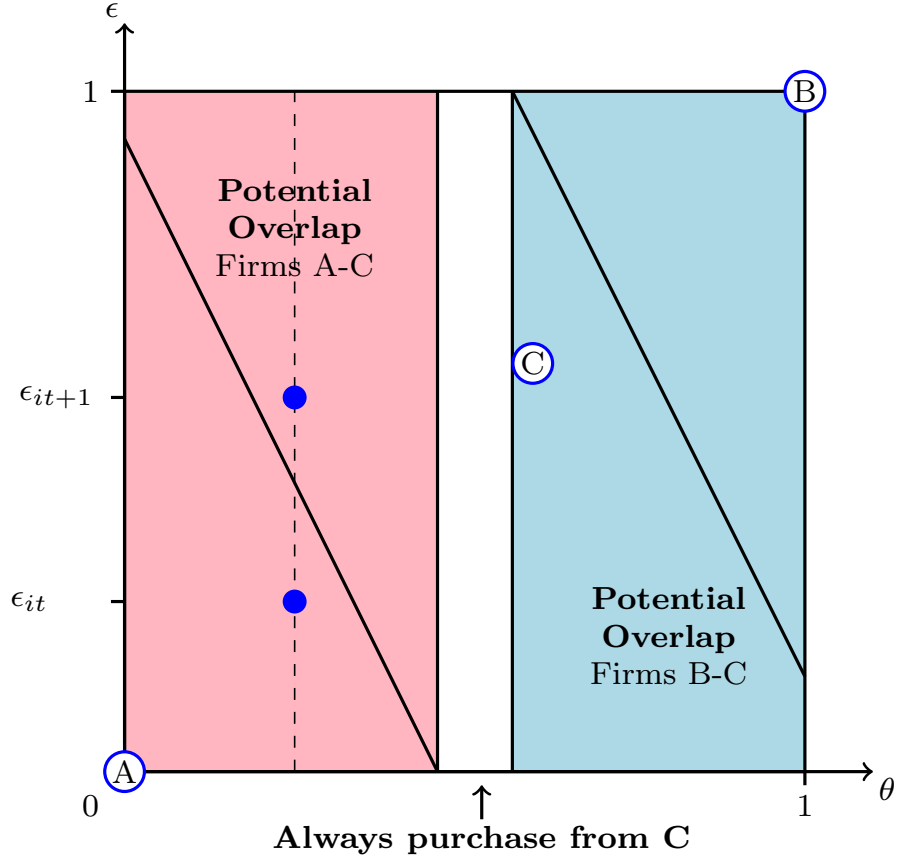
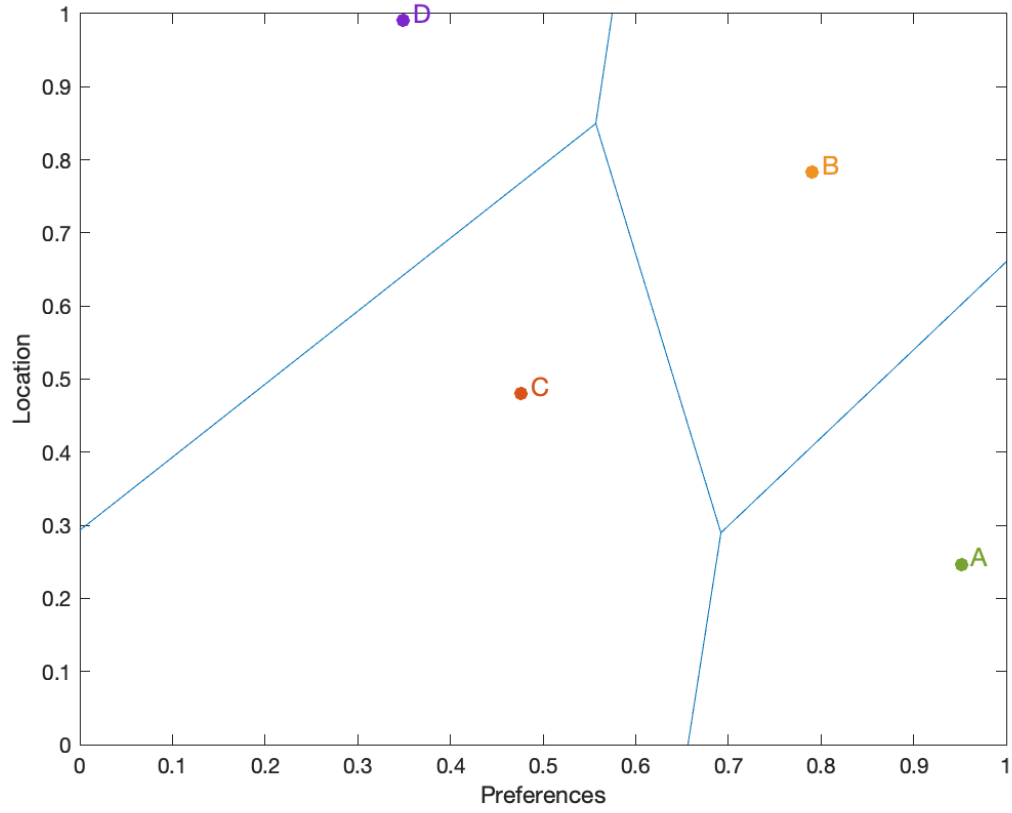


Appendix Figure A1: Overlap Illustration



Note: This figure provides a simple illustration of the consumer choices implied by the model described in Section 2 and the resulting overlaps. It depicts the two-dimensional space defined by θ (horizontal axis) and ϵ (vertical axis). Three firms are located in the space, firm A is located in (0,0), firm B in (1,1), and firm C in (0.6,0.6). Consumers are distributed across the space with a fixed brand preference $\theta_i \sim \mathbb{U}[0, 1]$ but a stochastic location $\epsilon_{it} \sim \mathbb{U}[0, 1]$, which varies across choice occasions. In this example, we set the parameters in equation (5) to be $\lambda_\theta = 2$, $\lambda_\epsilon = 1$, and $\alpha = 1$. Resultant equilibrium prices are $p_A = 0.56$, $p_B = 0.36$, and $p_C = 0.61$. These prices imply the two indifference sets depicted in the figure. One is the set of $(\theta_i, \epsilon_{it})$ pairs that imply indifference between firms A and C, and one is the set of pairs that imply indifference between firms C and B. Given this particular market configuration, consumers may either exhibit positive overlap between firms A and C (red region), always purchase from firm C (white region), or exhibit positive overlap between firms C and B (blue region). The extent of the overlap depends on the distribution of ϵ_i and on $G(\epsilon_i)$, which governs how much consumer locations fluctuate (up and down in the figure, along the ϵ_{it} margin) across choice occasions.

Appendix Figure A2: Graphical depiction of a single simulated market



Note: This is a graphical illustration of one of the 100 simulated markets described in Section 2, which corresponds to the overlap and diversion ratios reported in Appendix Table A1. Each blue line represents an indifference curve between two “adjacent” firms. The equilibrium prices in this market that generate these indifference curves are $p_A^* = 0.31$, $p_B^* = 0.30$, $p_C^* = 0.36$, $p_D^* = 0.33$.

Appendix Table A1: Numerical Simulation Example

(a) Overlap					(b) Diversion Ratio				
	Firm A	Firm B	Firm C	Firm D		Firm A	Firm B	Firm C	Firm D
Firm A	–	0.972	0.028	0	Firm A	–	0.899	0.101	0
Firm B	0.712	–	0.286	0.003	Firm B	0.589	–	0.389	0.022
Firm C	0.012	0.185	–	0.804	Firm C	0.051	0.262	–	0.687
Firm D	0	0.003	0.997	–	Firm D	0	0.019	0.981	–

(c) Log Normalized Overlap					(d) Log Normalized Diversion Ratio				
	Firm A	Firm B	Firm C	Firm D		Firm A	Firm B	Firm C	Firm D
Firm A	–	1.63	-2.18	$-\infty$	Firm A	–	1.55	-0.90	$-\infty$
Firm B	1.02	–	-0.24	-4.69	Firm B	0.83	–	0.07	-2.55
Firm C	-3.70	-1.01	–	0.44	Firm C	-2.21	-0.66	–	0.28
Firm D	$-\infty$	-4.55	0.94	–	Firm D	$-\infty$	-2.75	0.92	–

Note: Each cell in Panel (a) represents the overlap between a pair of firms. That is, the element (j, k) reports the share of firm k out of non- j purchases of consumers who ever bought from firm j . Panel (b) reports the corresponding diversion ratios from firm j to firm k . The correlation between the cells in these two panels is 0.989. Panels (c) and (d) normalize the overlap and diversion ratios above by dividing each cell by $s_k/(1 - s_j)$ (where s_k and s_j are the overall market shares of firm k and j) and then taking the log of each normalized measure. The correlation between cells in these two panels (excluding the values equal to $-\infty$) is 0.992.

Appendix Table A2: Summary Statistics of Coffee Vendor Markets

Market	Unique Cards (000s)	Share with a Car	Stores	Brands	Txns per Card	Amount per Txn (\$US)
2	20.7	0.78	3	1	2.80	8.13
3	33.5	0.74	3	1	3.49	9.10
4	42.0	0.74	6	1	2.92	9.21
5	1603.2	0.77	173	16	4.24	9.01
6	212.5	0.82	26	9	3.29	10.93
7	166.7	0.76	14	6	3.33	8.62
8	854.8	0.76	110	11	3.73	8.71
9	167.1	0.65	37	7	2.96	8.96
Avg	387.6	0.75	46.5	6.5	3.35	9.08

Market	Store HHI	Brand HHI	Avg Monthly Spend (\$US)	Travel Distance (km)		
				10 th pctile store	Median store	90 th pctile store
2	0.380	1	1719	6.67	9.96	14.42
3	0.335	1	2168	3.38	4.92	6.62
4	0.218	1	2338	8.04	13.57	20.23
5	0.008	0.879	3335	12.67	28.58	47.52
6	0.052	0.408	2559	3.70	9.31	16.21
7	0.100	0.567	2310	5.68	10.51	17.10
8	0.011	0.599	3227	8.98	24.82	42.49
9	0.033	0.838	2591	10.50	17.22	33.71
Avg	0.142	0.786	2532	7.45	14.86	24.79

Note: The definitions of a card, car owner, store and brand are described in detail in Section 3. *Txns per Card* is defined as the total number of transactions made by cardholders in the market divided by the number of unique cards. Similarly, *Amount per Txn* is defined as the sum of transaction amounts (in \$s) divided by the number of transactions in the market. HHIs are calculated from the share of transactions in a market (as opposed to revenues), both at the store-level and brand-level. *Monthly spending* is defined as the average monthly spending that we observe for each card. Therefore, *Average Monthly Spending* is defined as the average across all cards within a market of each card's average monthly spending. At the card level, *travel distance to the median store* is defined as the median distance between a cardholder and all available coffee vendors in their market, irrespective of whether a transaction occurred. Thus, this measure should not be interpreted as the median distance traveled, but the median distance among potential vendors. We report the average of these median distances across all cardholders within each market. Similarly, we report the average 10th percentile of distance and the average 90th percentile of distance in each market.

Appendix Table A3: Proportion of Avoidable Price Effects

Panel A: Customer Overlap

Share investigated	Share blocked		
	1%	4%	8%
0%	0.812	0.887	0.928
0.2%	0.829	0.895	0.931
0.6%	0.869	0.906	0.935
1%	0.893	0.914	0.938
2%	0.926	0.932	0.945
5%	0.968	0.966	0.964
50%	> 0.999	> 0.999	> 0.999

Panel B: ΔHHI

Share investigated	Share blocked		
	1%	4%	8%
0%	0.564	0.533	0.550
0.2%	0.573	0.538	0.551
0.6%	0.597	0.547	0.556
1%	0.614	0.563	0.560
2%	0.686	0.585	0.573
5%	0.803	0.652	0.610
50%	0.989	0.973	0.954

Note: This table reports the proportion of avoided post-merger price effects as a share of of the maximum avoidable price effect for the given merger rejection rate given by the column header; that is, relative to price effect that would be avoided if all potential mergers were to be investigated. We report this proportion for a set of different investigation rates (in each row) and total rejection rates (in each column). Panel A reports these statistics for the screening exercise using our proposed customer overlap analog. Panel B reports these statistics for the screening exercise using ΔHHI scaled by the total number of transactions within the relevant market.