

Minimum Advertised Pricing: Patterns of Violation in Competitive Retail Markets

ONLINE APPENDIX

TABLE A1

Correlation Matrix

Each observation is a *SKU x retailer x marketplace* combination. Percent of violations is the percent of violations across the database for each *SKU x retailer x marketplace* combination. Average depth of violations is the average depth of discount below MAP. Percent of violations and average depth of violations take values between 0 and 1, corresponding to 0% and 100%. While all other measures are based on 10303 observations, depth of violations includes only the 4044 violating observations. Assortment size is the number of products a retailer holds. Distribution intensity is the number of retailers that hold a certain SKU. Charge for shipping is true if there was a shipping charge for the *SKU x retailer x marketplace* combination. Always charge for shipping is true if there is always a shipping charge for the *SKU x retailer x marketplace*, Sometimes charge for shipping is true when the only some of the observations have a shipping charge. Showroom is true if the online retailer also has a brick and mortar store or a showroom. Authorized indicates whether or not the retailer is an authorized dealer. MAP price is the manufacturer-set floor price. Number of days selling SKU indicates the amount of days in the data that the retailer was observed selling a specific SKU. Top Retailer is true is the retailer appeared in one of the top retailers' lists. Electronics indicates the product category and market defines the specific marketplace.

	% of Violations	Avg. Depth of Violations	Assortment size	Distribution intensity	Shipping Charges	Always Shipping	Some. Shipping	Showroom==TRUE	Authorized==TRUE	Map price	Days Selling SKU	Top Retailer	Electronics==TRUE	AMAZON market	EBAY market	OWN WEBSITE
% of Violations	1.000															
Avg. Depth of Violations	0.188	1.000														
Assortment size	-0.373	-0.092	1.000													
Distribution intensity	0.053	-0.180	-0.154	1.000												
Shipping Charges	0.132	0.156	0.039	0.032	1.000											
Always Shipping	0.203	0.139	-0.169	0.078	0.482	1.000										
Some. Shipping	0.016	0.070	0.154	-0.017	0.807	-0.120	1.000									
Showroom==TRUE	-0.233	-0.129	0.166	-0.061	-0.087	-0.135	-0.006	1.000								
Authorized==TRUE	-0.434	-0.257	0.615	-0.115	-0.113	-0.203	0.007	0.385	1.000							
Map price	-0.100	-0.065	0.090	-0.247	-0.116	-0.079	-0.078	0.076	0.106	1.000						
Days Selling SKU	-0.328	-0.284	0.339	0.094	-0.077	-0.270	0.093	0.197	0.451	-0.040	1.000					
Top Retailer	-0.254	-0.033	0.564	-0.074	0.058	-0.058	0.100	0.012	0.411	0.041	0.176	1.000				
Electronics==TRUE	0.206	0.419	-0.102	-0.286	0.093	0.096	0.042	-0.094	-0.157	-0.068	-0.210	-0.087	1.000			
AMAZON market	0.031	0.048	0.012	-0.028	0.306	0.139	0.258	-0.126	-0.038	-0.123	-0.023	0.0467	0.147	1.000		
EBAY market	0.108	0.102	-0.162	0.002	-0.017	0.014	-0.028	-0.146	-0.140	0.003	-0.124	-0.0606	-0.001	-0.212	1.000	
OWN WEBSITE	-0.099	-0.116	0.096	0.023	-0.266	-0.134	-0.215	0.210	0.127	0.109	0.102	-0.0024	-0.132	-0.766	-0.467	1.000

TABLE A2

Univariate Models – Percent of Violations

The dependent variable is the average percent of violations at 0% deviation below MAP. All standard errors are White standard errors. The model is: $Percent - violations = \alpha + \beta_i X_i$, where X represents each of the variables below. Each observation is a *SKU x retailer x marketplace* combination. Percent of violations is the percent of violations across the database for each *SKU x retailer x marketplace* combination. Percent of violations takes values between 0 and 1, corresponding to 0% and 100%. Others avg. vio. depth/rate authorized/unauthorized is the average depth of violations among all other authorized/unauthorized selling this *SKU* in this *marketplace*. Assortment size is the number of products a retailer holds. Distribution intensity is the number of retailers that hold a certain *SKU*. Percent unauthorized is the percent of unauthorized retailers selling the *SKU* in the market. Charge for shipping is true if there was a shipping charge for the *SKU x retailer x marketplace* combination. Always charge for shipping is true if there is always a shipping charge for the *SKU x retailer x marketplace*, Sometimes charge for shipping is true when the only some of the observations have a shipping charge. Showroom is true if the online retailer also has a brick and mortar store or a showroom. Authorized indicates whether or not the retailer is an authorized dealer.

Violation Depth: Authorized	2.1*** (.103)											
Violation Depth: Unauthorized	1.5*** (.066)											
Violation Rate: Authorized	.523*** (.026)											
Violation Rate: Unauthorized	.476*** (.015)											
Assortment Size	-.004*** (8.8e-05)											
Distribution Intensity	.0006*** (.00011)											
%unauthorized	.685** (0.019)											
Charge for Shipping	.14*** (.011)											
Always Shipping	.36*** (.019)											
Sometimes Shipping	0.019 (.012)											
Showroom==TRUE	-.21*** (.0081)											
Authorized==TRUE	-.39*** (.0085)											
Constant	.25*** (.005)	.20*** (.006)	.23*** (.006)	.093*** (.006)	.51*** (.0071)	.27*** (.0083)	.024*** 0.008	.28*** (.0048)	.28*** (.0044)	.3*** (.0048)	.39*** (.0058)	.53*** (.0075)
R-squared	0.045	0.093	0.041	0.041	0.14	0.0029	0.11	0.017	0.041	0.00025	0.054	0.19
N. of cases	10303	10303	10303	10303	10303	10303	10303	10303	10303	10303	10303	10303
RMSE	0.43	0.42	0.43	0.42	0.41	0.44	0.41	0.44	0.43	0.44	0.43	0.4

TABLE A3

Univariate Models – Depth of Violations

The dependent variable is average depth of violations from MAP for violators only. All standard errors are White standard errors. The model is: $-depth = \alpha + \beta_i X$, where X represents each of the variables below. Each observation is a *SKU x retailer x marketplace* combination. Average depth of violations is the average depth of discount below MAP. Average depth of violations takes values between 0 and 1, corresponding to 0% and 100%. This analysis includes only the 4044 violating observations. Others avg. vio. depth/rate authorized/unauthorized is the average depth of violations among all other authorized/unauthorized selling this *SKU* in this *marketplace*. Assortment size is the number of products a retailer holds. Distribution intensity is the number of retailers that hold a certain *SKU*. Percent unauthorized is the percent of unauthorized retailers selling the *SKU* in the market. Charge for shipping is true if there was a shipping charge for the *SKU x retailer x marketplace* combination. Always charge for shipping is true when there is always a shipping charge for the *SKU x retailer x marketplace*, Sometimes charge for shipping is true when the only some of the observations have a shipping charge. Showroom is true if the online retailer also has a brick and mortar store or a showroom. Authorized indicates whether or not the retailer is an authorized dealer.

Violation Depth: Authorized	.595*** (.034)											
Violation Depth: Unauthorized	.818*** (.027)											
Violation Rate: Authorized	.007 (.009)											
Violation Rate: Unauthorized	.20*** (.007)											
Assortment Size	-.0003*** (.00006)											
Distribution Intensity	-.0006*** (4.3e-04)											
%unauthorized	.209*** (.010)											
Charge for Shipping	.046*** (.0048)											
Always Shipping	.06*** (.0072)											
Sometimes Shipping	.024*** (.0056)											
Showroom== TRUE	.041*** (.0049)											
Authorized== TRUE	.072*** (.0041)											
Constant	.11*** (.0025)	.05*** (.003)	.13*** (.003)	.02*** (.004)	.15*** (.0032)	.17*** (.0039)	.032*** (0.005)	.12*** (.0025)	.13*** (.0022)	.13*** (.0024)	.14*** (.0025)	.16*** (.0029)
R-squared	0.062	0.36	0.0001	0.173	0.0085	0.032	0.115	0.024	0.019	0.0049	0.017	0.066
N. of cases	4044	4044	4044	4044	4044	4044	4044	4044	4044	4044	4044	4044
RMSE	0.13	0.11	0.14	0.12	0.14	0.13	0.129	0.14	0.14	0.14	0.14	0.13

TABLE A4

Violation Rate – Sensitivity Results

	AUTHORIZED INTERACTIONS				UNAUTHORIZED INTERACTIONS			
	0%	1%	2.5%	5%	0%	1%	2.5%	5%
Violation Depth: Authorized	.12 (.22)	.65*** (.2)	.66*** (.2)	.72*** (.18)	.15 (.17)	.21 (.16)	.27 (.16)	.28 (.18)
Violation Depth: Unauthorized	.0093 (.12)	.095 (.099)	.1 (.095)	.09 (.093)	.73*** (.15)	.91*** (.15)	1*** (.15)	1*** (.15)
Violation Rate: Authorized	.55*** (.065)	.36*** (.051)	.35*** (.052)	.31*** (.05)	.12** (.058)	.049 (.055)	.054 (.054)	.066 (.055)
Violation Rate: Unauthorized	.051** (.023)	.044** (.02)	.041** (.019)	.034* (.018)	.25*** (.062)	.23*** (.058)	.24*** (.057)	.24*** (.053)
Assortment Size	-.0016*** (.00031)	-.0007*** (.00022)	-.00065*** (.00022)	-.00044** (.0002)	-.00044 (.0016)	-.000089 (.0017)	-.0015 (.0011)	-.0017** (.00078)
Distribution Intensity	.000018 (.00024)	-.00021 (.00014)	-.0002 (.00014)	-.000045 (.00014)	.00032 (.00025)	.00024 (.00025)	.00027 (.00024)	.00038 (.00023)
%unauthorized	-.0016 (.041)	.013 (.028)	.01 (.028)	-.00033 (.027)	.071 (.072)	.058 (.069)	.012 (.069)	-.027 (.066)
Always Shipping	.2** (.086)	.21** (.089)	.21** (.089)	.21** (.085)	.11** (.051)	.13*** (.051)	.13*** (.05)	.14*** (.05)
Sometimes Shipping	.053** (.025)	.037* (.019)	.035* (.019)	.026 (.017)	.11*** (.041)	.12*** (.043)	.13*** (.041)	.12*** (.039)
Showroom==TRUE	-.031 (.023)	-.024 (.017)	-.023 (.017)	-.023 (.016)	-.19** (.081)	-.19*** (.072)	-.15** (.069)	-.11* (.065)
Map Price	-.00001* (5.2e-06)	-.00001** (4.3e-06)	-9.8e-06** (4.3e-06)	-5.9e-06 (4.0e-06)	4.3e-06 (.000015)	-1.7e-06 (.000015)	4.7e-07 (.000013)	-3.8e-06 (.000012)
#days sell SKU	-.00047*** (.00011)	-.00057*** (.00011)	-.00055*** (.00011)	-.00054*** (.0001)	-.00052** (.00026)	-.00072*** (.00023)	-.00063*** (.00019)	-.00058*** (.00017)
Top Retailer	-.074*** (.026)	-.055*** (.019)	-.055*** (.018)	-.049*** (.017)	-.26* (.14)	-.32*** (.085)	-.35*** (.08)	-.32*** (.076)
Electronics==TRUE	-.048** (.021)	-.038** (.018)	-.035* (.018)	-.016 (.016)	.12*** (.038)	.14*** (.036)	.16*** (.034)	.18*** (.032)
Amazon Marketplace	.012 (.023)	.0045 (.019)	.0051 (.019)	.0013 (.017)	-.063 (.045)	-.076* (.046)	-.061 (.044)	-.052 (.041)
eBAY Marketplace	-.011 (.041)	-.011 (.038)	-.0078 (.038)	.00099 (.038)	-.0048 (.041)	-.031 (.04)	-.0071 (.038)	.016 (.036)

	0%	1%	2.5%	5%
Unauthorized	.18** (.078)	.2*** (.078)	.11** (.056)	.06* (.035)
Constant	.23*** (.026)	.16*** (.023)	.15*** (.023)	.13*** (.022)
R-squared	.36	.41	.4	.41
N cases	10303	10303	10303	10303

* p<0.10, ** p<0.05, *** p<0.01

The model is given by equation (1) and the dependent variable is the average percent of ANNUAL violations at X% deviation below MAP. We use model 4 for each of the regressions.

The standard errors are clustered by retailer.

TABLE A5

PANEL A: Violation Rate – Logit Results

	AUTHORIZED INTERACTIONS				UNAUTHORIZED INTERACTIONS			
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
Violation Depth: Authorized		12*** (1.4)		5.5*** (1.5)		2.6** (1.1)		.99 (1.2)
Violation Depth: Unauthorized		.1 (.74)		-.74 (.98)		6.9*** (.97)		5.2*** (1.1)
Violation Rate: Authorized			3.2*** (.36)	2.5*** (.4)			.74** (.31)	.68** (.34)
Violation Rate: Unauthorized			.33** (.16)	.39** (.2)			1.7*** (.24)	.71** (.28)
Assortment Size	-.013*** (.0036)	-.013*** (.0038)	-.014*** (.004)	-.014*** (.0039)	-.00018 (.007)	-.00058 (.0072)	.00069 (.0073)	.000012 (.0073)
Distribution Intensity	-.000059 (.0017)	.0015 (.0016)	-.00076 (.0017)	-6.8e-06 (.0016)	.0014 (.0012)	.0026** (.0013)	.00088 (.0013)	.0021 (.0013)
%unauthorized	.81*** (.31)	.33 (.33)	.26 (.3)	.19 (.32)	1.4*** (.34)	.44 (.36)	.7* (.37)	.38 (.36)
Always Shipping	1** (.42)	.89** (.43)	.75* (.44)	.76* (.45)	.46 (.28)	.55* (.29)	.53* (.29)	.55* (.29)
Sometimes Shipping	.63** (.27)	.62** (.27)	.64** (.29)	.64** (.29)	.53** (.23)	.62*** (.23)	.59** (.23)	.62*** (.23)
Showroom==TRUE	-.27 (.19)	-.29 (.19)	-.31 (.2)	-.31 (.2)	-1*** (.39)	-1** (.4)	-1** (.41)	-1** (.4)
Map Price	-.00021*** (.000056)	-.00015*** (.000058)	-.00014** (.000058)	-.00013** (.000059)	-.000069 (.000079)	6.0e-06 (.000074)	-.000019 (.000078)	9.1e-06 (.000076)
#days sell SKU	-.00055 (.0008)	.00028 (.00083)	.00044 (.00084)	.00061 (.00085)	-.0015 (.0012)	-.0016 (.0013)	-.0013 (.0013)	-.0014 (.0013)
Electronics==TRUE	-.27* (.15)	-.48*** (.17)	-.22 (.16)	-.29* (.17)	1.1*** (.19)	.57*** (.18)	.78*** (.19)	.6*** (.18)
Amazon Marketplace	-.1 (.26)	-.034 (.26)	-.055 (.28)	-.038 (.28)	-.35 (.23)	-.31 (.24)	-.32 (.24)	-.3 (.24)
eBAY Marketplace	-.52* (.3)	-.47 (.31)	-.55* (.32)	-.53 (.32)	-.1 (.2)	-.02 (.21)	-.02 (.21)	.0058 (.21)

	NO OTHERS' BEHAVIOR	OTHERS' VIOLATION DEPTH	OTHERS' VIOLATION RATE	OTHERS' DEPTH AND RATE
Unauthorized	.31 (.35)	.47 (.36)	.48 (.37)	.52 (.37)
Constant	-.57*** (.18)	-.56*** (.19)	-.63*** (.19)	-.62*** (.19)
LL	-5874.4869	-5668.7386	-5642.231	-5598.7104
N cases	10303	10303	10303	10303

* p<0.10, ** p<0.05, *** p<0.01

The model is given by equation (1) and the dependent variable is 0 if there were no MAP violations and 1 otherwise. The standard errors are clustered by retailer.

PANEL B: Violation Rate – Probit Results

	AUTHORIZED INTERACTIONS				UNAUTHORIZED INTERACTIONS			
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
Violation Depth: Authorized		6.8*** (.79)		3.2*** (.84)		1.5** (.65)		.5 (.68)
Violation Depth: Unauthorized		.056 (.42)		-.41 (.54)		3.8*** (.56)		2.7*** (.63)
Violation Rate: Authorized			1.9*** (.2)	1.4*** (.22)			.42** (.18)	.4** (.2)
Violation Rate: Unauthorized			.2** (.091)	.24** (.12)			1*** (.14)	.49*** (.18)
Assortment Size	-.0073*** (.002)	-.0076*** (.0021)	-.0079*** (.0022)	-.0079*** (.0022)	-.00016 (.0043)	-.00044 (.0044)	.00038 (.0044)	-9.4e-06 (.0044)
Distribution Intensity	.000034 (.00097)	.00088 (.00095)	-.00042 (.00097)	-3.9e-06 (.00095)	.00093 (.00074)	.0016** (.00076)	.00054 (.00076)	.0012 (.00076)
%unauthorized	.47*** (.17)	.21 (.19)	.16 (.17)	.12 (.18)	.88*** (.2)	.3 (.21)	.44** (.22)	.25 (.22)
Always Shipping	.61** (.25)	.54** (.25)	.44* (.26)	.45* (.26)	.27 (.17)	.32* (.18)	.32* (.18)	.32* (.18)
Sometimes Shipping	.37** (.16)	.36** (.16)	.37** (.17)	.37** (.17)	.33** (.14)	.37*** (.14)	.36*** (.14)	.38*** (.14)
Showroom==TRUE	-.16 (.11)	-.17 (.12)	-.18 (.12)	-.18 (.12)	-.61*** (.23)	-.61*** (.23)	-.6** (.24)	-.6** (.23)
Map Price	-.00012*** (.000031)	-.000087*** (.000032)	-.000081** (.000032)	-.000075** (.000033)	-.000041 (.000046)	-6.5e-06 (.000047)	-.000011 (.000046)	-1.7e-06 (.000047)
#days sell SKU	-.00034 (.00046)	.00016 (.00048)	.00024 (.00048)	.00034 (.00049)	-.00097 (.00075)	-.001 (.00079)	-.00079 (.00079)	-.00089 (.0008)
Electronics==TRUE	-.14* (.083)	-.26*** (.095)	-.11 (.09)	-.16* (.095)	.7*** (.12)	.37*** (.11)	.47*** (.11)	.37*** (.11)
Amazon Marketplace	-.046 (.15)	-.014 (.16)	-.022 (.16)	-.014 (.16)	-.23 (.14)	-.2 (.15)	-.2 (.14)	-.19 (.15)
eBAY Marketplace	-.3* (.17)	-.26 (.18)	-.3* (.18)	-.28 (.18)	-.065 (.12)	-.019 (.13)	-.018 (.13)	-.0026 (.13)

	NO OTHERS' BEHAVIOR	OTHERS' VIOLATION DEPTH	OTHERS' VIOLATION RATE	OTHERS' DEPTH AND RATE
Unauthorized	.21 (.22)	.29 (.22)	.31 (.22)	.33 (.22)
Constant	-.36*** (.11)	-.36*** (.11)	-.4*** (.11)	-.4*** (.11)
N cases	10303	10303	10303	10303

* p<0.10, ** p<0.05, *** p<0.01

The model is given by equation (1) and the dependent variable is 0 if there were no MAP violations and 1 otherwise.
The standard errors are clustered by retailer.

PANEL C: Violation Rate – Tobit Results

	AUTHORIZED INTERACTIONS				UNAUTHORIZED INTERACTIONS			
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
Violation Depth: Authorized		11*** (1.3)		3.5*** (1.2)		2.8** (1.2)		.89 (1.2)
Violation Depth: Unauthorized		.64 (.73)		-.33 (.92)		7.7*** (1.1)		5*** (1.2)
Violation Rate: Authorized			3.5*** (.4)	3*** (.42)			.76** (.34)	.74* (.38)
Violation Rate: Unauthorized			.44*** (.16)	.46** (.19)			2.3*** (.3)	1.2*** (.34)
Assortment Size	-.014*** (.0037)	-.014*** (.0036)	-.014*** (.0038)	-.014*** (.0037)	-.0024 (.0088)	-.0028 (.0086)	-.0012 (.0086)	-.0018 (.0085)
Distribution Intensity	.00046 (.0018)	.0022 (.0017)	-.00015 (.0016)	.00038 (.0016)	.0011 (.0015)	.0026* (.0015)	.00012 (.0014)	.0014 (.0014)
%unauthorized	.81*** (.31)	.21 (.33)	.081 (.29)	.02 (.31)	1.7*** (.41)	.49 (.42)	.7* (.41)	.37 (.41)
Always Shipping	1.4*** (.53)	1.3** (.53)	1* (.54)	1* (.54)	.63* (.34)	.7** (.34)	.69** (.34)	.7** (.34)
Sometimes Shipping	.57** (.26)	.51** (.25)	.51* (.27)	.51* (.26)	.5** (.23)	.59** (.23)	.56** (.23)	.58** (.23)
Showroom==TRUE	-.19 (.18)	-.2 (.18)	-.2 (.18)	-.2 (.18)	-1.2** (.5)	-1.2** (.48)	-1.1** (.49)	-1.1** (.48)
Map Price	-.00022*** (.00006)	-.00016*** (.00006)	-.00014** (.000059)	-.00013** (.000059)	-.000088 (.000098)	-2.1e-06 (.000093)	-.000012 (.000091)	9.0e-06 (.000091)
#days sell SKU	-.0026*** (.00088)	-.0017** (.00086)	-.0014 (.00087)	-.0013 (.00087)	-.0036** (.0015)	-.0036** (.0015)	-.003** (.0015)	-.0032** (.0015)
Electronics==TRUE	-.33** (.15)	-.57*** (.17)	-.26* (.15)	-.33** (.16)	1.4*** (.24)	.68*** (.22)	.83*** (.22)	.65*** (.21)
Amazon Marketplace	-.089 (.25)	-.038 (.24)	-.046 (.25)	-.038 (.25)	-.49* (.28)	-.41 (.27)	-.4 (.27)	-.38 (.27)
eBAY Marketplace	-.37 (.33)	-.29 (.33)	-.35 (.33)	-.32 (.33)	-.13 (.25)	-.021 (.25)	-.023 (.25)	.0088 (.25)

	Model 1	Model 2	Model 3	Model 4
UnAuthorized	.72 (.45)	.85* (.44)	.92** (.45)	.94** (.44)
Constant	-.87*** (.22)	-.82*** (.21)	-.9*** (.22)	-.8 (.2)
Sigma Constant	2*** (.15)	1.9*** (.15)	1.9*** (.15)	1.8*** (.15)
N cases	10303	10303	10303	10303

* p<0.10, ** p<0.05, *** p<0.01

The model is given by equation (1) and the dependent variable is the average percent of ANNUAL violations at 0% deviation below MAP. The deviations are limited to be between 0 and 1.

The standard errors are clustered by retailer.

TABLE A6

Shipping Fees and Number of Clicks

	Retailer FE	Retailer FE	SKU FE	SKU FE
Number of Clicks to see Shipping Fees	.88** (.43)	.43 (.49)	-.17 (.22)	-.35 (.24)
Account Information Required to see Shipping Fees	-.65** (.27)	-.46 (.31)	-.25** (.097)	-.14 (.1)
Number Clicks X Shipping		1.4* (.71)		1.1** (.55)
Account Info Required X Shipping		-.5 (.41)		-1.1*** (.29)
Assortment Size			.031*** (.006)	.028*** (.006)
Distribution Intensity	.0084 (.0062)	.0087 (.0062)		
%unauthorized	-1.8 (1.2)	-1.9 (1.2)	-.73 (1.8)	-.88 (1.8)
Shipping == TRUE	17*** (.62)	16*** (.95)	21*** (.47)	20*** (.79)
Showroom==TRUE			1.2*** (.43)	.94** (.44)
Map Price	.002*** (.00024)	.002*** (.00024)		
#days sell SKU	-.0025 (.0026)	-.0026 (.0026)	.0037 (.0024)	.0034 (.0024)
Electronics==TRUE	-1.3** (.65)	-1.3** (.65)		
Amazon Marketplace	.81 (.63)	.83 (.63)	-1.7*** (.48)	-1.8*** (.48)
eBAY Marketplace	1.4 (.99)	1.1 (1)	-1.2 (.76)	-1.4* (.76)
Unauthorized			3.7*** (.56)	3.4*** (.57)
Constant	-.66 (.96)	-.24 (1)	-2.9*** (1)	-2.2** (1)
R-squared	.44	.44	.25	.25
N cases	9042	9042	9042	9042

* p<0.10, ** p<0.05, *** p<0.01

The dependent variable is the average annual shipping fee or 0 if shipping is always free. All standard errors are clustered by the FE. "Number of clicks to see shipping fees" indicates the number of clicks a consumer has to go through from viewing a certain product on a web page until finding out the shipping fee. "Number Clicks X Shipping" is an interaction variable interacting the "Number of clicks to see shipping fees" and shipping==TRUE. "Account information required to see shipping fees" indicates a case when the consumer has to enter personal information and credit card information in order to find out the shipping fees. "Account Info Required X Shipping" is an interaction variable interacting the "Account information required to see shipping fees" and shipping==TRUE.

ONLINE APPENDIX B – EXAMPLES OF MAP POLICIES

Veterinary Ventures' MAP Policy

VETERINARY VENTURES, INC. UNILATERAL MINIMUM ADVERTISED PRICE POLICY

To protect the prestige, reputation and image of our quality products, [as well as our reputation for providing customers with high value and strong after-sales support,] we have adopted the following Unilateral Minimum Advertised Price Policy (MAP). Minimum advertised prices will be communicated to resellers from time to time, and may be obtained by resellers anytime by contacting us.

1. An advertised price does not comply with this policy if it is below the MAP price specified by us for the product. If the MAP price is displayed in an ad, it should not be shown as struck-through or altered or discounted in any way. An ad listing no price at all complies with this policy.
2. This policy applies to all forms of public advertising, including but not limited to print, mail, magazines, catalogs, internet (including any form of link or other direct accessibility from a web page or email), email, broadcast or signage. However, it does not apply to in-store signage or displays that are not distributed for customers to take away.
3. The following types of advertising by a reseller comply with this policy: advertising that the reseller has "low prices," or that it will "meet or beat any competitor's prices," or that a customer can "call for a price," or using similar language, or responding orally or by phone, fax, mail or email to inquiry as to the actual selling price of a product.
4. Failure to comply with this policy is grounds for discontinuance of business relationship with the reseller.
5. This unilateral policy concerns advertised prices only. It does not affect in any way the actual price that a reseller may charge for our products. Resellers remain free at all times to determine their own sales prices. This policy applies to resellers in the United States and is subject to change from time to time.

The above is a statement of Veterinary Ventures unilateral policy. We do not seek, nor will we accept, any agreement or understanding with respect to the prices any reseller may advertise or charge at any time.

PANASONIC HOME & ENVIRONMENT COMPANY

MINIMUM ADVERTISED PRICE POLICY

Panasonic Home & Environment Company, Unit of Panasonic Consumer Electronics Company, Division of Panasonic Corporation of North America ("Panasonic"), has unilaterally adopted a minimum advertised price policy (the "Policy") applicable to all Panasonic distributors, dealers and resellers (collectively, the "Resellers") as of May 15, 2007 for the products designated by Panasonic from time to time (the "Products"). The Policy is being implemented to help insure the long-term viability of the Panasonic brand and the innovation of Panasonic's ventilation fans and to protect the investment of the Resellers that provide valuable sales and product assistance and support to their customers.

Panasonic shall from time to time unilaterally establish a minimum advertised price for the Products ("MAP"). The Resellers are free to advertise, promote or sell the Products at any price they choose in their sole and absolute discretion. Pursuant to the Policy, the Resellers may not advertise or otherwise promote the Products using the Internet at a net price less than MAP and may not sell the Products to any other person or entity which advertises or otherwise promotes the Products using the Internet at a net price less than MAP. Panasonic will cancel all orders and refuse to accept any new orders from any Reseller for the Products immediately following verification by Panasonic to its reasonable satisfaction that the Reseller has advertised or otherwise promoted a Product or the Products using the Internet at a net price less than MAP or the Reseller has sold a Product or the Products to a person or entity which advertised or otherwise promoted a Product or the Products using the Internet at a net price less than MAP. Once Panasonic has decided to cancel all orders for the Products and not to accept new orders for the Products, Panasonic will never again sell the Products to the Reseller while the Policy remains in effect.

For purposes of the Policy, the "net price" shall mean the published or advertised price that the Reseller makes the Product available to its customers taking into account all discounts, deductions, rebates, allowances, credits, charges, trade-ins, the separate price of products bundled with the Products by the Reseller, coupons, premiums, promotions, free goods and services and gifts offered with the Product. Customer paid taxes shall not be included in the determination of the "net price."

The Policy is subject to change or cancellation at any time by Panasonic. Panasonic will provide the Resellers at least thirty (30) days notice of any change or cancellation of the Policy.

The Policy does not apply to close out, discontinued or non-current Products. The Policy also does not apply to prices that appear on Internet site "checkout" pages where the customer makes its final purchase.

The Resellers are not required to list prices in advertising. If a price is listed in an Internet advertisement or promotion, the net price must be at or above MAP. Statements such as "call for price," "call for quote," "click for price" or "add to cart for price" are acceptable.

Panasonic shall communicate to the Resellers the list of Products subject to the Policy. MAP shall be communicated to the Resellers on the Panasonic price list.

Each Reseller is free to independently decide whether or not to follow the Policy. Panasonic does not ask for, nor will it accept any assurance of compliance or agreement from a Reseller regarding the Policy nor will Panasonic discuss any conditions on acceptance related to the Policy. Notwithstanding anything to the contrary which may be expressed or implied in or by one or more agreements between the Reseller and Panasonic, nothing in those agreements shall constitute an agreement by the Reseller to comply with the Policy. A Reseller's decision to sell at or above MAP is not communicating acceptance or agreement to comply with the Policy.

The only person authorized to answer questions regarding the Policy and to comment on the Policy and to whom all questions regarding the Policy must be addressed is the Panasonic MAP Administrator. Inquiries should be addressed as follows:

1. E-mail Address: building-imap@us.panasonic.com

or

2. MAP Administrator
Panasonic Home & Environment Company,
Unit of Panasonic Consumer Electronics
Company, Division of Panasonic
Corporation of North America
One Panasonic Way, 1H-3
Secaucus, New Jersey 07094

No Panasonic employee or representative shall seek or accept any Reseller's agreement, nor solicit any Reseller's understanding, to sell or advertise at or above MAP. No Panasonic employee or representative has authority to modify or alter the Policy. Should a Reseller learn of any modification or alteration of the Policy or any attempt to do so, the Reseller should immediately notify the Panasonic contact set forth above.

ONLINE APPENDIX C – DAILY RESULTS

This appendix includes our analysis using daily observations.

1. Daily Violation Rate

For violation rate, we now use an indicator (0/1) of whether or not there was a retailer violation for the SKU in the marketplace for that day. We include *retailer x SKU x marketplace* fixed effects in the model due to the high inertia and lack of dynamics in the data. Additionally, we use one day lagged versions of the violation variables. Thus, our empirical identification strategy relies on temporal antecedence: does a violation by other retailers yesterday affect a retailer's compliance today?

In addition to lagged violation variables, we include lagged distribution intensity and lagged % unauthorized in the violation model. We use a contemporaneous shipping variable, which is coded as a dummy variable to indicate whether the retailer charges for shipping. In addition, we include the actual shipping rate as a continuous variable. We also include a control variable for the MAP price. Other variables were dropped from the model due to the inclusion of numerous fixed effects.

The results of our daily violation rate models are shown in Table C1 and are directionally consistent with the asymmetric spillovers we observe in the annual data. Past violations of other authorized retailers have a large, positive impact on authorized retailers (consistent with Hypothesis H3). But, past violations by unauthorized retailers have a much smaller impact on authorized retailers (consistent with Hypothesis H2, but inconsistent with the prediction of Hypothesis H4). In Model 2, the results are analogous to our previous findings as we find asymmetry in violation depth. But, in Model 3, the impact of violation rate is somewhat less asymmetric. We still observe that authorized retailers are more responsive to violations of other authorized retailers and less responsive to violations of other unauthorized retailers. But, the unauthorized retailers are equally responsive to past violations of any retailer.

Results from the daily violation rate models replicate our findings on shipping charges. Here, the key variable is Shipping Rate, which has a positive and significant coefficient. Retailers with higher shipping charges are more likely to violate, which confirms our prediction that retailers recoup lost margins through shipping rates. The median shipping rate when shipping is charged is 7.5% of the MAP price. The effect size at the median shipping rate is a 1% increase in violation rate for authorized retailers and 1.5% increase in violation rate for unauthorized retailers.

We also perform a series of robustness checks for the daily violation rate models. To account for serial correlation, we include fixed effects and an AR(1) disturbance. The results of this estimation are displayed in Table C2. The Bhargava et al modified Durbin-Watson statistic and the Baltagi-Wu LBI statistic suggests evidence of serial correlation that warrants such analysis. The results are consistent with those of Table C1 but are smaller in magnitude. We also estimate the daily violation rate model with additional lags (i.e., with a 2-period lag) and present the results in Table C3. Again, the main findings are robust to this alternative specification.

2. Daily Violation Depth

Similar to daily violation rate analysis, we also analyze depth of violations using a daily database (Table C4 for a 1-period lag, Table C5 for the AR(1) model, and Table C6 for a 2-period lag). We use the same model as we used for the violation occurrence case, but the dependent variable is the depth of violation on a specific day. Our identification assumption again depends on temporal antecedence: violation depth by competitors yesterday affects violation depth today.

Note that this model includes retailer x SKU x marketplace fixed effects; further, we condition our data on a violation occurring. Hence, empirical identification in this model relies on variation in violation depth within retailer x SKU x marketplace. For example, if a retailer violates at 10% below MAP and never changes this price, then this contributes no information to the parameters of interest. Our model requires a change in violation depth (e.g., from 10% to 15%) within a retailer x SKU x marketplace, which is a strong empirical requirement.

While we find some replication of the asymmetric pattern for the violation depth variables (e.g. Models 2 and 4 of Table C4), these are not robust. For example, for authorized retailers, the differences between the coefficients of other authorized retailers' violation depth and unauthorized retailers' violation depth are not statistically different, despite the replication of the pattern in economic terms. In addition, the results for the violation rate variables are admittedly less convergent with our prior findings. We anticipate that some of this is due to the correlation of violation rate and violation depth: by construction, when the past violation depth is positive the violation rate is equal to 1. This leads to a high correlation between these two variables. Overall, we speculate that our results for daily violation depth are less robust because we are stretching the data to its limits.

TABLE C1

MAP Violation Rate using Daily Observations

	AUTHORIZED INTERACTIONS				UNAUTHORIZED INTERACTIONS			
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
Violation Depth: Authorized (t-1)		1.3*** (.18)		0.027 (.17)		.085* (.045)		-0.11 (.095)
Violation Depth: Unauthorized (t-1)		.26*** (.055)		0.07 (.066)		.14*** (.038)		-0.01 (.053)
Violation Rate: Authorized (t-1)			.32*** (.021)	.31*** (.024)			.043** (.017)	.056** (.027)
Violation Rate: Unauthorized (t-1)			.039*** (.0071)	.034*** (.008)			.047*** (.0095)	.048*** (.013)
Distribution intensity (t-1)	-.00079*** (.00029)	-.00085*** (.00029)	-0.00046 (.00028)	-0.00046 (.00029)	0.0001 (.00036)	0.000064 (.00036)	0.00015 (.00036)	0.00017 (.00035)
%unauthorized (t-1)	-0.0082 (.02)	-.035* (.02)	-0.021 (.021)	-0.025 (.021)	-0.023 (.023)	-0.032 (.023)	-0.031 (.023)	-0.03 (.023)
Charge for Shipping==TRUE	.017* (.01)	0.015 (.01)	0.0075 (.0099)	0.0076 (.0098)	-0.023 (.015)	-0.023 (.015)	-.025* (.015)	-.025* (.015)
Shipping rate	.13** (.053)	.13** (.053)	.13** (.051)	.13** (.051)	.18*** (.069)	.19*** (.067)	.21*** (.065)	.21*** (.065)
Map Price	.001*** (.00014)	.0009*** (.00014)	.0006*** (.00013)	.0006*** (.00013)	.0025*** (.00056)	.0025*** (.00056)	.0023*** (.00056)	.0023*** (.00056)

	Model 1	Model 2	Model 3	Model 4
Constant	-.59*** (.1)	-.53*** (.1)	-.44*** (.097)	-.44*** (.097)
R-squared	0.84	0.85	0.85	0.85
N cases	1242105	1242105	1242105	1242105

* p<0.10, ** p<0.05, *** p<0.01

Table C1 contains the results of equation (1) under four different model specifications (Model 1 to Model 4), where the dependent variable equals 0 if there was no DAILY violation at 0% deviation below MAP, and 1 otherwise. The top panel contains coefficients for the interactions between the authorized dummy and independent variables (β_{ia}), as well as those for the interactions between the unauthorized dummy and independent variables (β_{iu}). The bottom panel of the table provides the estimates for the constant (α), and the R^2 for each of the models. The models include retailer x SKU x marketplace fixed effects. Standard errors are clustered by the fixed effects.

TABLE C2

MAP Violation Rate using Daily Observations - Fixed Effects with AR(1) Disturbance

	AUTHORIZED INTERACTIONS				UNAUTHORIZED INTERACTIONS			
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
Violation Depth: Authorized (t-1)		.12*** (.0096)		.0023 (.012)		.047*** (.0095)		-.095*** (.014)
Violation Depth: Unauthorized (t-1)		.05*** (.0048)		.031*** (.0059)		.26*** (.0063)		.17*** (.0082)
Violation Rate: Authorized (t-1)			.032*** (.0016)	.032*** (.002)			.03*** (.0021)	.045*** (.003)
Violation Rate: Unauthorized (t-1)			.0073*** (.00069)	.0047*** (.00085)			.049*** (.0012)	.028*** (.0016)
Distribution intensity (t-1)	.00096*** (.000028)	.00095*** (.000028)	.00092*** (.000028)	.00091*** (.000028)	.0026*** (.000041)	.0025*** (.000041)	.0024*** (.000041)	.0024*** (.000041)
%unauthorized (t-1)	.043*** (.002)	.042*** (.002)	.041*** (.002)	.041*** (.002)	.23*** (.0026)	.22*** (.0028)	.21*** (.0028)	.21*** (.0028)
Charge for Shipping==TRUE	-.0028*** (.00044)	-.0028*** (.00044)	-.0028*** (.00044)	-.0028*** (.00044)	.0038*** (.00095)	.0047*** (.00097)	.0047*** (.00097)	.0046*** (.00097)
Shipping rate	.012*** (.0018)	.012*** (.0018)	.012*** (.0018)	.012*** (.0018)	.027*** (.0049)	.018*** (.005)	.018*** (.005)	.018*** (.005)
Map Price	.00004*** (1.2e-06)	.00004*** (1.2e-06)	.00004*** (1.2e-06)	.00004*** (1.2e-06)	.00019*** (2.6e-06)	.00019*** (2.8e-06)	.00019*** (2.8e-06)	.00019*** (2.8e-06)

	Model 1	Model 2	Model 3	Model 4
Constant	.11*** (.000051)	.1*** (.000051)	.1*** (.000052)	.1*** (.000052)
RMSE	.044	.044	.044	.044
N cases	1231674	1207773	1207942	1207773
ρ (AR(1))	.97	.97	.97	.97
Modified Durbin-Watson	.12	.12	.13	.13
Baltagi-Wu LBI	.2	.2	.2	.2

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table C2 contains the results of equation (1) under four different model specifications (Model 1 to Model 4), where the dependent variable equals 0 if there was no DAILY violation at 0% deviation below MAP, and 1 otherwise. The top panel contains coefficients for the interactions between the authorized dummy and independent variables (β_{ia}), as well as those for the interactions between the unauthorized dummy and independent variables (β_{iu}). The bottom panel of the table provides the estimates for the constant (α), and the RMSE for each of the models, as well as the AR(1) correlation coefficient ρ , the Bhargava et al modified Durbin-Watson and Baltagi-Wu LBI. The models include retailer x SKU x marketplace fixed effects with AR(1) disturbance.

TABLE C3

MAP Violation Rate using Daily Observations with 2 Lags

	AUTHORIZED INTERACTIONS				UNAUTHORIZED INTERACTIONS			
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
Violation Depth: Authorized (t-1)		.76*** (.12)		.18 (.11)		.049 (.03)		-.056 (.051)
Violation Depth: Unauthorized (t-1)		.16*** (.033)		.027 (.04)		.087*** (.026)		.019 (.037)
Violation Rate: Authorized (t-1)			.16*** (.014)	.14*** (.014)			.024** (.01)	.03** (.014)
Violation Rate: Unauthorized (t-1)			.027*** (.0045)	.026*** (.0051)			.025*** (.0058)	.022** (.008)
Violation Depth: Authorized (t-2)		.64*** (.1)		-.15 (.1)		.04* (.022)		-.055 (.055)
Violation Depth: Unauthorized (t-2)		.1*** (.029)		.046 (.035)		.059*** (.018)		-.033 (.026)
Violation Rate: Authorized (t-2)			.16*** (.012)	.18*** (.013)			.02** (.0095)	.027* (.016)
Violation Rate: Unauthorized (t-2)			.012*** (.0037)	.0082* (.0042)			.024*** (.0052)	.028*** (.0072)
Distribution intensity (t-1)	-.0008*** (.00029)	-.0009*** (.00029)	-.00045 (.00028)	-.00045 (.00029)	.0001 (.00036)	.000063 (.00036)	.00015 (.00036)	.00017 (.00035)
%unauthorized (t-1)	-.0082 (.02)	-.035* (.02)	-.02 (.021)	-.024 (.021)	-.023 (.023)	-.032 (.023)	-.031 (.023)	-.029 (.023)
Charge for Shipping==TRUE	.017* (.01)	.015 (.01)	.0072 (.0098)	.0073 (.0098)	-.023 (.015)	-.023 (.015)	-.025* (.015)	-.025* (.015)
Shipping rate	.13** (.053)	.13** (.053)	.13** (.051)	.13** (.051)	.18*** (.069)	.19*** (.067)	.21*** (.064)	.21*** (.064)
Map Price	.001*** (.00014)	.00085** * (.00014)	.00063** * (.00013)	.00063** * (.00013)	.0025*** (.00056)	.0025*** (.00056)	.0023*** (.00055)	.0023*** (.00055)

	Model 1	Model 2	Model 3	Model 4
Constant	-.59*** (.1)	-.53*** (.1)	-.44*** (.097)	-.43*** (.097)
R-squared	.84	.85	.85	.85
N cases	1242105	1242105	1242105	1242105

* p<0.10, ** p<0.05, *** p<0.01

Table C3 contains the results of equation (1) under four different model specifications (Model 1 to Model 4), where the dependent variable equals 0 if there was no DAILY violation at 0% deviation below MAP, and 1 otherwise. The top panel contains coefficients for the interactions between the authorized dummy and independent variables (β_{ia}), as well as those for the interactions between the unauthorized dummy and independent variables (β_{iu}). The bottom panel of the table provides the estimates for the constant (α), and the R^2 for each of the models. The models include retailer x SKU x marketplace fixed effects. Standard errors are clustered by retailer.

TABLE C4

MAP Violation Depth using Daily Observations

	AUTHORIZED INTERACTIONS				UNAUTHORIZED INTERACTIONS			
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
Violation Depth: Authorized (t-1)		.13* (.076)		.17* (.088)		.028** (.014)		-.012 (.02)
Violation Depth: Unauthorized (t-1)		.052** (.026)		.06** (.029)		.057*** (.013)		.072*** (.016)
Violation Rate: Authorized (t-1)			-.0037 (.0048)	-.016** (.0074)			.019*** (.0057)	.021*** (.0078)
Violation Rate: Unauthorized (t-1)			.0015 (.0025)	-.0024 (.0029)			.0034 (.003)	-.007* (.0038)
Distribution intensity (t-1)	.0003 (.00024)	.00028 (.00024)	.00031 (.00024)	.00028 (.00024)	-.000043 (.000063)	-.000068 (.000064)	-.000048 (.000064)	-.00007 (.000063)
%unauthorized (t-1)	-.0034 (.0089)	-.0073 (.009)	-.0046 (.009)	-.0081 (.009)	-.00035 (.0052)	-.0057 (.0051)	-.00052 (.0053)	-.0047 (.0052)
Charge for Shipping==TRUE	-.0053 (.0044)	-.005 (.0044)	-.0053 (.0044)	-.0046 (.0044)	-.0086* (.0046)	-.0086* (.0046)	-.0089* (.0047)	-.0083* (.0046)
Shipping rate	.04 (.032)	.039 (.032)	.04 (.032)	.039 (.032)	.2*** (.025)	.2*** (.024)	.2*** (.025)	.2*** (.025)
Map Price	-.0002 (.00023)	-.0002 (.00023)	-.0002 (.00023)	-.00019 (.00023)	.0019*** (.00052)	.0019*** (.00053)	.0019*** (.00053)	.0018*** (.00052)

	Model 1	Model 2	Model 3	Model 4
Constant	-.34** (.15)	-.34** (.15)	-.35** (.15)	-.34** (.15)
R-squared	.95	.95	.95	.95
N cases	261702	261702	261702	261702

* p<0.10, ** p<0.05, *** p<0.01

Table C4 contains the results of equation (1) under four different model specifications (Model 1 to Model 4), where the dependent variable is the average depth of DAILY violations at 0% deviation below MAP, only for observations with a MAP violation. The top panel contains coefficients for the interactions between the authorized dummy and independent variables (β_{ia}), as well as those for the interactions between the unauthorized dummy and independent variables (β_{iu}). The bottom panel of the table provides the estimates for the constant (α), and the R^2 for each of the models. The models include retailer x SKU x marketplace fixed effects. Standard errors are clustered by the fixed effects.

TABLE C5

MAP Violation Depth using Daily Observations - Fixed Effects with AR(1) Disturbance

	AUTHORIZED INTERACTIONS				UNAUTHORIZED INTERACTIONS			
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
Violation Depth: Authorized (t-1)		.032*** (.0039)		.026*** (.0044)		.0093*** (.0017)		.0069*** (.0023)
Violation Depth: Unauthorized (t-1)		.059*** (.0027)		.058*** (.0032)		.081*** (.0014)		.071*** (.0017)
Violation Rate: Authorized (t-1)			.0058*** (.0008)	.0026*** (.00091)			.0027*** (.00061)	.0011 (.00079)
Violation Rate: Unauthorized (t-1)			.0051*** (.00048)	.000051 (.00056)			.016*** (.00036)	.0045*** (.00046)
Distribution intensity (t-1)	.0004*** (.00002)	.00038*** (.00002)	.00038*** (.00002)	.00038*** (.00002)	.0005*** (.000014)	.00047*** (.000014)	.00044*** (.000014)	.00045*** (.000014)
%unauthorized (t-1)	.04*** (.0016)	.037*** (.0015)	.038*** (.0016)	.037*** (.0015)	.11*** (.00089)	.1*** (.00089)	.1*** (.00089)	.1*** (.00089)
Charge for Shipping==TRUE	-.0018*** (.00029)	-.0019*** (.00029)	-.0018*** (.00029)	-.0019*** (.00029)	-.002*** (.0004)	-.0021*** (.0004)	-.0022*** (.0004)	-.0021*** (.0004)
Shipping rate	.021*** (.00091)	.021*** (.0009)	.021*** (.00091)	.021*** (.0009)	.056*** (.0026)	.055*** (.0026)	.056*** (.0026)	.055*** (.0026)
Map Price	.00003*** (1.0e-06)	.00003*** (1.0e-06)	.00003*** (1.0e-06)	.00003*** (1.0e-06)	.00005*** (9.6e-07)	.00005*** (9.5e-07)	.00005*** (9.6e-07)	.00005*** (9.5e-07)

	Model 1	Model 2	Model 3	Model 4
Constant	.053*** (.000034)	.048*** (.000034)	.049*** (.000034)	.048*** (.000034)
RMSE	.012	.012	.012	.012
N cases	257625	257625	257625	257625
AR(1) ρ	.95	.95	.95	.95
Modified Durbin-Watson	.18	.18	.18	.18
Baltagi-Wu LBI	.28	.29	.28	.29

* p<0.10, ** p<0.05, *** p<0.01

Table C5 contains the results of equation (1) under four different model specifications (Model 1 to Model 4), where the dependent variable is the average depth of DAILY violations at 0% deviation below MAP. The top panel contains coefficients for the interactions between the authorized dummy and independent variables (β_{ia}), as well as those for the interactions between the unauthorized dummy and independent variables (β_{iu}). The bottom panel of the table provides the estimates for the constant (α), and the RMSE for each of the models, as well as the AR(1) correlation coefficient ρ , the Bhargava et al modified Durbin-Watson and Baltagi-Wu LBI. The models include retailer x SKU x marketplace fixed effects with AR(1) disturbance.

TABLE C6

MAP Violation Depth using Daily Observations with 2 Lags

	AUTHORIZED INTERACTIONS				UNAUTHORIZED INTERACTIONS			
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
Violation Depth: Authorized (t-1)		.084 (.057)		.11* (.064)		.018* (.0099)		-.0062 (.015)
Violation Depth: Unauthorized (t-1)		.038 (.024)		.043 (.028)		.043*** (.0091)		.049*** (.012)
Violation Rate: Authorized (t-1)			-.004 (.0039)	-.012** (.0054)			.011*** (.0032)	.013*** (.0048)
Violation Rate: Unauthorized (t-1)			.0014 (.0015)	-.001 (.0021)			.0043** (.0019)	-.0028 (.0025)
Violation Depth: Authorized (t-2)		.05** (.025)		.063** (.03)		.012 (.0076)		-.0058 (.011)
Violation Depth: Unauthorized (t-2)		.014 (.011)		.018 (.012)		.014* (.0074)		.025*** (.0084)
Violation Rate: Authorized (t-2)			.00031 (.0025)	-.0041 (.0033)			.0084*** (.003)	.0095** (.0041)
Violation Rate: Unauthorized (t-2)			.00013 (.0016)	-.0015 (.0016)			-.00093 (.0017)	-.0047** (.0021)
Distribution intensity (t-1)	.0003 (.00024)	.00027 (.00024)	.00031 (.00024)	.00028 (.00024)	-.000043 (.000063)	-.000068 (.000064)	-.000048 (.000064)	-.000071 (.000063)
%unauthorized (t-1)	-.0034 (.0089)	-.0072 (.009)	-.0046 (.009)	-.008 (.009)	-.00035 (.0052)	-.0057 (.0051)	-.00051 (.0053)	-.0047 (.0052)
Charge for Shipping==TRUE	-.0053 (.0044)	-.005 (.0044)	-.0053 (.0044)	-.0046 (.0044)	-.0086* (.0046)	-.0086* (.0046)	-.0089* (.0047)	-.0082* (.0046)
Shipping rate	.04 (.032)	.039 (.032)	.04 (.032)	.039 (.032)	.2*** (.025)	.2*** (.024)	.2*** (.025)	.2*** (.025)
Map Price	-.0002 (.00023)	-.0002 (.00023)	-.0002 (.00023)	-.00019 (.00023)	.0019*** (.00052)	.0019*** (.00053)	.0019*** (.00053)	.0018*** (.00052)

	Model 1	Model 2	Model 3	Model 4
Constant	-.34** (.15)	-.34** (.15)	-.35** (.15)	-.34** (.15)
R-squared	.95	.95	.95	.95
N cases	261702	261702	261702	261702

* p<0.10, ** p<0.05, *** p<0.01

Table C6 contains the results of equation (1) under four different model specifications (Model 1 to Model 4), where the dependent variable is the average depth of DAILY violations at 0% deviation below MAP. The top panel contains coefficients for the interactions between the authorized dummy and independent variables (β_{ia}), as well as those for the interactions between the unauthorized dummy and independent variables (β_{iu}). The bottom panel of the table provides the estimates for the constant (α), and the R^2 for each of the models. The models include retailer x SKU x marketplace fixed effects. Standard errors are clustered by retailer.

ONLINE APPENDIX D – MODEL SIMULATION & MANAGERIAL IMPLICATIONS

In this section we aim to answer the question of which retailers managers should target if they want to improve compliance with MAP in their channel. We propose a simulation that “converts” violators into non-violators, and uses our regression estimates to predict how this change in behavior will impact the rest of the model (i.e., violation rates and violation depths of all other retailers). This exercise simulates what would happen to the rest of the market if a manufacturer exerted effort to bring a single retailer into compliance. In this sense, we are able to simulate the spillovers that we find in our analysis. We caution that in this exercise, one must have faith that the model coefficients reflect causal estimates. Admittedly, this is perhaps a bit bold as this analysis is based on a statistical model and is not a structural counterfactual. Nonetheless, we believe that this simulation exercise yields useful insights and managerial implications.

As a first step, we rank violating authorized retailers and violating unauthorized retailers by the number of SKUs for which they violated MAP. The logic behind this step is that retailers that violate MAP for many SKUs are likely to affect the violation behavior of many retailers, and therefore if we change the top ranked retailers’ violation status, they will affect more retailers through the change in their behavior. We then “convert” the top ranked violating retailers into compliers, one at a time, by the order imposed by the ranking and measure the corresponding effect on all other retailers’ violation rate and violation depth.

Table D1 illustrates the effect of converting MAP violators into MAP compliers. The largest violating retailer is labeled UN8, where the prefix UN is for unauthorized. Bringing this retailer into compliance reduces the violation rate of other unauthorized retailers by -0.514%. We convert this effect size into a base index of 100 to indicate that this is the largest spillover effect that a manufacturer could achieve by bringing a retailer into compliance. We then rank all retailers relative to this index. For example, retailer AU6 has an index of 50 (column 1 of Table D1), which indicates that bringing retailer AU6 into compliance has half the effect size as would compliance from UN8. A manager may be interested in any of the following size metrics: authorized violation rate/depth, unauthorized violation rate/depth, and/or total violation rate/depth. In Table D1, we rank retailers based on the spillovers created by bringing the violating retailer into compliance.

Table D1 shows that the top ten violators that have the largest effect on authorized rate of violations are authorized retailers, but the top ten violators that have the largest effect on unauthorized rate of violations are unauthorized. This emphasizes the asymmetric impact of MAP violation rate and depth. If a manager wants to manage the overall violation rate among both authorized and unauthorized retailers, a combination of violating authorized and unauthorized retailers has the highest effect size on violation rate. A similar pattern of results emerges when we look at depth of violation in Table D1.

Chart D1 illustrates the magnitude of these effects graphically. Panel A of Chart D1 displays the cumulative effects of converting the top retailers in terms of violation rate. For example, converting the top ten authorized violators reduces the average authorized violation rate of 14.7% by almost 2%

compared to a reduction of only 0.5% for unauthorized retailers. Converting the top ten unauthorized violators reduces the average unauthorized violation rate of 53.5% by 3.25% compared to a reduction of only 0.5% for authorized retailers. Panel B of Chart D1 illustrates the effect on the depth of violation. Again, we find that the effect of converting violating authorized retailers on the reduction of violation depth on other authorized retailers is greater than the effect of the unauthorized retailers on the authorized depth, and that the converse is true for the unauthorized retailers.

TABLE D1

Effect of Converting MAP Violators into MAP Compliers

This table summarizes the relative effects of switching a violator into a non violator on reducing violation rates and depths. Rate of violations is the average percent of violations at 0% deviation below MAP. Depth of violations is the average depth of violations at 0% below MAP. Each cell in the table specifies the ranking of switching the violator in parenthesis from a violator into a complier, in terms of the relative effect of converting them on the rate/depth of violations in that column. For example, if we aim to reduce authorized violation rate, the biggest effect size will be achieved by switching AU 4 into a complier, but in order to reduce unauthorized violation rate, the biggest effect will be switching UN 8. AU indicates an authorized retailer and UN indicates an unauthorized retailer, and the authorized retailers are in **bold** font. The number associated with each retailer is their relative ranking within their group, based on the number of SKUs for which they violate MAP. The largest effect size is -0.514% attributed to the effect of switching UN8 to a MAP complier on the unauthorized violation rate, and all indices are relative to that. The top 20 violators in terms of number of SKUs for which MAP was violated from authorized and unauthorized were used.

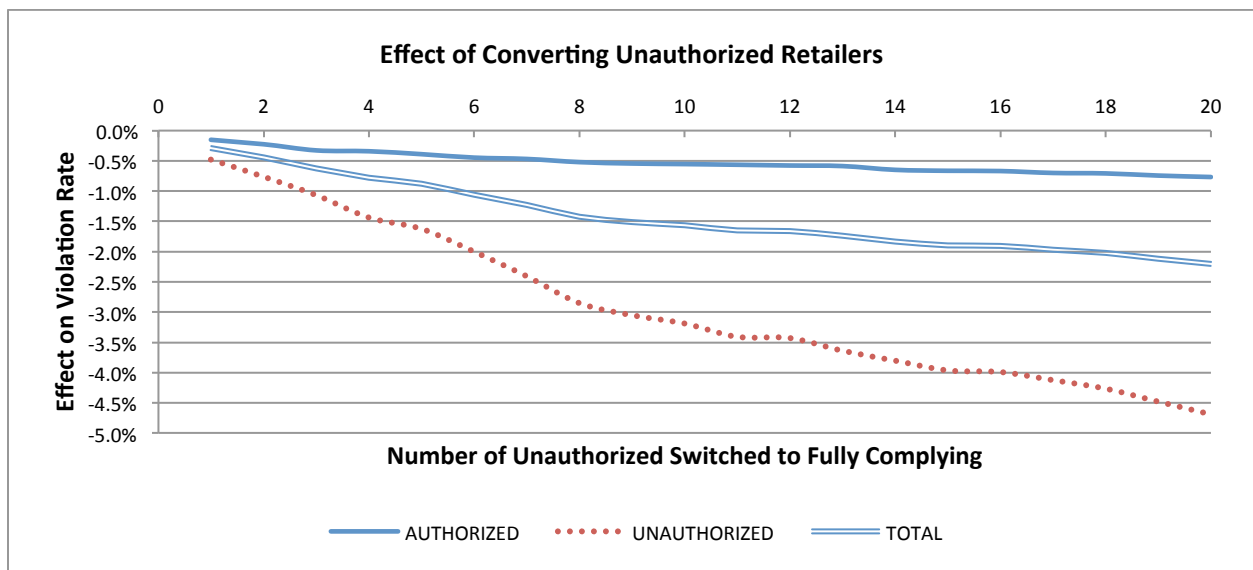
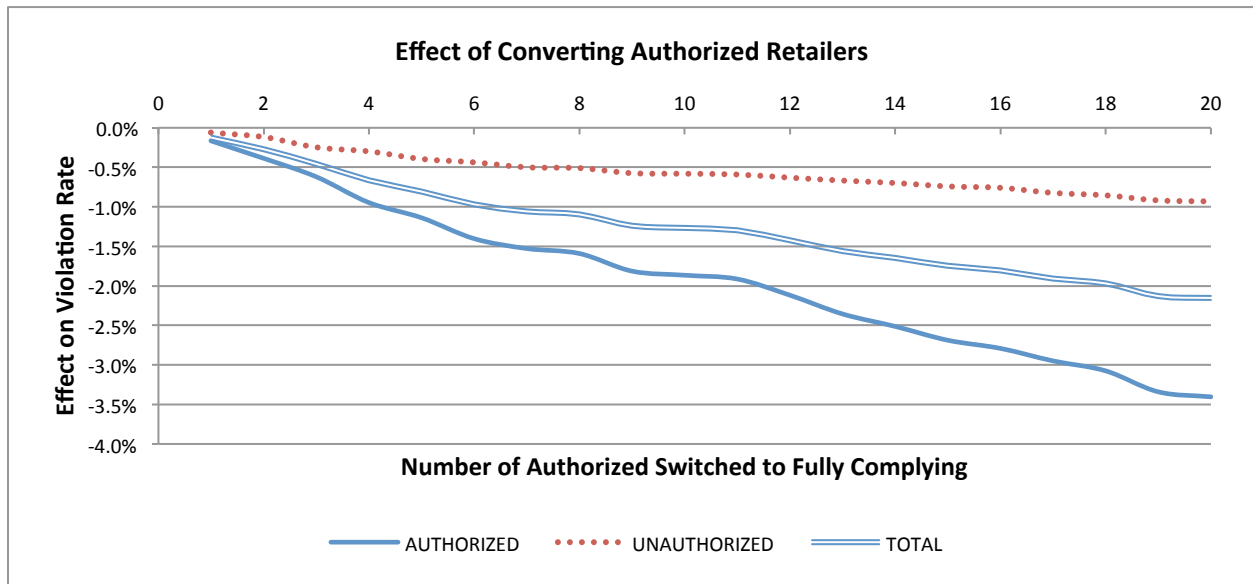
	<i>Rate of Violations</i>			<i>Depth of Violations</i>		
	<i>Authorized Rate</i>	<i>Unauthorized Rate</i>	<i>Total Rate</i>	<i>Authorized Depth</i>	<i>Unauthorized Depth</i>	<i>Total Depth</i>
1	62 (AU 4)	100 (UN 8)	57 (UN 1)	21 (AU 5)	62 (UN 8)	41 (UN 8)
2	50 (AU 6)	94 (UN 1)	48 (UN 8)	17 (AU 1)	42 (UN 6)	30 (UN 6)
3	46 (AU 13)	75 (UN 7)	41 (AU 4)	17 (AU 7)	40 (UN 7)	26 (UN 7)
4	45 (AU 3)	69 (UN 3)	40 (UN 3)	13 (UN 6)	38 (UN 16)	23 (UN 4)
5	44 (AU 5)	68 (UN 6)	37 (AU 3)	10 (AU 3)	37 (UN 4)	23 (UN 16)
6	44 (AU 9)	66 (UN 4)	35 (UN 6)	10 (AU 2)	34 (UN 10)	21 (UN 10)
7	44 (AU 12)	61 (UN 2)	34 (UN 7)	10 (UN 8)	28 (UN 9)	19 (UN 9)
8	43 (AU 2)	57 (UN 9)	34 (AU 5)	8 (UN 2)	23 (UN 15)	16 (UN 15)
9	40 (AU 19)	53 (UN 10)	33 (UN 2)	6 (AU 18)	21 (UN 13)	15 (UN 2)
10	39 (AU 15)	48 (UN 16)	33 (AU 6)	6 (UN 15)	20 (UN 12)	14 (UN 13)
11	34 (AU 17)	46 (UN 12)	31 (AU 9)	5 (AU 20)	19 (UN 2)	12 (AU 5)
12	33 (AU 1)	44 (UN 13)	30 (AU 2)	5 (UN 19)	16 (UN 18)	12 (UN 12)
13	31 (UN 1)	42 (UN 15)	30 (AU 13)	5 (UN 7)	13 (UN 11)	10 (UN 18)
14	30 (AU 14)	41 (UN 11)	29 (UN 4)	5 (UN 9)	8 (UN 3)	9 (AU 1)
15	26 (AU 7)	40 (UN 5)	29 (AU 12)	4 (AU 17)	8 (UN 20)	9 (UN 11)
16	23 (AU 18)	36 (UN 19)	29 (AU 19)	4 (UN 20)	7 (UN 1)	8 (AU 7)
17	20 (UN 3)	36 (UN 14)	26 (UN 9)	3 (AU 19)	6 (UN 19)	6 (AU 3)
18	19 (AU 16)	34 (UN 18)	26 (AU 15)	3 (UN 13)	6 (UN 14)	6 (UN 19)
19	14 (UN 2)	32 (UN 20)	25 (AU 1)	2 (AU 9)	5 (AU 5)	6 (UN 20)
20	13 (AU 8)	27 (UN 17)	25 (AU 17)	2 (AU 14)	4 (AU 1)	4 (UN 3)

CHART D1

Effect of Converting MAP Violators into MAP Compliers

The chart plots the effect of converting a group of violators into compliers. Rate of violations is the average percent of violations at 0% deviation below MAP. Depth of violations is the average depth of violations at 0% below MAP. We convert violating retailers into compliers, one by one, based on the ranking by the number of SKUs for which they violate MAP. We repeat this procedure for the group of authorized retailers and the group of unauthorized retailers. The horizontal axis indicates the number of retailers switched into fully complying and the vertical axis indicated the impact on violation rate in panel A and violation depth in panel B. Each curve in a graph is associated either with the effect on authorized retailers, effect on unauthorized retailers or the overall effect of converting the group of violators. The violation rates in the database are 14.7% for authorized retailers, 53.5% for unauthorized retailers, and 30.8% overall. The violation depths in the database are 9.1% for authorized retailers, 16.3% for unauthorized retailers, and 13.4% overall.

Panel A – Effect of Converting MAP Violators into MAP Compliers on Violation Rates



Panel B – Effect of Converting MAP Violators into MAP Compliers on Violation Depths

