Efficiency and Foreclosure Effects of Vertical Rebates: Empirical Evidence

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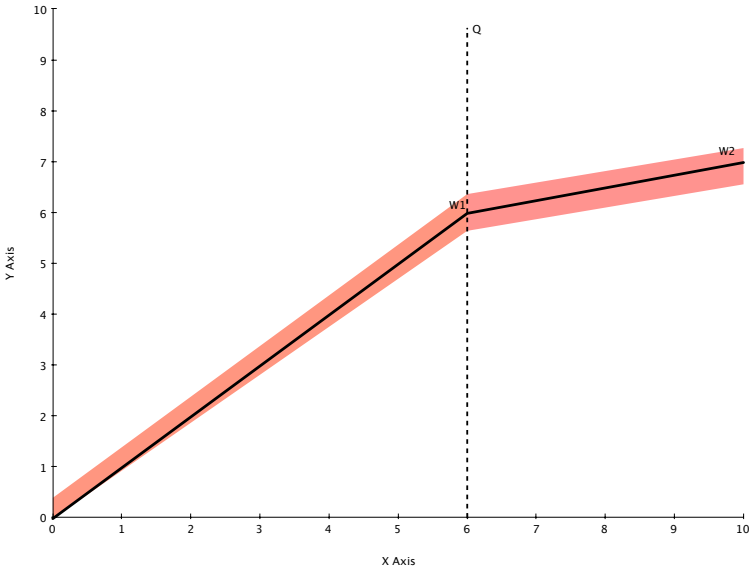
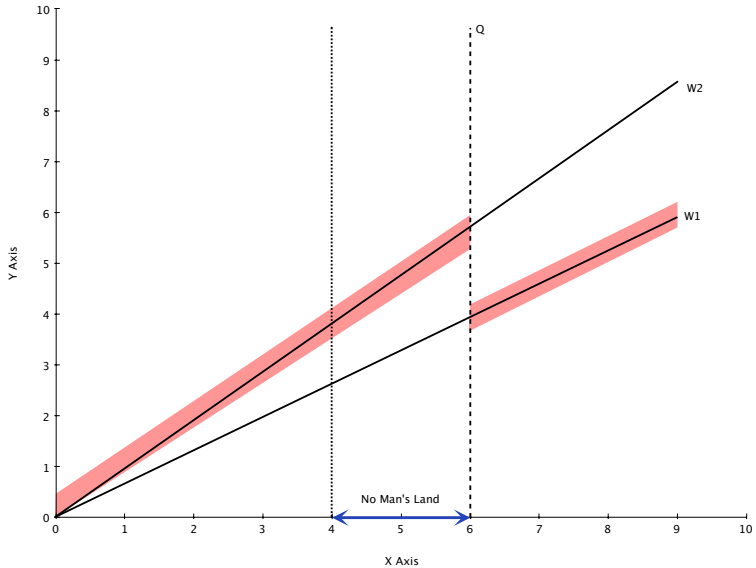
March 21, 2016

Vertical Rebates: All-Units Discounts

Vertical Rebates (All-Units Discounts) apply a linear discount retroactively to previous sales:



Standard Non-linear Pricing



All-Units Discounts

Use of Vertical Rebates

- Used prominently in many vertically-separated industries
- A wide range of different settings:
  - Used by dominant/competitive upstream firm?
  - Does it reference rivals?
  - Are multiple products covered? (If so, facing requirements?)
  - Is there downstream price competition?
- Just a few of the big recent anti-trust cases:
  - *LePages v. 3M (2004)*: rebates on branded and private-label tape products found to be exclusionary.
  - *Cascade Health Solutions v. PeaceHealth (2008)* and *Eisai v. Sanofi-Aventis (2014)*: hospital care/pharmaceutical rebates alleged to be exclusionary, allowed (price-cost test)
  - *Intel (2009)*: Marketshare-based rebates, found by the EU to be anticompetitive. ($1.4 billion fine; upheld in June.)
  - *Meritor v. Eaton (2012)*: rebates in heavy-duty truck transmission, found in violation of Sherman, Clayton Acts.

A Partial Literature Review

Theoretical Views on Vertical Contracts: Efficiency and Exclusion

- Chicago Critique: Bork (1978), Posner (1976)
- Game-theoretic response: Aghion & Bolton (1987), Bernheim & Whinston (1998), Fumagalli & Motta (2006)
- Efficiency effects: Telser (1960), Klein & Murphy (1988), Deneckere, Marvel & Peck (1996, 1997)
- Anti-competitive effects and exclusion: Shaffer (1991a/b), Rasmusen, Ramseyer & Wiley (1991), Segal & Whinston (2000), Inderst & Shaffer (2010), Asker & Bar-Isaac (2014)
- All-Units Discounts: Kolay, Shaffer, & Ordover (2004), O'Brien (2013), Chao & Tan (2013)

Empirical Work on Vertical Contracts, Downstream Effort/Moral Hazard

- Vertical Integration: Lafontaine (1992), Baker and Hubbard (2003), Crawford, Lee, Whinston and Yurukoglu (2015)
- Exclusive contracts: Lee (2013), Sinkinson (2014)

Efficiency vs. Foreclosure

At issue are the contracts' potential efficiency and foreclosure effects.

Efficiency effects include:

- Aligning incentives of upstream and downstream firms
- Incentivizing costly effort by downstream firms
- Eliminating double marginalization or downstream moral hazard.

Foreclosure effects include:

- Reducing competition from other manufacturers
- Reducing retail shelf-space or service levels on competitor's products
- Substituting brands that compete closely with brands that don't.
- Carrying underperforming brands by a rebating manufacturer.

Theoretical Background

Chicago Critique (Posner 1976, Bork 1978)

If we allow (costless) bi-lateral contracting between upstream and downstream firms, it should lead to joint maximization of industry profits. Therefore, exclusion only happens if it maximizes joint surplus.

- Downstream firms must be compensated for any losses under exclusion. If an upstream firm cannot pay, exclusion does not happen. Competing firms are only excluded if their costs are high.
- Very influential: substantially reduced intervention in vertical controls since 1970's.

More recent game theoretic results show the Chicago Critique may be special.

- Aghion and Bolton (1987), Bernheim and Whinston (1998), Marx and Shaffer (2004), Rey, Thal, and Verge (2005), Rey and Whinston (2011)

Challenges

- Tension between efficiency and foreclosure effects requires empirical analysis in order to resolve the relative contributions of a contract
  - But, vertical contracts are considered proprietary by firms, frustrating many empirical studies
  - And, measuring downstream effort can be difficult
- Our Approach:
  - Conduct a field experiment in product stocking (confections) to identify the relative cost of downstream moral hazard for upstream firms.
  - Examine an AUD contract using detailed data from one retailer
  - Estimate structural models of demand and retailer re-stocking to identify profit impacts of retailer decisions and the rebate.
  - Use exogenous variation (field experiment) for identification

Vending Industry

- $41 billion, vertically-separated industry
- Many small independent downstream operators
- A few large upstream manufacturers (Mars: $33b, Nestle $90b, Hershey $8b).
- Vending channel is about 1/3 of confections sales in US.
- No within-product (category) price variation
- We focus on the confections category, for which the dominant player, Mars, Inc., offers an AUD.
- Contracts have never been litigated!

Mars Rebate Program

The Only Candy You Need To Stock In Your Machine!

Spiral#1	Spiral#2	Spiral#3	Spiral#4	Spiral#5	Spiral#6	Spiral#7	Spiral#8
							
M&M's® Peanut Candies	SNICKERS® Bar	Twix® Caramel Cookie Bar	3 MUSKETEERS® Bar	MILKY WAY® Bar	M&M's® Milk Chocolate Candies	SKITTLES® Candies Original	STARBURST® Fruit Chews Original
#1 Selling Confection Item in Vending!	**#2 Selling Confection Item in Vending!**	**#3 Selling Confection Item in Vending!**	**#4 Selling Confection Item in Vending!**	**#11 Selling Confection Item in Vending!**	**#6 Selling Confection Item in Vending!**	**#5 Selling Confection Item in Vending!**	**#9 Selling Confection Item in Vending!**

- Based on the current business environment, vend operators are looking for one supplier to cover all of their Candy needs
  - **MARS - 100% Real Chocolate!**
  - **MARS - 100% Real Sales!**

PrOven 52 Weeks Ending 10/4/09

MARS chocolate north america

Mars Rebate Program

2010 Vend Operator Program

Platinum Rebate Level

- **Receive a great Every Day Low Cost from your Authorized Vend Product Distributor**
- **Purchase brand level targets for 6 singles or king size items**
  - Reduction from 7 must-stock items in 2009!
  - You pick the six items!
  - Will consolidate item variants to qualify (by brand, excluding SNICKERS ® Bar and M&M's ® Peanut Candies)
- **No Growth Requirement**
- **PLUS a Rebate Payment**

➢ ***Low Cost PLUS Rebate:***

Item	Rebate %	Rebate $ Per Bar (singles)
All Items	8%	4.0¢

MARS chocolate north america

Research Question and Findings

Research Question:

- What are the efficiency and foreclosure effects of an All-Units Discount used by Mars, Inc. in the confections industry?

Main Findings:

- Impact of the AUD depends on:
  - Substitutability of products
  - Substitutability of downstream effort
- Rebate has both efficiency and foreclosure effects:
  - Efficiency gains: better re-stocking, assortment for consumers
  - Foreclosure: Hershey is excluded; the contract fails to implement effort or assortment that is socially (or industry) optimal.
- Observed contracts are close to optimal (given wholesale p)
- Welfare effects depend on what happens without an AUD.

Data and Exogenous Product Removals

Detailed data from Mark Vend: retail and wholesale prices, quantities, rebate payments. Plus, a field experiment:

- Exogenously remove Snickers, Peanut M&Ms, or both.
- Simulates impact of re-stocking effort; identifies substitution.

Experimental Setting:

- 60 snack machines in office buildings in downtown Chicago
- For each run, remove product(s) for 2.5-3 weeks from all machines at each site.
- Data collected from January, 2006 - February, 2009.
- Interventions run during May - October, 2007 and 2008.
- For details, see our other papers.

Mark Vend's Assortment

Comparison of National Availability and Shares with Mark Vend

Manu-facturer	Product	National: Rank	National: Avail-ability	National: Share	Mark Vend: Avail-ability	Mark Vend: Share
Mars	Snickers	1	89	12.0	96	22.0
Mars	Peanut M&M	2	88	10.7	96	23.0
Mars	Twix Bar	3	67	7.7	79	13.0
Hershey	Reeses Peanut Butter Cups	4	72	5.5	29	3.7
Mars	Three Musketeers	5	57	4.3	34	4.3
Mars	Plain M&M	6	65	4.2	47	6.4
Mars	Starburst	7	38	3.9	16	1.0
Mars	Skittles	8	43	3.9	77	6.5
Nestle	Butterfinger	9	52	3.2	33	2.7
Hershey	Hershey with Almond	10	39	3.0	0	0
Nestle	Raisinets	>45	N/R	N/R	78	8.9

Notes: National Rank, Availability and Share refers to total US sales for the 12 weeks ending May 14, 2000, reported by Management Science Associates, Inc., at http://www.allaboutvending.com/studies/study2.htm, accessed on June 18, 2014. National figures not reported for Raisinets because they are outside of the 45 top-ranked products. By manufacturer, the national shares of the top 45 products (from the same source) are: Mars 52.0%, and Hershey 20.5%. For Mark Vend, shares are: Mars 80.0%, Hershey 8.5% (calculations by authors). Mark Vend averages 6.86 confection facings per machine.

Results from Snickers and Peanut M&M Joint Removal

Product	Control	Treatment	Change	% Change	Difference	T-Stat	Obs
Assorted Chocolate	104.5	227.8	123.2	117.9	1.79	6.12	69
Twix Caramel	213.0	313.3	100.3	47.1	1.43	5.64	70
Reeses Peanut Butter Cups	109.0	202.2	93.3	85.6	1.23	4.30	76
Assorted Pastry	287.4	374.2	86.9	30.2	1.16	3.60	75
Plain M&M	132.0	196.9	64.9	49.2	1.18	3.59	55
Assorted Nuts	359.3	415.8	56.6	15.7	0.73	2.28	78
Assorted Cookie	314.7	359.3	44.6	14.2	0.51	1.75	88
Assorted Nonchcolate Candy	263.4	301.1	37.7	14.3	0.45	1.80	83
Assorted Chips	548.2	585.6	37.4	6.8	0.43	1.35	87
Raisinets	184.0	215.9	31.9	17.3	0.44	1.99	73
Choc Chip Famous Amos	227.0	241.2	14.1	6.2	0.16	0.73	89
Rasbry Knotts	70.7	79.7	8.9	12.6	0.11	0.82	79
Assorted Pretzel/Popcorn	962.0	969.8	7.8	0.8	0.09	0.24	89
Assorted Fruit Snack	103.6	107.7	4.1	4.0	0.06	0.31	71
Dorito Nacho	284.5	282.6	-1.9	-0.7	-0.02	-0.10	89
Baked Chips	262.8	255.8	-7.0	-2.7	-0.08	-0.35	88
Assorted Cracker	114.4	93.3	-21.1	-18.5	-0.28	-1.18	75
Sun Chip	198.1	174.6	-23.5	-11.9	-0.29	-1.34	80
Cheeto	349.8	325.7	-24.1	-6.9	-0.27	-1.38	89
Assorted Salty Snack	711.9	678.1	-33.9	-4.8	-0.38	-1.16	89
Assorted Energy	272.1	229.0	-43.1	-15.8	-0.61	-1.90	71
Zoo Animal Cracker Austin	292.1	235.0	-57.1	-19.6	-0.64	-3.18	89
Snickers	379.4	13.2	-366.2	-96.5	-4.11	-16.00	89
Peanut M&M	425.9	9.4	-416.5	-97.8	-4.68	-18.19	89
Total	7,170.0	6887.3	-282.7	-3.9	-3.18	-12.07	89

Top Substitutes and Sales Impact Summary

Snickers	Peanut M&M	Joint
Peanut M&M*	Snickers*	Assorted Chocolate*
Twix Caramel*	Assorted Pretzel/Popcorn*	Twix Caramel*
Assorted Pretzel/Popcorn	Assorted Nuts*	Reeses Peanut Butter Cups*
Assorted Nuts*	Twix Caramel*	Assorted Pastry*
Assorted Fruit Snack*	Plain M&M*	Plain M&M*
Focal (-535.0)	Focal (-605.5)	Focal (-782.7)
Top 5 (539.9)	Top 5 (494.3)	Top 5 (468.6)
Total (-216.8)	Total (-197.6)	Total (-282.7)

Prices

- At our operator, retail prices are fixed at the category level. All confections are sold for 75 cents.
- We also observe the wholesale prices that the retailer pays to each manufacturer.
- We observe the terms of the AUD rebate program. We cannot disclose those directly.
- Mars leaked a copy of very similar rebate terms in 2010.
- Other manufacturers do not offer rebates (or offer "rebates" to the entire channel without a quantity threshhold).

Results of the Product Removals

Downstream Profit

			Before Rebate			After Rebate		
			Difference In:		T-Stat	Difference In:		T-Stat
Removal	Vends	Obs	Margin	Profit	of Diff	Margin	Profit	of Diff
Snickers	-216.82	109	0.39	-56.75	-2.87	0.24	-73.26	-4.33
Peanut M&Ms	-197.58	115	0.78	-10.74	-0.58	0.51	-39.37	-2.48
Joint	-282.66	89	1.67	-4.54	-0.27	1.01	-54.87	-3.72

Note: Rebate is a direct transfer from Mars to Retailer.

Upstream Revenue

	Pre-Rebate Impact of Removal on:				Cost Born by Mars	
Removal	Mars	Hershey	Nestle	Other	% Before	% After
Snickers	-26.37	5.89	19.32	-20.26	31.7%	11.9%
Peanut M&Ms	-68.38	32.76	11.78	-9.36	86.4%	50.2%
Joint	-130.81	61.43	20.22	37.10	96.7%	59.5%

Note: Revenues to manufacturer are calculated as the wholesale cost paid by Mark Vend to the manufacturer.

Theoretical Framework

- A single downstream retailer, R
- A dominant upstream manufacturer, M
- An upstream competitor, N
- The number of product slots is exogenously determined (capacity).

Three Stages:

1. Manufacturers set wholesale prices (w_m, w_n) and dominant firm M sets a nonlinear rebate contract $(\Delta, \overline{q}_m)$.
2. Retailer chooses a set of products and (scalar) effort (a, e).
3. Sales are realized $\mathbf{q}(a, e)$ at a fixed retail price.

Retailer's Problem

- Assume a uniform retail price p that is fixed for all products.
- Assume there is no uncertainty about the level of demand.
- Assume (relax later) we know for sure whether the rebate applies or not: $(w_m, w_n, \Delta, \overline{q}_m) \rightarrow (\tilde{w}_m, w_n)$.
- Assortment and effort: $a(\tilde{w}_m, w_n)$, $e(a, \tilde{w}_m, w_n)$.

Retailer solves:

$$\max_{e,a} \pi_r(a, e) - c(e) \tag{1}$$

Retailer's Problem

- The rebate contract may induce the retailer to stock more products by M and fewer products by N, or to select products that do not compete closely with M's products.
- We will brute force over all possible choices of product assortment a.
- Given (w_M, w_N) and a rebate contract, retailer computes optimal effort e for each choice of a
- Chooses the assortment a that maximizes her profits (inclusive of rebate): $\pi_r(a, e(a)) \geq \pi_r(a', e(a'))\forall a' \neq a$.
- The primary cost of effort is the fixed cost of restocking the vending machine.
- The primary benefit of effort is that there are fewer out of stock products in the vending machine.

Effort Model

- Let the retailer follow a multi-product (s, S) policy, with fixed cost FC of restocking (all products) to target inventory S.
- Use the number of potential consumer arrivals x (a scalar), rather than the vector s (i.e., the retailer observes the number of potential consumers but not the actual inventory levels of each product).
- Denote cumulative profits after x potential consumers as $u(x)$.

Dynamic Model of Re-stocking

- The retailer's value function is:

$$V(x) = \max\{u(x) - FC + \beta V(0), \beta E_{x'}[V(x'|x)]\} \tag{2}$$

- Given a policy, compute post-decision transition-probability-matrix $\tilde{P}$ and utility $\tilde{u}$ given by:

$$\tilde{u}(x, x^*) = \begin{cases} 0 & \text{if } x < x^* \\ u(x) - FC & \text{if } x \geq x^* \end{cases}$$

- Which solves the value function at all states in a single step:

$$V(x, x^*) = (I - \beta \tilde{P}(x^*))^{-1} \tilde{u}(x, x^*) \tag{3}$$

Estimation Details, Re-stocking Model

- To obtain $\pi(x)$ we estimate a model of demand and an arrival process of "likely consumers" $f(x'|x)$.
- Start with 10,000 "full machines" using assortment a of products.
- Simulate consumer arrivals using parameters from a random-coefficients demand model and construct expected profit after M consumers,
- Convert expected profits to a function of the number of consumers who would have made a purchase at a hypothetical "full machine" and fit a smooth Chebyshev polynomial, and use this as our approximation of profits.
- Similar to Rust (1987), estimate the retailer's optimal wait until the next re-stocking visit (as a function of the expected number of sales).
- In theory, we should be able to estimate FC, but our retailer sets a level of service that is too high to rationalize with any optimal stocking behavior.

Dynamic Restocking Procedure

- I am interested only in a stationary long-run policy $e \equiv x^*$. and $V(x, x*)$.
- I can evaluate the profits of R, M, N, or any combination $R + M$, etc. given a fixed policy x^*.
- We can micro-found this by assuming that retailer "pre-commits" to effort level before realizing sales, or by setting an enterprise wide "average service level".
- There is no uncertainty about demand, we have many machines, so we are interested only in the ergodic distribution of profits. (This makes the "game" static).

Our Procedure

Given demand parameters $\hat{\theta}$:

1. Forward Simulate sales for a machine with choice set a from full to completely empty as a function of x.
2. Pick a policy $e = x^*$.
3. Given $(\tilde{w_m}, w_n)$ we can compute $\pi_R(a, e)$, $\pi_M(a, e)$, $\pi_H(a, e)$ at ANY (a, e).

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- Focus on a large cluster of 28 'higher than average volume' machines.
- Assume a fixed cost of a re-stocking visit of \$10. (Approximates the per-machine restocking cost using the driver's wage and average number of machines serviced per day; Check several alternative assumptions.)

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Key questions: vary $(\tilde{w_m}, w_n)$ and see what happens.

- Does the observed rebate program lead to exclusion?
- Is Mars willing to pay for exclusion at observed rebate level?
- Could Hershey set $w_h = mc_h$ to avoid exclusion?
- Does the Mars exclusive assortment maximize industry profits? (Chicago Critique)

Optimal Retailer Effort (Stocking Policies)

For a representative machine (see paper):

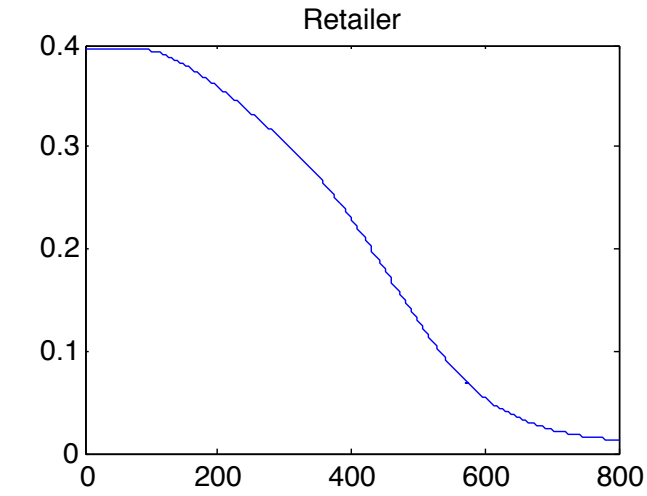
- Fix the five most commonly-stocked confections products: four Mars products (Snickers, Peanut M&Ms, Twix, and M&M Plain), and Nestle's Raisinets.
- Allow the retailer to consider different choices for the final two slots:
  - Two Mars products (Milkyway and 3 Musketeers)
  - Two Hershey products (Reese's Peanut Butter Cup and PayDay)
  - Two Nestle products (Butterfinger and Crunch).
- Display the five most profitable pairs.

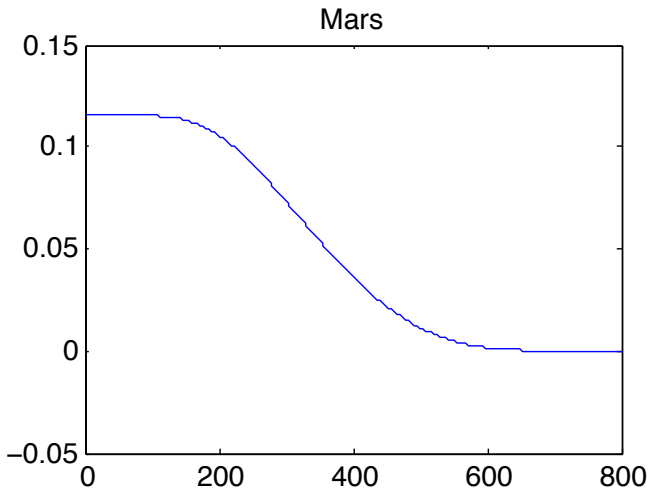
Restock after how many expected consumer arrivals?

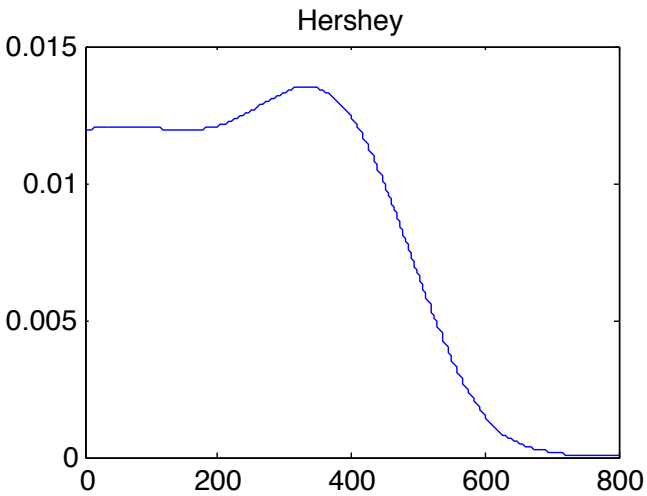
Additional Products Stocked*:	Retailer -Pre	Retailer -Post	Integrated	Industry	Retail Understock	Rebate Increase
Reeses PB Cup (H), 3 Musketeers (M)	267	261	244	247	9.4%	2.2%
Reeses PB Cup (H), Payday (H)	263	257	237	241	11.0%	2.3%
3 Musketeers (M), Milkyway (M)	264	259	243	244	8.6%	1.9%
Reeses PB Cup (H), Butterfinger (N)	263	257	238	241	10.5%	2.3%
Butterfinger (N), Crunch (N)	257	251	232	234	10.8%	2.3%

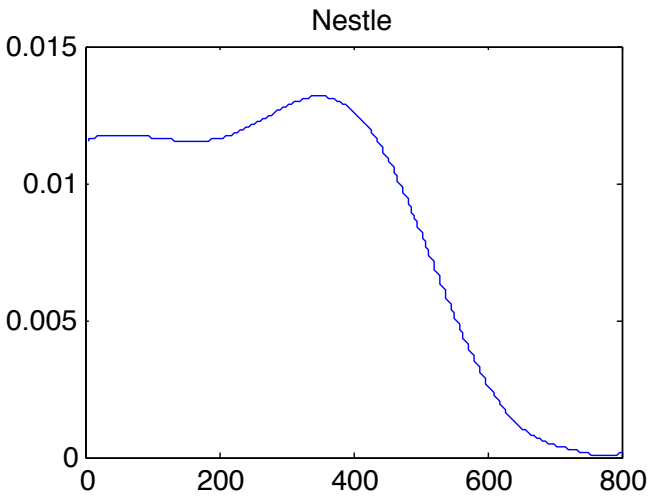
Notes: The five base products are: Snickers, Peanut M&M, Twix, Plain M&M (Mars), and Raisinets (Nestle). Manufacturers are denoted as (H) for Hershey's, (N) for Nestle, and (M) for Mars. 'Retail understock' reports (Retail-Pre - Integrated)/Integrated.

Variable Profits Per Consumer (Vary Restocking Policy)









Profit Impacts and Optimal Product Assortment

Profits under Alternate Product Assortments and Stocking Policies:

Policy	Retail (No Reb.)	Rebate	Mars	Hershey	Nestle	Integrated	Industry	Consumer Utility
(H,M) Assortment: Reeses Peanut Butter Cup and Three Musketeers								
Retailer-Pre (267)	36,399	1,875	11,719	1,302	1,260	48,117	**50,679**	**21,685**
Retailer-Post (261)	36,394	1,882	11,763	1,299	1,257	48,157	**50,713**	**21,752**
Integrated (244)	36,335	1,899	11,871	1,290	1,249	48,206	**50,744**	**21,911**
(H,H) Assortment: Reeses Peanut Butter Cup and Payday								
Retailer-Pre (263)	**36,661**	1,609	**10,055**	**2,173**	**1,285**	**46,716**	50,174	20,845
Retailer-Post (257)	36,656	1,617	10,106	2,167	1,282	46,762	50,211	20,914
Integrated (237)	36,578	1,640	10,251	2,149	1,272	46,829	50,250	21,102
(M,M) Assortment: Three Musketeers and Milkyway								
Retailer-Pre (264)	36,090	2,091	13,067	0	1,256	49,156	50,412	21,080
Retailer-Post (259)	**36,086**	**2,096**	**13,101**	**0**	**1,254**	**49,187**	50,441	21,136
Integrated (243)	**36,035**	**2,111**	**13,195**	**0**	**1,246**	**49,230**	50,476	21,289

Notes: Profit numbers represent the long-run expected profit from a single machine in Group D. Assumes that Mars sets the threshold to require Mars products in the last two slots, at Integrated level of effort, with $c = 0$.

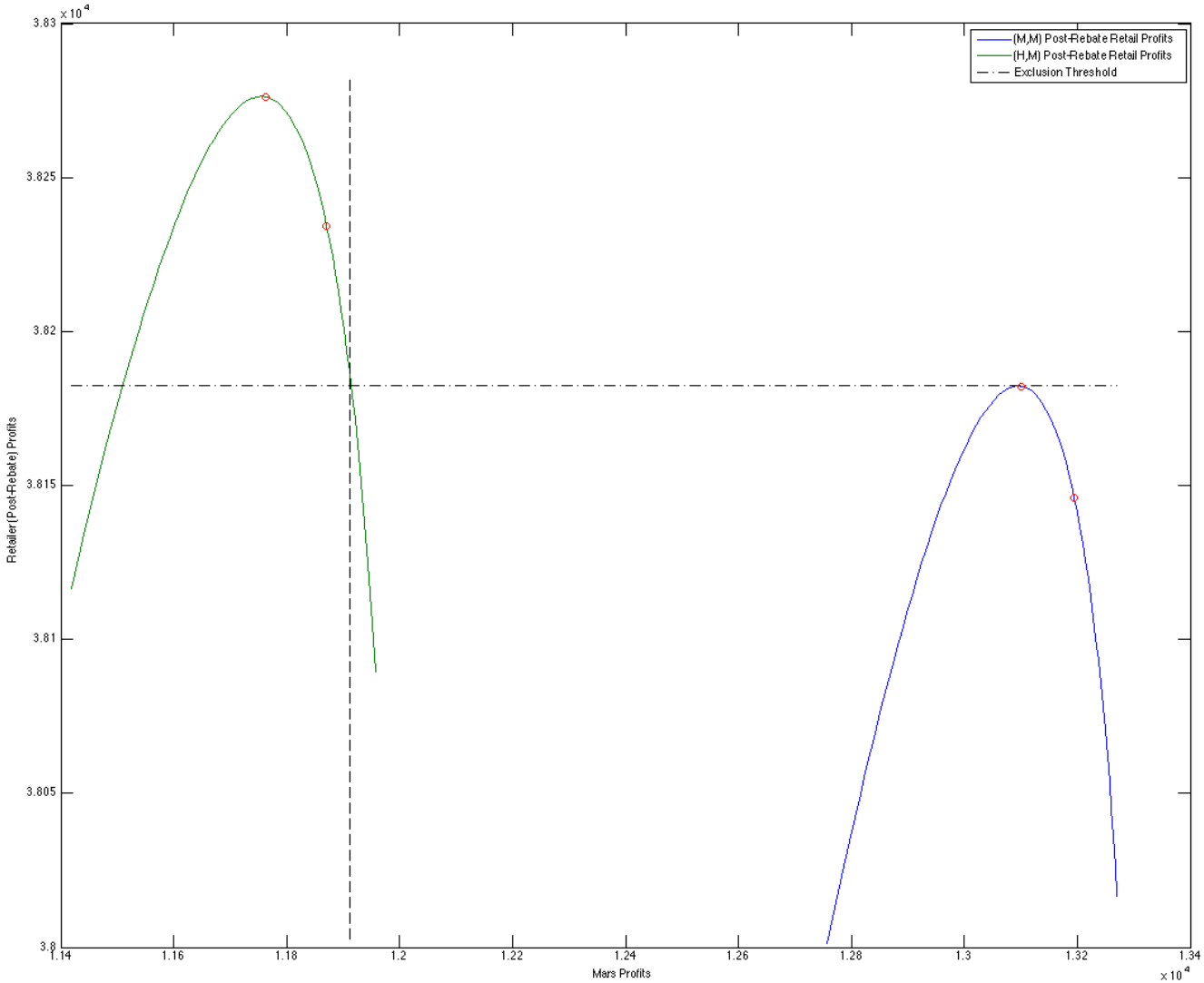
Potential Competitive Responses

(Comparison is (H,H) Pre-Rebate)

Threshold	$> 11{,}912$ $< 13{,}101$	$= 13{,}195$
Assortment	(M,M)	(M,M)
Policy	Retailer-Post	Integrated
Δ Retail Profit	1,521	1,485
Δ Mars Revenue	950	1,029
Δ Hershey Revenue	-2,173	-2,173
Δ Nestle Revenue	-31	-39
Δ Retailer+Hershey	-652	-688
Δ Consumer Utility	291	444
Δ Industry Profit	267	302
Price to Avoid Exclusion	12.83	13.54
Rebate Reduction ($c = .15$)	5.27%	3.53%

Notes: Comparisons are to the retailer's 'Pre-Rebate' optimal stocking policy and (H,H) assortment. Results refer to the long-run impacts for a single machine in Group D. The small changes to Nestle's profit result from changes in the retailer effort level (i.e., Retailer-Post or Integrated effort vs. Pre-Rebate for the (H,H) assortment). Hershey's price is 42.75 cents per unit.

The Role of Quantity Thresholds



The Pure Efficiency Effect

Potential Efficiency Gains from Vertically-Integrated Stocking

	(M,M)	(H,M)	(H,H)
Policy Change	8.6%	9.4%	11.0%
Δ Retail	-55	-64	-83
Δ Mars	128	196	196
Δ Mars + Retailer	73	132	113
Δ Hershey		-12	-24
Δ Nestle	-10	-11	-13
Δ Producer Surplus	64	65	76
%Δ Consumer Surplus	0.99%	1.04%	1.23%

Notes: Calculations based on holding assortment fixed and measuring the welfare impact of moving from the 'Retailer-Pre' row to the 'Integrated' row in previous table.

Linear Pricing

Linear Pricing vs. AUD (Assortment is (M,M))

	Post-Rebate	Integrated	Linear Pricing
Threshold	>11,871	=13,195	=0
Restocking Policy	259	243	257
Retail Profit (incl'g rebate)	38,182	38,146	39,103
Mars Profit	11,005	11,084	10,094
Nestle Profit	1,254	1,246	1,253
Integrated (Mars-Retailer) Profit	49,187	49,230	49,197
Consumer Surplus	21,136	21,289	21,158

Notes: The optimal wholesale price under linear pricing is estimated to be 41.36 cents per unit. Hershey is excluded in the (M,M) assortment for all three arrangements. The change in Nestle's profits is due to the retailer's choice of restocking policy.

Implications for Mars-Hershey Merger

Policy	Retail (No Reb.)	Rebate	Mars/ Hershey	Nestle	Inte- grated	Industry	Consumer Utility
(H,M) Assortment: Reeses Peanut Butter Cup and Three Musketeers							
Retailer-Pre (267)	36,399	2,083	13,021	1,260	49,419	**50,679**	**21,685**
Retailer-Post (262)	**36,395**	**2,089**	**13,055**	**1,257**	**49,451**	**50,708**	**21,741**
Integrated (245)	**36,340**	**2,105**	**13,155**	**1,249**	**49,496**	**50,745**	**21,903**
(N,N) Assortment: Butterfinger and Crunch							
Retailer-Pre (257)	**36,594**	1,631	**10,193**	**2,707**	**46,787**	49,494	19,430
Retailer-Post (251)	36,589	1,639	10,246	2,700	46,835	49,535	19,502
Integrated (232)	36,514	1,662	10,386	2,681	46,900	49,581	19,687

Notes: Profit numbers represent the long-run expected profit from a single machine in Group D. The two panels represent the two product assortments that offer the greatest potential retailer profit under different stocking policies and rebate payments.

Implications of Upstream Mergers

Comparison under Alternate Ownership Structures

	No Merger	M-H Merger	M-N Merger	H-N Merger
AUD Assortment	(M,M)	(H,M)	(M,M)	(M,M)
Alternative	(H,H)	(N,N)	(H,H)	(H,H)
Policy	Integrated	Integrated	Integrated	Integrated
Δ Retail	1,485	1,851	1,689	1,485
Δ Mars	1,029	857	785	1,029
Δ Bilateral	2,514	2,708	2,474	2,514
Δ Competitor	-2,173	-1,458	-2,173	-2,212
Δ Retailer + Competitor	-688	393	-484	-727
Δ Consumer Surplus	444	2,473	436	444
Δ Industry	302	1,251	302	302
Price to Avoid Exclusion	13.54	n/a	9.52	14.05
Rebate Reduction ($c = 0.15$)	3.5%	42.3%	12.1%	2.3%

Notes: Table compares the welfare impacts of an exclusive Mars stocking policy under alternative ownership structures. This assumes threshold is set at the vertically-integrated level in order to maximize efficiency gains.

Welfare Effects of the AUD

What do Mars and competitors do in the absence of an AUD?

- Hold (wholesale) prices fixed:
  - Mars and retailer are worse off; social welfare goes down.
  - Effort and assortment are worse for consumers.
- Set an optimal linear (wholesale) price:
  - Mars is worse off; retailer is better off.
  - Consumer surplus change small; depends on AUD 'threshold.'
- How would AUD contract adjust if upstream firms merge?
  - A merged Mars-Hershey can reduce rebate; retailer is worse off.
  - Social welfare goes up; effort, assortment better for consumers.
  - Implements socially (and industry) optimal effort, assortment.

Conclusion

- We find both efficiency and foreclosure effects of AUDs
- True efficiency effects of more frequent restocking are small
- Retailer effort is substitutable across competing upstream firms. (i.e., Hershey benefits when Snickers stocks out.)
- Hershey is foreclosed, and the industry-optimal assortment is not attained
- But total profits and consumer welfare are higher compared to a "retailer optimal" outcome without a rebate.