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for transportation policy compliance*

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# Normative and Image Motivations for Transportation Policy Compliance

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Normative and Image Motivations for Transportation Policy Compliance

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Abstract

Compliance with laws and regulations intended to protect common pool resources in the urban context is essential in tackling problems such as pollution and congestion. A high level of non-compliance necessitates investigation into motivations behind compliance. The long-held instrumental theory emphasizing the dependence of compliance on tangible deterrence measures fails to adequately explain empirical findings. More recently established compliance models incorporate normative, instrumental, and image factors as motivations for compliance. We investigate the importance of normative and image motivations for transportation policy compliance, and the influence of the *hukou* (China’s household registration) on the composition of motivations. Through a case study of Shanghai’s license auction policy to inhibit car growth, we use a structural equation model and data from a survey (n = 1,389) of policy attitudes and compliance behavior. The results show that both locals and migrants comply because of instrumental motivation. However, for locals, normative and image motivations not only influence compliance but do so to a greater degree than instrumental motivations. This stands in stark contrast with that there was no statistical relationship between normative and image motivations and compliance for migrants. The significant contribution of normative and image motivations to compliance in locals bears positive implications for compliance, but the absence of that in migrants is worrying. If only instrumental motivations matter, then the government is really constrained in how it can go about keeping social order. Compliance obtained strictly through social control indicates an unsustainable state of governance.

**Keywords:** policy compliance, instrumental motivation, normative motivation, image motivation, migrants

## 1. INTRODUCTION

Compliance with laws and regulations protecting common pool resources (CPR) is critical to ensuring sustainability. As Garrett Hardin described in “The Tragedy of the Commons” (1968), growing demand for use of the commons—mostly referring to environmental resources such as rivers, lakes, oceans, and the atmosphere—would reach the inflection point where advancements in technology cannot adequately increase efficiency to meet growing demand. Hence policymakers have used laws and regulations to protect the commons.

Although economics literature cites natural resources as examples of CPR, man-made objects like the roads are also examples of CPR (Coughlin, 1994). When excessive numbers of cars appear on the road, the “Tragedy of the Commons” is manifested in congestion and pollution. Cities in developing countries have recently seen astronomical increases in car ownership. Governments have adopted car ownership control policies such as the car license plate auction policy instituted in Shanghai (Chen and Zhao, 2013). However, a significant fraction of drivers in Shanghai (28% of those surveyed) obtain license plates from neighboring municipalities rather than participating in the auction. A high non-compliance level leads to three potential undesirable consequences: dilution of the ability to control vehicles, loss of auction revenue, and loss of public faith in the government’s ability to enforce regulations.

High noncompliance necessitates research into why people fail to comply and how to alter the policy approach. Compliance is necessary for effective governance, yet it is difficult to secure because most laws dictate behavior that citizens would rather avoid (Tyler, 2006). Compliance with policies protecting CPR, from the instrumental perspective, could be especially difficult to secure because the severity of punishment is relatively limited and the cost of raising the perceived probability of apprehension is high (Martin, 2012; Tyler, 2006). Therefore, other motivations to comply ought to be investigated. Theories developed and evidence collected since the 1990s have shown that other motivations—particularly normative and image motivation—play major roles in compliance (Ramcilovic-Suominen and Epstein, 2015). Based on Ostrom’s groundbreaking work on voluntary cooperation in protecting CPR (1990), various studies of fisheries and forests have shown the presence of other types of motivations in addition to instrumental motivation in compliance. However, no study has used the comprehensive compliance model integrating normative motivation, instrumental motivation, and image motivation to study compliance with transportation policy intended to reduce congestion and pollution. Through data analysis of survey responses given to car owners in Shanghai, this paper attempts to answer the following questions about common pool resource regulation compliance in the realm of transportation:

1. How do normative and image motivations influence compliance?
2. How do normative and image motivations vary with socioeconomic attributes?
3. How does residence status (locals vs. migrants) modulate the way in which normative and image motivations influence compliance?

The results shed lights on the possibilities to improve compliance of the auction policy to further mitigate congestion and pollution as well as to raise auction revenue. More importantly,

through the lens of analyzing compliance with a car control policy, this study provides a steppingstone in understanding and establishing conditions that promote compliance with common pool resource protection policies in general.

2. THEORETICAL FRAMEWORK AND LITERATURE REVIEW

Compliance Theory

Compliance with laws and regulations is motivated by three sets of factors: instrumental motivation, normative motivation, and image motivation (Tyler, 2006). The instrumental perspective of compliance, stemming from the theory of social control, rests on the assumption that external rewards and punishments motivate behavior. Social control theory has received support from the public choice perspective, in which economic models are applied to legal studies. In applying the economic model of crime and punishment, where the choice of crime depends on the expected net benefits (Becker, 1968; Stigler, 1970), policymakers assume that compliance behavior is driven by the same type of instrumental determinants that motivate rational decision-making in other parts of people’s lives. If the instrumental perspective is indeed all encompassing, then governance becomes controlling societal resources to deter non-compliance and it would be relatively straightforward—albeit costly—for the government to implement its agenda. The instrumental perspective, however, has proven insufficient in explaining free-rider problems like tax evasion, where the rate of tax evasion predicted by the expected utility model far exceeds the actual rate of tax evasion, so there other factors warrant consideration (Tyler, 2006).

Two additional sources of influence are widely recognized as determinants of compliance: personal values and the judgment of other people (Ariely et al, 2009). The impact of personal values on compliance is known as normative motivation. Normative factors are related not to rewards and punishments, but to the relationship between choices and one’s perception of appropriateness. Due to normative motivation, citizens may voluntarily comply. The judgment of other people, also known as image motivation, is both instrumental and normative. Peer groups and others can wield their judgments through the manipulation of both material resources such as job opportunities or intangible resources such as respect (Benabou and Tirole, 2006; Tyler, 2006). Since image motivation is both normative and instrumental and deviates from personal values, it must be considered as a distinct type of motivation.

The inclusion of the three types of motivations is insufficient in understanding compliance. The interactions among the three types of motivations must also be considered. Benabou and Tirole (2006) established a model incorporating all three types of motivation and derived conditions under which extrinsic factors such as government or organizational incentives could crowd out intrinsic motivation toward prosocial behavior or the positive image associated with prosocial behavior. The crowding effects among various types of motivations, while not explored in this study, play important roles in environmental protection policy and have been extensively examined.

The compliance model contains critical additions to the Theory of Planned Behavior (Ajzen, 1991), which is frequently used to model behavior in transport. According to the Theory of Planned Behavior, behavioral beliefs, normative beliefs, and control beliefs create the intent to perform a behavior, which then leads to actual behavior assuming a sufficient degree of control. Normative beliefs refer to only social norms. Behavioral studies conducted after the publication of the Theory of Planned Behavior have shown that personal norms should also be included (Beck and Ajzen, 1991), including behavior in transport (Parker et al, 1995). The compliance model considers personal norms not only in terms of personal morality, but also legitimacy, a feature that is directly controlled by legal authorities that holds potential to increase compliance. Therefore the compliance model is not only more comprehensive in modeling behavior but also more useful to legal authorities interested in obtaining greater compliance.

### **Legitimacy and Morality as Normative Motivations**

A comprehensive compliance model includes both socioeconomic and demographic attributes and motivation constructs—normative, instrumental, and image motivation—as explanatory variables for compliance. Furthermore, two types of normative motivation need to be explored: legitimacy and morality (Tyler, 2006). Legitimacy-motivated compliance arises from a belief that an entity has the authority to make and enforce laws (Easton, 1958; Friedman, 1975). Morality-motivated compliance refers to a sense to obey because the individual deems a particular law as just. Legitimacy is a more reliable motivation for normative compliance because the idea that the government has the right to enact laws promotes compliance over a broad scope of laws, giving discretionary authority to the government. Morality, on the other hand, can either increase or decrease voluntary compliance depending on whether the law aligns with the individual's personal values. The broader and more flexible reach of legitimacy gives researching legitimacy great appeal to policymakers interested in raising compliance, and indeed legitimacy was universally used—through measuring either the conventional concept of perceived obligation to obey or proxies like the perceived degree of public participation (Ramcilovic-Suominen and Epstein, 2015; Madrigal-Ballester et al, 2012)—in models concerning compliance with common pool resource protection policies.

### **Compliance Models in Environmental Protection and Transport Behavior**

The inadequacy of the economists' approach to understanding behavior through the instrumental perspective and the importance of considering the normative perspective in studying transport policies, particularly those aimed at protecting common goods such as congestion pricing and carbon taxation, are delineated by Metcalfe and Dolan (2012). This paper considers lessons from recent advancements in behavior economics in conjunction with literature about protection of other types of resources in modeling compliance as a combination of three types of motivations: normative, instrumental, and image. Furthermore, normative motivation bifurcated into two constructs: legitimacy and morality. Hence this model decomposes compliance motivation into four constructs: legitimacy, morality, instrumental, and image motivations.

Compliance models based solely on the instrumental theory such as the red-light running incidence study by Bar-Ilan and Sacerdote (2001), though failed to provide a complete understanding of motivations behind compliance, provided fruitful insights into non-compliance. Results suggesting that the elasticity of violation with respect to both fines and probability of detection is negative support Becker's theory in transport research and agrees with findings from more complete models in which deterrence is one of multiple motivators of compliance. More importantly, the suggestion that the driver's perception of the fine depends on his/her wealth provides implications in accordance with the theory posited by Polinsky and Shavell (1991) that the optimal fine be set according to personal wealth.

The comprehensive compliance studies provide better examples. Studies on public participation in regulatory turtle egg harvesting in Costa Rica (Madrigal-Ballesteros et al, 2012), forest regulation compliance in Ghana (Ramcilovic-Suominen and Epstein, 2015), agro-environmental regulation compliance in Denmark (Winter and May, 2001), fisheries regulations compliance in Tanzania (Eggert and Lokina, 2010), in Malaysia (Kuperan and Sutinen, 1998), in Denmark (Nielsen and Mathiesen, 2003), and in the Netherlands (Groeneveld, 2011), and a combination of agricultural and environmental regulations in Spain (Martin et al, 2012) all utilize survey questions pertaining to normative considerations, instrumental considerations, and image considerations as well as socio-demographic attributes to detect factors influencing compliance. In traffic laws, Yagil studied the influence of normative and instrumental motivations for compliance in Israel. In one study, Yagil (1998b) found that while young and male drivers exhibited lower normative motivations to comply with traffic laws, normative motivations played a greater role in their compliance than in the compliance of female and older drivers. In a similar study of soldiers, Yagil found that younger drivers exhibited lower motivation, both instrumental and normative, than older drivers to comply; however, normative motivation better predicted compliance in young drivers and instrumental in older drivers (1998a). Yagil's use of demographic variables in gender and age and his suggestion that socioeconomic attributes be considered motivated the use of these variables in this study.

Xie and Parker investigated the role of legitimacy in compliance in transport (2002) in a study of factors causing traffic violations in China. The study concluded that the sense of social hierarchy, tendency to challenge authority, and belief in the importance of interpersonal networks all play critical roles in traffic violations. Xie and Parker's study validated the division of normative motivation into legitimacy and morality in this study.

**Summary of Literature Review**

The currently accepted model of compliance comprises of three forms of motivation: normative, instrumental, and image. In comparison with the Theory of Planned Behavior (Ajzen, 1991), normative motivation is analogous to attitude toward behavior, the penalty component of instrumental motivation is analogous to behavioral belief; the cost of compliance component of instrumental motivation is analogous to perceived behavioral control and control beliefs; and image motivation is analogous to normative beliefs and subjective norms. Although the motivating factors are categorized differently, this model has been applied to studying many

common pool resource protection policy compliance cases. The results have mostly shown that the three forms of motivation indeed factor in compliance. Particularly in transportation, Yagil's work on normative and image motivation demonstrated the need to further investigate these motivations. Hence the three-factor compliance model was adopted for this study. As literature shows, gender and age are fundamental demographic factors to be explored. This paper also explores the length of residency as a demographic factor since it is available in survey data and one could intuitively hypothesize that the length of residency is positively related to image motivation. For socioeconomic attributes, Polinsky and Shavell's work (1991) suggests that income and employment status be explored; Becker's work (1968) suggests education be explored; and China's unique feature of urban residency status (*hukou*) is studied.

### 3. SHANGHAI'S LICENSE PLATE AUCTION POLICY

Shanghai uses a monthly car license plate auction policy to limit the number of license plates issued. Vehicles with nonlocal plates are banned from driving on elevated roads during peak hours (Monday-Friday 7:30-9:30 a.m. and 4:30-6:30 p.m.). In 2011, traffic control photographic systems were installed to catch violators. Violators will be fined 200 CNY (median monthly household income is around 12,500 CNY according to this survey) and deducted 3 credits from their drivers' licenses. An accumulation of up to twelve credits results in fines only. Having accumulated between twelve and twenty-four credits, the driver must pay the fine as well as attend classes and pass tests to regain driving privileges.

For brevity, vehicles with non-local license plates will be referred to as non-local vehicles from hereon. This study treats any driver with non-local vehicles as violators of the auction policy even though only driving non-local vehicles during peak hours is banned. The law dictates that all residents of Shanghai participate in the auction when obtaining a vehicle, so while driving non-local vehicles during off-peak hours results in no penalty, it violates the spirit of the law that all residents obtain Shanghai license plates. More importantly, the government uses auction revenue for transportation projects. Avoidance of the auction, even without congestion and pollution considerations, is a form of free riding. Thus any participant driving non-local vehicles is considered a violator.

### 4. METHOD

#### Questionnaire Survey in Shanghai

Shanghai Online Market Research Corporation Ltd. (OMRC), which operates the online survey platform [www.51poll.com](http://www.51poll.com) distributed a questionnaire on behalf of the research team. Samples were selected from a database of 100,000 individuals living in Shanghai. E-mails were sent containing the survey invitation and link. Potential respondents were offered incentives of 10 CNY for completing the questionnaire. The questions on the questionnaire used in this study were selected after an initial test survey (Chen and Zhao, 2013). This survey was conducted in two waves. The first wave was conducted in September 2012, for which OMRC sent invitations to 10,930 randomly selected individuals. 6,120 viewed the e-mails, 3,672 clicked the

questionnaire link, and 1,000 completed the questionnaire. Due to the disproportionately high presence of car owners among the respondents in the first wave, a booster wave focused on non-car owners was conducted to bring sample characteristics closer to those of the population. The second wave was conducted in November 2012, for which OMRC sent invitations to 10,783 randomly selected individuals. 9,120 viewed the e-mails, 5,483 clicked the link, and 500 completed the questionnaire. After combining responses from the two waves and weighting for accuracy and representativeness of the population, 1389 records were selected for the final dataset. Of those, the 721 respondents (52%) who owned at least one car were selected for this study. □

Respondents were asked to provide socio-demographic information, and answer questions about their awareness of the policy, vehicle ownership, travel behavior, attitude toward the auction policy, attitude toward non-local licensed cars, and attitude toward car ownership as well as car dependence. Most questions were presented as statements to which respondents were asked indicate the extent of their agreement with the statement on 5-level Likert scale indicators. The five levels were strongly agree, partially agree, neutral, partially disagree, and strongly disagree, coded 1 through 5 respectively. For this model, scores for all statements were rescaled to test the hypothesis that all four latent variables have positive relationships with compliance. In addition, a question about weekly usage of vehicles on elevated roads during peak hours was included. The hypothesis with usage is that greater usage would positively relate to compliance since greater usage would mean more fines for a non-local vehicle.

**Motivation Constructs and Compliance Variable Representation**

Compliance was coded as a binary variable with violation = 0 and compliance = 1. Both multi-car owners with at least one non-local car and single-non-local car owners were considered violators. This model included three motivations: normative, instrumental, and image; these three motivations were represented by four latent variables and one observed variable. Normative motivation bifurcated into legitimacy and morality, each represented by one latent variable. Whereas Tyler (2006) used a set of statements querying the individual’s perception of obligation to obey to measure legitimacy, using confirmatory factor analysis to remove inappropriate statements called for this study the use of one statement about personal sense of obligation and one statement about expectation of others’ sense of obligation. Morality is defined as the degree to which people consider a particular law appropriate, irrespective of penalties or rewards. Statements about further measures to eliminate non-local vehicles were used for morality. It is likely that if the respondent deems a greater enforcement of the policy appropriate, then he views the original, less stringent enforcement level, as acceptable.

Most compliance models follow Becker’s expected utility theory and measure instrumental motivation using statements regarding the perceived probability of detection, expected penalty, and cost of compliance and/or benefit of noncompliance. The probability of detection in this case is a constant because the photographic traffic surveillance system catches all non-local license plates. The variable cost of noncompliance is the penalty set at 200 CNY

per violation. The fixed cost of noncompliance consists of both the relative inconvenience of obtaining nonlocal license plates and the additional cost borne by nonlocal local vehicles during biannual checks required of all vehicles. For local vehicles the fee is 200 CNY per check; for nonlocal vehicles the fee is 1000 CNY per check. To measure instrumental motivation in this study, two variables—one latent, one observed—were used to cover the differences in cost between local and nonlocal vehicles. An observed variable of weekly usage of vehicles on elevated roads during peak hours (greater usage means greater fines incurred) addresses the variable additional cost of nonlocal vehicles. A latent variable addresses the fixed additional cost of nonlocal vehicles in the form of differences in vehicle checks and ease of purchasing a nonlocal vehicle. The bid price of Shanghai license plates fluctuates and therefore so does the benefit of using nonlocal license plates; hence, the expected benefit was not included in this model.

Image statements closely follow the definition of image in Tyler (2006) and of reputation in Benabou and Tirole (2006) in querying about the psychological benefit of social approval and acceptance for having a Shanghai license plate. Table 1 shows the indicators of the four motivation constructs as latent variables and an observed motivation variable in this compliance model as well as their distributions.

The variables measured in this model do not reflect the full range of factors considered in compliance models. As mentioned, legitimacy is a more encompassing term than simply the obligation to obey; studies have also shown that support for authorities is indicative of legitimacy (Johnson et al, 2014). In addition, expected benefit could not be measured to fully reflect instrumental motivation; the latent variable for instrumental motivation only concerns the relative convenience of local vehicles. The latent variables therefore are referred to as obligation, spirit, and convenience rather than legitimacy, morality, and instrumental motivation to acknowledge data limitations and to avoid extrapolation.

TABLE 1 about here

Demographic and Socioeconomic Attributes

We included both demographic attributes such as age, gender and birthplace, and socioeconomic attributes as exogenous variables. Given the possible psychological impact of Shanghai license plates on local residents, whether the respondent was born in Shanghai were incorporated. Socioeconomic attributes included education, employment status, income, and *hukou*, a socioeconomic attribute unique to China. *Hukou* is a household registration system that identifies every person by name, birth date, gender, and the official location of residence (city and province) and type (urban or rural).

Variations of this registration system began more than two thousand years ago in China to provide a base for taxation and conscription. In 1950s, the Chinese government officially promulgated the family register system to control the movement of people between urban and rural areas. An additional function of *hukou* is that government can use it to indirectly control the migration of rural workers to cities (Afridi et al, 2015) by differentiating the package of social welfare granted to urban and rural workers. Urban *hukou* holders enjoy more employment opportunities, ration stamps, and other benefits such as subsidized housing, health services, and education. This disparity keeps many rural residents away from the city. Since households passed on *hukou* to future generations, *hukou* establishes an institutional and inherent disparity in socioeconomic mobility through different opportunities in education and eventually employment. Since economic reforms began in the late 1970s, rural migration to urban areas has increased but the separation of opportunities and benefits between urban and rural *hukou* holders has persisted. The primary socioeconomic distinction in China between rural and urban residents has therefore transformed into one between rural and urban *hukou* holders in urban areas (Afridi et al, 2015). The impact of *hukou* on compliance with many types of laws and regulations is often significant. However, only limited literature on the impact of *hukou* on transport behavior is available. One study (Zhang et al, 2013) showed that rural *hukou* holders exhibited lower overall risk of traffic accidents but higher risk of severe/fatal accidents.

For the purposes of this study, the aggregate sample was separated into Shanghai *hukou* holders (referred to as locals for simplicity) and holders of other *hukou* (referred to as migrants). We hypothesized that the difference in social welfare granted to locals and migrants would yield in different strengths in the relationships between compliance and the perceived legitimacy of authorities and perceived morality of the laws and regulations. In addition, the fact that non-local *hukou* holders were mostly born outside of Shanghai would yield a weaker relationship between image motivation and compliance.

TABLE 2 about here

### Structural Equation Model

Studies of vehicle ownership based on data pertaining to attitudes, perceptions, and behavior are appropriate applications of structural equations models (Golob, 2003). This compliance model is a structural equation model (SEM) defined by the following relationships:

1. Compliance is affected by four latent variables and one observed variable representing the five motivation constructs. Each type of motivation is measured by a set of survey questions listed in Table 1.
  2. Compliance is also affected by 9 demographic and socioeconomic attributes listed in Table 2.
  3. Each type of motivation is affected by all 9 attributes to explore the influence of these attributes on each type of motivation. Each of these attributes was treated as a dummy variable.
  4. Each latent variable also correlates with the other three. This was to account for possible interactions among the four constructs within a particular individual to better fit the model.
- The modulating effect of *hukou* on compliance through the motivations is explored by dividing the sample into Shanghai *hukou* holders (locals) and non-holders (migrants) and examining the relationships between motivations and compliance for each group. The division of the sample yielded two models: one model for the aggregate sample and a two-group model for locals and migrants.

### FIGURE 1 about here

The SEM diagram is illustrated in Figure 1. The model was estimated in Mplus (Muthén and Muthén, 2007) using the maximum likelihood estimator. The modulating effect was investigated by running a model that divides sample into locals and migrants. The Multiple Group Analysis in Mplus was used so that the scales of the error term are the same for both subgroups and the coefficients are therefore comparable. The goodness of fit measures for all three models are listed below:

### TABLE 3 about here

Both the comparative fit index and the Tucker Lewis index are approximately greater than 0.9. The root mean square residual is less than 0.05 (Bentler and Bonett, 1980). The measures of goodness of fit therefore indicate strong fit (Maccallum et al, 1996).

The factor scores listed below in Table 4 show that the indicators served as good measures of the latent variables (all significant at 0.01 level).

### TABLE 4 about here

5. RESULTS

Relationships Between Motivations and Compliance for Locals

While the model imposes causality from motivation constructs to compliance behavior, it is possible that behavior also influences motivations. Thus the results of this study only explore associations rather than directional causality; the SEM however does control for confounding factors such as demographic and socioeconomic attributes. Table 5 shows that for local residents, the perceived obligation to obey (legitimacy) is positively related to compliance. Similarly, support for the spirit of the policy against non-local vehicles (morality) by supporting the government in further restricting non-local vehicles is also positively related to compliance. The expected frequency of using elevated roads during peak hours (representative of the variable cost of noncompliance) is positively related to compliance. Finally, the positive image of Shanghai license plates is positively related to compliance. The positive relationships confirm the intuitive hypothesis that greater motivation to comply is positively related with greater likelihood of compliance and agree with the results of most studies of common pool resource protection policies illustrating the importance of all three types of motivations.

The standardized results reflect the relative importance of the various types of motivations. As Table 5 shows, support for further enforcement in the spirit of the policy and the sense of obligation to obey, both of which constitute normative motivation, exhibit stronger linkages to compliance than instrumental motivation variables.

TABLE 5 about here

Differences in Motivations to Comply Between Locals and Migrants

The modulating effect of *hukou* on compliance through motivations is quite telling because the contrast in motivations for compliance between locals and migrants is stark. Table 5 shows that locals are most motivated to comply due to normative considerations (morality and legitimacy), followed by avoidance of the penalty (variable cost), and lastly by image considerations. Migrants, however, comply only because of avoiding the penalty. Normative and image factors do not influence migrants' decisions to comply. On the aggregate level, since locals make up a much higher fraction of the total population than migrants (63% to 37%), the influence of normative and image motivations on compliance for the aggregate sample is still statistically significant even though they are not for the migrants.

Relationships Between Demographic and Socioeconomic Attributes and Motivations

Rarely explored in the literature on compliance are the relationships between demographic and socioeconomic attributes and different types of motivation. These relationships for the aggregate population are shown in Table 6. The structural equations for the aggregate population rather

than those for each group are examined to explore potential divisions in the population in addition to *hukou*.

#### TABLE 6 about here

There are two significant findings at the .05 level. First, having a college education is, however, negatively associated with agreement to further restrict non-local vehicles in Shanghai. Second, people at the two ends of the age spectrum (under 30 and over 60) had significant negative relationships with the frequency of using elevated roads during peak hours, presumably because the activity pattern for these people place less demand for car based travel during peak hours.

We note some findings at the 0.08 level that, whilst falling short of the desirable levels of statistical significance, are suggestive of the veracity of the model. Local-born residents are more likely to support further restriction as they are more inclined to protect the sanctity of the local license plate. Having been born in Shanghai is also positively related to the driver's perception of the image associated with having Shanghai license plates whereas *hukou* had no significant influence on image motivation. Given that *hukou* is a government-imposed stratification whereas being born in a particular locale is an innate status, that birthplace rather than *hukou* is significantly influences image motivation came as no surprise to the research team. In addition, having high income is negatively related to the fixed cost of purchasing nonlocal vehicles—represented by the relative perceived convenience of local vehicles. In other words, those with high income find owning nonlocal vehicles less inconvenient, presumably because fines makes up a smaller proportion of their income, making them less sensitive to the fine. The negative relationship between income and fixed cost agrees with the literature on instrumental compliance.

## 6. DISCUSSIONS

Although this study is the first to investigate motivations behind compliance with a distinct form of transportation regulation, the results of this study partially fell in alignment with those of studies of other types of regulations in other areas of the world. The sample is much more demographically and socioeconomically diverse than the Scandinavian fishermen studied in marine regulation compliance models. The potential consequences of violation are much less severe than those of traffic violations like speeding—and certainly much less than those of drunk driving (Yagil, 1998a, 1998b). However, these results confirmed hypotheses about factors relevant to compliance and to each motivation construct for local residents.

The license plate auction policy offers a distinct perspective on compliance. The bid price of a license plate has exceeded \$15,000 at one point, meaning that obtaining just a license plate is about as costly as purchasing a car. The magnitude of the gains of violation makes this case study comparable to something like tax evasion instead of ordinary traffic violations. Yet, violations of the policy are treated like traffic violations. The penalties of violation are benign in the sense that the penalty involves only a fine and points on the driver's license; no criminal charges are brought against the violator. These features of the license plate auction policy

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captures the quintessential dilemma of common pool resource protection: the consequences are severe, yet the punishments are limited, so it is critical that something must influence people to voluntarily comply. The presence of normative and image motivations to comply is crucial To that end, the results of this study offer both reassurance and pessimism in that locals are very strongly influenced by normative and image motivations whereas migrants are not influenced by normative and image motivations at all.

The major findings of this study are the following. First, monetary rewards and punishments, which are instrumental in nature, influence everyone’s decision to comply with the law, as economists predicted that they would. However, for those with local residence status (local *hukou*) normative motivations and image motivation also influence compliance with the law. In fact, normative motivations are more strongly related to compliance than instrumental motivations. Second, those without local residence status (migrants) do not comply because of normative motivations and image motivation; their decisions are strictly influenced by monetary rewards and punishments. Because locals comprise a majority of the total municipal population, statistical significance was still found to exist between normative and image motivations and compliance.

**Instrumental Motivations**

The positive relationship between instrumental motivations and compliance for both locals and migrants validates Becker’s theoretical hypothesis that decreasing utility from violation due to more severe punishment would decrease the level violation (1968). In particular, the results show that variable cost (penalties incurred from each violation) is more strongly related to compliance than fixed cost (additional costs incurred bi-annually), which came as no surprise given the frequency and magnitude of the variable cost of violation. As a note on enforcement, the optimal level of compliance is not necessarily 100% and subject to discussion. Zhao et al (2016) discusses the potential benefits of policy leakage and distinguishes the government’s intentional policy leakage from its incapacity of full enforcement. While changes in enforcement level is related to compliance, for the instrumental perspective does not solely explain the motivation behind compliance for locals; indeed, the presence of normative and image motivations for compliance implies that there are more important changes in governance and policy that affect compliance than increasing fines or improving the surveillance system. Moreover, the absence of normative and image motivations for migrants is potentially bothersome.

**Normative and Image Motivations**

The broad nature of the statements pertaining to obligation to obey underscores the importance of the positive relationship between obligation to obey and compliance for locals. Other studies used obligation statements specific to the case at hand. Yagil (1998b) used the statement, “A driver should obey all traffic laws, regardless of whether they seem logical or not.” The statements used here did not address the auction policy specifically; it queried about the

respondent's general sense of obligation to obey all laws. Hence, these positive relationships are tremendously encouraging for policymakers as they can depend on local *hukou* holders' normative compliance across a spectrum of policies out of deference to authority. Moreover, the perception of the legitimacy of authorities can be improved through adjusting police behavior to foster a stronger perception of procedural fairness (Tyler, 2006). This provides policymakers with an additional means to increasing enforcement to increase compliance for locals.

The importance of legitimacy in compliance begs the question of how to obtain legitimacy, a core topic of research in political science. Max Weber states that legitimacy manifested in any one or any combination of three types: traditional legitimacy, charismatic legitimacy, and rational-legal legitimacy (O'Neil, 2010); many forms of government, not just democracy, may obtain legitimacy. It is beyond the scope of this paper to decipher the precise form of government in China and how it ought to strengthen its legitimacy, but it is worth noting that compliance depends on legitimacy to a significant extent.

The representation of morality by statements pertaining to stricter enforcement and the fact that primal importance of morality as motivation for compliance yield the intuitive yet important conclusion that people comply voluntarily with rules that they deem appropriate. In fact, for local *hukou* holders, the strongest motivation for compliance was morality. For policymakers, this result implies that the public's agreement with the substance of laws and regulations provides the greatest source of voluntary compliance. However, disagreement with particular laws or regulations could make compliance level for local *hukou* holders fall below what the expected punishment and enforcement level would predict. Turning to the relationship between morality and socio-demographics, the results indicate that those with college education were less likely to support further restriction of non-local license plates. This may be interpreted as that college-educated residents prioritize the freedom to use the roads ahead of addressing the issues associated with overcrowding the roads.

The importance of image motivation suggests that public campaigns to promote the social significance of Shanghai license plates could increase compliance. Although the literature on the effectiveness of public campaigns in transportation such as ones against drunk driving shows that they have at best achieved mixed results, the fact that image motivation is significant in compliance in this particular case suggests that there is potential for increasing image motivation to raise compliance for local *hukou* holders. We refer to normative and image motivations collectively as non-instrumental motivations.

A significant relationship between non-instrumental motivations and compliance exists for the aggregate population because the relationship is particularly strong for local *hukou* holders. This relationship does not exist for migrants, meaning that non-instrumental motivations do not influence migrants' decision to comply. The investigation into the modulating effect of *hukou* was undertaken because of the socioeconomic divide it poses in Chinese society, and hence we hypothesized that normative factors would influence locals' compliance differently than they would migrants' compliance. The results were even more striking—normative factors had no statistically significant impact on migrants when they decide whether to comply with the

law. In addition, as the coefficients of determination in Table 3 indicate, the model incorporating all three types of motivations fits much better for locals than for migrants.

The absence of the relationship between non-instrumental factors and compliance for migrants is a significant result of this paper and a very problematic finding for policymakers. For a large and growing fraction of the urban population, authorities cannot obtain greater compliance through improving procedural fairness or establishing laws and regulation that have greater public support or promoting them through public campaigns. The issue indicated by the results is not that migrants have lower levels of legitimacy, morality, or image of the local license plate. Authorities can promote normative and image factors through changes in police procedure, adjusting particular parts of laws and regulations, and initiating public campaigns. The issue is the lack of relationships between these factors and compliance. It is not a sustainable state of governance if the authorities would have to solely rely on increasing punishments or the likelihood of apprehension by spending more public resources on enforcement to obtain greater compliance. The significant contribution of normative and image motivations to compliance in locals bears positive implications for compliance, but the absence of that in migrants is worrying. If only instrumental motivations matter, then the government is really constrained in terms of how it can go about keeping social order.

**Implications for Research**

This paper advanced the framework for compliance research in three ways. First, socio-demographic variables were examined in relation to both compliance and motivations for compliance. This fosters the understanding of compliance by pinpointing how motivations vary across different sectors of society and consequently provides potential solutions for government to tailor policy approaches in accordance with these variations. Second, the modulating effect of *hukou* was incorporated into the compliance framework and significant differences were found between locals and migrants. The lack of normative and image motivations is problematic for authorities. Future research into compliance ought to consider this sharp socioeconomic divide when sampling and analyzing data. Third, instrumental motivation was separated into fixed and variable components. Given that the latter has potential to incur much greater monetary losses than the former, it was unsurprising that variable cost proved to be of greater significant in compliance. Future research ought also to consider the distinction between variable and fixed cost to make the results more robust.

There are several limitations to this study. First, it must be stated that underreporting bias due to fear of potential consequences is a cause for concern for data validity; hence, 28% could be an underestimate of the actual noncompliance rate. Second, the lack of quantitative metrics for instrumental motivation other than usage is another limitation since incentives and probabilities can be quantified and numerical results—even if they show low elasticity—would greatly help policymakers. Third, our data and structural equation models can only evidence that the *relationships* between normative and image motivations and compliance is non-existent for migrants. The paper cannot directly speak to the reason or mechanism behind such non-existence.

Additional research is required to understand the fundamental differences in motivation structure between locals and migrants. Lastly, it bears reiterating that there are more dimensions of various forms of motivations than those measured in this study (Johnson et al, 2014). For example, legitimacy can be measured in terms of both the obligation to obey and support for the authorities. Additional dimensions of legitimacy require context-specific questions and vary from case to case, but they still warrant consideration in the study of legitimacy and compliance.

The limitations of this study calls for future surveys exploring motivations behind compliance to include a greater number and variety of statements addressing the various aspects of normative and image motivations behind compliance. For instrumental motivation, the questionnaire should ask about the perceived probabilities of detection and the perceived cost of compliance (license plate price) to help researchers attain a clearer understanding of the compliance model. One potential way to address underreporting bias is to use available statistics on violations for particular groups in conjunction with self-reporting. For example, Tyler and Fagan (2008) used precinct level crime statistics in addition to self-reporting of crimes for a compliance study of New York City residents. As mentioned in introducing the framework of this model, the interactions among various motivations were not investigated in this paper. Understanding the crowding effects, particularly that of instrumental motivation on normative motivation, is critical for governments in optimizing resources and policies (Benabou and Tirole, 2006). Policy instruments that reduce normative motivation to comply can be especially wasteful.

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**TABLE 1 Indicators of Motivation Constructs**

ID	Motivation Type	Statement	Strongly agree	Partially agree	Neutral	Partially disagree	Strongly disagree		
Indicators for Obligation (Legitimacy)									
u7	Normative	I think it's fine to disobey rules that don't make sense.	17%	32%	25%	21%	6%		
u8	Normative	The general public thinks it's fine to disobey rules that don't make sense.	10%	32%	29%	23%	6%		
Indicators for Spirit (Morality)									
u3	Normative	Shanghai should cooperate with nearby cities to totally ban Shanghai residents registering non-local vehicle licenses.	24%	30%	19%	19%	9%		
u4	Normative	Shanghai government should totally ban non-local vehicles driven on Shanghai's roads.	13%	24%	23%	20%	19%		
Indicators for Image									
u5	Image	Getting a Shanghai car license makes me feel more like a Shanghai citizen.	16%	34%	28%	14%	7%		
u6	Image	I feel that a person driving a car with a Shanghai license plate has more pride.	16%	37%	27%	13%	7%		
Indicators for Convenience (Fixed cost)									
u1	Instrumental	Biannual check of vehicles with non-local license is very inconvenient.	30%	53%	11%	6%	1%		
u2	Instrumental	Purchase and sale of vehicles with non-local license need to take place in the license issuing cities, which is very inconvenient.	23%	51%	18%	6%	1%		
Indicator for Usage (Var. cost)									
u9	Instrumental	How frequently do you use elevated roads during your daily commute during rush hours? (Converted to weekly frequency)	never 8%	once a month 34%	once 2 to 3 weeks 24%	1 to 2 times / week 15%	3 to 4 times / week 5%	5 times / week 3%	6 to 7 times / week 11%

Due to rounding, sum of proportions of responses may be off by +/- 1% from 100%

**TABLE 2 Demographic and Socioeconomic Profile of the Sample**

Variable	Values	% of Sample	% of Shanghai Population
Demographic			
Gender	Male	51	50
Age	30 and under	26	33
	61-65	12	8
Residency	Born in Shanghai	70	N.A.
Socioeconomic			
Education	College and above	54	21
	Masters and above	10	N.A.
Employment	Employed	78	N.A.
Income	Over 15k CNY	17	N.A.
Hukou status	Have Shanghai hukou	63	61

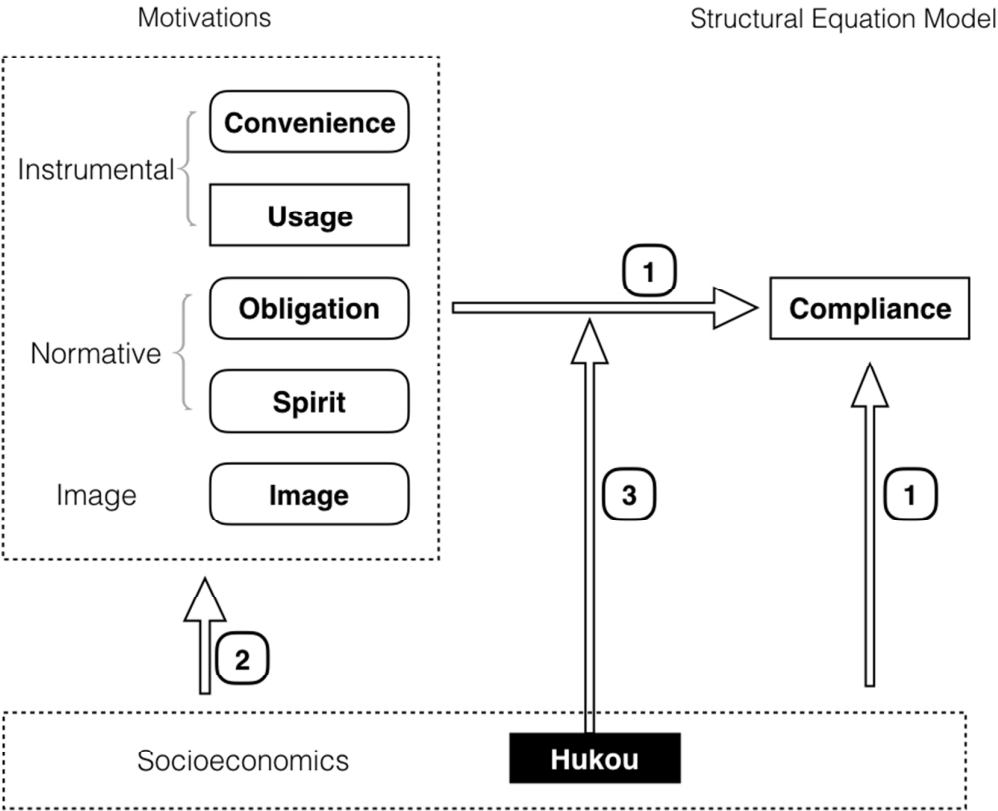


FIGURE 1 The Structural Equation Model for License Auction Policy Compliance

**TABLE 3 Goodness of Fit Measures**

	Two-Group Model	Aggregate Model
Observations	457 (Locals) 264 (Migrants)	721
Comparative fit index	0.971	0.958
Tucker Lewis index	0.938	0.903
RMSEA	0.027	0.032
90 Percent C.I.	(0.008, 0.040)	(0.021, 0.042)
Chi-squared	136.654	99.849
Degrees of freedom	108	58
Coefficient of Determination	0.376 (Locals) 0.187 (Migrants)	0.355

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**TABLE 4 Measurement Equations for the Aggregate Model**

Latent Variable	Indicator	Estimate	Est./S.E.
Obligation	U7	0.818	21.803
Obligation	U8	0.698	19.758
Spirit	U3	0.829	32.877
Spirit	U4	0.819	30.664
Convenience	U1	0.829	17.727
Convenience	U2	0.741	17.821
Image	U5	0.923	35.649
Image	U6	0.839	33.889

**TABLE 5 Structural Equations for the Determinants of Compliance**

Variable	Local		Migrant		Aggregate	
	Estimate	Est./S.E.	Estimate	Est./S.E.	Estimate	Est./S.E.
Obligation	0.283***	3.308	0.151	0.952	0.235***	3.298
Spirit	0.378***	4.654	0.104	0.623	0.261***	3.580
Convenience	0.062	0.930	0.087	1.030	0.086	1.742
Usage	0.259***	5.138	0.180**	2.282	0.214***	5.318
Image	0.211***	3.128	0.090	1.023	0.125**	2.894
Male	-0.018	-0.134	-0.251	-1.659	-0.111	-1.193
Under 30	-0.077	-0.442	0.519***	3.258	0.201	1.821
Over 60	-0.494	-0.999	0.725***	2.701	0.325	1.570
College edu	0.050	0.337	0.093	0.535	0.037	0.346
Grad edu	-0.067	-0.348	0.326	1.127	0.092	0.633
Employed	-0.320	-0.691	0.583***	3.384	0.364**	2.271
High income	0.341	1.894	0.086	0.365	0.241	1.753
Hukou					0.375	1.845

\*\*\*p<0.01; \*\*p<0.05

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**TABLE 6 Structural Equations for the Determinants of Motivations**

	Obligation		Spirit		Convenience		Usage		Image	
	Est.	t	Est.	t	Est.	t	Est.	t	Est.	t
Male	0.131	1.462	-0.094	-1.114	-0.053	-0.602	0.065	0.858	-0.016	-0.195
Under 30	-0.037	-0.329	-0.019	-0.171	-0.048	-0.409	-0.195**	-2.030	-0.058	-0.537
Over 60	-0.097	-0.467	-0.203	-0.997	-0.078	-0.337	-0.370**	-2.093	-0.057	-0.274
College edu	0.166	1.644	-0.247	-2.575***	-0.018	-0.175	-0.016	-0.178	-0.063	-0.687
Grad edu	-0.162	-1.015	0.141	1.010	-0.121	-0.892	-0.062	-0.516	0.102	0.745
Employed	0.029	0.182	-0.17	-1.046	-0.173	-0.905	-0.183	-1.295	-0.083	-0.591
High income	-0.001	-0.011	-0.157	-1.316	-0.204	-1.810	0.015	0.141	-0.157	-1.409
Born in Shanghai	-0.062	-0.352	0.308	1.739	0.062	0.328	0.015	0.099	0.294	1.762
Shanghai hukou	0.106	0.621	-0.129	-0.746	-0.011	-0.058	0.183	1.234	0.071	0.430

\*\*\*p<0.01; \*\*p<0.05