for urban sector. The figure plots the distribution of the dummies across the 75 regions.

Figure A.4: Fact 2: Other countries



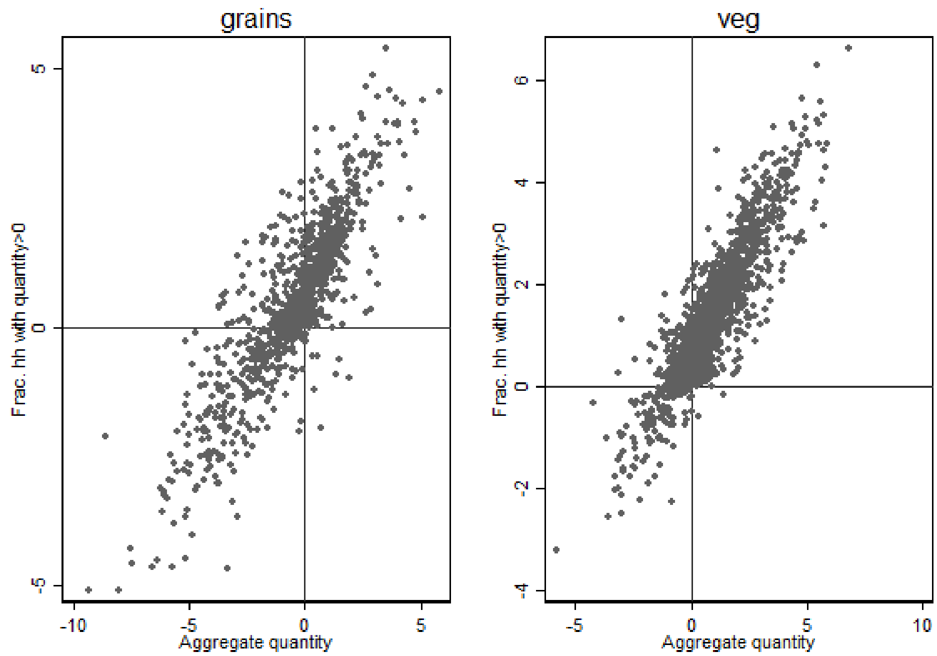
Note: See Figure **??** for notes.

Figure A.5: Share of households consuming a variety in each region (1983 vs. 2009, and rural vs. urban in 2009)



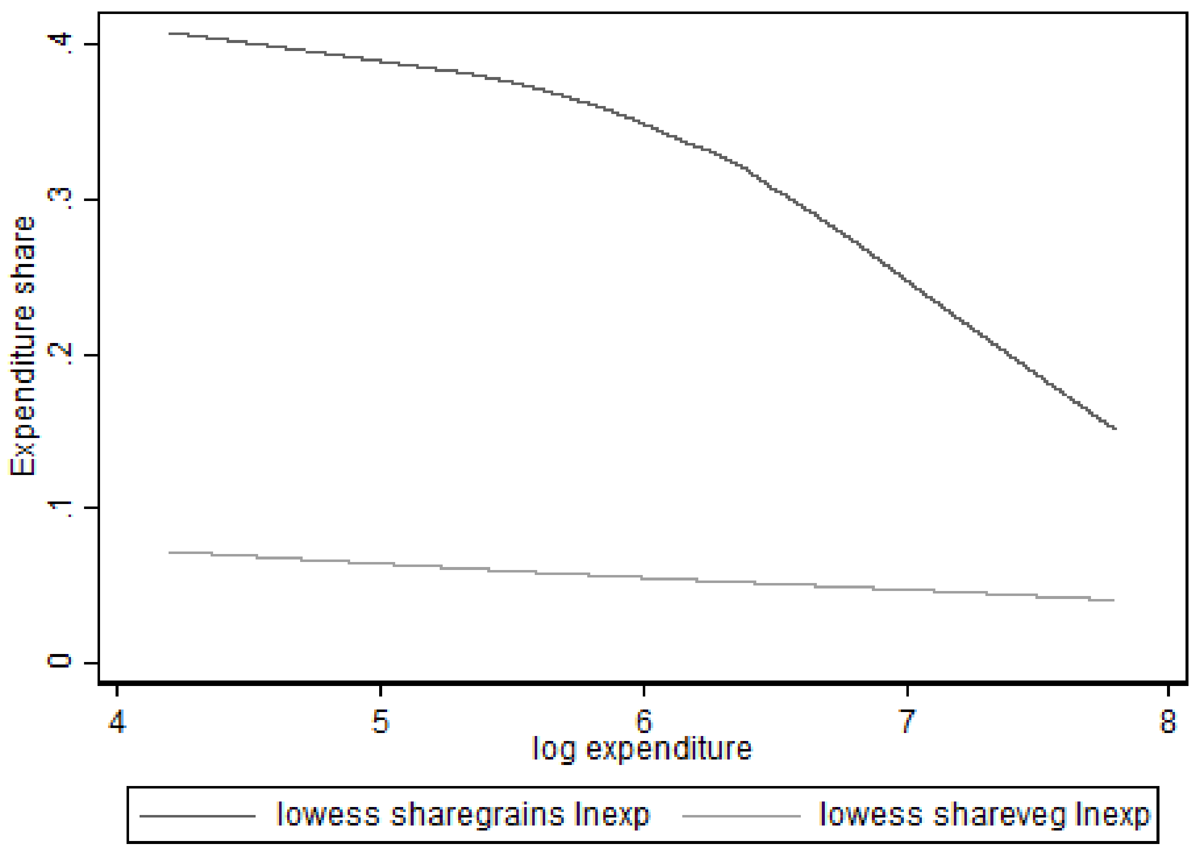
Note: Each observation represents the share of households in a region consuming a variety. The dashed 45 degree represents no change in the share of households consuming the variety, while points above the 45 degree line imply that a larger share of households consumed that variety. The solid line is a linear regression fit through the points in the scatter plot.

Figure A.6: Change in aggregate quantity (X-axis) vs. change in fraction of households consuming (Y-axis) between 1983-2009. Each observation is a region-variety.



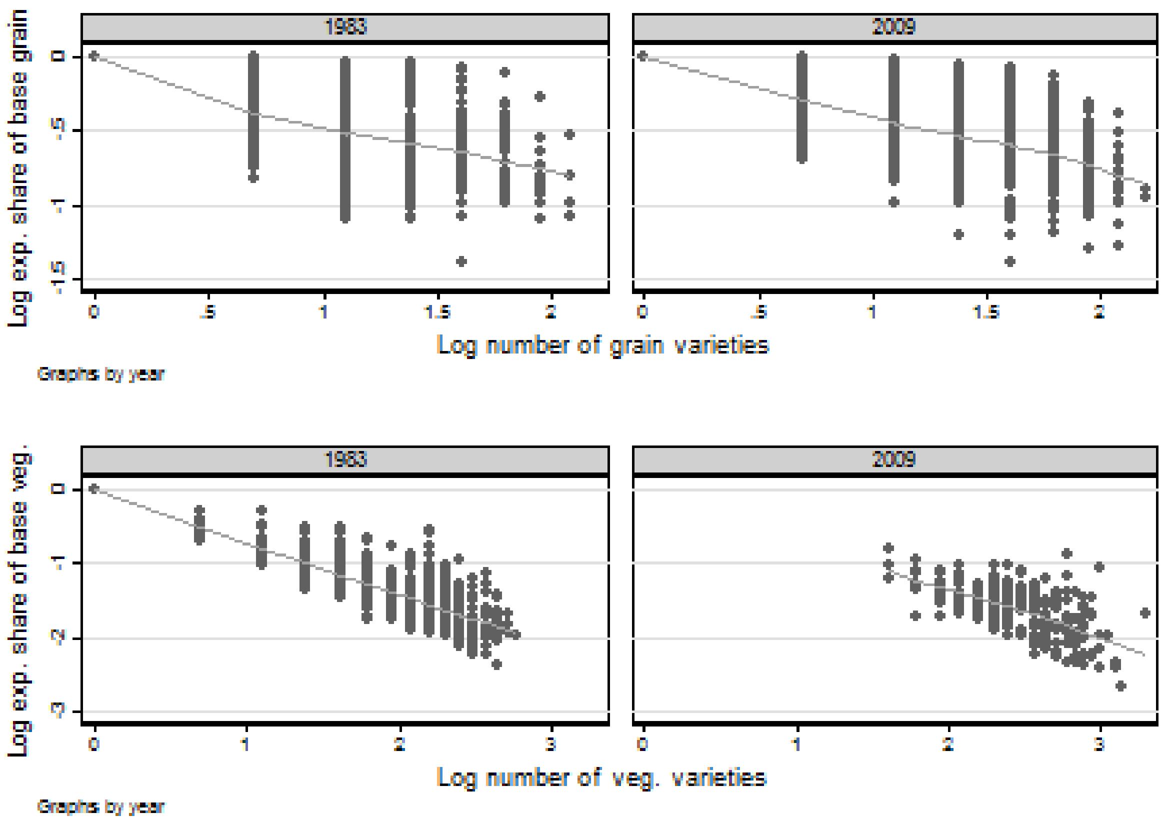
Note: Quadrant 2 and 4 observations represent 26% and 22% of all observations for grains and vegetables respectively.

Figure A.7: Group expenditure shares and total expenditures



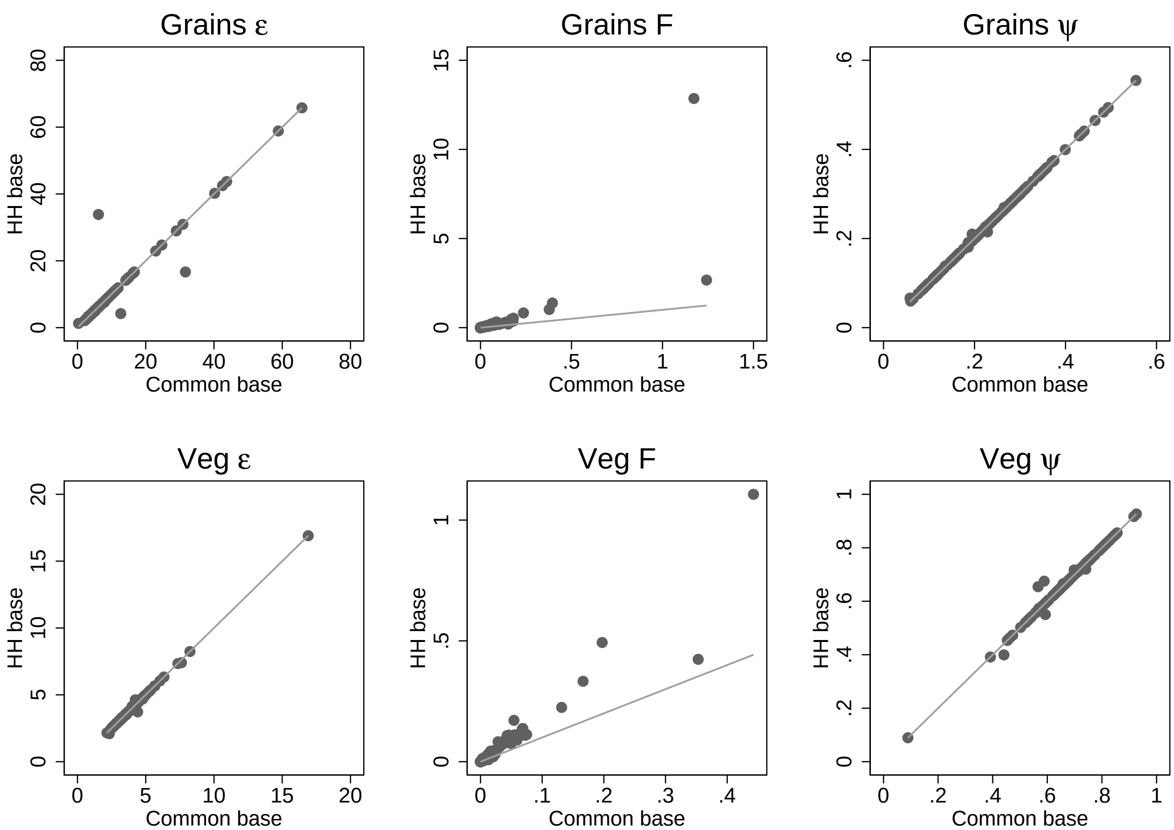
Note: Relationship between log total expenditures and expenditure shares for grains and vegetables in 1983 NSS consumption data (lowess plot).

Figure A.8: Example of how relative importance (log expenditure share) of base variety varies with number of varieties consumed across households



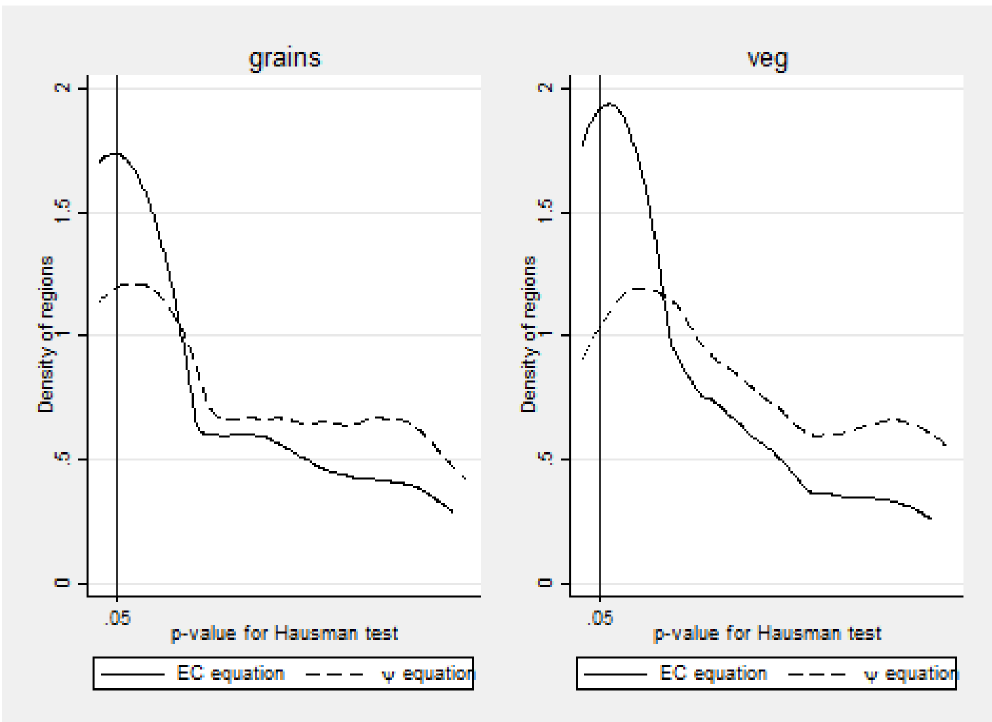
Note: Scatter and lowess regression plots of log expenditure share of base variety vs. log variety for grains and vegetables (Coastal Maharashtra region in 1983 and 2009-10).

Figure A.9: Comparison of parameter estimates using region common base or household-specific base variety



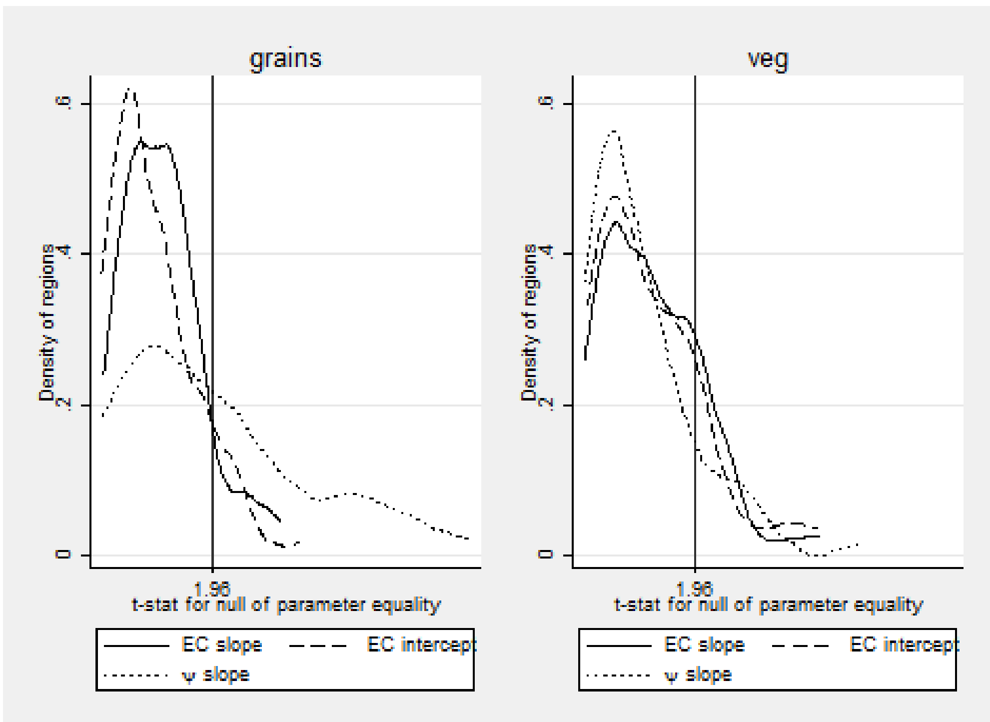
Note: Common base refers to using the variety consumed by the most households in a region as the base variety for estimation and dropping households for which this is not the highest expenditure variety. Household base refers to using the highest expenditure variety for each household as the base variety for estimation.

Figure A.10: Test for endogeneity (Hausman specification test) of parameters: distribution of p-values across regions



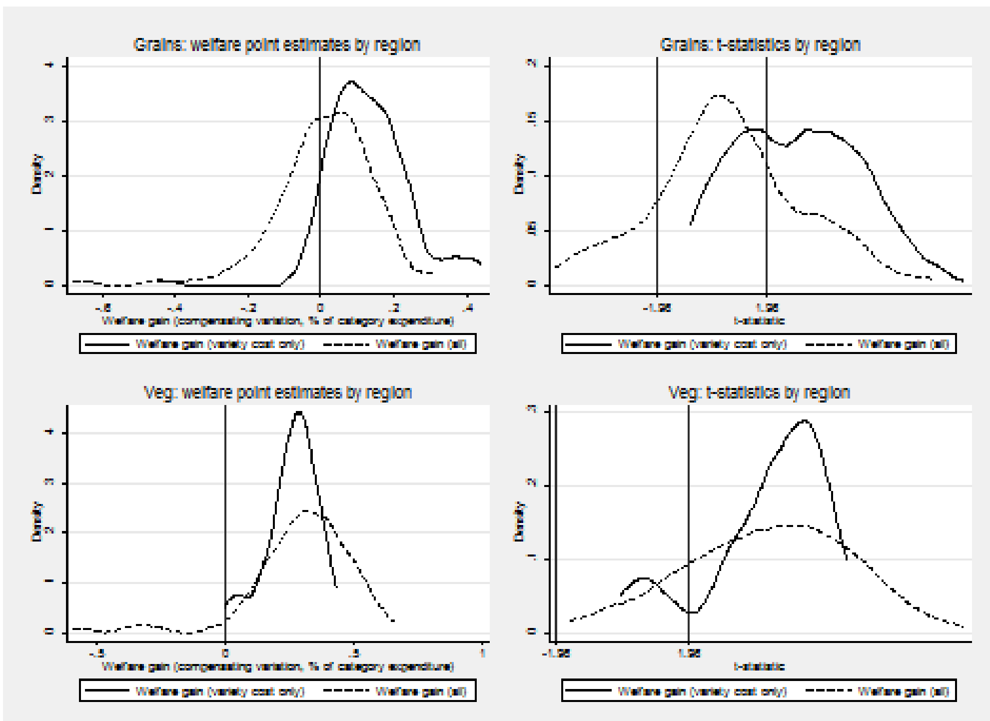
Note: The instruments are a set of dummies for head of household education, used to instrument for log group expenditure (EC equation 12) or log group variety (ψ equation 11). Standard errors clustered by region. Estimates use common base variety and 75 regions in 1983.

Figure A.11: Test for equality of parameters above/below median per capita real expenditure: distribution of t-statistics across regions



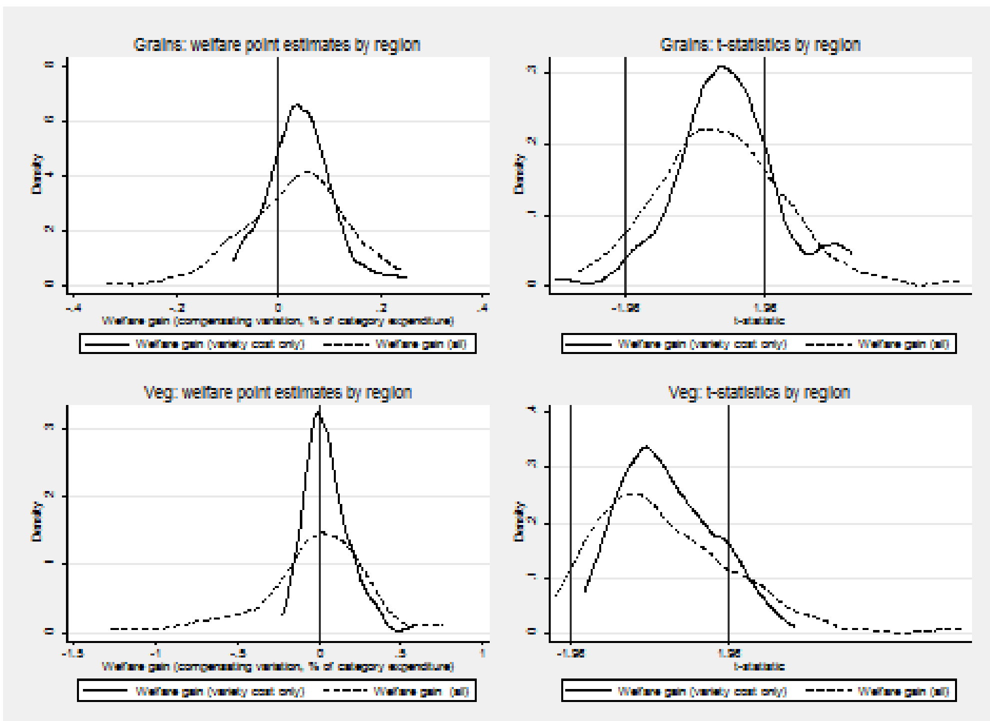
Note: T-statistics reported are "above median per capita expenditure" dummy interacted with log group expenditure (EC slope) or uninteracted (EC intercept) in equation 12, or interacted with log group variety (ψ slope) in equation 11. Standard errors clustered by region. Estimates use common base variety and 75 regions in 1983.

Figure A.12: Distribution of point estimates and t-statistics for cost-of-living changes between 1983-2010 across Indian regions



Note: Kernel density plot of point estimates (left) and t-statistics (right) across NSS regions. Solid line (variety cost only) represents % decrease in cost-of-living in 2010 relative to 1983 due to changes in ϵ, F only, while dashed line (all) includes effects of changes in ψ parameter as well.

Figure A.13: Distribution of point estimates and t-statistics for cost-of-living difference between rural and urban across Indian regions in 2010



Note: Kernel density plot of point estimates (left) and t-statistics (right) across NSS regions. Solid line (variety cost only) represents % decrease in cost-of-living in 2010 relative to 1983 due to changes in ϵ, F only, while dashed line (all) includes effects of changes in ψ parameter as well.

Table A.1: Fact 2 robustness: Household food variety, location characteristics and retail environment.

	(1)	(2)	(3)	(4)	(5)	(6)
	Dep. var: log household variety (only hh with no servants)			Dep. var: employ servants		
Log food exp.	0.318***	0.259***	0.343***	0.107***	0.097***	0.116***
	(0.010)	(0.010)	(0.009)	(0.010)	(0.008)	(0.009)
Log hh size	0.060***	0.124***	0.071***	-0.074***	-0.064***	-0.074***
	(0.018)	(0.019)	(0.019)	(0.008)	(0.005)	(0.006)
Log distr. mean exp.		-0.020	0.007		-0.031***	-0.033***
		(0.021)	(0.030)		(0.009)	(0.008)
Log distr. pop. density		-0.032***	-0.066*		0.016*	-0.002
		(0.007)	(0.036)		(0.008)	(0.010)
Log distr. road density		0.029***	0.014*		-0.003	-0.001
		(0.008)	(0.008)		(0.002)	(0.001)
Share of pop. in food retail		2.130***	1.182***		0.670***	0.249**
		(0.352)	(0.403)		(0.167)	(0.121)
Log distr. price dispersion		-0.043**	0.008		-0.008	-0.002
		(0.020)	(0.020)		(0.008)	(0.004)
Log distr. share dispersion		-0.093***	-0.045		-0.009	0.097***
		(0.030)	(0.069)		(0.014)	(0.021)
Log distr. food varieties		0.144***			0.058**	
		(0.043)			(0.028)	
Log village food varieties		0.643***			0.092***	
		(0.016)			(0.011)	
District FE	No	No	Yes	No	No	Yes
Observations	186,926	186,926	186,926	195,586	195,586	195,586
R-squared	0.352	0.481	0.463	0.059	0.085	0.106

Standard errors clustered by district. *** p<0.01, ** p<0.05, * p<0.1. Sample includes households from 43rd, 61st, and 66th NSS rounds not missing any variables. Households with servants are identified using household roster (for servants who are household members) and expenditures on servants from the consumption survey. All regressions include year fixed effects. Districts based on ICRISAT VDSA definitions. Food retail includes food distribution (wholesale) and restaurants. Price dispersion is measured as coefficient of variation in district median unit values across food varieties. Share dispersion is district mean of the within-household coefficient of variation for food expenditure shares.

Table A.2: Fact 3 robustness: Composition of variety bundle varies systematically with household variety. Dependent variable is the average rank of varieties consumed by a household, ranked along selected dimension at village level

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variety characteristic	Aggregate exp. share		Fraction of hh consuming (exp.> 0)		Mean exp. if exp> 0		Median unit value	
				Grain varieties				
Number of varieties	0.50***	0.51***	0.40***	0.40***	0.46***	0.48***	0.33***	0.33***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Log expenditure		-0.04***		-0.01***		-0.07***		-0.02***
		(0.00)		(0.00)		(0.00)		(0.00)
Observations	98,966	98,966	98,966	98,966	98,966	98,966	98,966	98,966
R^2	0.90	0.90	0.86	0.86	0.89	0.89	0.91	0.91
				Vegetable varieties				
Number of varieties	0.37***	0.41***	0.26***	0.26***	0.19***	0.27***	0.05***	0.04***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Log expenditure		-0.25***		0.01		-0.60***		0.09***
		(0.01)		(0.01)		(0.01)		(0.01)
Observations	98,813	98,813	98,813	98,813	98,813	98,813	98,813	98,813
R^2	0.90	0.90	0.88	0.88	0.90	0.91	0.90	0.90

Standard errors clustered by village. *** p<0.01, ** p<0.05, * p<0.1. Dependent variable is average rank of varieties consumed by household. Varieties are ranked along each dimension at the village level. All specifications include village fixed effects and use NSS 66th round.

Table A.3: Fact 4 robustness: Household food variety and its predictors increase shopping time. Dependent variable is total minutes per day spent on the specified activity by all household members or dummy for any minutes.

Dep. var	Shop min. > 0		Shop min. (excl. serv)		Shop min. (spouse)		Travel		Cooking		Leisure		Grain process		Free gather	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Log exp.	0.0805***	0.0812***	3.082**	2.822**	0.602	0.671	3.011	5.561	27.19***	21.16***	46.13*	50.92*	-0.124	-0.220	-2.233	-4.269**
	(0.0178)	(0.0195)	(1.409)	(1.311)	(0.764)	(0.631)	(3.524)	(3.748)	(3.760)	(4.740)	(25.90)	(28.84)	(1.057)	(1.001)	(1.549)	(1.901)
Pop. share food ret.	5.555**		511.1**		409.0**		405.6		1,718*		4,677		-122.9		657.3**	
	(2.714)		(234.5)		(187.3)		(547.8)		(918.1)		(3,302)		(187.8)		(286.9)	
Log mean exp.	0.119		7.788		10.23		26.55		-116.5***		-94.60		2.796		-44.39***	
	(0.131)		(10.30)		(6.815)		(21.47)		(36.55)		(150.3)		(4.986)		(11.60)	
Mean food variety		0.0110*		1.173***		0.810***		-0.457		0.331		0.926		-0.572**		-0.280
		(0.00574)		(0.406)		(0.198)		(0.589)		(0.999)		(4.784)		(0.229)		(0.281)
Log mean food exp.		-0.00242		-2.080		3.997		5.644		-42.19*		-154.3		12.88***		-13.32**
		(0.108)		(5.536)		(2.910)		(14.40)		(23.28)		(92.49)		(4.362)		(6.019)
N	18,589	18,589	18,527	18,527	15,144	15,144	18,589	18,589	18,589	18,589	18,589	18,589	18,589	18,589	18,589	18,589
R^2	0.046	0.046	0.050	0.057	0.050	0.060	0.201	0.198	0.262	0.248	0.634	0.634	0.009	0.013	0.071	0.050
Mean of dep. var.	0.54	0.54	29	29	11	11	126	126	222	222	3196	3196	7	7	14	14

Standard errors clustered by district. *** p<0.01, ** p<0.05, * p<0.1. All regressions include log household size, adult male and female ratios, dummies for caste, tribe, religion, farmer status, house type, and district population density. Time-use survey sample from 1998-1999 merged to NSS data for 1999-2000. Columns 1 and 2 use a dependent variable equal to one if shopping minutes are above zero for the reported week. Columns 3 and 4 exclude households with live-in servants and columns 5 and 6 report only the minutes of the wives of male household heads. Columns 7 through 16 report household minutes for other time-use categories.

Table A.4: Fact 4 robustness: Household variety and shopping patterns in the Nielsen Colorado sample

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent variable		Number of trips			Number of stores	Trips/store	Variety (UPCs)	
Expenditure	0.503***		0.297***	0.303***	0.120***	0.183***	0.481***	0.133***
	(0.008)		(0.014)	(0.014)	(0.013)	(0.013)	(0.011)	(0.007)
Variety (UPCs)		0.631***	0.340***	0.444***	0.323***	0.120***		
		(0.009)	(0.017)	(0.023)	(0.025)	(0.020)		
Number of trips							0.251***	0.122***
							(0.013)	(0.007)
Number of modules				-0.146***	-0.136***	-0.010		0.875***
				(0.023)	(0.025)	(0.020)		(0.009)
Obs.	43003	43003	43003	43003	43003	43003	43003	43003

*** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered at the household level. Data are from the publicly available Nielsen Homescan data for Colorado 1994-1995, used in **?**. All variables are in logs. Variety is defined as the number of unique UPCs consumed by the household during the sample period. Regressions include MSA fixed effects and household demographic controls (see text). Modules are groupings of varieties created by Nielsen.

Table A.5: Fact 4 robustness: Shopping time correlated with income and urban location in 2008 American Time-Use Survey. Dependent variable is total daily minutes reported by the household respondent.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Dependent variable			All shopping					Food shopping		
Log weekly earnings	1.315**					0.276				
	(0.638)					(0.265)				
Log (1+weekly earnings)		1.312**		0.524	0.269		0.266		0.152	0.023
		(0.635)		(0.700)	(0.757)		(0.264)		(0.293)	(0.323)
Dummy(earnings> 0)		-13.549*		-5.758	-2.978		-3.090		-1.964	-0.692
		(7.043)		(7.691)	(8.267)		(2.942)		(3.242)	(3.549)
Log annual family income			2.384***	2.260***	2.175***			0.462**	0.462**	0.464*
			(0.534)	(0.571)	(0.618)			(0.223)	(0.235)	(0.259)
Urban	4.573***	4.253***	4.336***	4.287***	4.457***	1.906***	1.998***	1.808***	1.802***	1.864***
	(1.529)	(1.138)	(1.199)	(1.202)	(1.209)	(0.557)	(0.421)	(0.457)	(0.459)	(0.468)
Log household size	2.231**	3.141***	2.132**	2.177**	2.151**	0.214	0.399	0.080	0.106	0.104
	(1.078)	(0.789)	(0.887)	(0.891)	(0.916)	(0.390)	(0.314)	(0.359)	(0.360)	(0.370)
Mean of dep. var.	26	26	26	26	26	8	8	8	8	8
Observations	7,250	12,723	10,937	10,937	10,119	7,250	12,723	10,937	10,937	10,119
R-squared	0.002	0.003	0.005	0.005	0.004	0.001	0.002	0.002	0.002	0.002

Robust standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$. Sample size changes due to respondents with zero earnings (columns 1 and 6) or with missing or top-coded family incomes (family income is imputed as mid-point of the range for each category, with top band excluded.)

Table A.6: First-stage for grain variety elasticity. Dep. variable is $\Delta \ln p_i$

Instruments	Regional rain x variety dummy	Prices in other regions
Rain	0.000665***	
	(0.000208)	
chira	-0.000645**	
	(0.000265)	
khoi, lawa	-0.000687	
	(0.000680)	
muri	-0.000404	
	(0.000344)	
other rice products	-0.00140**	
	(0.000599)	
wheat	-0.000642**	
	(0.000309)	
maida	-0.000909***	
	(0.000315)	
suji, rawa	-0.000508*	
	(0.000303)	
sewai noodles	-0.00257***	
	(0.000581)	
bread (bakery)	-0.000369	
	(0.000370)	
other wheat products	-0.00416***	
	(0.000641)	
jowar	-0.00172***	
	(0.000402)	
bajra	-0.000689**	
	(0.000329)	
maize	-0.00132***	
	(0.000254)	
barley	-0.00207***	
	(0.000566)	
small millets	-0.00186**	
	(0.000876)	
ragi	-0.000976*	
	(0.000515)	
other cereals/cereal substitutes	-0.00193***	
	(0.000525)	
Prices in other regions of state		0.659***
		(0.0704)
Region-variety FE	Yes	Yes
Observations	166,511	166,511
Region-year-varieties	1370	1370
Joint F-stat	5.951	87.55

*** $p<0.01$, ** $p<0.05$, * $p<0.1$. Standard errors clustered by region-year-variety in parentheses. Data are from the 38th and 66th NSS rounds merged with rainfall data from the ICRISAT VDSA. "Regional rainfall" column reports the coefficient on rainfall interacted with dummies for each listed variety. Rice is the omitted category (uninteracted effect of rainfall).

Table A.7: First-stage for vegetable variety elasticity. Dep. variable is $\Delta \ln p_i$

Instruments	Regional rain x variety dummy	Prices in other regions
Rain	0.000247*	
	(0.000133)	
onion	-0.000775***	
	(0.000202)	
radish	-0.00104***	
	(0.000277)	
carrot	-0.00229***	
	(0.000433)	
turnip	-0.00279***	
	(0.000729)	
beet	-0.000612*	
	(0.000341)	
sweet potato	-0.00213***	
	(0.000537)	
arum	-0.00135***	
	(0.000505)	
pumpkin	-0.000954***	
	(0.000280)	
gourd	-0.000665**	
	(0.000331)	
bitter gourd	-0.000469**	
	(0.000237)	
cucumber	-0.00129***	
	(0.000271)	
parwal, patal	-0.00121***	
	(0.000286)	
jhinga, torai	-0.00148***	
	(0.000252)	
snake gourd	0.000543	
	(0.000695)	
cauliflower	-0.000596***	
	(0.000221)	
cabbage	-0.000417*	
	(0.000223)	
brinjal	-0.000846***	
	(0.000217)	
lady's finger	-0.000966***	
	(0.000226)	
palak/other leafy vegetables	-0.000776***	
	(0.000280)	
french beans, barbati	-0.000588**	
	(0.000232)	
tomato	-0.000310	
	(0.000205)	
peas	-0.00138***	
	(0.000312)	
chillis: green	-0.000722**	
	(0.000317)	
capsicum	0.000714*	
	(0.000367)	
plantain: green	-0.000725***	
	(0.000257)	
jackfruit: green	-0.00206***	
	(0.000425)	
lemon	0.00260**	
	(0.00118)	
other vegetables	-0.00100***	
	(0.000221)	
Prices in other regions of state		0.966***
		(0.0345)
Region-variety FE	Yes	Yes
Observations	627,018	627,018
Region-year-varieties	2597	2597
Joint F-stat	9.600	782.4

*** $p<0.01$, ** $p<0.05$, * $p<0.1$. Standard errors clustered by region-year-variety in parentheses. Data are from the 38th and 66th NSS rounds merged with rainfall data from the ICRISAT VDSA. "Regional rainfall" column reports the coefficient on rainfall interacted with dummies for each listed variety. Potato is the omitted category (uninteracted effect of rainfall).

Table A.8: Test for equality of elasticity of substitution above (vs. below) median real per capita exp.

	(1)	(2)	(3)	(4)
Grain varieties				
Specification	OLS		IV: prices in other regions	
$\Delta \ln p$	-0.619***	-0.568***	-1.111***	-1.039***
	(0.113)	(0.0879)	(0.198)	(0.160)
$\Delta \ln p$ x above median exp.	-0.115	0.0945	-0.0371	0.107
	(0.140)	(0.107)	(0.195)	(0.155)
Control for Δ HH share	No	Yes	No	Yes
Region-variety FE	Yes	Yes	Yes	Yes
Observations	166,511	166,511	166,215	166,215
Region-year-varieties	1272	1272	1270	1270
Vegetable varieties				
Specification	OLS		IV: region rain x variety	
$\Delta \ln p$	-0.147***	-0.144***	-0.648***	-0.677***
	(0.0438)	(0.0435)	(0.0991)	(0.101)
$\Delta \ln p$ x above median exp.	0.284***	0.274***	0.0283	0.0944
	(0.0526)	(0.0522)	(0.117)	(0.117)
Control for Δ HH share	No	Yes	No	Yes
Region-variety FE	Yes	Yes	Yes	Yes
Observations	627,018	627,018	626,945	626,945
Region-year-varieties	2510	2510	2510	2510

*** $p<0.01$, ** $p<0.05$, * $p<0.1$ Standard errors clustered by region-year-variety in parentheses. Data are from rural areas of the 38th round (1983) and 66th round (2009-2010) NSS expenditure surveys. Rainfall data is derived by aggregating district rainfall to the regional level in the ICRISAT VDSA data set and then merging it at the region level to the NSS data. Above median expenditure is defined as median across all sample households using official rural laborer price index to deflate 2010 expenditures to 1983 rupee basis. All regressions include dummies for above median expenditure. Specifications with Δ hh share (columns 2 and 4) also include interaction of Δ hh share with above median expenditure dummy. IV specifications interact instrument set with dummy for above median expenditure.

Table A.9: Comparison of mean estimates using household base versus common base

Comparison	Over time (2010 vs. 1983 base)				Urban 2010 vs. Rural 2010 base			
Group	Grains		Vegetables		Grains		Vegetables	
Base	Household	Common	Household	Common	Household	Common	Household	Common
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Decomposition of difference in variety (2010 vs. 1983) at median								
Change in variety (%Δn)	0.493	0.485	0.567	0.557	0.292	0.256	0.093	0.074
Expenditure component (X/b)	-0.046	-0.049	0.047	0.136	-0.012	-0.016	0.022	0.030
Int. margin component (ψ)	-0.120	-0.121	0.051	0.048	-0.026	-0.034	-0.020	-0.017
Variety cost component (F, ϵ)	0.661	0.652	0.469	0.373	0.334	0.308	0.091	0.061
Panel B: Welfare gains (2010 vs. 1983, as share of group expenditure) at median								
Variety cost (F, ϵ) only	0.135	0.134	0.253	0.216	0.044	0.054	0.035	0.020
Variety cost and int. margin (F, ϵ, ψ)	0.017	0.015	0.305	0.267	0.033	0.035	-0.049	-0.094
Rich bias: 90th vs. 10th pct. (F, ϵ)	0.019	0.019	-0.062	-0.065	0.025	0.021	0.017	-0.001

Means across 75 regions of variety Engel curve model. Odd numbered columns (household base) are the results reported in the main text Tables 6 and 7, where b is defined as a Tornqvist price index over all common varieties, the base (highest expenditure) variety is allowed to vary by household, and all households are included in the sample. Even numbered columns (common base) define b as the price for a single variety per region and exclude households for which this variety is not the one with the highest expenditure share.

Table A.10: Detailed results by region: Grains over time (2010 vs. 1983 base)

State-region	Decomposition			Welfare				CES	
	n	X/b	ψ	F, ϵ	F, ϵ	F, ϵ, ψ	Rich Bias	Region	Village
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Andhra Pradesh Coastal	1.282	-0.081	-0.125	1.488	0.168	0.113	0.065	-0.001	0.028
	(0.114)	(0.010)	(0.031)	(0.118)	(0.024)	(0.018)	(0.009)		
Nagaland	1.241	0.341	-0.626	1.526	0.221	-0.007	0.112	0.012	0.017
	(0.273)	(0.054)	(0.333)	(0.467)	(0.063)	(0.037)	(0.033)		
Pondicherry	1.143	-0.029	0.138	1.034	0.072	0.170	0.003	-0.001	0.021
	(0.365)	(0.014)	(0.046)	(0.366)	(0.026)	(0.035)	(0.009)		
Madhya Pradesh Vindhya	1.087	-0.140	-0.573	1.800	0.387	-0.065	0.071	-0.091	-0.051
	(0.141)	(0.021)	(0.197)	(0.278)	(0.055)	(0.046)	(0.014)		
Madhya Pradesh Malwa	1.066	-0.054	-0.443	1.563	0.283	0.043	0.100	-0.002	-0.066
	(0.172)	(0.018)	(0.127)	(0.241)	(0.046)	(0.037)	(0.018)		
Maharashtra Eastern	1.041	-0.134	-0.255	1.430	0.222	0.133	0.106	-0.006	-0.032
	(0.222)	(0.034)	(0.190)	(0.333)	(0.052)	(0.055)	(0.022)		
Bihar Northern	0.932	-0.026	-0.601	1.559	0.372	-0.122	0.082	-0.005	-0.045
	(0.077)	(0.006)	(0.087)	(0.139)	(0.041)	(0.028)	(0.011)		
Jammu & Kashmir Outer Hills	0.919	-0.095	-0.178	1.193	0.438	-0.002	0.000	0.000	0.000
	(0.199)	(0.043)	(0.107)	(0.272)	(0.094)	(0.141)	(0.033)		
Uttar Pradesh Southern	0.798	-0.047	-0.217	1.061	0.212	0.018	0.037	-0.033	0.006
	(0.174)	(0.008)	(0.081)	(0.214)	(0.045)	(0.037)	(0.019)		
Maharashtra Coastal	0.793	-0.064	-0.065	0.922	0.181	0.119	0.032	-0.009	0.011
	(0.130)	(0.008)	(0.025)	(0.139)	(0.032)	(0.029)	(0.011)		
Andhra Pradesh South-Western	0.763	-0.037	-0.061	0.860	0.193	0.087	0.002	0.002	-0.037
	(0.272)	(0.015)	(0.018)	(0.275)	(0.274)	(0.286)	(0.023)		
Manipur Hills	0.746	-0.008	0.010	0.744	0.062	0.067	0.012	-0.002	0.000
	(0.154)	(0.009)	(0.023)	(0.158)	(0.016)	(0.017)	(0.005)		
Karnataka Inland Southern	0.741	-0.078	-0.217	1.035	0.186	-0.023	0.025	-0.012	-0.025
	(0.122)	(0.015)	(0.056)	(0.152)	(0.032)	(0.032)	(0.011)		
Meghalaya	0.720	-0.066	-0.179	0.964	0.089	0.028	0.017	0.000	0.013
	(0.232)	(0.021)	(0.044)	(0.256)	(0.022)	(0.018)	(0.018)		
Tamil Nadu Southern	0.710	-0.032	0.026	0.716	0.096	0.109	0.043	-0.011	-0.023
	(0.132)	(0.010)	(0.024)	(0.137)	(0.025)	(0.026)	(0.009)		
Tamil Nadu Coastal Northern	0.697	-0.014	0.017	0.693	0.114	0.150	-0.002	-0.001	-0.003
	(0.127)	(0.006)	(0.007)	(0.128)	(0.023)	(0.028)	(0.008)		
Rajasthan Southern	0.693	-0.020	-0.054	0.767	0.318	0.073	-0.017	-0.067	0.000
	(0.206)	(0.008)	(0.060)	(0.224)	(0.187)	(0.249)	(0.032)		
Kerala Southern	0.676	-0.041	0.168	0.548	0.073	0.253	0.001	-0.006	0.062
	(0.100)	(0.006)	(0.024)	(0.100)	(0.016)	(0.031)	(0.005)		
Madhya Pradesh Central	0.667	-0.118	-0.028	0.813	0.137	0.117	0.062	-0.098	-0.004
	(0.197)	(0.018)	(0.047)	(0.205)	(0.040)	(0.045)	(0.022)		
Bihar Southern	0.654	-0.032	-0.226	0.912	0.146	0.027	0.117	-0.008	-0.021

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Table A.10 – continued from previous page

State-region	Decomposition			Welfare			Rich Bias	CES	
	n	X/b	ψ	F, ϵ	F, ϵ	F, ϵ, ψ		Region	Village
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	(0.091)	(0.009)	(0.052)	(0.118)	(0.028)	(0.022)	(0.016)		
Kerala Northern	0.647	-0.016	0.022	0.642	0.097	0.196	-0.023	-0.006	0.043
	(0.133)	(0.011)	(0.015)	(0.133)	(0.292)	(0.260)	(0.009)		
Madhya Pradesh Northern	0.646	-0.178	-0.096	0.920	0.131	0.077	0.037	-0.048	-0.025
	(0.268)	(0.022)	(0.065)	(0.290)	(0.047)	(0.041)	(0.021)		
West Bengal Himalayan	0.638	0.002	-0.191	0.827	0.109	-0.025	0.025	-0.006	0.004
	(0.200)	(0.010)	(0.093)	(0.238)	(0.044)	(0.049)	(0.015)		
Lakshadweep	0.619	-0.015	0.018	0.616	0.188	0.236	-0.098	-0.003	-0.003
	(5.700)	(0.047)	(0.145)	(9.024)	(6.E+15)	(9.E+15)	(2.E+19)		
Uttar Pradesh Himalayan	0.599	-0.048	-0.231	0.878	0.208	-0.080	0.019	-0.015	-0.034
	(0.124)	(0.009)	(0.052)	(0.148)	(0.036)	(0.039)	(0.018)		
Andhra Pradesh Inland Southern	0.599	-0.003	-0.004	0.606	0.128	0.117	0.003	0.007	-0.003
	(0.274)	(0.014)	(0.048)	(0.284)	(0.071)	(0.074)	(0.018)		
Assam Plains Eastern	0.596	0.003	-0.087	0.681	0.067	0.015	0.019	-0.002	0.002
	(0.154)	(0.008)	(0.028)	(0.164)	(0.017)	(0.016)	(0.011)		
Karnataka Inland Eastern	0.594	-0.122	-0.025	0.741	0.119	0.103	0.084	-0.014	-0.008
	(0.237)	(0.046)	(0.072)	(0.254)	(0.053)	(0.059)	(0.029)		
Rajasthan North-Eastern	0.563	-0.062	-0.160	0.785	0.180	0.024	0.013	-0.017	-0.079
	(0.150)	(0.014)	(0.038)	(0.178)	(0.037)	(0.026)	(0.018)		
Andhra Pradesh Inland Northern	0.544	-0.010	-0.024	0.578	0.141	0.012	0.004	0.000	-0.004
	(0.104)	(0.007)	(0.022)	(0.111)	(0.277)	(0.319)	(0.007)		
Maharashtra Inland Central	0.540	-0.047	-0.050	0.637	0.184	0.118	-0.012	-0.002	0.022
	(0.106)	(0.008)	(0.028)	(0.113)	(0.031)	(0.038)	(0.015)		
Maharashtra Inland Western	0.531	-0.121	-0.053	0.705	0.181	0.127	0.039	-0.004	0.019
	(0.091)	(0.009)	(0.035)	(0.103)	(0.030)	(0.036)	(0.014)		
Rajasthan South-Eastern	0.522	-0.021	-0.105	0.649	0.182	-0.045	-0.008	-0.007	-0.016
	(0.219)	(0.008)	(0.095)	(0.271)	(0.168)	(0.207)	(0.027)		
Uttar Pradesh Western	0.509	-0.071	-0.255	0.835	0.199	-0.073	0.023	-0.014	0.003
	(0.071)	(0.003)	(0.032)	(0.088)	(0.026)	(0.022)	(0.010)		
Jammu & Kashmir Mountainous	0.496	-0.035	-0.576	1.107	0.300	-0.266	0.075	0.004	0.016
	(0.119)	(0.010)	(0.170)	(0.235)	(0.070)	(0.078)	(0.022)		
Bihar Central	0.494	-0.003	-0.569	1.066	0.206	-0.168	0.092	-0.014	-0.018
	(0.095)	(0.007)	(0.111)	(0.177)	(0.037)	(0.033)	(0.016)		
Uttar Pradesh Eastern	0.493	-0.018	-0.394	0.906	0.216	-0.138	0.064	-0.016	-0.007
	(0.064)	(0.004)	(0.050)	(0.094)	(0.030)	(0.026)	(0.012)		
Orissa Southern	0.476	-0.031	-0.136	0.643	0.073	0.020	0.107	0.000	0.011
	(0.344)	(0.018)	(0.073)	(0.345)	(0.073)	(0.075)	(0.026)		
Karnataka Inland Northern	0.461	-0.012	-0.009	0.482	0.177	0.036	-0.064	-0.007	0.024
	(0.091)	(0.010)	(0.012)	(0.094)	(0.376)	(0.442)	(0.027)		
West Bengal Eastern Plains	0.432	-0.110	-0.014	0.556	0.062	0.054	0.030	-0.003	0.007

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Table A.10 – continued from previous page

State-region	Decomposition n (1)	X/b (2)	ψ (3)	F, ϵ (4)	Welfare F, ϵ (5)	F, ϵ, ψ (6)	Rich Bias (7)	CES Region (8)	Village (9)
	(0.126)	(0.012)	(0.029)	(0.133)	(0.020)	(0.020)	(0.009)		
West Bengal Central Plains	0.371	-0.082	0.014	0.438	0.072	0.086	0.011	-0.003	0.003
	(0.077)	(0.007)	(0.016)	(0.079)	(0.016)	(0.019)	(0.007)		
Madhya Pradesh South-Western	0.356	-0.046	-0.051	0.453	0.123	0.044	0.019	-0.026	-0.057
	(0.179)	(0.014)	(0.032)	(0.195)	(0.049)	(0.051)	(0.022)		
Gujarat Plains Northern	0.352	-0.036	-0.160	0.548	0.180	-0.074	0.027	-0.009	-0.001
	(0.088)	(0.005)	(0.027)	(0.100)	(0.035)	(0.035)	(0.013)		
Orissa Coastal	0.350	-0.050	0.099	0.301	0.045	0.140	0.012	-0.002	0.014
	(0.133)	(0.014)	(0.027)	(0.132)	(0.021)	(0.029)	(0.012)		
Gujarat Saurashtra	0.327	-0.076	-0.260	0.662	0.219	-0.204	0.026	-0.006	0.016
	(0.124)	(0.013)	(0.075)	(0.167)	(0.052)	(0.063)	(0.016)		
Maharashtra Inland Eastern	0.326	-0.010	0.029	0.308	0.097	0.135	-0.039	-0.008	0.019
	(0.119)	(0.007)	(0.021)	(0.121)	(0.028)	(0.035)	(0.014)		
Rajasthan Western	0.325	-0.058	-0.080	0.463	0.129	-0.009	0.004	-0.008	0.000
	(0.140)	(0.012)	(0.033)	(0.163)	(0.039)	(0.031)	(0.019)		
Punjab Northern	0.311	-0.073	-0.283	0.668	0.133	-0.070	0.052	-0.020	-0.021
	(0.100)	(0.010)	(0.055)	(0.131)	(0.031)	(0.029)	(0.015)		
Uttar Pradesh Central	0.306	-0.024	-0.160	0.490	0.152	-0.116	-0.004	-0.016	-0.007
	(0.108)	(0.006)	(0.041)	(0.130)	(0.034)	(0.035)	(0.018)		
Punjab Southern	0.296	-0.105	-0.040	0.441	0.063	0.036	0.034	-0.007	-0.008
	(0.126)	(0.011)	(0.019)	(0.132)	(0.023)	(0.022)	(0.013)		
Orissa Northern	0.293	-0.035	0.068	0.260	0.042	0.100	-0.004	-0.002	0.015
	(0.172)	(0.009)	(0.021)	(0.172)	(0.025)	(0.030)	(0.010)		
Karnataka Coastal & Ghats	0.219	-0.117	0.128	0.208	0.022	0.134	0.006	-0.007	0.007
	(0.279)	(0.045)	(0.060)	(0.279)	(0.032)	(0.048)	(0.018)		
Haryana Western	0.211	-0.058	-0.065	0.334	0.085	0.023	-0.011	-0.003	-0.005
	(0.191)	(0.016)	(0.025)	(0.203)	(0.042)	(0.039)	(0.021)		
Maharashtra Inland Northern	0.209	-0.026	-0.019	0.254	0.072	0.050	0.011	-0.002	0.010
	(0.130)	(0.012)	(0.036)	(0.138)	(0.038)	(0.048)	(0.020)		
Madhya Pradesh Chhatisgarh	0.197	-0.057	0.002	0.252	0.026	0.028	0.033	-0.003	0.019
	(0.133)	(0.016)	(0.014)	(0.138)	(0.025)	(0.025)	(0.010)		
Arunachal Pradesh	0.193	0.107	-0.194	0.280	0.079	-0.041	0.002	0.041	-0.008
	(0.645)	(0.039)	(0.106)	(0.624)	(0.182)	(0.219)	(0.102)		
Assam Plains Western	0.181	-0.092	-0.093	0.366	0.010	-0.015	0.038	-0.001	0.013
	(0.139)	(0.016)	(0.038)	(0.164)	(0.014)	(0.012)	(0.009)		
Jammu & Kashmir Jhelam Valley	0.101	-0.010	-0.066	0.178	0.032	-0.078	-0.005	0.007	0.000
	(0.076)	(0.008)	(0.040)	(0.095)	(0.134)	(0.150)	(0.007)		
Delhi	0.085	-0.063	-0.068	0.217	0.072	-0.030	0.002	-0.030	-0.032
	(0.125)	(0.011)	(0.028)	(0.134)	(0.040)	(0.048)	(0.023)		
West Bengal Western Plains	0.046	-0.062	0.007	0.102	0.027	0.035	-0.014	-0.008	-0.001

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Table A.10 – continued from previous page

State-region	Decomposition				Welfare		Rich Bias	CES	
	n	X/b	ψ	F,ϵ	F,ϵ	F,ϵ,ψ	Rich Bias	Region	Village
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	(0.149)	(0.013)	(0.009)	(0.152)	(0.028)	(0.029)	(0.012)		
Himachal Pradesh	0.020	-0.042	-0.162	0.224	0.116	-0.267	-0.027	-0.009	-0.012
	(0.096)	(0.010)	(0.041)	(0.115)	(0.041)	(0.059)	(0.024)		
Sikkim	-0.038	-0.106	-0.247	0.315	0.084	-0.155	-0.006	-0.017	0.006
	(0.313)	(0.027)	(0.097)	(0.326)	(0.072)	(0.115)	(0.035)		
Haryana Eastern	-0.040	-0.051	-0.044	0.055	0.014	-0.047	0.002	-0.016	-0.033
	(0.145)	(0.010)	(0.016)	(0.150)	(0.038)	(0.041)	(0.016)		
Chandigarh	-0.104	-0.012	-0.039	-0.054	0.027	-0.022	-0.066	-0.035	-0.032
	(0.223)	(0.013)	(0.053)	(0.230)	(0.066)	(0.080)	(0.039)		
Mizoram	-0.113	0.024	-0.107	-0.030	-0.021	-0.068	0.018	-0.001	0.040
	(0.209)	(0.010)	(0.033)	(0.214)	(0.051)	(0.040)	(0.018)		
Tripura	-0.245	-0.007	-0.055	-0.183	-0.021	-0.045	0.001	-0.001	-0.016
	(0.258)	(0.015)	(0.044)	(0.261)	(0.028)	(0.035)	(0.018)		
Gujarat Plains Southern	-0.379	-0.014	-0.015	-0.350	-0.043	-0.186	-0.131	0.004	0.015
	(0.212)	(0.020)	(0.042)	(0.228)	(0.294)	(0.340)	(0.050)		

Standard errors are clustered by region-year and boot-strapped following the procedure described in the text. Decomposition in columns 1 through 4 is based on equation 7. Welfare results in columns 5 and 6 are based on equation 8. Both are evaluated at the utility level of a household at the 50th percentile of group expenditure in the base. Rich bias is the difference in gains for utility levels corresponding to the 90th and 10th percentiles of household expenditure distribution in the bsae. Columns 8 and 9 are based on the **?** formula using the same estimate of σ, applied at the region level or village/block level (median across all bilateral comparisons between village/blocks within region).

Table A.11: Detailed results by region: Vegetables over time (2010 vs. 1983 base)

State-region	Decomposition				Welfare		Rich Bias	CES	
	n	X/b	ψ	F,ϵ	F,ϵ	F,ϵ,ψ	Rich Bias	Region	Village
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Andaman & Nicobar Islands	1.112	0.245	0.125	0.742	0.334	0.499	-0.067	0.010	0.500
	(0.133)	(0.025)	(0.055)	(0.135)	(0.063)	(0.078)	(0.029)		
Manipur Hills	0.989	0.104	0.092	0.793	0.370	0.515	-0.102	0.035	0.820
	(0.172)	(0.012)	(0.027)	(0.173)	(0.070)	(0.076)	(0.027)		
Assam Hills	0.866	0.373	-0.073	0.566	0.206	0.141	0.037	0.098	0.484
	(3.936)	(0.223)	(3.968)	(5.707)	(4.E+03)	(3.E+03)	(3.E+03)		
Nagaland	0.850	0.184	-0.127	0.792	0.359	0.168	0.006	0.078	0.540
	(0.163)	(0.013)	(0.080)	(0.184)	(0.095)	(0.110)	(0.025)		
Rajasthan Southern	0.840	0.273	0.042	0.525	0.335	0.439	-0.194	-0.001	0.843
	(0.158)	(0.025)	(0.024)	(0.155)	(0.081)	(0.089)	(0.041)		
Uttar Pradesh Southern	0.837	0.313	0.341	0.183	0.077	0.495	-0.025	0.001	0.421

Continued on next page

Table A.11 – continued from previous page

	Decomposition			Welfare				CES	
State-region	n	X/b	ψ	F,ϵ	F,ϵ	F,ϵ,ψ	Rich Bias	Region	Village
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	(0.132)	(0.015)	(0.067)	(0.141)	(0.052)	(0.071)	(0.038)		
Bihar Northern	0.830	0.236	0.089	0.504	0.197	0.320	0.044	0.000	0.283
	(0.062)	(0.006)	(0.028)	(0.069)	(0.046)	(0.062)	(0.012)		
Jammu & Kashmir Outer Hills	0.818	0.124	-0.030	0.724	0.399	0.349	-0.103	0.012	0.592
	(0.135)	(0.017)	(0.051)	(0.143)	(0.072)	(0.088)	(0.029)		
Maharashtra Inland Western	0.792	0.070	0.006	0.716	0.332	0.340	-0.007	0.038	0.259
	(0.063)	(0.009)	(0.031)	(0.069)	(0.052)	(0.056)	(0.011)		
Kerala Northern	0.774	0.226	-0.029	0.577	0.294	0.254	-0.072	0.000	0.277
	(0.089)	(0.015)	(0.024)	(0.091)	(0.055)	(0.054)	(0.018)		
Kerala Southern	0.766	0.187	-0.109	0.688	0.307	0.178	-0.033	0.000	0.229
	(0.074)	(0.011)	(0.031)	(0.080)	(0.055)	(0.044)	(0.012)		
Maharashtra Inland Northern	0.756	0.207	0.038	0.512	0.242	0.294	-0.019	-0.001	0.445
	(0.084)	(0.014)	(0.043)	(0.090)	(0.050)	(0.063)	(0.019)		
Uttar Pradesh Eastern	0.751	0.165	0.134	0.453	0.195	0.449	-0.076	0.000	0.334
	(0.059)	(0.005)	(0.021)	(0.061)	(0.038)	(0.066)	(0.018)		
Maharashtra Eastern	0.742	0.154	-0.051	0.639	0.358	0.246	-0.043	0.005	0.360
	(0.129)	(0.011)	(0.052)	(0.144)	(0.077)	(0.101)	(0.022)		
Karnataka Inland Eastern	0.736	-0.029	-0.202	0.967	0.407	0.169	-0.013	0.000	0.137
	(0.124)	(0.018)	(0.095)	(0.154)	(0.080)	(0.094)	(0.020)		
Jammu & Kashmir Mountainous	0.722	0.318	0.082	0.322	0.170	0.270	-0.025	0.048	0.485
	(0.091)	(0.016)	(0.043)	(0.098)	(0.052)	(0.062)	(0.019)		
Bihar Southern	0.702	0.267	0.242	0.193	0.102	0.435	-0.088	0.000	0.329
	(0.067)	(0.008)	(0.036)	(0.076)	(0.031)	(0.061)	(0.028)		
Pondicherry	0.691	0.201	0.077	0.414	0.205	0.342	0.047	0.015	0.221
	(0.215)	(0.029)	(0.092)	(0.230)	(0.125)	(0.146)	(0.053)		
Rajasthan Western	0.672	0.140	0.100	0.431	0.211	0.358	-0.073	0.014	0.586
	(0.098)	(0.014)	(0.029)	(0.101)	(0.048)	(0.063)	(0.023)		
Orissa Coastal	0.657	0.066	-0.102	0.692	0.304	0.105	-0.025	0.000	0.290
	(0.082)	(0.009)	(0.053)	(0.102)	(0.067)	(0.089)	(0.016)		
West Bengal Central Plains	0.652	0.000	0.089	0.563	0.197	0.333	0.002	0.000	0.162
	(0.059)	(0.010)	(0.038)	(0.072)	(0.044)	(0.068)	(0.010)		
Andhra Pradesh South-Western	0.646	0.089	-0.073	0.630	0.329	0.169	-0.032	0.000	0.312
	(0.114)	(0.012)	(0.050)	(0.125)	(0.074)	(0.098)	(0.021)		
Tamil Nadu Coastal Northern	0.645	0.103	-0.007	0.549	0.301	0.286	-0.073	0.000	0.137
	(0.072)	(0.008)	(0.024)	(0.075)	(0.055)	(0.065)	(0.015)		
Maharashtra Inland Eastern	0.645	0.103	0.023	0.519	0.279	0.320	-0.048	0.001	0.315
	(0.073)	(0.009)	(0.029)	(0.076)	(0.054)	(0.065)	(0.016)		
Tamil Nadu Southern	0.643	-0.019	-0.174	0.835	0.431	0.058	-0.037	0.000	0.254
	(0.068)	(0.007)	(0.041)	(0.077)	(0.070)	(0.067)	(0.012)		
Meghalaya	0.638	-0.048	0.241	0.445	0.213	0.499	0.005	0.000	0.243

Continued on next page

Table A.11 – continued from previous page

	Decomposition				Welfare			CES	
State-region	n	X/b	ψ	F,ϵ	F,ϵ	F,ϵ,ψ	Rich Bias	Region	Village
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	(0.085)	(0.018)	(0.058)	(0.105)	(0.046)	(0.064)	(0.022)		
Andhra Pradesh Inland Northern	0.637	0.193	0.006	0.437	0.269	0.282	-0.163	0.000	0.455
	(0.062)	(0.008)	(0.018)	(0.064)	(0.051)	(0.056)	(0.022)		
Tamil Nadu Coastal	0.633	0.090	0.011	0.532	0.338	0.375	-0.105	0.003	0.265
	(0.088)	(0.009)	(0.018)	(0.089)	(0.064)	(0.079)	(0.020)		
Tamil Nadu Inland	0.629	0.078	-0.046	0.596	0.282	0.212	0.003	0.000	0.197
	(0.080)	(0.010)	(0.044)	(0.087)	(0.058)	(0.067)	(0.012)		
Madhya Pradesh South	0.618	0.198	-0.009	0.429	0.182	0.170	0.007	0.000	0.238
	(0.109)	(0.013)	(0.043)	(0.117)	(0.056)	(0.063)	(0.018)		
Madhya Pradesh Vindhya	0.614	0.233	0.039	0.342	0.157	0.200	-0.011	0.013	0.555
	(0.146)	(0.019)	(0.036)	(0.150)	(0.066)	(0.070)	(0.020)		
Maharashtra Coastal	0.609	0.007	-0.003	0.606	0.317	0.311	-0.049	0.000	0.228
	(0.066)	(0.008)	(0.028)	(0.072)	(0.054)	(0.061)	(0.014)		
Rajasthan North-Eastern	0.606	0.237	0.065	0.304	0.199	0.345	-0.141	0.001	0.408
	(0.079)	(0.010)	(0.016)	(0.079)	(0.048)	(0.064)	(0.030)		
Bihar Central	0.602	0.065	0.307	0.231	0.108	0.610	-0.112	0.000	0.300
	(0.100)	(0.008)	(0.038)	(0.102)	(0.035)	(0.064)	(0.038)		
Karnataka Inland Southern	0.590	0.027	-0.050	0.613	0.360	0.228	-0.124	0.000	0.188
	(0.071)	(0.006)	(0.033)	(0.077)	(0.061)	(0.088)	(0.017)		
Madhya Pradesh Malwa	0.590	0.206	0.050	0.333	0.195	0.277	-0.080	0.000	0.389
	(0.107)	(0.018)	(0.024)	(0.108)	(0.054)	(0.063)	(0.024)		
Dadra & Nagar Haveli	0.580	0.234	-0.263	0.609	0.462	-0.465	-0.082	0.031	0.449
	(0.274)	(0.075)	(0.195)	(0.325)	(0.137)	(0.406)	(0.057)		
Maharashtra Inland Central	0.579	0.133	-0.131	0.576	0.307	0.110	-0.067	0.000	0.213
	(0.086)	(0.013)	(0.037)	(0.092)	(0.062)	(0.052)	(0.015)		
Punjab Southern	0.578	0.161	0.107	0.310	0.182	0.378	-0.050	0.000	0.288
	(0.081)	(0.009)	(0.025)	(0.084)	(0.049)	(0.065)	(0.022)		
Madhya Pradesh Central	0.577	0.149	0.130	0.299	0.171	0.398	-0.070	0.001	0.256
	(0.118)	(0.012)	(0.046)	(0.125)	(0.061)	(0.079)	(0.031)		
Uttar Pradesh Western	0.576	0.166	0.137	0.273	0.143	0.380	-0.065	0.000	0.181
	(0.049)	(0.006)	(0.027)	(0.056)	(0.033)	(0.062)	(0.016)		
Haryana Western	0.572	0.314	0.190	0.068	0.047	0.305	-0.042	0.031	0.375
	(0.114)	(0.013)	(0.045)	(0.119)	(0.056)	(0.067)	(0.028)		
Karnataka Coastal & Ghats	0.571	0.215	-0.162	0.517	0.295	0.068	-0.072	0.001	0.313
	(0.161)	(0.021)	(0.099)	(0.182)	(0.091)	(0.123)	(0.027)		
Orissa Northern	0.568	0.185	-0.107	0.491	0.228	0.078	0.000	0.003	0.340
	(0.109)	(0.012)	(0.049)	(0.118)	(0.066)	(0.068)	(0.022)		
Uttar Pradesh Central	0.556	0.093	0.195	0.268	0.131	0.506	-0.085	0.000	0.246
	(0.076)	(0.007)	(0.035)	(0.081)	(0.033)	(0.070)	(0.026)		
Gujarat Saurashtra	0.555	0.029	0.106	0.420	0.188	0.393	0.000	0.006	0.318

Continued on next page

Table A.11 – continued from previous page

State-region	Decomposition				Welfare			CES	
	n	X/b	ψ	F,ϵ	F,ϵ	F,ϵ,ψ	Rich Bias	Region	Village
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	(0.090)	(0.006)	(0.046)	(0.099)	(0.053)	(0.085)	(0.017)		
West Bengal Himalayan	0.551	0.112	0.085	0.354	0.184	0.367	-0.074	0.013	0.267
	(0.126)	(0.010)	(0.052)	(0.139)	(0.065)	(0.095)	(0.023)		
Rajasthan South-Eastern	0.550	0.343	-0.004	0.210	0.189	0.181	-0.232	0.028	0.470
	(0.110)	(0.019)	(0.034)	(0.112)	(0.066)	(0.081)	(0.041)		
Gujarat Plains Northern	0.543	0.123	0.063	0.357	0.235	0.403	-0.102	0.000	0.298
	(0.060)	(0.005)	(0.020)	(0.064)	(0.045)	(0.066)	(0.020)		
Jammu & Kashmir Jhelam Valley	0.513	-0.068	0.000	0.581	0.218	0.218	0.070	0.001	0.328
	(0.075)	(0.007)	(0.043)	(0.085)	(0.047)	(0.057)	(0.015)		
Mizoram	0.512	-0.048	-0.026	0.587	0.351	0.290	-0.119	0.000	0.375
	(0.164)	(0.010)	(0.023)	(0.166)	(0.081)	(0.087)	(0.027)		
Manipur Plains	0.506	-0.137	-0.059	0.702	0.360	0.276	-0.089	0.056	0.938
	(0.139)	(0.016)	(0.028)	(0.139)	(0.070)	(0.072)	(0.025)		
Karnataka Inland Northern	0.500	0.088	-0.109	0.520	0.348	0.097	-0.115	0.000	0.250
	(0.069)	(0.006)	(0.028)	(0.074)	(0.063)	(0.053)	(0.016)		
Madhya Pradesh Northern	0.484	0.078	0.048	0.358	0.170	0.239	0.003	0.000	0.245
	(0.155)	(0.018)	(0.061)	(0.169)	(0.077)	(0.086)	(0.026)		
Tripura	0.483	0.087	0.095	0.302	0.227	0.552	-0.198	0.001	0.309
	(0.141)	(0.009)	(0.022)	(0.143)	(0.069)	(0.079)	(0.059)		
Sikkim	0.482	-0.028	0.552	-0.042	0.016	0.483	0.122	-0.001	0.096
	(0.157)	(0.023)	(0.348)	(0.400)	(0.124)	(0.105)	(0.054)		
Madhya Pradesh Chhatisgarh	0.480	0.100	0.048	0.331	0.271	0.429	-0.233	0.000	0.392
	(0.073)	(0.006)	(0.012)	(0.075)	(0.049)	(0.066)	(0.040)		
West Bengal Eastern Plains	0.478	0.121	0.016	0.340	0.185	0.218	-0.036	0.000	0.171
	(0.082)	(0.010)	(0.037)	(0.093)	(0.058)	(0.073)	(0.016)		
Uttar Pradesh Himalayan	0.470	0.192	0.202	0.076	0.064	0.375	-0.088	0.009	0.259
	(0.103)	(0.015)	(0.046)	(0.113)	(0.052)	(0.066)	(0.034)		
Himachal Pradesh	0.466	0.186	0.054	0.226	0.150	0.235	-0.076	0.002	0.409
	(0.097)	(0.010)	(0.020)	(0.098)	(0.052)	(0.059)	(0.020)		
West Bengal Western Plains	0.464	0.341	0.432	-0.309	-0.097	0.360	-0.021	0.000	0.202
	(0.117)	(0.010)	(0.079)	(0.143)	(0.051)	(0.074)	(0.025)		
Andhra Pradesh Coastal	0.464	0.176	0.075	0.212	0.151	0.311	-0.091	0.000	0.391
	(0.055)	(0.007)	(0.020)	(0.058)	(0.033)	(0.055)	(0.022)		
Assam Plains Eastern	0.435	0.065	0.011	0.359	0.274	0.329	-0.102	0.000	0.411
	(0.087)	(0.004)	(0.014)	(0.089)	(0.061)	(0.079)	(0.021)		
Assam Plains Western	0.434	0.087	-0.034	0.381	0.216	0.120	-0.031	0.000	0.339
	(0.072)	(0.004)	(0.018)	(0.078)	(0.057)	(0.056)	(0.012)		
Arunachal Pradesh	0.389	0.152	0.010	0.227	0.263	0.284	-0.370	0.131	0.274
	(0.470)	(0.082)	(0.048)	(0.445)	(0.267)	(0.281)	(0.137)		
Orissa Southern	0.379	0.297	-0.313	0.394	0.213	-0.342	-0.015	0.004	0.496

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Table A.11 – continued from previous page

State-region	Decomposition n (1)	X/b (2)	ψ (3)	F,ϵ (4)	Welfare F,ϵ (5)	F,ϵ,ψ (6)	Rich Bias (7)	CES Region (8)	Village (9)
	(0.178)	(0.019)	(0.099)	(0.204)	(0.098)	(0.197)	(0.034)		
Punjab Northern	0.372	-0.003	0.002	0.374	0.212	0.215	-0.055	-0.002	0.202
	(0.062)	(0.007)	(0.031)	(0.069)	(0.046)	(0.063)	(0.014)		
Madhya Pradesh South-Western	0.371	0.385	0.154	-0.168	-0.083	0.125	-0.019	0.002	0.412
	(0.115)	(0.017)	(0.058)	(0.126)	(0.068)	(0.074)	(0.031)		
Andhra Pradesh Inland Southern	0.341	0.221	-0.187	0.307	0.285	-0.282	-0.113	0.003	0.257
	(0.119)	(0.017)	(0.069)	(0.140)	(0.092)	(0.229)	(0.033)		
Chandigarh	0.227	0.033	0.113	0.081	0.047	0.225	-0.015	0.017	0.164
	(0.162)	(0.037)	(0.122)	(0.205)	(0.103)	(0.113)	(0.064)		
Haryana Eastern	0.199	0.169	0.155	-0.125	-0.030	0.275	-0.118	0.000	0.169
	(0.113)	(0.011)	(0.035)	(0.121)	(0.061)	(0.068)	(0.038)		
Goa	0.097	0.004	0.005	0.088	0.070	0.077	-0.055	0.044	0.129
	(0.155)	(0.029)	(0.079)	(0.165)	(0.099)	(0.122)	(0.049)		
Gujarat Plains Southern	-0.063	-0.011	0.007	-0.058	0.063	0.097	-0.130	0.013	0.378
	(0.166)	(0.016)	(0.023)	(0.168)	(0.111)	(0.128)	(0.057)		
Delhi	-0.130	0.004	0.010	-0.144	0.055	0.210	-0.255	0.011	0.175
	(0.185)	(0.039)	(0.021)	(0.187)	(0.302)	(0.255)	(0.109)		
Lakshadweep	-0.808	0.084	0.876	-1.768	-0.144	0.441	-0.026	0.182	0.131
	(6.002)	(0.109)	(0.584)	(6.136)	(1.E+02)	(3.E+02)	(5.E+02)		

Standard errors are clustered by region-year and boot-strapped following the procedure described in the text. Decomposition in columns 1 through 4 is based on equation 7. Welfare results in columns 5 and 6 are based on equation 8. Both are evaluated at the utility level of a household at the 50th percentile of group expenditure in the base. Rich bias is the difference in gains for utility levels corresponding to the 90th and 10th percentiles of household expenditure distribution in the bsae. Columns 8 and 9 are based on the **?** formula using the same estimate of σ, applied at the region level or village/block level (median across all bilateral comparisons between village/blocks within region).

Table A.12: Detailed results by region: Grains, urban 2010 vs. rural 2010 base

State-region	Decomposition n (1)	X/b (2)	ψ (3)	F,ϵ (4)	Welfare F,ϵ (5)	F,ϵ,ψ (6)	Rich Bias (7)	CES Region (8)	Village (9)
Andhra Pradesh Inland Southern	2.078	-0.031	-0.408	2.517	0.309	0.256	0.079	0.000	0.029
	(0.521)	(0.030)	(0.159)	(0.564)	(0.101)	(0.102)	(0.045)		
Madhya Pradesh Chhatisgarh	1.313	0.002	0.026	1.285	0.179	0.199	0.068	-0.002	0.019
	(0.224)	(0.012)	(0.036)	(0.228)	(0.038)	(0.042)	(0.023)		
Uttar Pradesh Western	0.896	-0.031	0.068	0.859	0.079	0.112	0.024	0.000	0.006
	(0.119)	(0.007)	(0.063)	(0.123)	(0.016)	(0.029)	(0.006)		
West Bengal Western Plains	0.841	-0.009	0.003	0.848	0.151	0.173	-0.009	-0.001	0.015

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Table A.12 – continued from previous page

	Decomposition				Welfare			CES	
State-region	n	X/b	ψ	F,ϵ	F,ϵ	F,ϵ,ψ	Rich Bias	Region	Village
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	(0.292)	(0.016)	(0.069)	(0.299)	(0.049)	(0.063)	(0.014)		
Madhya Pradesh Malwa	0.733	-0.055	0.037	0.751	0.089	0.107	0.022	0.000	0.024
	(0.285)	(0.016)	(0.056)	(0.293)	(0.041)	(0.044)	(0.019)		
Madhya Pradesh Central	0.723	0.013	0.130	0.580	0.089	0.180	0.012	-0.001	0.026
	(0.290)	(0.020)	(0.070)	(0.285)	(0.047)	(0.058)	(0.033)		
Karnataka Coastal & Ghats	0.686	0.011	0.104	0.572	0.075	0.153	0.013	0.000	0.007
	(0.393)	(0.022)	(0.122)	(0.405)	(0.070)	(0.088)	(0.030)		
Bihar Southern	0.671	0.049	-0.022	0.644	0.065	0.056	0.088	-0.001	0.012
	(0.137)	(0.013)	(0.067)	(0.151)	(0.028)	(0.030)	(0.017)		
Kerala Southern	0.581	-0.013	0.032	0.562	0.134	0.193	-0.016	0.000	0.005
	(0.146)	(0.007)	(0.016)	(0.147)	(0.035)	(0.041)	(0.015)		
Maharashtra Eastern	0.559	0.026	0.034	0.499	0.098	0.126	0.000	0.000	0.002
	(0.399)	(0.027)	(0.131)	(0.407)	(0.073)	(0.111)	(0.040)		
Andaman & Nicobar Islands	0.550	0.003	0.038	0.509	0.114	0.159	-0.030	0.000	0.011
	(0.420)	(0.012)	(0.047)	(0.427)	(0.113)	(0.112)	(0.038)		
Madhya Pradesh Northern	0.538	-0.011	0.072	0.478	0.071	0.109	-0.014	0.001	0.014
	(0.378)	(0.027)	(0.050)	(0.377)	(0.045)	(0.049)	(0.026)		
Uttar Pradesh Himalayan	0.526	-0.021	-0.091	0.639	0.043	0.005	0.028	-0.001	0.010
	(0.153)	(0.010)	(0.068)	(0.165)	(0.017)	(0.031)	(0.012)		
Maharashtra Inland Western	0.492	0.008	-0.133	0.617	0.125	0.020	0.086	0.000	-0.007
	(0.137)	(0.010)	(0.089)	(0.165)	(0.042)	(0.061)	(0.021)		
Assam Plains Western	0.488	-0.043	0.168	0.363	0.011	0.046	0.020	0.001	0.018
	(0.314)	(0.016)	(0.063)	(0.310)	(0.022)	(0.028)	(0.010)		
Uttar Pradesh Central	0.466	-0.015	0.004	0.477	0.052	0.056	0.015	-0.001	0.018
	(0.200)	(0.012)	(0.099)	(0.194)	(0.024)	(0.042)	(0.014)		
West Bengal Central Plains	0.466	-0.036	0.021	0.481	0.075	0.103	0.008	0.002	0.013
	(0.138)	(0.006)	(0.028)	(0.141)	(0.024)	(0.029)	(0.010)		
Rajasthan North-Eastern	0.460	-0.033	0.010	0.483	0.048	0.054	0.015	0.000	0.004
	(0.254)	(0.011)	(0.026)	(0.258)	(0.029)	(0.030)	(0.016)		
Tripura	0.438	-0.069	0.032	0.474	0.023	0.032	0.026	0.000	0.006
	(0.207)	(0.019)	(0.047)	(0.214)	(0.016)	(0.019)	(0.011)		
Dadra & Nagar Haveli	0.411	-0.063	-0.344	0.817	0.069	-0.021	0.075	-0.003	0.040
	(0.579)	(0.038)	(0.413)	(0.727)	(0.111)	(0.108)	(0.042)		
Goa	0.399	-0.037	-0.017	0.453	0.093	0.071	0.004	0.005	0.003
	(0.207)	(0.012)	(0.079)	(0.237)	(0.048)	(0.072)	(0.025)		
Orissa Northern	0.389	-0.007	0.029	0.367	0.074	0.135	-0.022	0.000	0.018
	(0.287)	(0.010)	(0.051)	(0.280)	(0.042)	(0.057)	(0.023)		
Orissa Southern	0.382	0.024	-0.001	0.360	0.077	0.076	-0.036	0.001	0.018
	(0.371)	(0.027)	(0.043)	(0.368)	(0.112)	(0.114)	(0.044)		
Bihar Central	0.359	-0.027	-0.152	0.537	0.038	-0.008	0.026	-0.004	0.005

Continued on next page

Table A.12 – continued from previous page

State-region	Decomposition n (1)	X/b (2)	ψ (3)	F,ϵ (4)	Welfare F,ϵ (5)	F,ϵ,ψ (6)	Rich Bias (7)	CES Region (8)	Village (9)
	(0.165)	(0.014)	(0.074)	(0.182)	(0.019)	(0.026)	(0.010)		
Madhya Pradesh Vindhya	0.347	0.030	-0.025	0.343	0.046	0.021	0.007	-0.003	0.013
	(0.225)	(0.013)	(0.160)	(0.270)	(0.014)	(0.047)	(0.008)		
Arunachal Pradesh	0.346	-0.125	0.020	0.450	0.046	0.055	0.053	-0.002	0.003
	(0.219)	(0.027)	(0.031)	(0.225)	(0.037)	(0.036)	(0.021)		
West Bengal Eastern Plains	0.335	-0.049	0.186	0.198	0.005	0.084	0.033	0.000	0.014
	(0.199)	(0.015)	(0.065)	(0.203)	(0.025)	(0.033)	(0.012)		
Assam Plains Eastern	0.333	-0.037	0.310	0.060	-0.008	0.087	0.016	0.001	0.017
	(0.281)	(0.015)	(0.103)	(0.268)	(0.018)	(0.031)	(0.009)		
Maharashtra Inland Northern	0.285	0.024	-0.216	0.477	0.086	-0.092	0.082	-0.010	0.013
	(0.209)	(0.017)	(0.141)	(0.266)	(0.068)	(0.091)	(0.032)		
Haryana Eastern	0.259	-0.025	0.016	0.268	0.045	0.063	0.014	-0.001	0.008
	(0.165)	(0.007)	(0.028)	(0.164)	(0.030)	(0.035)	(0.016)		
Bihar Northern	0.258	-0.019	0.028	0.249	0.022	0.038	0.004	0.000	0.000
	(0.151)	(0.009)	(0.052)	(0.146)	(0.013)	(0.030)	(0.006)		
Orissa Coastal	0.257	0.007	0.024	0.226	0.049	0.085	-0.001	0.000	0.013
	(0.243)	(0.015)	(0.060)	(0.243)	(0.048)	(0.054)	(0.025)		
Tamil Nadu Coastal Northern	0.256	0.017	-0.057	0.296	0.025	-0.017	0.045	-0.002	-0.002
	(0.213)	(0.006)	(0.064)	(0.224)	(0.046)	(0.051)	(0.018)		
West Bengal Himalayan	0.254	0.007	0.040	0.207	0.009	0.030	0.013	0.000	0.007
	(0.317)	(0.014)	(0.168)	(0.341)	(0.041)	(0.060)	(0.011)		
Karnataka Inland Eastern	0.247	-0.133	-0.010	0.389	0.046	0.041	0.050	0.000	0.001
	(0.371)	(0.031)	(0.146)	(0.380)	(0.083)	(0.101)	(0.044)		
Tamil Nadu Southern	0.207	-0.016	0.013	0.210	0.028	0.038	0.022	0.002	0.008
	(0.232)	(0.010)	(0.025)	(0.235)	(0.042)	(0.045)	(0.025)		
Himachal Pradesh	0.200	-0.112	-0.019	0.330	0.030	0.020	0.052	-0.001	0.000
	(0.180)	(0.023)	(0.090)	(0.209)	(0.033)	(0.040)	(0.021)		
Karnataka Inland Southern	0.184	-0.047	-0.002	0.233	0.024	0.023	0.000	0.000	0.003
	(0.176)	(0.013)	(0.110)	(0.211)	(0.025)	(0.053)	(0.011)		
Andhra Pradesh South-Western	0.180	-0.080	0.176	0.084	-0.016	0.063	0.059	0.000	0.004
	(0.431)	(0.033)	(0.107)	(0.458)	(0.082)	(0.091)	(0.022)		
Punjab Southern	0.164	-0.052	0.026	0.191	0.028	0.045	0.003	0.002	0.008
	(0.190)	(0.007)	(0.022)	(0.190)	(0.028)	(0.029)	(0.016)		
Maharashtra Coastal	0.143	-0.080	-0.074	0.297	0.055	-0.017	0.017	0.000	0.023
	(0.261)	(0.017)	(0.076)	(0.280)	(0.058)	(0.067)	(0.032)		
Sikkim	0.140	0.071	-0.530	0.599	0.036	-0.164	0.089	-0.011	-0.010
	(0.297)	(0.039)	(0.301)	(0.464)	(0.059)	(0.060)	(0.039)		
Andhra Pradesh Coastal	0.132	-0.050	-0.001	0.183	0.002	0.002	0.031	0.000	0.004
	(0.208)	(0.014)	(0.034)	(0.212)	(0.024)	(0.024)	(0.011)		
Uttar Pradesh Southern	0.128	-0.029	-0.323	0.481	0.094	-0.096	-0.039	-0.001	0.032

Continued on next page

Table A.12 – continued from previous page

	Decomposition				Welfare			CES	
State-region	n	X/b	ψ	F,ϵ	F,ϵ	F,ϵ,ψ	Rich Bias	Region	Village
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	(0.303)	(0.023)	(0.216)	(0.413)	(0.068)	(0.074)	(0.024)		
Madhya Pradesh South	0.114	-0.040	-0.555	0.709	0.164	-0.223	-0.001	-0.015	0.007
	(0.257)	(0.029)	(0.177)	(0.334)	(0.056)	(0.062)	(0.030)		
Uttar Pradesh Eastern	0.112	-0.050	0.089	0.073	0.004	0.046	0.006	-0.001	0.009
	(0.117)	(0.009)	(0.039)	(0.122)	(0.012)	(0.019)	(0.007)		
Karnataka Inland Northern	0.067	-0.025	-0.005	0.097	0.016	0.001	0.014	0.000	-0.001
	(0.148)	(0.009)	(0.097)	(0.167)	(0.179)	(0.169)	(0.013)		
Maharashtra Inland Central	0.041	-0.010	-0.155	0.206	0.032	-0.122	0.023	0.000	0.002
	(0.154)	(0.009)	(0.075)	(0.185)	(0.046)	(0.076)	(0.021)		
Maharashtra Inland Eastern	0.036	0.043	0.027	-0.034	-0.041	-0.018	0.053	-0.001	-0.003
	(0.175)	(0.011)	(0.063)	(0.187)	(0.045)	(0.062)	(0.023)		
Jammu & Kashmir Outer Hills	0.035	-0.030	-0.481	0.547	0.073	-0.257	0.023	-0.001	0.000
	(0.320)	(0.024)	(0.289)	(0.453)	(0.149)	(0.212)	(0.029)		
Rajasthan South-Eastern	0.001	-0.014	0.097	-0.082	-0.012	0.064	0.007	0.004	0.000
	(0.363)	(0.013)	(0.178)	(0.349)	(0.129)	(0.121)	(0.015)		
Punjab Northern	-0.001	-0.052	-0.158	0.209	0.034	-0.053	0.000	0.000	0.000
	(0.161)	(0.010)	(0.073)	(0.182)	(0.029)	(0.039)	(0.015)		
Madhya Pradesh South-Western	-0.027	0.020	-0.603	0.556	0.035	-0.306	0.108	-0.009	-0.019
	(0.299)	(0.022)	(0.659)	(0.793)	(0.111)	(0.126)	(0.045)		
Gujarat Plains Northern	-0.069	-0.027	-0.099	0.057	-0.024	-0.120	0.049	0.000	-0.049
	(0.136)	(0.008)	(0.043)	(0.149)	(0.039)	(0.050)	(0.017)		
Chandigarh	-0.128	0.107	-0.222	-0.012	-0.105	-0.247	0.093	0.007	0.000
	(0.602)	(0.041)	(0.316)	(0.672)	(0.183)	(0.340)	(0.073)		
Haryana Western	-0.149	-0.021	-0.042	-0.085	-0.048	-0.063	0.049	0.001	0.006
	(0.251)	(0.015)	(0.046)	(0.264)	(0.044)	(0.044)	(0.025)		
Gujarat Saurashtra	-0.155	-0.014	0.057	-0.198	-0.027	0.030	-0.007	0.000	0.000
	(0.219)	(0.009)	(0.060)	(0.217)	(0.037)	(0.069)	(0.015)		
Tamil Nadu Inland	-0.209	0.008	-0.026	-0.191	-0.028	-0.058	-0.023	0.000	0.003
	(0.249)	(0.013)	(0.026)	(0.252)	(0.064)	(0.070)	(0.026)		
Jammu & Kashmir Mountainous	-0.386	-0.023	0.458	-0.821	-0.027	0.101	0.000	-0.001	0.003
	(0.199)	(0.016)	(0.126)	(0.226)	(0.016)	(0.041)	(0.007)		
Tamil Nadu Coastal	-0.391	-0.029	0.032	-0.395	-0.033	-0.017	-0.029	0.008	0.005
	(0.263)	(0.012)	(0.030)	(0.267)	(0.036)	(0.042)	(0.017)		
Delhi	-0.411	0.025	0.099	-0.535	-0.089	0.016	-0.039	0.004	0.000
	(0.352)	(0.021)	(0.168)	(0.391)	(0.096)	(0.166)	(0.067)		
Pondicherry	-0.581	0.009	0.018	-0.608	-0.058	-0.029	-0.051	0.009	0.017
	(0.591)	(0.015)	(0.041)	(0.587)	(0.113)	(0.125)	(0.037)		
Meghalaya	-0.684	0.047	0.081	-0.813	-0.090	-0.078	0.040	0.000	0.012
	(0.273)	(0.021)	(0.103)	(0.277)	(0.023)	(0.024)	(0.015)		
Nagaland	-0.942	0.003	-0.034	-0.911	-0.073	-0.082	-0.013	0.000	0.005

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Table A.12 – continued from previous page

State-region	Decomposition n (1)	X/b (2)	ψ (3)	F, ϵ (4)	Welfare F, ϵ (5)	F, ϵ, ψ (6)	Rich Bias (7)	CES Region (8)	Village (9)
	(0.497)	(0.012)	(0.045)	(0.510)	(0.045)	(0.044)	(0.012)		

Standard errors are clustered by region-year and boot-strapped following the procedure described in the text. Decomposition in columns 1 through 4 is based on equation 7. Welfare results in columns 5 and 6 are based on equation 8. Both are evaluated at the utility level of a household at the 50th percentile of group expenditure in the base. Rich bias is the difference in gains for utility levels corresponding to the 90th and 10th percentiles of household expenditure distribution in the bsae. Columns 8 and 9 are based on the **?** formula using the same estimate of σ, applied at the region level or village/block level (median across all bilateral comparisons between village/blocks within region).

Table A.13: Detailed results by region: Vegetables, urban 2010 vs. rural 2010 base

State-region	Decomposition n (1)	X/b (2)	ψ (3)	F, ϵ (4)	Welfare F, ϵ (5)	F, ϵ, ψ (6)	Rich Bias (7)	CES Region (8)	Village (9)
Assam Hills	0.775	-0.041	-3.021	3.837	0.940	-5.811	0.008	-0.009	0.028
	(4.367)	(0.113)	(4.295)	(6.817)	(1.E+05)	(3.E+11)	(2.E+04)		
West Bengal Himalayan	0.607	-0.041	-0.372	1.021	0.524	-0.730	0.017	0.000	0.024
	(0.209)	(0.012)	(0.199)	(0.294)	(0.145)	(1.288)	(0.032)		
Mizoram	0.502	-0.023	-0.119	0.644	0.271	0.046	0.017	0.000	0.054
	(0.151)	(0.010)	(0.070)	(0.172)	(0.094)	(0.148)	(0.027)		
Nagaland	0.493	0.011	0.120	0.362	0.205	0.368	0.010	0.001	0.014
	(0.178)	(0.016)	(0.132)	(0.232)	(0.109)	(0.158)	(0.018)		
Andaman & Nicobar Islands	0.478	0.254	0.196	0.028	0.011	0.278	0.005	0.000	0.059
	(0.146)	(0.016)	(0.116)	(0.166)	(0.102)	(0.178)	(0.042)		
Orissa Coastal	0.470	0.140	0.193	0.137	0.040	0.326	0.033	0.000	0.056
	(0.147)	(0.016)	(0.190)	(0.221)	(0.071)	(0.121)	(0.020)		
Madhya Pradesh South-Western	0.465	0.009	0.074	0.383	0.190	0.296	-0.008	0.001	0.042
	(0.159)	(0.020)	(0.128)	(0.199)	(0.102)	(0.146)	(0.032)		
Maharashtra Coastal	0.449	0.078	-0.103	0.475	0.229	0.037	-0.013	0.001	0.154
	(0.115)	(0.011)	(0.050)	(0.125)	(0.073)	(0.099)	(0.032)		
Madhya Pradesh Chhatisgarh	0.431	0.077	0.016	0.338	0.239	0.299	-0.012	0.000	0.071
	(0.105)	(0.009)	(0.067)	(0.127)	(0.079)	(0.117)	(0.024)		
Sikkim	0.362	0.256	0.540	-0.433	-0.265	0.426	0.077	0.000	0.135
	(0.116)	(0.031)	(0.208)	(0.237)	(0.141)	(0.313)	(0.023)		
Assam Plains Western	0.358	0.021	-0.013	0.350	0.084	0.070	0.090	0.000	0.057
	(0.154)	(0.010)	(0.112)	(0.198)	(0.090)	(0.093)	(0.031)		
Dadra & Nagar Haveli	0.354	0.004	0.038	0.311	0.139	0.582	-0.039	-0.002	0.005
	(0.425)	(0.012)	(0.074)	(0.424)	(0.298)	(0.641)	(0.083)		
Orissa Southern	0.341	0.056	0.231	0.054	0.021	0.455	-0.029	0.000	0.053

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Table A.13 – continued from previous page

State-region	Decomposition n (1)	X/b (2)	ψ (3)	F,ϵ (4)	Welfare F,ϵ (5)	F,ϵ,ψ (6)	Rich Bias (7)	CES Region (8)	Village (9)
	(0.185)	(0.014)	(0.143)	(0.243)	(0.085)	(0.178)	(0.016)		
Andhra Pradesh Inland Northern	0.317	-0.002	-0.170	0.489	0.227	-0.086	0.027	0.000	0.068
	(0.083)	(0.007)	(0.072)	(0.113)	(0.061)	(0.091)	(0.014)		
Rajasthan Southern	0.301	0.019	0.097	0.184	0.115	0.422	0.001	0.002	0.159
	(0.242)	(0.018)	(0.160)	(0.297)	(0.164)	(0.433)	(0.037)		
Arunachal Pradesh	0.276	0.055	-0.018	0.240	0.135	0.109	-0.029	0.000	0.052
	(0.129)	(0.013)	(0.051)	(0.134)	(0.079)	(0.109)	(0.032)		
Gujarat Saurashtra	0.230	0.008	-0.220	0.441	0.178	-0.285	0.080	0.000	0.015
	(0.134)	(0.012)	(0.131)	(0.200)	(0.109)	(0.221)	(0.045)		
Assam Plains Eastern	0.213	0.001	-0.218	0.431	0.193	-0.357	0.042	0.000	0.060
	(0.123)	(0.009)	(0.069)	(0.145)	(0.085)	(0.260)	(0.027)		
Tamil Nadu Coastal Northern	0.203	0.123	-0.102	0.182	0.021	-0.134	0.096	0.000	0.056
	(0.108)	(0.010)	(0.092)	(0.140)	(0.076)	(0.150)	(0.024)		
Kerala Southern	0.197	-0.043	-0.056	0.297	0.115	0.043	0.008	0.000	0.004
	(0.116)	(0.011)	(0.065)	(0.134)	(0.062)	(0.072)	(0.014)		
Orissa Northern	0.196	0.068	0.222	-0.094	-0.027	0.325	-0.018	0.000	0.059
	(0.148)	(0.023)	(0.135)	(0.196)	(0.080)	(0.099)	(0.029)		
Uttar Pradesh Central	0.194	0.040	-0.101	0.255	0.105	-0.092	0.057	0.000	0.057
	(0.128)	(0.014)	(0.125)	(0.195)	(0.096)	(0.156)	(0.028)		
Rajasthan Western	0.187	0.069	-0.079	0.197	0.125	-0.055	-0.020	0.000	0.078
	(0.107)	(0.011)	(0.059)	(0.125)	(0.081)	(0.138)	(0.032)		
Karnataka Inland Southern	0.182	0.029	-0.270	0.423	0.175	-0.450	0.034	0.000	0.033
	(0.085)	(0.007)	(0.216)	(0.235)	(0.118)	(0.822)	(0.014)		
Bihar Southern	0.181	0.043	0.101	0.037	-0.003	0.139	0.050	0.000	0.104
	(0.082)	(0.014)	(0.077)	(0.114)	(0.073)	(0.080)	(0.022)		
Gujarat Plains Southern	0.173	0.018	-0.014	0.168	0.096	-0.094	-0.018	-0.001	-0.010
	(0.293)	(0.028)	(0.211)	(0.333)	(0.149)	(0.249)	(0.046)		
Pondicherry	0.172	-0.017	0.742	-0.553	-0.117	0.725	0.001	0.000	0.002
	(0.199)	(0.014)	(0.518)	(0.554)	(0.149)	(0.098)	(0.027)		
Himachal Pradesh	0.171	0.038	-0.155	0.289	0.160	-0.129	-0.011	-0.001	0.046
	(0.138)	(0.014)	(0.050)	(0.147)	(0.079)	(0.096)	(0.020)		
Maharashtra Inland Western	0.162	0.081	0.262	-0.181	-0.079	0.374	-0.066	0.000	0.042
	(0.105)	(0.011)	(0.085)	(0.132)	(0.116)	(0.074)	(0.040)		
West Bengal Eastern Plains	0.156	0.086	0.035	0.034	0.011	0.081	0.010	0.000	0.054
	(0.112)	(0.009)	(0.102)	(0.152)	(0.076)	(0.157)	(0.019)		
Uttar Pradesh Himalayan	0.153	0.042	-0.012	0.122	0.065	0.042	0.014	0.000	0.066
	(0.104)	(0.010)	(0.083)	(0.137)	(0.078)	(0.112)	(0.026)		
Bihar Northern	0.129	0.003	-0.178	0.304	0.126	-0.211	0.032	0.000	0.045
	(0.098)	(0.010)	(0.100)	(0.144)	(0.074)	(0.128)	(0.019)		
Uttar Pradesh Western	0.129	0.043	0.041	0.045	0.018	0.095	0.010	0.000	0.040

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Table A.13 – continued from previous page

State-region	Decomposition n (1)	X/b (2)	ψ (3)	F, ϵ (4)	Welfare F, ϵ (5)	F, ϵ, ψ (6)	Rich Bias (7)	CES Region (8)	Village (9)
	(0.067)	(0.006)	(0.057)	(0.091)	(0.050)	(0.084)	(0.014)		
Manipur Plains	0.115	-0.015	0.179	-0.049	-0.053	0.167	0.068	0.000	0.024
	(0.119)	(0.012)	(0.063)	(0.130)	(0.067)	(0.088)	(0.025)		
Jammu & Kashmir Jhelam Valley	0.114	-0.017	-0.109	0.240	0.122	-0.050	0.003	0.000	0.019
	(0.129)	(0.010)	(0.076)	(0.153)	(0.084)	(0.112)	(0.021)		
Andhra Pradesh Inland Southern	0.103	0.035	0.447	-0.378	-0.189	0.506	0.026	0.000	0.042
	(0.170)	(0.021)	(0.197)	(0.238)	(0.140)	(0.186)	(0.033)		
Madhya Pradesh Northern	0.097	0.018	0.129	-0.050	-0.001	0.254	-0.054	0.001	0.051
	(0.144)	(0.017)	(0.093)	(0.170)	(0.120)	(0.145)	(0.040)		
Uttar Pradesh Southern	0.093	0.057	-0.105	0.141	0.186	-0.221	-0.080	-0.001	0.024
	(0.186)	(0.022)	(0.332)	(0.416)	(0.153)	(0.416)	(0.071)		
Uttar Pradesh Eastern	0.077	0.010	-0.119	0.186	0.081	-0.180	0.027	0.000	0.035
	(0.088)	(0.006)	(0.056)	(0.110)	(0.057)	(0.148)	(0.026)		
Andhra Pradesh Coastal	0.075	-0.004	0.164	-0.085	-0.053	0.220	0.018	0.000	0.021
	(0.095)	(0.008)	(0.066)	(0.121)	(0.067)	(0.077)	(0.021)		
Karnataka Coastal & Ghats	0.069	0.060	-0.906	0.914	0.409	-1.275	0.033	0.001	0.014
	(0.165)	(0.036)	(0.307)	(0.322)	(0.131)	(0.287)	(0.027)		
West Bengal Central Plains	0.068	-0.021	0.030	0.059	0.005	0.062	0.035	0.000	0.033
	(0.090)	(0.010)	(0.130)	(0.159)	(0.053)	(0.106)	(0.022)		
Bihar Central	0.066	0.034	0.036	-0.004	0.002	0.098	-0.008	0.000	0.046
	(0.148)	(0.009)	(0.054)	(0.150)	(0.106)	(0.113)	(0.034)		
Madhya Pradesh Vindhya	0.063	0.065	-0.029	0.027	-0.016	-0.050	0.052	0.001	0.050
	(0.115)	(0.021)	(0.083)	(0.138)	(0.077)	(0.105)	(0.030)		
Goa	0.045	-0.091	0.329	-0.193	-0.099	0.216	0.040	0.000	-0.065
	(0.189)	(0.027)	(0.132)	(0.241)	(0.132)	(0.098)	(0.039)		
Madhya Pradesh Malwa	0.021	0.089	0.097	-0.165	-0.037	0.273	-0.161	0.000	0.088
	(0.148)	(0.019)	(0.053)	(0.158)	(0.087)	(0.108)	(0.037)		
Andhra Pradesh South-Western	0.013	-0.013	-0.015	0.041	0.019	-0.013	-0.004	0.000	0.024
	(0.175)	(0.018)	(0.159)	(0.242)	(0.119)	(0.184)	(0.028)		
Maharashtra Eastern	0.002	0.021	0.159	-0.178	-0.078	0.285	-0.040	-0.001	0.026
	(0.192)	(0.015)	(0.156)	(0.257)	(0.164)	(0.284)	(0.033)		
Kerala Northern	-0.003	-0.013	0.071	-0.062	-0.028	0.072	-0.003	0.000	0.008
	(0.100)	(0.010)	(0.054)	(0.114)	(0.061)	(0.081)	(0.020)		
Gujarat Plains Northern	-0.008	0.051	0.167	-0.226	-0.159	0.202	0.048	0.000	0.043
	(0.092)	(0.007)	(0.065)	(0.119)	(0.086)	(0.136)	(0.030)		
Tripura	-0.021	0.005	0.308	-0.334	-0.223	0.399	0.060	0.000	0.036
	(0.078)	(0.007)	(0.078)	(0.110)	(0.135)	(0.107)	(0.019)		
Punjab Northern	-0.028	-0.022	-0.277	0.271	0.104	-0.500	0.055	0.005	0.012
	(0.099)	(0.011)	(0.096)	(0.141)	(0.073)	(0.146)	(0.019)		
West Bengal Western Plains	-0.048	0.076	0.028	-0.152	-0.039	0.032	-0.081	0.000	-0.011

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Table A.13 – continued from previous page

	Decomposition				Welfare			CES	
State-region	n	X/b	ψ	F,ϵ	F,ϵ	F,ϵ,ψ	Rich Bias	Region	Village
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	(0.222)	(0.017)	(0.165)	(0.255)	(0.165)	(0.292)	(0.033)		
Tamil Nadu Southern	-0.050	0.022	-0.037	-0.035	-0.066	-0.123	0.061	0.000	0.022
	(0.108)	(0.009)	(0.123)	(0.169)	(0.090)	(0.268)	(0.016)		
Maharashtra Inland Eastern	-0.051	0.074	-0.103	-0.022	-0.013	-0.274	0.000	0.004	0.030
	(0.103)	(0.012)	(0.074)	(0.124)	(0.075)	(0.152)	(0.021)		
Madhya Pradesh Central	-0.058	0.046	-0.255	0.152	0.056	-0.734	0.049	0.000	0.042
	(0.170)	(0.013)	(0.157)	(0.241)	(0.161)	(0.377)	(0.043)		
Haryana Western	-0.081	0.127	0.197	-0.405	-0.239	0.104	-0.024	0.000	0.042
	(0.128)	(0.015)	(0.086)	(0.149)	(0.126)	(0.107)	(0.036)		
Maharashtra Inland Central	-0.098	0.024	0.258	-0.381	-0.123	0.123	0.033	0.002	0.014
	(0.097)	(0.020)	(0.100)	(0.139)	(0.059)	(0.093)	(0.019)		
Jammu & Kashmir Outer Hills	-0.099	-0.030	-0.004	-0.065	-0.035	-0.044	-0.010	0.000	0.058
	(0.169)	(0.024)	(0.145)	(0.238)	(0.114)	(0.184)	(0.040)		
Haryana Eastern	-0.130	-0.048	0.165	-0.248	-0.172	0.105	0.061	0.000	0.060
	(0.091)	(0.012)	(0.087)	(0.130)	(0.074)	(0.126)	(0.026)		
Rajasthan North-Eastern	-0.134	0.030	0.197	-0.362	-0.176	0.410	-0.100	0.000	0.090
	(0.103)	(0.011)	(0.066)	(0.130)	(0.068)	(0.096)	(0.033)		
Meghalaya	-0.136	-0.007	0.040	-0.169	-0.098	-0.006	-0.025	-0.004	0.068
	(0.095)	(0.016)	(0.105)	(0.143)	(0.104)	(0.162)	(0.030)		
Karnataka Inland Northern	-0.165	0.044	0.065	-0.274	-0.089	0.015	-0.043	0.000	0.009
	(0.102)	(0.007)	(0.040)	(0.106)	(0.068)	(0.097)	(0.032)		
Tamil Nadu Inland	-0.172	0.035	-0.363	0.156	0.065	-0.804	0.024	0.000	0.022
	(0.111)	(0.012)	(0.121)	(0.161)	(0.089)	(0.253)	(0.019)		
Tamil Nadu Coastal	-0.215	-0.016	-0.098	-0.100	-0.091	-0.456	0.019	0.000	0.006
	(0.119)	(0.009)	(0.083)	(0.147)	(0.098)	(0.272)	(0.025)		
Karnataka Inland Eastern	-0.223	-0.005	-0.113	-0.105	-0.021	-0.198	-0.026	0.000	-0.008
	(0.186)	(0.030)	(0.254)	(0.310)	(0.131)	(0.466)	(0.031)		
Madhya Pradesh South	-0.245	0.083	-0.321	-0.007	0.084	-0.832	-0.098	0.000	0.077
	(0.165)	(0.015)	(0.092)	(0.188)	(0.094)	(0.205)	(0.041)		
Punjab Southern	-0.260	0.010	-0.001	-0.269	-0.166	-0.171	-0.053	0.000	0.018
	(0.109)	(0.010)	(0.036)	(0.116)	(0.088)	(0.103)	(0.043)		
Maharashtra Inland Northern	-0.268	0.005	0.079	-0.353	-0.125	0.049	-0.083	0.000	0.006
	(0.126)	(0.011)	(0.114)	(0.172)	(0.096)	(0.205)	(0.023)		
Rajasthan South-Eastern	-0.317	0.015	-0.057	-0.275	-0.014	-0.217	-0.042	-0.001	0.034
	(0.151)	(0.016)	(0.087)	(0.174)	(0.092)	(0.133)	(0.032)		
Jammu & Kashmir Mountainous	-0.369	-0.097	-0.108	-0.164	-0.125	-0.283	0.033	0.000	-0.015
	(0.151)	(0.018)	(0.100)	(0.189)	(0.124)	(0.150)	(0.042)		
Delhi	-0.378	0.085	1.221	-1.684	-0.531	0.474	0.078	0.000	-0.024
	(1.768)	(0.026)	(0.010)	(1.764)	( )	( )	( )		
Manipur Hills	-0.544	0.024	0.341	-0.908	-0.520	0.539	-0.117	-0.057	-0.033

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Table A.13 – continued from previous page

	Decomposition				Welfare			CES	
State-region	n	X/b	ψ	F,ϵ	F,ϵ	F,ϵ,ψ	Rich Bias	Region	Village
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	(0.481)	(0.040)	(0.128)	(0.507)	(0.475)	(0.279)	(0.119)		
Chandigarh	-0.637	-0.011	-0.317	-0.309	-0.243	-1.134	-0.060	0.004	-0.009
	(0.304)	(0.047)	(0.224)	(0.382)	(0.215)	(0.768)	(0.098)		
Lakshadweep	-0.771	0.025	-0.356	-0.440	-0.083	-1.231	-0.260	0.004	-0.071
	(0.595)	(0.054)	(0.228)	(0.602)	(0.313)	(0.883)	(0.109)		

Standard errors are clustered by region-year and boot-strapped following the procedure described in the text. Decomposition in columns 1 through 4 is based on equation 7. Welfare results in columns 5 and 6 are based on equation 8. Both are evaluated at the utility level of a household at the 50th percentile of group expenditure in the base. Rich bias is the difference in gains for utility levels corresponding to the 90th and 10th percentiles of household expenditure distribution in the bsae. Columns 8 and 9 are based on the **?** formula using the same estimate of σ, applied at the region level or village/block level (median across all bilateral comparisons between village/blocks within region).

Table A.14: Correlation of variety cost estimates with proxies for retail environment. Dependent variable is Fn^{ϵ} with n either fixed at urban median or based on region-sector median.

	Grains				Vegetables			
	N fixed		N variable		N fixed			N variable
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Share of pop. in food retail	-5.248*	-3.497	0.430***	0.341***	-0.365***	-0.389***	0.093	-0.034
	(2.696)	(2.394)	(0.118)	(0.128)	(0.133)	(0.137)	(0.061)	(0.093)
Mean exp.		-15.458*		0.545**		-0.251		0.457**
		(9.242)		(0.218)		(0.242)		(0.208)
Population		-3.511		0.071		-0.113*		-0.058
		(2.356)		(0.054)		(0.062)		(0.052)
Observations	139	139	139	139	148	148	148	148
R^2	0.028	0.123	0.095	0.135	0.039	0.062	0.006	0.081

Standard errors clustered by region in parentheses. Each observation is a region-sector. Estimated parameters are based on Table 7. All variables are in logs.

B Nielsen data appendix

To supplement my findings for India, I use Nielsen Homescan data for households in Colorado. These data have the advantage that shopping expenditure and product variety are recorded at the shopping trip-level, although trip durations are not recorded.[1] A variety here is defined as a distinct UPC-barcode.

I begin by regressing the log count of monthly shopping trips on log monthly variety and expenditure, controlling for household demographics (number of members, work status, race and age) and MSA. Appendix Table **??** columns 1 and 2 show that households with higher expenditures and variety undertake more shopping trips, while column 3 shows that controlling for expenditure, households with 1% higher variety undertake 0.34% more shopping trips. The positive expenditure coefficient in column 3 also suggests that purchasing higher quantity/quality (holding variety constant) is also associated with more shopping trips. This could be due to a number of factors such as capacity constraints for transport, storage/spoilage costs, differences in the returns to bargain hunting, or greater shopping effort required to purchase higher quality goods. Column 4 adds the number of product modules as a control with similar results.[2]

Columns 5 and 6 look at the two components of shopping frequency – the number of distinct stores visited in a month and the average number of trips per distinct store. Variety (conditional on total expenditure) is more strongly related to the number of stores visited than the number of trips per store. Columns 7 and 8 use variety as the dependent variable and show that there is an Engel curve for variety in these data even controlling

[1] I use the Colorado sample from 1994-1995 used by **?** as this is publicly available.

[2] A Nielsen product module is a fairly disaggregated category like "canned fruit pineapple" or "vegetable beans lima canned" that encompasses multiple varieties. Interestingly the coefficient on this variable is negative but the coefficient on variety increases when it is included. One possible interpretation is that finding a preferred variety within a product module requires more effort than finding a different product module because the former requires visiting multiple shopping outlets while the latter is more easily accommodated by a single supermarket.

for the number of shopping trips and product modules. Thus even on a given purchase occasion, higher spending households tend to purchase more varieties.

Together these results suggest that increasing variety entails shopping costs that are distinct from those associated with purchasing goods in higher quantities or at different prices. Higher spending households (within a location) and those in certain locations are more willing to undertake these costs of consuming more diverse diets. These results use the same data as **?** and are not inconsistent – **?** find that older, retired households (who are also likely to have lower market expenditures than younger working households) tend to shop more intensively in the same stores to purchase the same varieties at lower prices. Their results all hold the size of the shopping basket (number of UPCs) constant, while my results pertain to the number of UPCs in the shopping basket.

C Theory Appendix

C1. Fixed budget costs

A simple variation on the variety cost model presented in the paper uses variety costs in the budget constraint instead of the utility function to capture direct monetary costs of variety (perhaps due to indivisibilities or prices that vary with quantity). See **?** and **?** for a more detailed analysis of budget fixed costs. The budget constraint can be written as $\int_0^n q_i p_i di + n^\nu F_b \leq X$ to reflect the contribution of these variety costs to expenditure X. If we first take n as given and solve for quantities as a function of $X - n^\nu F_b$, the variety choice problem can be written as:

$$\max_n \left(\frac{X - n^\nu F_b}{p n^{-\psi}} \right) \tag{1}$$

Defining $F = F_b/p$ and $\epsilon = \nu + \psi$, this problem is identical to the first-stage variety choice problem in equation 3. This variant of the variety cost model therefore has identical implications for welfare, variety choice, and measurement of variety costs given an estimate of ψ.

The difference between the models is in the second-stage of the problem in which households allocate expenditures across a given set of varieties. Depending on how the fixed costs enter the budget and show up in variety-specific expenditures, relative expenditures across varieties may no longer be sufficient to estimate the elasticity (σ) and symmetry (θ) parameters that quantify the marginal benefit of variety $\psi \equiv \frac{1}{\sigma-1} - \frac{1}{\theta}$. If the fixed costs do not show up in expenditure per variety (because they capture transport costs or hiring servants) then this is not an issue, although it means that the correct X to use for the second stage also needs to account for these costs (or needs to be instrumented). If the fixed costs do show up in expenditure variety, and are not proportional to the relative price/taste/quality difference, then estimation of the parameters σ and θ would be more complicated.

C2. Decomposition of variety differences

Beginning with equation 6 and denoting the two periods/locations being compared with with 0 and 1 subscripts, we have:

$$\ln(\frac{n_1}{n_0}) = \frac{1}{\epsilon_1 - \psi_1}\left[\ln(X_1/p_1) + \ln\psi_1 - \ln(F_1\epsilon_1)\right] - \frac{1}{\epsilon_0 - \psi_0}\left[\ln(X_0/p_0) + \ln\psi_0 - \ln(F_0\epsilon_0)\right] \quad (2)$$

Subtracting the term $\frac{1}{\epsilon_1 - \psi_1}\left[\ln(X_0/p_0) + \ln\psi_0 - \ln(F_0\epsilon_0)\right]$ from the first expression and adding it to the second, collecting terms, yields:

$$\ln(\frac{n_1}{n_0}) = \frac{1}{\epsilon_1 - \psi_1}\left[\ln(\frac{X_1/p1}{X_0/p_0}) + \ln\frac{\psi_1}{\psi_0} - \ln\frac{F_1\epsilon_1}{F_0\epsilon_0}\right] + \left[\frac{1}{\epsilon_0 - \psi_0} - \frac{1}{\epsilon_1 - \psi_1}\right]\ln(\frac{X_0\psi_0}{F_0\epsilon_0} \quad (3)$$

Now add and subtract the term $\frac{1}{\epsilon_1 - \psi_0}\ln(\frac{X_0\psi_0}{F_0\epsilon_0}$ to give

$$\begin{aligned}\ln(\frac{n_1}{n_0}) = \frac{1}{\epsilon_1 - \psi_1}\left[\ln(\frac{X_1/p1}{X_0/p_0})\right] &+ \left\{\frac{1}{\epsilon_1 - \psi_1}\ln\frac{\psi_1}{\psi_0} - \frac{1}{\epsilon_1 - \psi_1}\ln(\frac{X_0\psi_0}{F_0\epsilon_0}) + \frac{1}{\epsilon_1 - \psi_0}\ln(\frac{X_0\psi_0}{F_0\epsilon_0})\right\} \\ &- \left\{\frac{1}{\epsilon_1 - \psi_1}\ln\frac{F_1\epsilon_1}{F_0\epsilon_0} - \frac{1}{\epsilon_1 - \psi_0}\ln(\frac{X_0\psi_0}{F_0\epsilon_0}) + \frac{1}{\epsilon_0 - \psi_0}\ln(\frac{X_0\psi_0}{F_0\epsilon_0})\right\} \quad (4)\end{aligned}$$

Collecting terms gives equation 7, where the first expression in curly brackets is 0 when $\psi_1 = \psi_0$ and strictly increasing in their difference (higher marginal benefit of variety), and the second expression in curly brackets is 0 when $\epsilon_1 = \epsilon_0$ and $F_1 = F_0$ and is strictly decreasing in their difference (higher marginal cost of variety).

C3. Alternative models

A model nesting all of the models discussed in the text (CES, variety cost, translated additive, and multiple purchase occasions) can be written as follows:

$$U = \sum_{j=1}^{J}\left(\sum_{i=1}^{N} z_{ij}(q_{ij} + \gamma_i)^{\frac{\sigma_i - 1}{\sigma_i}} - \sum_{i=1}^{n} F_{ij} I(q_i > 0)\right)^{\eta} \quad (5)$$

subject to a budget constraint $\sum_j^J \sum_{i=1}^N q_{ij}p_{ij} \leq X_h$, a Poisson distributed purchase occasion generating process $J = \Lambda(Z_h)$ and log-normal distributed taste parameter $z_{ij}\ logN(\mu(Z_h, z_i), sd(Z_h))$. Z_h is a vector of household characteristics (possibly including income).

The model of **?** imposes $\gamma_i = 0, \sigma_i \to \infty$ and $F_{ij} = 0$ on the utility function above. Linear utility within a purchase occasion implies that only a single variety is chosen on each occasion. Random variation in tastes and diminishing returns to quantity across occasions ($0 < \eta < 1$) imply that households may purchase multiple varieties when they have multiple purchase occasions. Utility is increasing in J (the number of purchase occasions) both because the household gets more z_{ij} draws (and hence a higher expected maximum across all occasions) and because they can spread quantity across more occasions to counteract diminishing returns to quantity within occasion. In fact households benefit from more purchase occasions even if there is only one variety in the choice set and the benefit of more purchase occasions (in terms of more draws from the idiosyncratic taste distribution and counteracting diminishing returns within a purchase occasion) is the same. Households always choose to consume on all purchase occasions in this model (even if the choice set includes an outside good and this is their preferred option) unless there is a minimum quantity requirement (which acts like a fixed cost). In principle one could relax this by allowing γ_i to differ from zero. Holding the occasion generating process constant (or treating it as exogenous to the choice problem), differences in prices or availability of varieties across locations affect the cost-of-living only through the discrete-choice problem and can therefore be identified from aggregate data or from households that only consume a single variety. If households could choose J at some cost in terms of money or utility, households with higher expenditures would choose higher J because they consume more quantity and therefore benefit more from counteracting diminishing returns to quantity per occasion; the model in this case would be similar to the variety cost model, albeit one with "purchase occasion" costs and heterogeneous tastes rather than "variety" costs. Without different choice probabilities for poor and rich households, the set of varieties chosen by rich and poor households is the same on average. However, the model does generate a "hierarchy" of varieties in the sense that, conditional on observing a household that purchased more varieties, statistically these will be more marginal on average in the sense that they were chosen by fewer households and have higher within household expenditure shares. For example, if there are two varieties with purchase probabilities P and $1-P$ with $P > 0.5$ the average rank of a one variety household is $1P + 2(1-P)$ while the average rank of a two variety household is 1.5; however, the implied slope of the hierarchy is much lower than what I find in the data and there is no prediction for household expenditure (without the assumptions mentioned above) unless tastes that vary systematically with income are also incorporated. Finally, note that because the same choice probabilities determine the intensive and extensive margin, changes in the share of households consuming a variety, its within household relative expenditure share, and aggregate expenditure share must all move in the same direction.

The translated additive utility/reservation price model of **?** imposes $J = 1$ and $F_{ij} = 0$ on the utility function above. Typically the translation term $\gamma_i > 0$, so marginal utility for good i is bounded even when $q_i = 0$. Some formulations assume $\gamma_i < 0$ which requires that the household always consumes $q_i > \gamma_i$ for utility to be defined. For the general case the first-order condition for quantity:

$$\frac{\sigma_i - 1}{\sigma_i} z_i (q_i + \gamma_i)^{-1/\sigma_i} = \lambda p_i \tag{6}$$

implicitly defines the cutoff p_i or reservation/choke price that, along with the Lagrange multiplier and non-negative quantity constraints, determines whether a household will consume a positive quantity of variety i or not. Solving for $q_i = \left(\frac{z_i \frac{\sigma_i - 1}{\sigma_i}}{\lambda p_i}\right)^{\sigma_i} - \gamma_i$ we see that for a given price, there is some expenditure level (generating a low enough Lagrange multiplier λ) that quantity is positive and the variety is consumed; similarly, for a given value of of λ there is some price low enough that the quantity is positive and the variety is consumed.

Because the same first-order condition determines whether a variety is consumed (i.e. quantity is positive) and how much is consumed, the extensive and intensive margins are necessarily linked in this class of models. This applies not only to household expenditures (through λ), which can generate the same hierarchical consumption patterns documented in the paper, but also any of the other parameters including p_i, the taste term d_i or the translation term γ_i. Increases in the number of households consuming a variety due to differences in any of these parameters should be accompanied by increases in quantity for households that were already consuming that variety, leading to higher aggregate quantity.

Another way to see this linkage is by considering a simple version of this model that generates log-linear variety Engel curves. Consider Stone-Geary preferences, which are a special case of the demand function when $\sigma_i \to 1$ for all i. The consumer problem is to maximize $U = \int_0^N z_i \ln(q_i + \gamma_i)di$ subject to $\int_0^N p_i q_i di = X$. Let the choice set have measure N and assume that $\gamma_i = \gamma i^\epsilon$ and $p_i/z_i = bi^{1/\theta}$, i.e. similar to the exponential parametrization of the variety cost model in the main text. This generates a log-linear Engel curve for variety $n = \left[\frac{X}{\gamma b}\frac{1/\theta+\epsilon+1}{1/\theta+\epsilon}\right]^{\frac{1}{1/\theta+\epsilon+1}}$ with a flat portion above N for households with very high incomes (which may not be observable empirically). The slope depends on both the relative price of marginal varieties (through θ) but also on the "slope" of the translation terms γ_i which is interpreted as a preference parameter. Note that both decreases in θ (which makes varieties less symmetric and marginal varieties more expensive/less valuable) and ϵ (which raises the reservation price for marginal varieties) shift down the intercept and slope the variety Engel curve. They also both lower the relative consumption of marginal variety $i > 1$ relative to variety 1, given by $q_i/q_1 = \frac{-\lambda b\gamma i^\epsilon + i^{-1/\theta}}{-\lambda b\gamma + 1}$.

Another example of preferences featuring an expenditure-varying reservation/choke price is quadratic utility with no outside good. Suppose the consumer problem is to maximize utility $U = \alpha\int_0^n q_i di - \frac{1}{2}\gamma\int_0^n q_i^2 di$. Demand curves are linear in price holding constant the marginal utility of expenditure (λ) with $q_i = \frac{\alpha}{\gamma} - \frac{\lambda p_i}{\gamma}$. The marginal utility of expenditure (λ) falls as total expenditures increase, shifting demand curves up and lowering the finite reservation prices given by $p_i = \frac{\alpha}{\lambda}$. Parameterizing prices along the continuum of varieties as $p_i = bi^{\frac{1}{\theta}}$, this model generates a log-linear variety Engel curve similar to the variety cost model: $n = \left(\frac{\gamma X}{\alpha b}\left[\frac{\theta}{1+\theta} - \frac{\theta}{2+\theta}\right]^{-1}\right)^{\frac{\theta}{1+\theta}}$. The key term that generates variety Engel curves is the γ parameter, which measures product differentiation and plays a similar role to σ in CES models. An increase in γ (like an decrease in σ) increases the benefit of variety by making diminishing returns from quantity more severe. Like a decrease in σ this lowers consumer welfare (the expenditure function is $X = \left[U\frac{\gamma(1+\theta)}{\alpha^2}\right]^{\frac{1+\theta}{\theta}}\left(\frac{\alpha p}{\gamma}\left[\frac{\theta}{1+\theta} - \frac{\theta}{2+\theta}\right]\right)$

which is increasing in γ). However, it only shifts the variety Engel curve intercept and not the slope, and the slope only depends on relative prices (θ). Thus the quadratic utility model is similar to the translation model above, in that the intensive and extensive margins always move together.

In its most general form the variety cost model imposes $J = 1, \gamma_i = 0$ on the nested utility function above. This more general model is not amenable to marginal analysis and instead every combination of varieties and fixed costs has to be evaluated to determine the optimal basket of varieties. The presence of fixed costs weakens the link between the relative intensive margin and extensive margin for varieties in the reservation price models – it is now possible for q_i to decrease for some households while the number of households with $q_i > 0$ increases (e.g. because p_i rose but F_i fell). It is also possible to have varieties with high quantity consumed by a few households and other varieties with low quantity consumed by many households, even if $\sigma_i = \sigma$ for all varieties and tastes are homogeneous. In general there need not be a hierarchy of varieties in the sense that the consumption baskets of richer households need not embody more "marginal" varieties.

The model I estimate also imposes $\sigma_i = \sigma$. Note that one implication of this restrictions is that the model retains characteristics of CES such as the Independence of Irrelevant Alternatives property (IIA) (CES imposes the further restriction that $F_{ij} = 0$ for all varieties). Relative expenditures on consumed varieties are not affected by fixed costs, total expenditures or the prices or availability of other varieties. This potentially facilitates parameter identification in that variety costs can be ignored when estimating the "CES" part of the model based on relative expenditures and prices only (except for the taste heterogeneity issue discussed in the section on estimating σ). Variety costs are only relevant for the second-stage problem that leverages the data on variety Engel curves. In principle identification of how $P \equiv (\sum_{i \in \Omega} z_i p_i^{1-\sigma})^{\frac{1}{1-\sigma}}$ varies with the set of varieties Ω or count n, and how Ω or n vary with expenditure, can be modeled quite flexibly. However, my application to India makes an additional assumption on the distribution of p_i/z_i and the variety costs that implies hierarchical consumption and log-linearity of the variety Engel curve. This restriction seems reasonable in my context given the evidence presented earlier and allows for simple linear regressions and decompositions. However for other applications it may be necessary to adopt a parametrization that allow for more curvature or estimate separate costs for each variety.

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