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Does rush hour see a rush of emotions? Driver mood in conditions likely to exhibit congestion

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ABSTRACT

Polls show that a large portion of the public considers traffic congestion to be a problem and believes a number of policy interventions would ameliorate it. However, most of the public rejects new taxes and fees to fund transportation system improvements or raise the cost of travel. This may be because of a disconnect between the public's stated antipathy towards congestion and the recalled emotional costs congestion imposes. To explore this, we use a large and representative sample drawn from the American Time Use Survey to examine how drivers experience four emotions (happiness, sadness, stress, and fatigue), plus a constructed composite mood variable, when they travel in peak periods, in large metropolitan areas, in city centers, and in combinations of these. We also explore the interactions between these indicators and trip duration. We find evidence that drivers in the largest cities at the very peak of rush hour (5:00 pm–6:00 pm) on non-holiday weekdays are in a less positive mood, presumably because of congestion. However, this effect, though significant, is small, and we find no significant results using broader definitions of the peak period. In all, our findings suggest that congestion's impact on drivers as a group is quite limited. This may help explain why the public's attitude toward painful financial trade-offs to address congestion is lukewarm.

1. Introduction

Without question, traffic congestion comes with considerable costs. The Texas Transportation Institute (TTI) (Schrank et al., 2012) finds the average peak-period, urban driver experiences 38 h of delay annually, up from 16 h in 1982. This results in 19 extra gallons of fuel consumed per year, 380 additional pounds of CO_2 created per year, and an average annual cost (in fuel and time) to the peak traveler of $818. The TTI estimates total congestion costs at $121 billion per year, with 56 billion pounds of additional CO_2 emissions. Moreover, many of the costs of congestion are difficult to quantify (including decreased travel time reliability and delays in goods movement), probably making these cost estimates lower bounds.

Another cost that is difficult to measure, but of great importance, is the emotional toll congestion takes. To anybody who has been stuck in traffic, it seems self-evident that congestion breeds frustration. However, there is little empirical evidence on whether congestion is actually creating an unhappy driving public using a broad U.S. sample. This paper aims to help fill this lacuna.

This issue is important because policy responses to congestion come with costs. The popularity, and likelihood of adoption, of road improvements, adding transit service, or sending price signals to discourage driving is dependent upon the public's perception of congestion's impact on their lives.

We posit that driver attitudes towards congestion are not primarily shaped by fuel costs, as it is difficult for a motorist to calculate how congestion contributes to these payments. Additionally, it is difficult for motorists to calculate environmental costs such as congestion's contribution to emissions, and many motorists may be apathetic about these. Instead, perceptions of the costs of congestion likely come from (1) the opportunity cost of additional travel time, and (2) the emotional discomfort experienced while fighting congestion. It is the latter factor that this paper will measure.

2. Literature review

2.1. Motorist opinion on congestion and its remedies

One recent survey (Atlantic Media and Siemens, 2014) tells a somewhat ambiguous story about how the public perceives

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congestion: 22% say it is a "big problem," 29% say it is a "small problem," and 48% say it is "not a problem." Moreover, congestion is disproportionately perceived to be a problem in urban areas (25% say it is a "big problem" and 35% say it is a "small problem" compared to 20% and 27%, respectively, in non-urban areas). Still, more than half of the public aver that congestion is a public policy problem, at least to a degree.

Moreover, on an individual level there is evidence that many motorists are willing to pay a great deal to avoid congestion. Janson and Levinson (2014) study the behavior of drivers using Minnesota's high-occupancy toll lanes and find that users are willing to pay between $60 and $124 in tolls per hour of travel time savings, an amount far higher than commonly used estimates for the value of time.

Given that a large portion of the public perceives congestion to be a problem, what do survey respondents believe should be done? The data indicate that they believe numerous policies would have an impact (Table 1):

With half of the public believing congestion is a problem, and a majority believing that every policy listed above would help remedy it, it would seem that large-scale investment in the transportation system, or steps to more rigorously price travel, should be underway. Yet the public rejects these measures to reduce congestion if they involve painful sacrifices. In the Atlantic Cities/Siemens (2014) poll, only 17% supported, and 77% opposed, raising parking prices. In a Reason (2011) poll, only 19% favored increases in the federal gas tax, while 77% opposed such an increase. A similar poll by Gallup in 2013 found that 66% of people would vote against a state law that would increase gas taxes in order to improve roads or introduce more mass transportation (Brown, 2013). A 2006 survey by the AAA found tepid support for tolls on new roads (39%), tolls on existing roads (33%), increased fuel taxes (21%), vehicle-miles taxes (21%), and increases in non-transportation taxes (e.g., sales taxes or income taxes) for transportation purposes (19%) (AAA Market Research, 2006, as cited by Zmud and Arce, 2008). These results are even more striking when keeping in mind that about five percent of American households do not own an auto (Renne and Bennett, 2014); given that almost all of these policies involve taxing drivers only, and given that less congestion should bring about higher transit speeds, it would seem that non-drivers should strongly favor new fees and taxes to fight congestion. This suggests that an even higher percentage of drivers oppose these policies.

If the public avers that congestion is a problem, but refuses to make sacrifices to ameliorate it, an important question arises: are drivers as a group truly bothered by congestion?

2.2. Travel time and mood

A body of literature addresses this question. First, several studies examine links between mood and travel time, which is increased due to congestion. Some conclude that life satisfaction is lower in those with lengthier commutes (Choi et al., 2013; Morris, 2011; Stutzer and Frey, 2008), and that satisfaction with commutes is lower for those with longer commutes (Olsson et al., 2013; Ory et al., 2004; Ory and Mokhtarian, 2005; Stokols et al., 1978). A number of studies suggest this dissatisfaction is in part caused by elevated stress levels on long trips (Evans et al., 2002; Evans and Wener, 2006; Gatersleben and Uzzell, 2007; Gottholmseder et al., 2009; Kluger, 1998; Koslowsky et al., 1996; Sposato et al., 2012; Stokols et al., 1978; Wener et al., 2003; Wener and Evans, 2011). Morris and Guerra (2015) find that longer trips are associated with greater stress, fatigue and sadness, and worse overall mood, than shorter ones. On the other hand, some work concludes that individuals generally prefer a commute of modest duration over a very long or very short one (Ory et al., 2004; Páez and Whalen, 2010; Redmond and Mokhtarian, 2001). The balance of opinion is that trips of longer duration are more stressful, suggesting that, to the extent that congestion contributes to increased travel times, it is deleterious to our emotional lives.

Table 1
Public opinion on the potential impact of congestion-fighting measures.

	Major impact (%)	Minor impact (%)	No impact (%)	Do not know (%)
Building more lanes/roads	38	28	31	2
Upgrading transit	38	28	30	3
Adding more bike lanes	24	34	40	1
Improving sidewalks	28	35	35	2
Promoting telecommuting	39	21	24	5

Source: Atlantic Media/Siemens State of the City Raw Data.

2.3. Congestion and stress

Other work has focused on the direct emotional impact of driving in traffic. Three studies of bus drivers find traffic congestion is a problem due to increased stress (Duffy and McGoldrick, 1990; Evans et al., 1999; Evans and Carrère, 1991); this is measured using self-reports or stress biomarkers such as blood pressure or heart rate. Non-professional drivers interviewed in high-congestion conditions also exhibit elevated levels of stress, frustration, aggression, irritation, and negative mood (Hennessy and Wiesenthal, 1999, 1997). Hennessy and Wiesenthal (1999) suggest this is caused by both travel time increases and, probably, the frustration of driving in congestion. Congestion may also potentially induce stress due to the fact that it causes travel time unpredictability (Evans et al., 2002). High congestion is associated with reduced persistence at solving problems (Novaco et al., 1979; Stokols et al., 1978; White and Rotton, 1998) and degraded proofreading skills (Schaeffer et al., 1988).

A study in Southern California found that ridesharing mitigated some of the effects of commutes on stress (Novaco and Collier, 1994). It is possible that ridesharing is less stressful because of: (1) a shared distribution of driving responsibilities, and (2) pleasure from interacting with another. Our data enable us to examine this.

2.4. Our contribution to the literature

This study contributes to these lines of inquiry in a number of ways. First, we examine the relationship between congestion and emotions that have not been observed before (happiness, sadness, and fatigue, in addition to the more commonly studied stress). Second, we consider the separate impacts of delay and non-delay emotional stimuli. Third, unlike previous work which generally utilizes small samples in restricted geographies, we have a large, geographically diverse sample of drivers (over 14,000) drawn from the entire U.S. Finally, our study differs conceptually from prior work in that we do not directly observe exposure to congestion, which would be extremely difficult to do given a sample as large as ours. Instead, we observe whether drivers reside in large metropolitan statistical areas (MSAs) and in central areas within MSAs, and whether they are traveling at the peak time periods. These conditions are strong predictors of congestion, but because we do not observe individual exposure we can only indirectly infer whether congestion produces negative emotions at an individual level. However, our data are ideal for examining our area of interest—how congestion shapes the political attitudes of drivers as a group—because we take into account that many drivers, even those