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# **Guidelines for Shaping Perceptions of Fairness of Transportation Infrastructure Policies: The Case of a Vehicle Mileage Tax**

## *Abstract*

*Regulatory focus theory is used to study individuals' perceptions of fairness towards a Vehicle Miles Traveled (VMT)-based transportation funding policy. According to regulatory focus theory, messages are more effective when they are congruent with the goal framing promotion (gains) or prevention (loss avoidance) focus of the recipients (i.e., there is a regulatory fit). This study confirms an interaction effect when the information in a message is congruent with the regulatory orientation of the individual. In addition, we find that the sensitivity towards fairness is more pronounced when subjects exhibit a prevention fit than when they exhibit a promotion fit. Our findings emphasize the importance of regulatory focus as it concerns public perceptions of potential transportation funding policy and provide useful guidelines for related outreach messaging strategies for influencing them.*

Progress towards an efficient transportation infrastructure policy, which maximizes the spread between social benefits and costs of use, hinges on the public's ability to raise the necessary funds to finance it (Winston 1991). Efficient highway infrastructure policy certainly relies on effective road pricing. Yet, despite decades-old calls to alter a highway-pricing scheme reliant on fuel taxes (e.g., see Winston 1991), these taxes remain the largest source of revenue for U.S. highway development, improvement, and upkeep, at both federal and state levels (Upchurch 2006). And the problem is unlikely to abate in the near future. While the National Surface Transportation Infrastructure Financing Commission (NSTIF) recently concluded that a Vehicle Miles Traveled (VMT) system would be the *best solution* for replacing the gas tax and ensuring adequate financing for highway infrastructure investment needs (NSTIF 2009), the Obama administration declared that it would not support implementation of a vehicle mileage tax.

The administration's rejection belies a major constraint that plagues the adoption of administrative or legislative policy whose need is

obvious to many: It must be pertinent to all, especially the general public. Arguably, then, controversial transportation policy deliberations are shaped by expected public acceptance or, conversely, rejection of the wished-for courses of action. For example, a contentious feature of a 2005 initiative by the California legislature to address that state's transportation funding calamity called for lowering the gasoline sales tax by five percentage points and offsetting the revenue loss from gas sales with a quarter percent increase in the general sales tax. This counterintuitive proposal, which could encourage more vehicle miles driven while exposing non-drivers to a greater onus of transportation funding (Sorensen 2006), was spurred by legislator concern about public acceptance of a gasoline sales tax increase (Nunez 2005). Thus, the development and implementation of transportation policies involve the gauging of public receptiveness, which implies that a sharper lens for how such receptiveness develops is important.

The extant literature on transportation financing, motivated by usually low public acceptance of transportation pricing policies, has commendably improved our ability to explain what drives public acceptance in this area. For example, Schuitema and Steg (2007) show that public acceptance of a kilometers-driven tax varies with an individual's belief about where

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the revenue generated by the tax will be allocated. This stream of research has also increased the call for better outreach efforts that are informed by the findings evident in it. Buckeye and Munnich, Jr. (2004) and Li (2007), for instance, argue that broad outreach programs are needed to win public support of managed lane programs such as congestion, road use, value pricing, high-occupancy-vehicle (HOV) and high-occupancy toll (HOT) lanes. Yet, little guidance beyond anecdotal suggestions for outreach efforts appears in this body of research.

The aim of this study is to expand the framework for outreach about policy measures designed to address pressing transportation problems. Specifically, we look more closely at the underlying mechanism driving the call by researchers for customized messaging strategies to help build transport policy support. To do so, we invoke regulatory focus theory, which argues that one's openness to an idea depends on the degree to which the presentation of the idea complements one's goal orientation. Using an experimental setting, we demonstrate how perceptions about a controversial proposed transportation policy change, the replacement of the gasoline tax with a Vehicle Miles Traveled (VMT) tax, can be swayed by the manner in which messages portraying the proposal are framed. While we couch our study in the context of a proposed state-level VMT tax, implications for federal- or state-level management of public acceptance are commensurate. Our results corroborate that an individual's perception of fairness, an antecedent to acceptability of a specific transport policy measure (Eriksson, Garvill, and Nordlund 2008), can be altered via customized messaging and can provide a basis for outreach planning efforts for new, potentially contentious transport policy measures.

We begin by detailing the motivation for and nature of a VMT highway pricing system. Next, we summarize research into the process of public acceptance of transportation policy and invoke regulatory focus theory to build hypotheses about the effects of customized messages on perceptions of a VMT tax. The last four sections describe the empirical methodology used to corroborate the hypotheses,

discuss our experimental results, and state conclusions and implications.

#### **A VEHICLE-MILES-TRAVELED HIGHWAY PRICING SYSTEM**

A key transportation infrastructure issue confronting the United States government today is how to best finance the upkeep and expansion of its highway system. This problem has arisen in great part because gas tax receipts, at least at the federal level, have not been indexed to inflation and, over time, particularly since 1993 when federal fuel taxes were last raised, the purchasing power of fuel tax revenues has declined (Puentes and Prince 2003). Moreover, variable fuel efficiency across the U.S. automobile and trucking fleets distorts the level of infrastructure usage that can be gauged from fuel tax revenues, a condition that has been exacerbated by the trend towards the use of more fuel-efficient vehicles. Indeed, since 1980, road usage has doubled while consumption of fuel has increased by 50 percent (Sorensen et al. 2009). In light of these shortcomings, the NSTIF recently identified a VMT system as the best way to close the gap between revenues from the Highway Trust Fund and investment projects authorized by law. Under a VMT system, road usage would be taxed based on the number of miles vehicles are driven. Assessment and collection mechanisms would likely involve GPS technology solutions, which would be costly to establish and not without controversy. For example, access to the data collected by outside agencies, e.g., law enforcement bureaus, has raised concern about potential erosion of privacy rights brought on by a VMT system.<sup>1</sup>

Although the Obama administration has shelved pursuit of a VMT tax at this time, the idea is not likely to fade from public debate. A recent call by the chair of the House Transportation and Infrastructure Committee suggests deliberation could reemerge at the federal level.<sup>2</sup> Regardless of federal-level discussion, state-level implementation is under consideration in a number of states. The Oregon Department of Transportation (ODOT), for example, recently conducted a pilot program of a VMT system that involved 299 volunteers over a twelve-month period. A follow-up survey indicated volunteers were satisfied with most aspects of the program (Whitty 2007). Although

it did not explicitly assess it, the ODOT suggested that fairness of a VMT system as it relates to public acceptance is an implementation issue that should be addressed.

Other stakeholders have expressed skepticism about abandoning fuel tax financing. The American Trucking Associations and American Bus Association, for example, suggest that fuel tax funding may still be adequate given high enough tax rates and proper appropriation of fuel tax revenues (Edmonson 2009a, 2009b). Still others see promise in a middle ground using both types of taxes. Parry (2008, 652) estimated optimal social welfare gains would be obtained for “. . . a diesel fuel tax of 69 cents per gallon and charges on trucks that vary between 7 and 33 cents per mile” for heavy truck users.

Despite the NSTIF recommendation of a VMT policy as the optimal long-term solution, it is clear that public support for this option remains a concern (Miller 2009). Findings from public opinion surveys, which indicate low acceptance for road pricing alternatives, including fuel taxation, led the NSTIF to conclude, “Public opinion is critical to the success of pricing initiatives” (NSTIF 2009, 141). Given the likelihood of continued debate at the state or federal level about implementing VMT tax measures, an understanding of potential public response to such a policy is called for (Sorensen et al. 2009).

To gain such understanding, we will assess individual perceptions of fairness of a VMT tax policy. Extant research shows that public perceptions of fairness are critical in terms of mitigating retaliatory behavior (Brebels, De Cremer, and Sedikides 2008), increasing the amount of citizenship behavior and attitudes (Cropanzano, Paddock, Rupp, Bagger, and Baldwin 2008), and shaping tax-compliance behaviors (Gilligan and Richardson 2005). Perceived fairness has also been shown to influence public acceptance of transport policy measures, a topic we next discuss.

## LITERATURE REVIEW AND HYPOTHESES

### Public Acceptance of Transportation Policy

Research about public acceptance of transportation policy emerged in part from a need to explain the reluctance of political figures

and the public to accept rational economic solutions to urgent transportation problems. For example, pricing incentive policy measures to reduce traffic congestion may be economically appealing and offer positive net benefits, but as Winston (1991, 119) observed almost twenty years ago:

Congestion pricing has been advocated by economists for many years, but policy makers have either ignored it or dismissed it on political and practical grounds.

Efforts to explain this reluctance have turned to perspectives of other disciplines such as political science and psychology. An analysis by Oberholzer-Gee and Weck-Hannemann (2002) exemplifies efforts from a political economy perspective. They argued that voter preferences influence elected officials’ decisions to adopt or reject road pricing policy measures, yet moderating factors such as the rational ignorance of voters (Downs 1957) and, perhaps due to this, the influence of interest groups, soften the effect and let officials deviate from, distort, or even reject voter preferences in the policy-making process.

Studies of psychological mechanisms, including that of Schuitema and Steg (2008) mentioned previously, comprise insights about the role of individual characteristics in the building of public consensus for transport policy measures. Schade and Schlag (2002), for instance, using survey results from four European cities, showed how the acceptability of two proposed transport pricing policies could be explained by an individual’s mobility-related social norms, perceptions of the effectiveness and efficiency of the policies, and their expectation of personal outcomes from the policies.

More recently, Eriksson, Garvill, and Nordlund (2008) invoke the value-belief-norm (VBN) theory of environmentalism to demonstrate how acceptance of push-and-pull transport policy measures<sup>3</sup> for offsetting negative environmental effects due to automobiles is affected by an individual’s beliefs about the environment and problems therein and their beliefs about the specific measures. They found that one’s awareness of car-induced environmental problems and their personal norm about helping to counteract them had direct and indirect effects on the acceptability of single and

combined policy measures. The indirect effects came through one's willingness to reduce the negative effects of their car usage and their perceptions of the measures' effectiveness and fairness. Overall, perceived effectiveness and perceived fairness were found to have the greatest impact on acceptance. Clearly, our knowledge of what drives public acceptance of transport finance policy has become more sophisticated.

One implication echoed across a number of studies is that comprehensive education and outreach efforts involving effective communication strategies that account for end-user concerns are needed. In particular, a number of authors call for customized messaging (TCRP 2003; Buckeye and Munnich 2004; Munnich and Loveland 2005; Li 2007; Schuitema and Steg 2008), arguing that presentation matters to the acceptance of potentially divisive transport policy measures. For example, Schuitema and Steg (2008, 230) stated that their finding that a kilometers-driven charge becomes more acceptable when car users expect to benefit from the allocation of revenues "...is important for communicating the implementation of transport policies to the public."

These calls for effective outreach through customized messaging suggest that how information is perceived impacts one's judgment of it. However, frameworks that explain how this messaging effect occurs in regard to acceptance of transport policy are scarce. We believe this gap in the literature can be addressed by applying regulatory focus theory, which we next invoke to state our hypotheses.

### **Regulatory Focus Theory**

Regulatory focus theory (Higgins 1997) is a goal pursuit theory about the relationship between a person's motivational orientation or regulatory focus and the strategic means by which they try to attain a goal. A person's motivational orientation tends towards either a promotion or prevention focus, which have been characterized as follows:

A person in a promotion focus represents goals as hopes or aspirations and is concerned with nurturance, accomplishment, and advancement. A person in a prevention focus represents goals as duties or obligations and is concerned with safety and security. (Cesario et al. 2008, 445)

Cesario et al. (2008) further explain that one's dominant focus implies preference for certain means of achieving a desired goal. Promotion-oriented people prefer eager strategic means that ensure that positive outcomes result during goal pursuit, or, in other words, that everything goes right. Their tactics for ensuring positive outcomes include risk seeking, broad exploration, and heuristic processing so as to insure accomplishments and avoid errors of omission (Crowe and Higgins 1997; Pham and Avnet 2004). In contrast, prevention-oriented people prefer vigilant strategic means, which ensure that negative outcomes do not occur during goal pursuit, i.e., nothing goes wrong. Their tactics include risk aversion, reliance on external information, and analytical processing so as to maximize correct rejections and minimize false alarms (Crowe and Higgins 1997; Pham and Avnet 2004; Scholer et al. 2007). When one's orientation matches the means employed, a regulatory fit is said to exist, causing them to feel right about what they are doing and intensifying their commitment to that activity. Conversely, a mismatch of orientation and means can leave one with a dissonant feeling, which may cause them to abandon or curtail the pursuit of the desired goal.

When applied in a communication context where interest centers on persuading someone of an advocated position, the theory suggests that messages are effective when they are congruent with and sustain the message recipient's regulatory focus (Aaker and Lee 2001; Aaker and Lee 2006; Cesario, Grant, and Higgins 2004). If message content is framed to be congruent with motivational orientation, i.e., a "regulatory fit" (Higgins 2000) is obtained, persuasion is more likely because recipients will either feel comfortable in receiving the message, be more engaged in processing it, or both (Cesario et al. 2004; Cesario et al. 2008). Messages can be positively framed to emphasize potential benefits or favorable outcomes associated with the message subject or negatively framed to emphasize avoidance of unfavorable outcomes.

The effects of regulatory fit on persuasion have been demonstrated in marketing (Cesario, Grant, and Higgins 2004; Florack and Scarabis 2006) and health promotion contexts (Spiegel, Grant-Pillow, and Higgins 2004). For instance,

Zhao and Pechmann (2007) found that when the frame of messages in anti-smoking advertisements aligned with high school students' regulatory focus, they reported stronger intentions not to smoke than when the messages were not aligned, i.e., regulatory fit was absent. Given tobacco products' status as demerit goods, the findings also indicate the applicability of regulatory fit theory to settings involving public goods and policies.

Indeed, studies of how regulatory fit influences public perceptions and acceptance of taxes identify a nascent research stream in this area. Research on attitudes towards tax policies tells us that policy makers should account for public opinion and in doing so, weigh any effects of information framing on it (McCaffery and Baron 2004), particularly since media and information campaigns can influence perceptions of fairness and acceptance (White et al. 1990; Roberts 1994; Holler et al. 2008). For example, in a study of tax compliance behavior among working-class Austrian adults, Holler et al. (2008) found that the manner in which tax payment messages for public goods are presented affected intentions of complying with income tax norms. Specifically, prevention-oriented participants indicated greater intention to comply with accepted tax reporting when presented with message statements that emphasized how lack of tax payments deters the state's prosperity. A similar response was obtained from promotion-oriented subjects whose message statements stressed how tax payments foster state prosperity.

The evidence from these studies, which offers useful insights for ex post diagnostic and remedial activity relating to existing tax systems, suggests that regulatory fit can also affect ex ante perceptions and attitudes about proposed transportation policy measures, such as a VMT tax, and provide insights for activity aimed at gaining adoption of such measures. Given this evidence and earlier cited evidence of perceived fairness as an antecedent to acceptance of transport measures, we propose the following interaction effect on perceptions of fairness of a proposed VMT measure:

H1: Perceptions of the fairness of a VMT tax will be greater when the informational message is congruent with the regulatory focus (positively framed message congruent

with promotion focus; negatively framed message congruent with prevention focus) than when it is not congruent.

In Holler et al.'s (2008) study, even though regulatory fit effects were confirmed for prevention- and promotion-oriented subjects, findings suggest that subjects with an avoidance of loss disposition (prevention focus) responded more strongly to the negatively framed message than did promotion-focused subjects who were presented with a positively framed message. While they did not statistically test for this, it raises the question of whether one type of regulatory fit, prevention or promotion, elicits greater effects when the issue at hand concerns taxes.

Recent research suggests that when prevention-oriented individuals encounter negative stimuli they are apt to adopt more a lenient criterion for acceptance of the stimuli and tolerate increased chances of false alarms in their vigilance against avoiding loss (Scholer et al. 2007). Prior research also shows that while most taxpayers recognize the public need for taxes, the more they perceive that they will be affected by them, the more negatively they view them (Kirchler 1998). If true, the ability to determine an individual's sensitivity towards negative versus positive messaging stimuli as it relates towards perceptions of fairness can be a promising venue for policy makers.

Other findings corroborating endowment (Thaler 1980) and loss aversion (Tversky and Kahneman 1981) theories suggest people exhibit greater preference for avoiding losses than for realizing gains, especially if they feel the object in question belongs to them. Functioning highways, which are public endowments sustained by taxation, are so integral to our everyday activity that gains or improvements to them may be more difficult to visualize than the loss or deterioration of them. A heightened sensitivity to negative outcomes associated with these facilities could arise in response to a change of events related to the public endowment, such as a proposal to replace a road user fuel tax with a VMT tax. Taken together, the above findings suggest that car users with a prevention regulatory focus could exhibit a more vigilant response to messages implying the loss or deterioration of highway systems. This leads to our second hypothesis.

H2: The relative effect of perception of fairness of a VMT tax is more pronounced vis-à-vis the baseline (control) condition when an individual's regulatory fit exhibits a prevention focus than a promotion focus.

## EMPIRICAL STUDY

### Experimental Design

To test the hypotheses, a 3 x 2 between-subjects experimental design was executed under conditions defined by two treatment variables. The first variable, labeled *VMT framing*, comprised differently framed messages (positive message vs. negative message vs. baseline message) about a vehicle mileage tax. The second, called *Regulatory focus*, represented the two archetypes of goal orientation (promotion vs. prevention) underlying regulatory focus theory, which we measured as an individual trait. The dependent variable for each treatment scenario was labeled *Perceived fairness*. Participants were randomly assigned to one of the three framed message conditions in the experiment. The second factor, regulatory focus, was calculated consistent with Holler et al. (2008) to split the sample into predominant promotion and predominant prevention groups. The VMT framing messages were adapted from Holler et al. (2008) and are given in Appendix 1.

### Participants

One hundred and nineteen subjects (63 female, 56 male; mean age = 27.66 years) were recruited for this study from an urban university in the western part of the United States, where most students commute to and from classes on a daily basis. Participation was solicited on a voluntary basis using the opportunity to earn extra credit towards a course grade as an incentive. The VMT framing treatment was randomly administered during regularly scheduled class time. To keep the cell sizes equal, we created equal numbers of copies for each cell of the experimental packet and subjects randomly selected one of the packets from a counterbalanced pile as they entered the room (Gravetter and Forzano 2005).

All information about participants and their responses were kept confidential throughout the study to ensure anonymity of the subjects.

### Material and Procedure

Each participant received a pencil-and-paper packet with a cover page explaining that they would be completing a study of a VMT tax system.

1. The cover page then instructed them to turn the page and read a short scenario (see Appendix 1) regarding a Vehicle Mileage Taxation system and respond to the "questions with regard to the scenarios." One of the questions was a single item semantic differential scale used to measure *perceived fairness* (e.g., Bolton, Warlop, and Alba 2003; Yperen, Bos, and Graaff 2005), which asked subjects to rate the fairness or unfairness of the proposed VMT described in their assigned scenario. The endpoints of the rating scale were 1 = Unfair and 9 = Fair. Participants were also asked to respond to an item designed as a manipulation check of whether they read and understood the scenario. The item, "The scenario you read claims that by using a vehicle mile taxation plan, which one is more likely to occur?" preceded a semantic differential scale with the endpoints: 1 = "The threat of restrictions in our infrastructure can be avoided" and 9 = "The ability to have improvements in our infrastructure can be maintained."
2. Following the scenario-specific questions, participants responded to an 18-item scale, shown in Appendix 2, which measures individual regulatory focus. As discussed previously, *regulatory focus* is an individual differences variable that measures the propensity for promotion-versus prevention-focused behavior. Responses to each item were along a 9-point Likert scale (1 = not at all true of me; 9 = very true of me). Nine of the items are worded to reflect chronic promotion and the other nine to reflect prevention goals (Lockwood, Jordan, and Kunda 2002). Subjects also answered several demographic questions about themselves.
3. Lastly, participants completed other demographic questions, including (1) whether they owned a car, and if so, what is the primary purpose for their transportation, (2) prior familiarity with the

concept of a VMT system, (3) their age, and (4) their gender. Regarding car ownership, nearly all test subjects, 115 (97 percent of the participants), indicated that they owned an automobile. As to the primary use of their cars, 46 percent of the respondents indicated it was for work, 10 percent stated it was for leisure travel, and the remaining 44 percent cited travel for work, leisure, and everything else.

### RESULTS

Two analyses were conducted for the hypotheses testing. For our first hypothesis, we use a 2x2 analysis and then the 3x2 is used for our second hypothesis. To test for the interaction effect predicted by our first hypothesis, we conducted a 2 (*VMT framing*: Positive message vs. Negative message) x 2 (*Regulatory focus*: Prevention-Focused vs. Promotion-Focused) analysis of variance (ANOVA). To test the sensitivity of the relative effect predicted by our second hypothesis, pair-wise comparisons of means to the baseline or control condition, which did not have a positive or a negative message, were performed. Along with the hypotheses tests, checks for the validity of the experimental manipulations were performed.

#### Manipulation Checks

An ANOVA of responses to the manipulation check item described earlier, which asked respondents to rate the nature of the claim associated with the VMT tax described in the scenario they read, allows us to assess whether message framings operated as intended. The results (not shown) revealed a significant difference between the mean responses of the groups receiving the differently framed messages ( $F(1, 118) = 5.67, p < .01$ ). Those who read the prevention- and promotion-framed messages rated their scenarios as having more to do with avoiding restrictions to the infrastructure ( $mean = 4.78$ ) and being able to improve the infrastructure ( $mean = 6.33$ ), respectively, while those in the control group assigned a more neutral rating ( $mean = 5.40$ ). The relative magnitudes of the means also matched expectations. Thus, according to this check, the effect of the message manipulation was significant. As a supplementary manipulation check, we analyzed responses to the item about individual *familiarity* with a VMT system and

found no significant differences in familiarity across the groups assigned to the control vs. prevention vs. promotion message framing scenarios ( $means = 3.20$  vs.  $3.48$  vs.  $3.17$ ;  $F(1, 108) = 0.19$ ).

#### Determining Participant's Regulatory Focus

To assess an individual's *dominant regulatory focus*, separate averages for the nine prevention-focused items ( $\alpha = .78$ ) and nine promotion-focused items ( $\alpha = .85$ ) were first determined for each subject. Following previous research (e.g., Lockwood, Jordan, and Kunda 2002; Zhao and Pechmann 2007), we determined an individual's dominant regulatory focus by subtracting the prevention score from the promotion score. Thus, a low score implies a relative prevention focus whereas a high score implies a relative promotion focus. Following this, a median split was taken to classify the participants as either predominantly prevention- or promotion-focused (Zhao and Pechmann 2007). This split put 61 of the 119 respondents under a promotion-related focus and 58 with a prevention-related focus.

#### Test of Hypotheses

Analysis of variance (ANOVA) was conducted to assess perceived fairness of the VMT message framing across the two types of regulatory focus, prevention-focused and promotion-focused. To account for the quasi-experimental nature of the study and effects of covariates from previous studies examining regulatory fit, demographic variables age and gender were included as covariates (Holler et al. 2008). Results for our first hypothesis test are shown in Tables 1 and 2 and Figure 1. Outcomes for the covariates show a significant and positive effect of age ( $F(1,73) = 8.39, p = 0.01$ ) and no effect for gender.

*H1 Test.* H1 hypothesizes that perceptions of fairness will be greater when the informational message is congruent, or fits with the individual's regulatory focus. Consistent with our prediction, the *VMT Framing x Regulatory Focus* interaction effect, i.e., regulatory fit effect, shown in Table 1, is significant ( $F(1, 73) = 4.27, p = 0.04$ ) with a medium size effect ( $d=.66$ , not shown). The estimated marginal means shown in Table 2 and intersecting lines in Figure 1 illustrate this joint effect, which

**Table 1. ANOVA Model Results**

Tests of Between-Subjects Effects					
Dependent Variable: Perceived Fairness					
Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	85.574	5	17.115	3.321	.009
Intercept	17.215	1	17.215	3.341	.072
Age	43.234	1	43.234	8.389	.005
Gender	6.103	1	6.103	1.184	.280
VMT Framing	1.263	1	1.263	.245	.622
Regulatory Focus	7.036	1	7.036	1.365	.246
VMT Framing x Regulatory Focus	21.979	1	21.979	4.265	.042
Error	376.198	73	5.153		
Total	2176.000	79			
Corrected Total	461.772	78			

**Table 2. H1 Analysis: Estimated Marginal Means of Perceived Fairness with Covariates<sup>a</sup>**

VMT Framing		Regulatory Focus	
		Promotion-focused	Prevention-focused
Prevention	<i>Mean</i>	3.94	5.61
	<i>SE</i>	(0.51)	(0.51)
	95% CI	2.92-4.96	4.59-6.63
	N	20	20
Promotion	<i>Mean</i>	4.75	4.29
	<i>SE</i>	(0.50)	(0.54)
	95% CI	3.76-5.74	3.22-5.36
	N	21	18

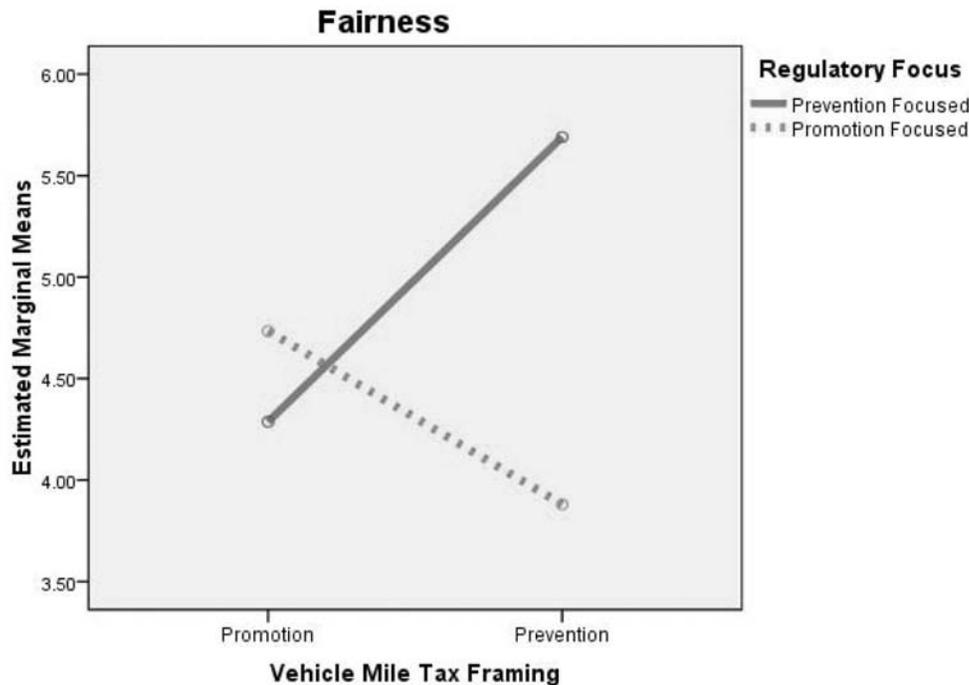
<sup>a</sup> Covariates in the model are evaluated at these values: age=27.32.

indicates that the observed perceptions of fairness for the proposed state VMT tax were not swayed simply by the way in which the tax's benefits were framed or by one's predominant goal orientation. Rather, we can conclude that the VMT tax system was deemed fairer under conditions of regulatory fit than under conditions of non-fit and find support for our first hypothesis.

**H2 Test.** H2 hypothesizes that the informational message will be most effective when it is framed negatively towards those who have a prevention-oriented regulatory focus. To assess this hypothesis, pair-wise comparisons of means for prevention- and promotion-oriented regulatory fit to their respective baseline or control conditions were conducted. To verify the impact of the control group on our analysis, we conducted a supplementary 3 (VMT framing: Control vs. Promotion vs. Prevention) x

2 (Regulatory focus: Prevention-Focused vs. Promotion-Focused) ANOVA. Results appear in Table 3 and Figure 2.

The findings for the covariates (not shown) again revealed that age registers a significant effect ( $F(1,100) = 13.30, p = 0.00$ ) but not gender ( $F(1,100) = 1.10, p = 0.30$ ). As expected, the effect of regulatory fit on prevention-focused individuals ( $mean = 5.69, SE = 0.50$ ) was significantly more pronounced ( $F(1,100) = 5.82, p = 0.02$ ) when compared to the baseline condition ( $mean = 4.13, SE = 0.63$ ) than it was on promotion-focused subjects ( $mean = 4.62, SE = 0.51$  and  $mean = 4.90, SE = 0.51$  respectively). Compared to the neutral description of the VMT tax, the regulatory fit induced by the vigilant slant of the negative-framed description elicited a stronger response of perceived fairness than did the fit induced by the eager slant of the positive-framed message.

**Figure 1: Interaction of Vehicle Mile Tax Framing and Individual Regulatory Focus**

In other words, when prevention-oriented subjects read a more engaging message, i.e., one fitting their regulatory focus, the tax seemed much fairer to them, which was not the case for promotion-oriented subjects. One explanation for this is that the negative message could have triggered prevention-oriented subjects to be less risk averse in their tactics to reject potential false alarms related to a VMT tax and relax their standard of fairness about it. They clearly considered highway use restriction and the potential for no improvements to the highway system as serious enough threats to deem the proposed tax as a reasonable offset. On the other hand, the positive message might not have convinced promotion-oriented subjects enough of a VMT tax's ability to ensure highway improvements or that they would be committing an error of omission by not favoring it more, i.e., perceiving it as more fair. In sum, even though new taxes are apt to be viewed as negative stimuli, our findings indicate that negative framings of an informational message about a VMT tax's benefits can improve perceptions of fairness for prevention-focused people and offer support for our second hypothesis.

#### CONCLUSIONS AND FUTURE RESEARCH

How does the recommendation for a VMT system as the best solution for financing future U.S. highway infrastructure needs get shelved, even though a highly selective panel of experts puts it forth? The essence of a VMT is simple, easy to understand, and economically rational. Yet its implementation has for the time being been refused for arguably viable reasons, one of which has to be political concern about public opinion and acceptance of it.

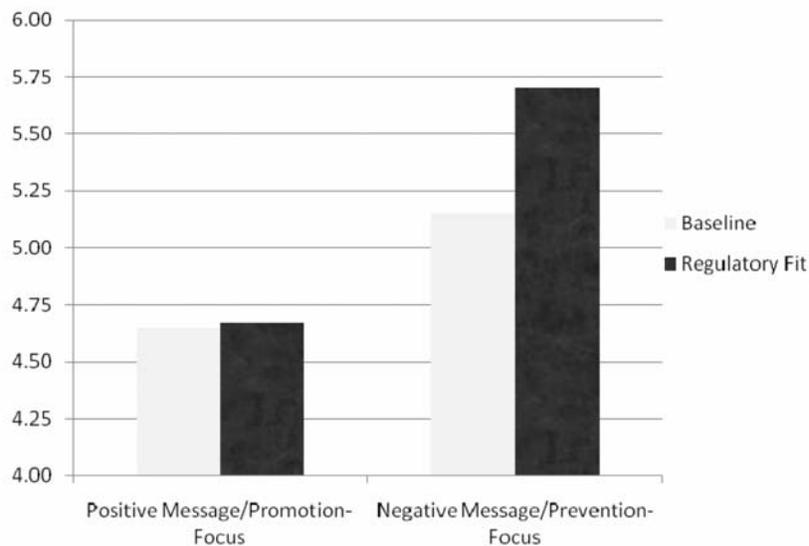
Researchers studying public acceptance of transportation policy measures agree that public outreach with effective communication strategies will help build public acceptance. Buckeye and Munnich (2004), for instance, in commenting about building consensus for HOT lanes on an interstate highway in Minnesota, stress the need to consider perceptual processes when devising a case and plea for public backing:

Promoting the right message in communicating the benefits of value pricing is important. If members of the public view value pricing as toll roads, progress will be slight. If they view value pricing as a way of providing a

**Table 3. H2 Analysis: Estimated Marginal Means of Perceived Fairness with Covariates<sup>b</sup>**

VMT Framing		Regulatory Focus	
		Promotion-focused	Prevention-focused
Control	<i>Mean</i>	4.90	4.13
	<i>SE</i>	(0.51)	(0.63)
	95% CI	3.88-5.91	2.88-5.37
	N	20	20
Prevention	<i>Mean</i>	3.98	5.69
	<i>SE</i>	(0.50)	(0.50)
	95% CI	2.98-4.97	4.70-6.68
	N	20	20
Promotion	<i>Mean</i>	4.62	4.54
	<i>SE</i>	(0.51)	(0.53)
	95% CI	3.60-5.64	3.41-5.50
	N	21	18

<sup>b</sup> Covariates in the model are evaluated at these values: age = 27.69

**Figure 2: Sensitivity of Perception of Fairness**

choice to avoid congestion for a fee, they are more likely to support the project. Yet, effective customized messaging should not simply be about stressing or re-labeling certain features of new transport pricing measures, particularly ones that will dramatically change road user payment for highway facilities, such as a VMT tax would.

On the contrary, an unambiguous portrayal of the features of a VMT tax or any contentious transport-pricing scheme should be an essential

element of a customized messaging outreach effort. Since individual regulatory focus tends to make people more responsive to messages about negative or positive outcomes, it is more important to customize messages about the desired aims of a VMT system to audience characteristics, so as to obtain audience engagement with the message. Without such engagement, the process of shifting public attitudes and building acceptance of a VMT system will be unsuccessful.

Our results highlight the importance of the framing of a message. When we showed experimental subjects messages about the benefits of a VMT tax that matched their predominant goal pursuit focus, their perceptions of the tax's fairness, a known antecedent to public acceptance, were significantly higher than those of subjects who viewed messages that were mismatched to their dominant focus. Furthermore, a more pronounced regulatory fit effect was observed when prevention-oriented individuals were shown a message emphasizing how a VMT tax would help avoid future restrictions to use of its highway system. This latter result is consistent with findings of Poels and Dewitte (2008), which show that advertising messages meant to convey hope in a product's ability to prevent negative outcomes induced greater interest in information about the product (in the message) and willingness to try it than did messages emphasizing hope in the product's ability to achieve something positive.

Together, these results imply a few guidelines for outreach messaging strategies, whether they are executed through public announcements, speaking venues, publicity, or advertising, etc., to build public acceptance of a VMT. First is that information content about a VMT tax system should be consistent even though the framing of the content can vary. In both scenarios of our experiment, a state VMT tax was described as a beneficial policy measure from two slightly but distinctly different perspectives. Does this imply that a single message packet depicting positive and negative framings of these benefits could be used to simultaneously induce regulatory fit for promotion- and prevention-oriented audiences? While we did not test for this, we surmise the potential for offsetting effects could confuse or alienate recipients, leading them to renege on message processing.

Related to this, a second guideline is that the immediate objectives of a VMT tax messaging strategy should be to design messages that ensure their acceptance by the audience as opposed to persuading them to adopt a particular framing of the tax's benefits. Without regulatory fit, audiences are less likely to ask themselves how they feel about such a tax. In this sense, the "motivational impact [of regulatory fit] is at the *strategic* rather than outcome

level" (Cesario et al. 2008, 455) and messages should be devised for the purposes of sustaining engagement of the topic of a VMT tax.

A third guideline would be to consider detailing the types of restrictions to road usage that would occur if highway maintenance, repair, and expansion could not be sufficiently funded. The heightened effect of regulatory fit on prevention-oriented drivers' perceptions of fairness observed in our experiment is consistent with recent evidence. In particular, Scholer et al. (2007) show that negative stimuli tend to cause prevention-oriented individuals to tolerate more false alarms or errors of commission as a tactic of vigilance against loss avoidance. This increased concern about overlooking a negative outcome is apt to intensify vigilant action such as scanning of external information and analytical processing (Pham and Avnet 2004). Providing more scenarios and details about what is at stake if a VMT tax is not adopted could reinforce such vigilance and sustain engagement on the topic.

A fourth guideline, which emanates from the extant literature, is that regulatory fit can be induced with or without message framing by either integral and incidental regulatory fit manipulations, respectively (Cesario et al. 2008). In our study, integral regulatory fit was induced by framing the benefits of a VMT tax as part of the main message. In contrast, incidental manipulations can be used to induce fit prior to presentation of the message, thereby precluding the need for framing. Both methods have been shown to be valid. For example, while we did not do so, we might have first presented a non-VMT related situation designed to prime a promotion or prevention motivational state, perhaps by telling subjects that more attention to one's studies during college leads to higher incomes in their career (promotion focus) or less attention results in lower average incomes (prevention focus). After verifying that regulatory fit is induced, we could simply have presented a neutral, unframed message about the benefits of a VMT system.

These different methods of inducing fit have obvious implications for the execution of communication strategies. If an integral approach is used, message framing is necessary to induce regulatory fit that would leave recipients feeling better and more engaged in the processing of

the specific message they receive (positive or negative framing). On the other hand, if a single message about a VMT is desired, then it becomes necessary to induce regulatory fit prior to delivering the message. Following discussion by Holler et al. (2008) about the application of induction approaches in a TV ad context, an integral framework would require either separate ads for prevention- and promotion-oriented audiences or within the same ad, separate message framings for each audience. Alternatively, if policy makers wish to pursue a single message (e.g., “A VMT tax benefits everyone”), then an incidental induction would be needed.

Although our study contributes to regulatory focus theory from a transportation policy perspective, we need to acknowledge limitations of our research. Our experiment focused on only one possible solution, VMT, yet the NSTIF has suggested other possible solutions (e.g., congestion pricing). We focused our experiment on the “best solution” as per the NSTIF as we believe that this solution would receive more public opinion scrutiny. However, future research should examine other solutions provided by NSTIF or combinations of solutions to further understand the effect of public perception on these possible transportation tax solutions. For instance, for the short term, the NSTIF recommended raising current fuel taxes and other user taxes such as tire, registration, and truck sales taxes. How just would a VMT or other new solutions to the infrastructure funding problem be viewed when compared to direct and indirect taxes and other mechanisms currently embedded in the transportation funding system?

Another potential limitation of this article lies in the use of a student convenience sample. Although using a student sample can be considered problematic, it is a very common technique in experimentally based transportation research (e.g., Fujii and Kitamura 2003). Moreover, while the sample’s characteristics (average age of 28 years, nearly all owned a car, and a large majority reported using autos for work, leisure, and other purposes) suggest subjects are regular commuters, future research could gather data to make sure that the results would still apply and to further test the applicability of regulatory focus theory.

In addition, our experiment only captured individual perceptions on the general fairness of a VMT taxation policy, which, along with perceived effectiveness of a transport policy measure, influences public acceptance of it (Ericsson et al. 2008). Tests for the effects of regulatory fit on perceived effectiveness alone or combined with perceived fairness is another avenue for future experimentation. Additional future research could center on privacy concerns about the implementation of a VMT taxing system.<sup>4</sup> Experimentation might be used to gauge the potential for applying regulatory focus theory to the mitigation of perceived threats from such a policy.

In summary, few areas of public policy are more controversial than taxation and this holds for policies designed to fund the U.S. Highway Trust, which is fed by a pastiche of user taxes and fees. Such taxes and fees are so embedded in our expectations that they obscure the link we perceive between how much we travel and the price we pay for the road systems we use. Most car and truck owners could likely cite their vehicle’s fuel mileage rating, but could they cite how much federal and state fuel tax they pay for each gallon and for what end? The perception for many of us is that the price we pay for fuel is simply the cost of moving our vehicle a certain number of miles; often missing from the perception is the fact that we are also paying for the roads across which we move. If we aggregate these perceptions across millions of vehicle owners, this shortcoming of the current pricing of U.S. transportation infrastructure becomes much clearer. Throw a new alternative for infrastructure funding into the fray, and the challenge of how best to court public favor for a VMT tax solution also becomes more obvious. Regulatory fit theory offers a framework for planning effective communication strategies for better engaging public attention on the need for a VMT tax and motivating them to decide on its merits.

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## Appendix 1

VMT Framing	Scenario
1. Control	The Director of the Nevada Department of Transportation recently told members of the Senate Finance and Assembly Ways and Means committees that her department is considering the idea of basing gas prices on each individual vehicle use. Known as a Vehicle Mile Taxation (VMT) plan, it entails charging drivers a fee on the number of miles they drive instead of the amount of gasoline they buy. The goal is to create an equitable way of taxing drivers while providing NDOT with the appropriate funds for Nevada's road system.
2. Prevention (Control plus this part)	A lack of tax revenues may lead to a cutback on the transportation system. As a further consequence of lacking tax revenues, the state may be <i>unable to expand and improve infrastructure</i> (e.g., roads and railways). If we base gas prices on each individual vehicle use, the threat of restrictions in our infrastructure <i>can be avoided</i> .
3. Promotion (Control plus this part)	Sufficient tax revenues would allow the state to <i>further expand and improve infrastructure</i> (e.g., roads and railways). If we base gas prices on each individual vehicle use, the ability to have improvements in the infrastructure <i>can be maintained</i> .

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**Appendix 2**

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Please answer the following questions with regards to **YOURSELF** (1 = not at all true of me; 9 = very true of me) (Lockwood, Jordan, and Kunda 2002)

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1. In general, I am focused on preventing negative events in my life.
  2. I am anxious that I will fall short of my responsibilities and obligations.
  3. I frequently imagine how I will achieve my hopes and aspirations.
  4. I often think about the person I am afraid I might become in the future.
  5. I often think about the person I would ideally like to be in the future.
  6. I typically focus on the success I hope to achieve in the future.
  7. I often worry that I will fail to accomplish my academic goals.
  8. I often think about how I will achieve academic success.
  9. I often imagine myself experiencing bad things that I fear might happen to me.
  10. I frequently think about how I can prevent failures in my life.
  11. I am more oriented toward preventing losses than I am toward achieving gains.
  12. My major goal in school right now is to achieve my academic ambitions.
  13. My major goal in school right now is to avoid becoming an academic failure.
  14. I see myself as someone who is primarily striving to reach my “ideal self” – to fulfill my hopes, wishes, and aspirations.
  15. I see myself as someone who is primarily striving to become the self I “ought” to be – to fulfill my duties, responsibilities, and obligations.
  16. In general, I am focused on achieving positive outcomes in my life.
  17. I often imagine myself experiencing good things that I hope will happen to me.
  18. Overall, I am more oriented toward achieving success than preventing failure.
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**ENDNOTES**

<sup>1</sup> Electronic Privacy Information Center, <http://epic.org/privacy/connolly/>, referenced June 7, 2009.

<sup>2</sup> “U.S. News: U.S. Watch,” *Wall Street Journal* (Eastern edition), Apr. 29, 2009, p. A.5.

<sup>3</sup> Push measures aim to discourage car usage by making it less attractive (e.g., increasing usage taxes), while pull measures try to accomplish the same by drawing users to alternative means of transport.

<sup>4</sup> “Big Brother’s Riding Shotgun,” Spinney, Mike, *East Bay Express*, May 12, 2009.