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**Demand Reduction from Plain and Pictorial Cigarette Warning Labels:
Evidence from Experimental Auctions**

**Matthew C. Rousu
Susquehanna University**

**James F. Thrasher
University of South Carolina**

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Association's 2012 AAEA Annual Meeting, Seattle, Washington, August 12-14, 2012*

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Susquehanna
University

Matthew C. Rousu, Susquehanna University
James F. Thrasher, University of South Carolina

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Introduction

- New FDA rules to place pictorial labels on cigarettes have been delayed.
- Data is needed on public health impact of pictorial cigarette labels
- We used field auctions with 402 smokers from four US cities – extending the results of Thrasher et al.
- We examine the percentage of smokers that will decrease their demand for cigarettes that contain a pictorial label and a pictorial label with plain packaging.

The experimental auctions

Background:

- We set up tables at grocery stores in four cities: Columbia, SC; San Diego, CA; Selinsgrove, PA; and Tampa Bay, FL.
 - Sample characteristics presented in table 1.
- Posted signs offering smokers \$15 for 15 minutes of their time assisting with a university research project.
- Participants bid on products in an actual auction – where winners purchased products.
- This was a field experiment. There are benefits and drawbacks of conducting field experiments instead of laboratory experiments.
- We used the Becker-DeGroot-Marschack (BDM) auction in our experiment, this auction mechanism gives participant's a weakly dominant strategy to bid their true value for products.

The Products and Labels:

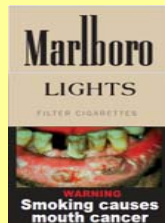
- Participants bid on cigarettes with:

A standard side label

A front text label

A pictorial label

A pictorial label with plain packaging



- All participants bid twice – seeing two different labels. (Ordering was randomized.) Only the first round bids are considered for this analysis.
 - Participants bid either on full-flavored, light, or menthol cigarettes – whatever they preferred.
- Standard experimental action procedures were followed:
 - Demand revealing mechanism.
 - Instructions on the auction mechanism, practice rounds, and opportunities for questions/clarifications.
 - Winners purchased the products.
 - Follow up questionnaire allows us to examine how characteristics impact preferences.

Table 1: Sample characteristics of study sample and associated experimental conditions

	Control text and larger front text (N=91)	Control text and pictorial label (N=81)	Larger front text and pictorial label (N=84)	Larger front text and plain pack with picture (N=77)	Pictorial label and plain pack with picture (N=69)	Entire sample (N=402)
Age (mean)	38.8	37.7	37.9	36.5	39.2	38.0
Female	51%	40%	46%	41%	42%	44%
Race/ Ethnicity	White 60%	63%	63%	53%	57%	59%
	Black 30%	37%	31%	41%	42%	36%
	Other 10%	4%	5%	6%	1%	5%
Annual household income	Less than \$15,000 42%	42%	49%	47%	43%	43%
	\$15,000- \$35,000 35%	31%	36%	40%	32%	35%
	More than \$35,000 23%	27%	15%	13%	25%	18%
Educational attainment	Less than HS 23%	20%	12%	14%	12%	16%
	HS degree but no college 25%	42%	46%	51%	43%	41%
	At least some college 52%	38%	42%	34%	45%	43%
# of cigarettes per day	15.5	18.2	15.6	16.3	17.0	16.5
Intend to quit within the next six months	51%	52%	65%	57%	54%	56%

MODEL AND RESULTS

- We first examined the percentage of smokers who bid less on cigarettes with a stricter warning label. (Table 2).

- Between 20-64% of smokers in our sample decreased their demand when faced with the more-stringent label.
- Differed based on type of label, but the front text label was less effective than the pictorial labels.

- We then used probit models to examine the probability a participant bids less for the cigarettes with the stricter label. (Tables 3 and 4).

- Confirms unconditional results that a label containing a pictorial image caused more smokers to decrease their demand.
- Younger smokers were less likely to reduce their demand for cigarettes with a text only warning label, but more likely to reduce their demand when faced with a pictorial label image.
- Smokers without a high school degree were more likely to decrease their demand for cigarettes that had plain packaging.

Table 2: Percentage of participants who bid less on cigarettes with a more stringent warning label.

Treatment	Percentage who bid less for cigarettes with the stronger warning label
Participants who bid on cigarettes with the current US label standards compared to two stronger labels	20% ^a
Participants who bid on cigarettes with a front text warning compared to two stronger labels	40% ^{a,b}
Participants who bid on cigarettes with a Front Text label vs. Graphic Image label (N=81)	45% ^a
Participants who bid on cigarettes with a Front Text label vs. Graphic Image label & Plain-labeled (N=77)	64% ^{a,c}
Participants who bid on cigarettes with a Graphic Image vs. Graphic Image label & Plain-labeled (N=69)	36% ^a

- a - This percentage is statistically significant at the 1% level using a t-test.
- b - For all participants who also bid on the US label, the difference in the percentage who bid less for cigarettes with the pictorial label relative to the front text label is statistically significant at the 1% level using a t-test.
- c - For all participants who also bid on the front text label, the difference in the percentage who bid less for cigarettes with the pictorial label relative to the pictorial label that has removed branding information is statistically significant at the 1% level using a t-test.

Table 3: Probit model examining probability smokers bid less on cigarettes with a more stringent label. Comparing results from smokers who bid on the US-labeled cigarettes and then either cigarettes with a front-text warning label or a pictorial warning label. (N=172)^a

	Model 1	Model 2	Model 3	Model 4
Intercept	-0.30 (0.30)	-0.79* (0.15)	-1.08*** (0.19)	-0.60 (0.37)
Participant bid on cigarettes that with the pictorial warning label	0.58*** (0.21)	1.48*** (0.46)	0.64*** (0.21)	0.64*** (0.22)
Age	-0.014** (0.007)	-0.002 (0.010)		-0.013* (0.007)
Interaction - age*bid on cigs with pictorial label		-0.024* (0.014)		
Female			0.45** (0.21)	0.40* (0.22)
Income				0.00 (0.00)
Race/Ethnicity - Black				-0.18 (0.24)
Race/Ethnicity - Other				-0.17 (0.45)
Quit_soon				0.19 (0.21)
Education - No HS degree				-0.02 (0.30)
Education - Only HS deg				0.05 (0.25)

- *** Statistically significant at the 1% level
- ** Statistically significant at the 5% level
- * Statistically significant at the 10% level
- + Other models were run but aren't reported (no different statistically significant results were found in those models). Those results are available from the authors upon request.

Table 4: Probit model examining probability smokers bid less on cigarettes with a more stringent label. Comparing results from smokers who bid on front-text-labeled cigarettes and cigarettes with a pictorial label or a plain-labeled package with a pictorial label. (N=161)^a

	Model 1	Model 2	Model 3	Model 4
Intercept	-0.15 (0.14)	-0.02 (0.40)	-0.04 (0.21)	0.20 (0.42)
Participant bid on cigarettes that had the pictorial image but also were plain labeled (debranded)	0.46** (0.20)	0.58** (0.21)	0.53 (0.33)	0.19 (0.34)
Age		-0.01 (0.01)		-0.01 (0.01)
Female		0.10 (0.21)		0.08 (0.22)
Income		-0.00 (0.00)		-0.00 (0.00)
Race/Ethnicity - Black		0.23 (0.25)		0.16 (0.24)
Race/Ethnicity - Other		0.35 (0.48)		0.42 (0.49)
Quit_soon		0.21 (0.22)		0.18 (0.22)
Education - No HS degree		-0.24 (0.36)	-0.81 (0.50)	-0.97* (0.52)
Education - Only HS deg		-0.16 (0.25)	-0.06 (0.29)	-0.24 (0.53)
Interaction - No HS degree* bid on cigs with plain label			1.19* (0.68)	1.51** (0.72)
Interaction - Only HS deg* bid on cigs with plain label				-0.01 (0.43)
				0.22 (0.46)

- *** Statistically significant at the 1% level
- ** Statistically significant at the 5% level
- * Statistically significant at the 10% level
- + Other models were run but aren't reported (no different statistically significant results were found in those models). Results are available from the authors upon request.

CONCLUSION

- Between 20-64% of smokers decreased their demand when faced with a more-stringent label.
- The front text label had the smallest impact on demand, while the cigarettes with the pictorial labels caused more smokers to decrease their demand for cigarettes.
- Younger smokers were more likely to reduce their demand when faced with the pictorial label.
- Our study provides further evidence that pictorial warning labels may be more effective than text-only warnings.