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Public Acceptance Towards Different Smog Control Policies in Beijing
-- From Policy Instrument Selection Perspectives

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Abstract: With increasingly severe smog pollution in Beijing, the government adopted driving restriction policy (i.e. regulation) since 2008 and is making the policy of congestion charge (i.e. market-based instrument) since 2013. However, these policy instruments drew different opposition level in society. As citizens have played increasingly important role during policy design process, public acceptance represents the legitimacy of policy design and its relationship with policy instrument selection should be re-considered under this changing context. The critical puzzle facing Beijing government is how to make policy instrument selection to gain more acceptance rather than opposition when design or re-design the policy, giving that public acceptance might vary towards these instruments. However, little attention has been paid to public acceptance towards different policy instruments during policy-making process. Based on a sample of 285 valid questionnaires from Beijing, this paper adopts the ordered logistic regression to explore the causal relationship between policy instrument type and public acceptance towards driving restriction and congestion charge. The results show the general public prefer regulatory policy over market-based policy, and political trust in policymaking process and perceived fairness have significantly positive effects on public acceptance towards both instruments.

Key Words: Public acceptance; Policy instrument; Smog control; Driving restriction; Congestion fee

1. Introduction

Inhalable particles have become the principal pollution source in many Chinese cities, triggering the severe smog crisis and causing great harm to people's health. Exposure to fine particulate matters ($PM_{2.5}$) can aggravate chronic respiratory and cardiovascular diseases, alter host defenses, and damage lung tissue, even leading to premature death and cancer (Xie et al., 2015). Smog pollution become a severe public issue as Chen et al. (2013) indicates that 500 million residents of Northern China are losing more than 5 years of life expectancy per person because of air pollution.

Various Chinese municipal governments started designing and implementing smog control policies via direct and indirect policy instruments such as traffic control, emission reduction, industry upgrading, and urban planning (He et al., 2002; Wang et al., 2014; Lin, 2003; Shi et al., 2016). Among all alternatives, traffic control instrument has been widely adopted in many cities given that road transport is one of the main sources of $PM_{2.5}$ accounting for approximately 25-30% per year in major cities, such as Beijing (Cheng, et al., 2013), Shanghai[1], Guangzhou[2], Hangzhou[3], Nanjing[4] and so on.

For example, Beijing designed odd-even number driving restriction scheme to facilitate the Olympic games both for traffic control and for air quality control. The air pollution control effect of the policy was significant: Cai & Xie (2011) showed that daily average concentration of PM_{10}, CO and NO_2 decreased significantly in the traffic restriction period during and after Olympics. Beijing, thereafter, kept the one-day-a-week driving licensing scheme inside (excluding) 5th ring road since October 11th, 2008. The odd-even number driving restriction scheme, which was more restrict, was also kept but only adopted on severe smog days according to 'Emergency

[1] Source: http://www.shanghai.gov.cn/nw2/nw2314/nw2315/nw17239/nw17252/u21aw968232.html
[2] Source: http://www.gzepb.gov.cn/yhxw/201502/t20150205_78984.htm
[3] Source: http://www.gzepb.gov.cn/yhxw/201502/t20150205_78984.htm
[4] Source: http://jsnews.jschina.com.cn/system/2015/04/30/024548067.shtml

Plan for Heavy Air Pollution in Beijing' in 2013[5]. It is worth noting that driving restriction is not a permanent law, rather, it requires legal extension once a year. Recently, Beijing government is considering extending the odd-even number restriction policy to the whole heating season in winter[6].

Yet, public oppositions and limited policy effectiveness of driving restriction in the long run did exist. A survey in Beijing showed that 45.18% of non-car owners opposed the odd-even number driving restriction scheme, while 60.98% of car owners strongly expressed their oppositions and said that driving restriction was unfair to them and left their cars unused[7]. Some scholars stated that driving restriction invaded citizens' private property rights, and there was no restriction on the government owned vehicles, which led to injustice and might reduce public trust for authorities[8]. Oppositions led to rule-breaking behaviors. Wang et al. (2014) pointed out that rule-breaking behaviors (i.e. drive on plate restricted days) were constant and pervasive, and the Beijing Municipal Commission of Transport stated that there were 85,000 cases of restricted car driving on road during a severe smog period between December 16th and December 18th, 2016[9]. Other rule breaking behaviors include purchasing multiple cars with different odd-even license plates, covering plates to avoid punishment or borrowing license plates from others (Wang et al., 2014).

With increasing level of pollution and limited effects of driving restriction policy, Beijing government tries to adopt additional policy instruments such as congestion fee policy that charges most motor vehicles operating within the Low Emission Area in the central part of Beijing (2013-2017 Beijing Clear Air Action Plan[10]). This time, public oppositions soared even before the policy was drafted. In an online opinion

5 Source: http://news.163.com/13/1018/13/9BFJJMTH00014AED.html
6 Source: http://news.163.com/16/0129/16/BEGSEESM00014JB5.html
7 Source: http://auto.sina.com.cn/news/2008-09-04/2241407437.shtml
8 Source: http://www.infzm.com/content/18432/0
9 Source: http://news.cenews.com.cn/html/2016-12/20/content_53871.htm
10 Source: http://www.bj.xinhuanet.com/bjyw/2013-09/13/c_117351459.htm

poll, 61.4% of respondents in Beijing disagreed with congestion fee policy[11]. Particularly, car owners stated that it was unfair to charge congestion fee if citizens lived within the low emission area, and they took this as an extra burden to their daily life. In both policy processes, citizens presented oppositions based on various interests, which challenged Beijing government not only in terms of executing existing policy in a effective way, but also in terms of gaining enough support to design and launch new smog control policy.

This puzzle reflects a bigger theoretical discussion in public administration: where is the public in policy making process. Scholars usually tend to treat the public as a completely exogenous factor in the process of policy design and implementation, whose influence is only expressed by public managers and political appointees through electing political officials (Frederickson and Smith, 2003). Recently, researches have paid increasingly attentions to the role of the public, stating that more complicated policy design is supposed to involve the collaboration of multiple stakeholders, in which the voice of the general public is valued (Alford, 2009; Thomas, 2012). Thus, putting the public back into governance, and involving them into the policy-making process, is of great importance, and is viewed as a potent means to achieve key democratic values such as legitimacy, justice and effectiveness (Fung, 2006 & 2015).

It is true that, with the development of civil society and the Internet technology, the general public has better means to interact with political officials and to express their opinions towards policies. Policy acceptance rate, thus, represents legitimacy of the policy design (Doelen, 1998), and its relationship with policy instrument selection should be re-considered under this changing context. In China, citizen's rights of saying no to certain policies are hardly any news: several deployments of nuclear

[11] Source: http://finance.qq.com/a/20160603/012060.htm

power or paraxylene (PX) projects are suspended or cancelled because of low policy acceptance rate and social movements (Wang, 2014; Zhou, 2011).

Till now, policy makers are better at combining different types of instruments (i.e. regulations and market-based instruments) with believes that instrument mix can accumulate instrument advantages and avoid policy ineffectiveness (Goulder & Parry, 2008). However, little attention has been paid to public acceptance towards different policy instruments. Do the public think regulatory policy is fair even if policy makers believe they can assure a reasonable degree of fairness in the distribution of impacts? Or do the public agree with policy makers that market-based instruments are cost-effectiveness? The literature gap lies in the fact that little has been put on how to ensure instrument selected by the government gain enough public acceptance. This paper tries to explore the causal effect relationship by answering following questions: does policy instrument type serve as an influencing factor of public acceptance level? If so, what is the influential channel: does the instrument type influence public acceptance directly or through other essential factors?

This research adopts smog control policy in Beijing as the study subject and compares two types of policy instruments: driving restriction regulation and congestion fee, to explain public acceptance formation from six dimensions: policy instrument type, trust in government agencies, perceived fairness, perception of costs, perceived risk and knowledge of smog. The rest of this paper is organized as follows. Section 2 presents literature review and hypothesis. Section 3 introduces the research design and data source. Section 4 illustrates the methodology. Section 5 provides findings and discussions. Section 6 presents a further conclusions and policy implication.

2. Literature Review and Hypothesis

2.1 Policy instruments and levels of public acceptance

First of all, this paper focuses on the concept of public acceptance, not public

perception. Public perception is defined closely related to public attitude, with numerous studies revealing the level of public support for, or opposition to environmental projects, newly biotechnology or renewable technologies (Warren et al., 2005; Wolsink, 2007; Goodfellow et al., 2011; Valente & Chaves, 2017), while public acceptance states citizens' opinion towards local deployment of these projects. In many situations, perception dispatched from acceptance as previous studies found that there existed "high public support but low success rate" in which the public agreed with the technology development in general, yet, refused the local deployment (Wolsink, 2007; Bell et al., 2005). This research differentiates these two concepts to separate research focusing on personal attitude towards a technology or a project from research focusing on attitude towards a policy decision. Focusing on public acceptance allows this paper to explain why some policies obtain higher level of legitimacy than others.

Existing literatures found public preference varies towards different types of policy instruments (Loukopoulos et al., 2005). According to the governmental involvement degree, policy instruments could be categorized as coercive instruments (or called command-and-control instruments) with higher level of government enforcement (i.e. laws, regulation), and market instruments (or called incentive-based mechanisms) with low government intervention (i.e. quota trading, taxation and fees) (Vedung, 1998; Linder and Peters, 1989; Goulder & Parry, 2008; Howlett et al., 1995). Different stakeholders and entities have different preference over coercive instruments and market instruments (Stavins, 1998; Gunningham & Simlair, 1999; Linder and Peters, 1989; Goulder & Parry, 2008). For examples, policymakers previously prefer regulations, in which they can ensure their influence on policy design and implementation. However, with increasing knowledge of market-based instrument, more and more bureaucrats are willing to devote resources to achieve certain policy goals at lower cost by market-based instruments, especially young staff members who are influenced by the 'law and economics' movement (Hahn & Stavins,

1991). Not surprisingly, economists highly advocate market-based instruments owing to the minimization of aggregate costs, whereas, environmental groups typically support regulations as their achievements are more, and they disfavor market-based instruments because of the highly visible costs of environmental protection to the industry (Hahn & Stavins, 1991; Requate , 2005; Montero, 2002). It is worth noting that stakeholders might have unstable preference for policy instruments according to the specific context and the changing effects of different instruments (Hahn & Stavins, 1991).

However, policy acceptance of the general public has barely been mentioned in previous studies. This paper assumes higher possibility that the public would perform more as environmentalist than government sectors or economist given that the public regard smog control policy more from environmental protection perspectives. Thus, adopting the economic vs. coercive category of instruments, this paper assumes:

H1: public acceptance towards different types of policy instruments varies. For environmental protection policy such as smog control policy, the general public would welcome regulations more than economic-driven policies.

2.2 Political trust

Political trust is the individual's basic evaluative orientation toward the government based on how well the government is operating according to people's normative expectations (Zannakis et al., 2015). Trust in the government influence people's acceptance towards public policy in general, not excepting environmental policy (Levi, 1997; Jagers & Hammar, 2009). It is argued that political trust has positive effect on both people's attitude towards government regulation and the level of compliance (Dalton, 2004; Torgler, 2003; Harring & Jagers, 2013; Jagers & Hammar, 2009).

In most cases, political trust holds positive relationship with policy acceptance. Simply put, people are more willing to comply with government regulation and laws

if they have high level of trust in these authorities (Levi, 1997; Jagers & Hammar, 2009; Marien & Hooghe, 2011; Zannakis et al., 2015). Tyler & Huo (2002) suggested that citizens are more likely to abide by the decisions of political agencies if they perceive these agencies as legitimate whereas, citizens with low political trust intend to calculate the costs and benefits in compliance and be non-compliant (Tyler, 2006). Similar conclusions could be drawn to taxation policy and individual carbon allowance policies: when citizens trust that government agencies can use the tax or fee revenues in a judicious way, they are more likely to accept the policy (Jagers, Löfgren & Stripple, 2010; Dalton, 2004).

Existing literatures also mention that the effects of political trust on public acceptance are moderated by other factors. For example, political trust matters more to conservatives than it does to liberals (Rodolph & Evans, 2005), whereas political trust matters more when individuals are asked to sacrifice material interests to support policies (Hetherington, 2006). Following these, this research assumes that political trust might influence public acceptance towards congestion fee and driving restriction to different extent, since congestion fee is designed to take away of material resources from individuals.

Hypothesis 2.1: Political trust will have positive influence on public acceptance towards policy instruments.

Hypothesis 2.2: The effects of political trust on market-based policy instruments should be stronger than effects on regulatory policy instruments.

2.3 Perceived fairness

Studies show that fairness is also considered as a crucial factor affects people's support for policy instruments (Jagers, Löfgren & Stripple, 2010; Jakobsson et al., 2000; Zannakis et al., 2015). The public accept the policy if they perceive the instrument to be fair in its procedure and outcome (Jagers & Hammar, 2009). Comparing with procedural fairness, which refers to the situation that government

implements policy impartially, namely treating equal cases equally, it is the outcome fairness, which refers to the distribution of benefits and burdens within various groups of citizens that matters more to the public acceptance towards environmental policies.

Environmental problems, particularly, regard to collective benefit (Hardin, 1968; Ostrom, 1990). For example, smog control policies have embedded "social dilemma" where individual interests (i.e. enjoy the comfort and convenience of driving) will be sacrificed in pursuit of collective goods (i.e. reducing traffic amount to abate smog pollution) (Dawes, 1980). Therefore, existing research defines fairness both in equality term, in which everyone has the same policy obligation, and in equity term, in which policies treat the public according to their status (Deutsch, 1975; Törnblom and Foa, 1983; Jagers, Löfgren & Stripple, 2010). For example, equity policy allows low emission cars pay less carbon tax, while equality policy charges the same amount of carbon tax to all cars.

Many environmental policies are designed according to equality standard to fulfill the collective benefit. On-site sewage system in Sweden, for example, gained more public acceptance when local citizens felt they were treated equally (Zannakis et al., 2015). For these policies, the general public tend to accept environmental policies if they perceive equally distribution of costs and benefits in policy outcome (Jagers, Löfgren & Stripple, 2010; Jagers & Hammar, 2009; Hammar & Jagers, 2007). For equity-oriented policies, such as carbon tax, the public agree with equity principles that people who pollute should pay for it (Jagers & Hammar, 2009). It is worth noting that people who prefer equity standard may have their own definition of equity, which could be different from what is defined in equality policy or even from that in equity policy design. For instance, carbon tax embedded in petrol price was designed to an equity policy, in which drivers who drove more paid more tax. Yet, this taxation increase affected poor people and citizens who lived in remote areas (who were car dependent) a lot more than it affected rich people, which still made citizens perceiving the distributional consequences of this policy as unfair in terms of equity

and led to low public acceptance (Tindale & Hewett, 1999; Jagers & Hammar, 2009).

In Beijing, driving restriction policy is designed with equality standard, in which all cars follow equal obligations, while congestion fee policy is set with equity standard, in which only cars drive into the low-emission region are charge. Therefore, we assume different public reaction over the fairness of the two policies.

Hypothesis 3.1: Perceived outcome fairness (i.e. equality and equity) will have positive impacts on public acceptance towards policy instruments.

Hypothesis 3.2: Perceived outcome fairness of equality and perceived outcome fairness of equity would have different influence on public acceptance towards driving restriction policy and congestion fee policy. Due to the various understanding of equity, it may generate negative impact on pubic acceptance than perceived equality.

2.4 Perceived cost

Environmental policy such as smog controlling requires the public to change their living style (i.e. reduce driving), which might generate inconvenience to their daily life and increase perceived cost. Jakobsson et al. (2000) found that the public acceptance of congestion fee policy was lower because the public felt they encountered infringement on traffic freedom by paying for something that had been free before. Similarly, driving restriction policy limited individual's freedom to choose travel methods, which might diminish individual's travelling efficiency and comfort (Eriksson et al., 2006). Therefore, driving restriction and congestion fee policy might all influence people's perceived cost and decrease their acceptance of these policies (Jakobsson et al., 2000; Eriksson et al., 2006).

Hypothesis 4: Perceived cost of policy impact will have negative impact on public acceptability.

2.5 Knowledge and perceived risk

Studies on the effects of knowledge and risk perception can be traced to the nuclear debate in 1960s (Sowby, 1965; Starr, 1969), and has been gradually expanded to topics on climate change, and renewable energy development (Warren et al., 2005; Goodfellow et al., 2011). In these researches, scholars reveal that both knowledge and perceived risk are related to the public's acceptance towards local deployment (Flynn et al., 1993; Katsuya, 2001; Huang et al., 2013).

Knowledge is influential to public acceptance both in terms of information amount and knowledge accuracy. Lack of knowledge or disinformation, for example, is a major factor of public opposition to new technology or pro-environmental behavior (Ottinger & Williams, 2002; Bell et al., 2005; Zsóka et al., 2013; Wang et al., 2015), while accurate knowledge about the causes of climate change is the strongest single predictor of behavioral intention to support climate policy (i.e. choose public transportation) (Patchen, 2006; Whitmarsh, 2009; Bord et al., 2000; Aini et al., 2013). Although some scholars regard knowledge as an antecedent to individual's attitude or value while others suggest it as a direct determinant of individual's behavioral intention (Fishbein & Ajzen, 1975; Kollmuss and Agyeman, 2002; Bamberg and Möser, 2007), this research takes knowledge influence as a direct influence over public acceptance.

Hypothesis 5: Knowledge of smog will have positive effects on public acceptance towards driving restriction policy and congestion fee policy.

Risk perception is defined as individual's subjective judgment of adverse consequences of a particular hazard and threats to environment or health (Aven & Renn, 2010). Previous studies state that risk perception is negatively related to the public's acceptance towards local deployment of renewable energy development (Flynn et al., 1993; Katsuya, 2001; Huang et al., 2013). Scientific facts show that exposure to $PM_{2.5}$ can cause chronic respiratory and cardiovascular diseases, alter host defenses, and damage lung tissue (Xie et al., 2015). At the same time, the general

public generates individual risk perception towards smog even without scientific training. A survey conducted in 2013 asked citizens what might be the hazards caused by smog, and the respondents perceived potential harms to their health as the primary hazard. 82% of them stated that smog pollution might cause disease like respiratory besides other hazards such as global warming (54.9%), oxygen layer destruction (49.1%) and acid rain (37.8%)[12]. As risk perception is positively related with people's perceived environmental responsibility and environmental-friendly behavior (Liobikienė & Juknys, 2016), we assume that if people perceive more risk of smog, they might accept the driving restriction and congestion fee policy more.

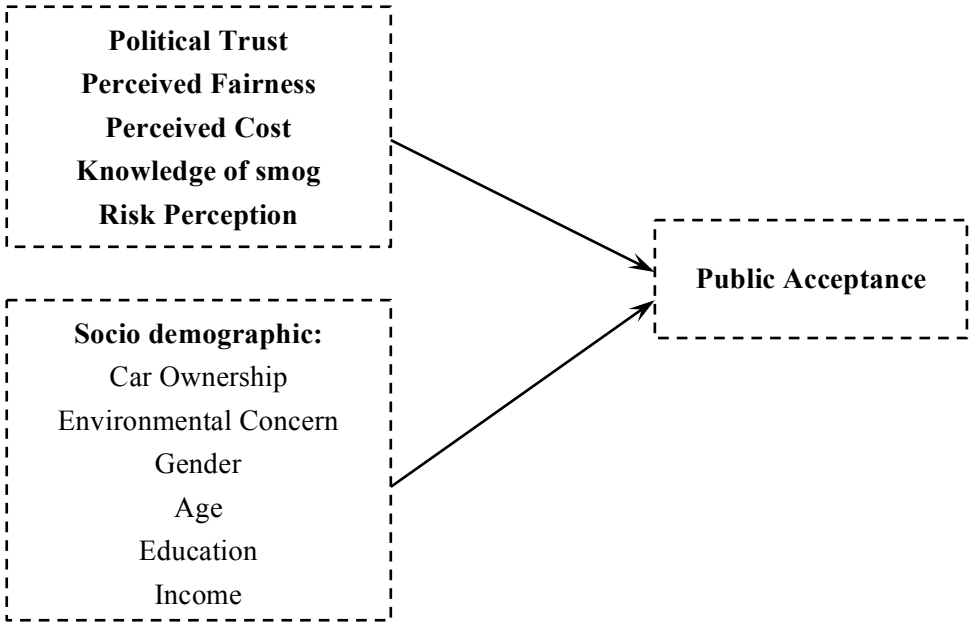
Hypothesis 6: Perceived risk of smog will positively influences public acceptance towards smog controlling policy.

3. Research Design and Data Source

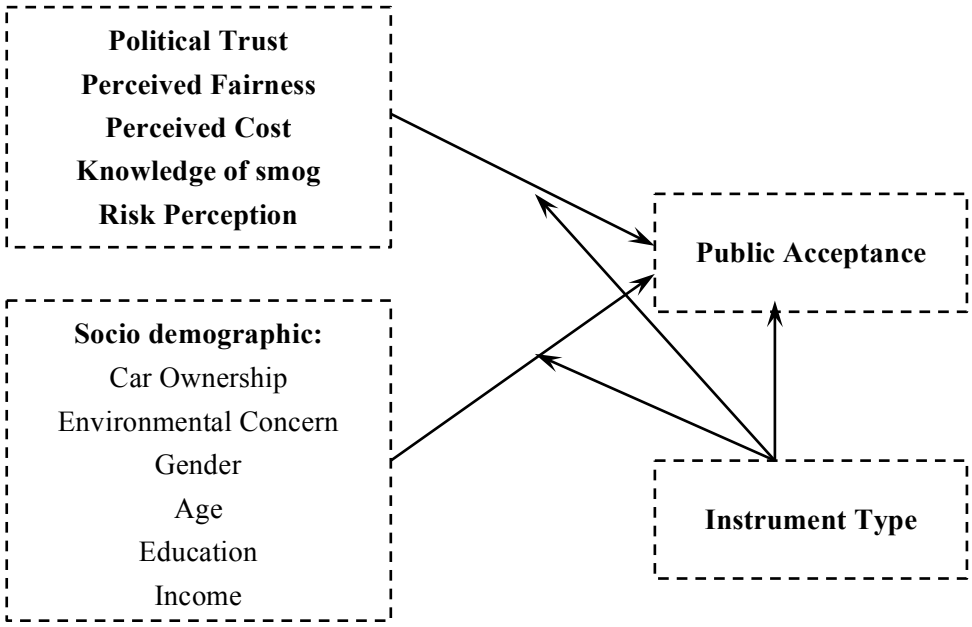
3.1 Theoretical model and variable specification

Based on the literature review, previous studies revealed various factors influencing public acceptance, such as political trust, perceived fairness, perceived cost, knowledge, risk perception and other socio demographics (Jagers, Löfgren & Stripple, 2010; Jagers & Hammar, 2009; Jakobsson et al., 2000; Zannakis et al., 2015; Liobikienė & Juknys, 2016; Zsóka et al., 2013; Wang et al., 2015). However, less attention has been paid to the role of policy instrument type, that is, whether the instrument type will serve as a direct and moderating factor to influence public acceptance. Figure 1 illustrates the theoretical framework.

[12] Data Source: http://news.xinhuanet.com/legal/2013-04/07/c_124545386.htm



A. Previous casual path excluding policy instrument type



B. Considering the casual path including policy instrument type

Figure 1. Theoretical framework: Policy instrument type and public acceptance towards smog controlling policies in China.

According to the theoretical framework, we grouped survey questions in seven parts, measuring socio demographic characteristics, political trust, perceived fairness,

knowledge of smog, perceived risk of smog, perceived cost of traffic inconvenience and public acceptance towards polices. Except for socio demographic variables and knowledge of smog, we used the 5 point Likert-scale measurement for all other variables.

First of all, this paper did not use one general question to measure *political trust*, such as 'how much do you trust in the government generally' or 'how much do you trust in the institution', due to the complexity of this concept. "Trust" can be expressed as 'A trusts B's ability to do X'. However, the dominant measurement of political trust in previous literature only pays attention to the object B, such as the government sector, judiciary, army and other entities, while the context or the target X has been ignored (Li, 2014). We followed Li (2012) and measured trust in two dimensions: one as politician's commitment to protect public interests and the other as their competence to act. Commitment to act refers to the government agencies' promise keeping, caring about the public, incentive compatibility, or certain combination of the three (Levi & Stoker, 2000). And competence to act refers to the capacity of political institutions to realize their commitment to protect public interests or achieve certain goals (Li, 2012; Levi & Stoker, 2000). Besides commitment and capacity, political trust also has other measurements such as trust in policy-making process and trust in policy effectiveness. Thus, this paper measured political trust in nine questions, including trust in policy transparency and openness (i.e. 'I think the process of smog control policy making is open'), trust in competence (i.e. 'I think local government has the ability to deal with smog crisis in a short time'), trust in commitment to act (i.e. 'I think local government is willing to control smog'), trust in effectiveness (i.e. 'I think local government has implemented effective policies in smog control') and so on.

Secondly, *perceived fairness* refers to outcome fairness in this research and is measured both by its equality and equity. For smog control policy, the principle of equality implies that each car-owner has the same obligation to obey the driving

restriction rule, whereas equity implies whoever drives into certain area pays for the fee or people who pollute more should pay more. Following the measurement of Jagers et al. (2010) and Zannakis et al. (2015), we asked respondents' perceived fairness (in terms of equality and equity) to driving restriction policy and congestion fee policy respectively.

Additionally, this study adopted a objective knowledge assessment scale to test the public's *knowledge of smog* rather than self-reported assessment, because people are highly likely to overestimate their capacity in self-reported assessment, generating threats to validity and reliability (Kruger & Dunning, 1999). Our objective knowledge scale contained eight items to test the public's knowledge from different aspects, including the formation and prevention of smog (i.e. circle out the main pollutants in smog), the severity of smog crisis (i.e. circle out the correct average annual concentration of $PM_{2.5}$ in Beijing) and policy content (i.e. circle the correct driving restriction policy content).

According to the measurements of perceived risk in Katsuya (2001) and Huang et al. (2014), the general public have risk perception mainly on healthy (i.e. disease), environmental (i.e. solid pollution, acid rain etc.) and societal threats (i.e. social movement, poverty etc.). Considering the main hazards people concern about smog is health hazards[13] and knowledge uncertainty of smog, we measured *perceived risk of smog* both from health risk and uncertain risk point of view. Following Jakobsson et al. (2000), we measured the perceived travel cost from in question of 'to what extend do you agree that smog control will bring travel inconvenience to people's daily life'.

Along with age, gender, education, income, we still tested if the respondents were car owner (i.e. how many cars do you have), their pro-environmental attitude (i.e. I take environment protection as an important issue.) and willingness to pay for smog control as control variables.

[13] Data Source: http://news.xinhuanet.com/legal/2013-04/07/c_124545386.htm

Finally, the dependent variables were *public acceptance* towards driving restriction policy and congestion fee policy. We measured the public acceptance respectively: 'I support the driving restriction policy in Beijing', 'I support the congestion fee policy in Beijing to alleviate air pollution'.

As Cronbach's α is the average linear correlation among questions belonging to the same scale, we adopted this index to test scale reliability. Nunnally (2010) stated that a commonly accepted rule of thumb for describing internal consistency via Cronbach's α is that is should be 0.7 or greater. However, as a larger number of items can artificially inflate the alpha value, this rule might be more suitable if the scale has more than 14 items (Cortina, 1993). Since the number of items in our scale is limited, we took the lowest α of 0.5786 as acceptable. Additionally, the construct validity of our scale is guaranteed by literature review. We adopted the concept definition and variable measurement from previous studies, which can be considered to be valid.

Table 1

Reliability of questionnaire

Variable	Cronbach's α	The number of items
Public acceptance	0.5862	2
Political trust	0.8744	9
Perceived fairness	0.5786	4
Risk perception	0.9256	2
Knowledge of smog	0.7082	8

3.2 Data Source and Sampling

We study two smog control policies in Beijing, the capital city of China that has severe smog situation. Beijing is the first city in China adopting harsh regulatory traffic restriction policy starting from 2008 and renews this policy every year. In 2013, Beijing Municipal Government started to study the congestion fee policy that will

charge vehicles in the low emission area via market based instrumental design. Both of these policies raised hot discussions in the society.

This research takes both driving restriction and congestion fee as research objects. We conducted an online survey to residents who has lived in Beijing for at least 6 months in August 2016 to check residents' acceptance level towards two smog control policies. During survey period, the average $PM_{2.5}$ concentration in Beijing ranged from 37-65μg/m^3, which was all categorized as "good air quality" according to the $PM_{2.5}$ concentration standard of National Environmental Protection Bureau[14]. Therefore, no significant of weather influence should be considered during data analysis.

We started to pass the online survey link among students in Tsinghua University and developed our sample group following the "snow-ball" strategy (Noy, 2008). In order to make sure that qualified respondents pay sufficient attention to questions, we double-checked how much time each respondent spent on the questionnaire as a proxy of the data quality (Huang, 2015). We dropped the survey data if the time was much less than 3 minutes[15]. Finally, we had 285 valid questionnaires.

Our survey sample conforms to the population distribution of Beijing in almost all aspects (see Table 3). Among the 285 respondents, 56.49% was male (N=161) and 43.51% (N=124) was female. However, the average age in our sample ranged from 14 to 69 with the mean of 30 years old, which was younger than the city level age average. People between 21 to 30 years old are over represented in this research. In our data, 128 respondents (48.42%) hold college degree and 117 (41.05%) hold

[14] Data Source: Data Center of National Environmental Protection Bureau. http://datacenter.mep.gov.cn
It is smog day if 24 hours average $PM_{2.5}$ concentration is more than 75 μg/m^3. Source: http://kjs.mep.gov.cn/hjbhbz/bzwb/dqhjbh/dqhjzlbz/201203/t20120302_224165.htm
Although the upper limit of 24 hours average $PM_{2.5}$ concentration is 25 μg/m^3 according to the standard of WHO, we adopted the standard of National Environmental Protection Bureau considering the severe air pollution in China. Source:
http://apps.who.int/iris/bitstream/10665/69477/3/WHO_SDE_PHE_OEH_06.02_chi.pdf

[15] According to the pilot survey, the normal answering time is more than 3 minutes. Thus we dropped the subjects if the answering time is less than 3 minutes in the online survey.

postgraduate degree or higher, which made higher educated population being over represented compared with the whole population. Monthly income, measured in yuan (RMB), ranged from 7,001 to 10,000 in our sample, which is higher than the average monthly income of 6,906 yuan (RMB) in Beijing[16]. Authors attributed these selection biases to online survey method, which naturally over represented people who are younger, better educated with higher monthly income[17]. Nearly half of the respondents (N=143) had no car in their family, 114 of them had one car, and only 28 respondents had two cars or more.

Table 2

Summary of sample socio demography (N=285)

	Background	Frequency	Percentage (%)	Distribution of Beijing Population (%)
Gender	Male	161	56.49	50.18
	Female	124	43.51	49.82
Age	14-19	6	2.11	3.90
	20-29	142	49.82	21.70
	30-39	101	35.44	18.50
	40-49	23	8.07	16.40
	50-69	13	4.56	22.90
Monthly	<2000	10	3.51	3.00
Income	2000-4000	23	8.07	23.30
	4001-7000	72	25.26	27.95
	7001-10000	70	24.56	19.25
	10001-20000	78	27.37	18.70
	>20000	32	11.12	7.30
Education	Middle school or below	10	3.51	39.22
	High school	20	7.2	15.36
	College	138	48.42	38.61
	Masters or above	117	41.05	4.72
Car	None	143	50.18	74.72
	1	114	40.00	25.28
	>1	28	9.82	

Data source[18]: data collected by authors, and Beijing Census Data in 2014[19], reports of Beijing average

[16] Source: http://www.cngold.com.cn/newtopic/20160727/2016nbjpjgzsds.html

[17] Although with certain bias in sample selection, online survey still becomes increasingly important in social science (Huang, 2015). In this study, although the respondents were younger, better educated and have higher monthly income than the general population of Beijing, this group usually intends to be more politically active and more involved with the policy-making process, and hence merit particular attention.

[18] Distributions of gender, age and education of Beijing population are from Beijing Census Data in 2014,

monthly income[20] and car parc in 2016[21].

4. Methodology

4.1 Ordered logistic model

As the dependent variable in this study is ordinal: public acceptance towards driving restriction or congestion charge policies. Commonly speaking, ordinal scale is characterized to be a clear ordering of the levels exists while the absolute distances among different levels are unknown. Although a lot of literature and methods treated categorical data as nominal for effectively and efficiently modeling, it's of great importance of treating them as ordinal, such as greater flexibility and detection power, simpler interpretations and so on (Agresti, 2010).

As the dependent variable – public acceptance in our research is measured by 5 points Likert scale, we adopted ordered logistic model that is popular for analyzing studies with an ordered categorical outcome. Ordered logistic model can be expressed as follow:

$$y^{*}=X\beta+u,\ u \mid X \sim Logit(0,\ 1) \qquad (1)$$

where y^{*} is the exact but unobserved latent variable, X is the vector of independent variables, u is the error term, and β is the vector of regression coefficients which we wish to estimate. Suppose y^{*} can't be observed, we can only observe the categories of response:

$y = 1$, if $y^{*} \leq \alpha_1$;

$y = 2$, if $\alpha_1 < y^{*} \leq \alpha_2$;

$y = 3$, if $\alpha_2 < y^{*} \leq \alpha_3$;

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while distributions of monthly income and car ownership are collected from reports of Beijing average monthly income and car parc in 2016 respectively.

19 Source: http://www.bjstats.gov.cn/rkjd/

20 Source: http://www.cngold.com.cn/newtopic/20160727/2016nbjpjgzsds.html

21 Source: http://mt.sohu.com/20170115/n478747938.shtml

$y = 4$, if $\alpha_3 < y^* \leq \alpha_4$;

$y = 5$, if $y^* > \alpha_4$,

where the parameters α_i are the externally imposed endpoints of the observable categories. Thus, the ordered logistic technique will use the observations on y, which are a form of censored data on y^* to fit the parameter vector β. The vector of coefficients β represent the log odds ratios of y to be equal to or greater than j when each component of X increases by one unit, respectively, and the other components remain constant:

$$P(y=1| X) = P(y^* \leq \alpha_1 | X) = P(X\beta + u \leq \alpha_1 | X) = \Phi(\alpha_1 - X\beta)$$

$$P(y=j| X) = P(\alpha_j - 1 < y^* \leq \alpha_j | X) = \Phi(\alpha_j - X\beta) - \Phi(\alpha_j - 1 - X\beta) \quad (2)$$

$$P(y=5| X) = P(y^* > \alpha_4 | X) = 1 - \Phi(\alpha_4 - X\beta)$$

($j=2,3,4$; $\Phi(\cdot)$ is distribution function)

4.2 Analysis of this research

In our study, the analysis is three-tiered. At first, we used descriptive analysis and T-test to compare citizens' acceptance level towards driving restriction and congestion charge policies. Additionally, we also made initial assessment of influencing factors (i.e. political trust, perceived risk, perceived fairness and knowledge).

Secondly, we adopted order logistic model to delineate the causality between public acceptance level and policy instrument type. The regression can be characterized as:

$$Acceptance = \alpha + \beta\ type + \gamma\ X_i + u \quad (3)$$

The dependent variable *acceptance* measures respondents' acceptance level towards driving restriction or congestion charge policies, ranging from 1 ('strongly disagree') to 5 ('strongly agree'). The main independent variably *type* is marked as 0 for driving restriction policy while 1 for congestion charge policy. Moreover, the vector *X*

contained other influencing factors as political trust, perceived risk, perceived fairness, knowledge, car ownership, environmental concern and socio demographics.

Lastly, to further investigate the moderating effect of policy instruments on public acceptance level, we estimated the equation (4), which encompassed all the above variables and the interaction term (X_i * *type*).

$$Acceptance = \alpha + \beta\ type + \gamma\ X_i + \delta\ (X_i * type) + u \quad (4)$$

5. Findings and Discussion

5.1 Descriptive statistics

Table 3 summarizes the descriptive statistics of all variables. With T- test value (see Figure 2), public acceptance towards driving restriction policy and congestion fee policy is significantly different: people tend to support driving restriction policy much more than congestion fee policy (0.55 higher in average) [22]. With nine measurements of political trust, we further adopt factor analysis to categorize them into two dimensions with one representing trust in openness and transparency of policy making process (we name it as 'political trust in process'), and the other representing political trust in governmental capacity[23]. As shown in Table 3, the public has a bit higher level of trust in government capacity than their trust in openness and transparency of policymaking process. This is consistent with Ma (2007) that authoritarian values have significant effects on political trust in Southeast Asian countries, and the high level of political trust in China is strongly influence by traditional values (i.e. the worship of authorities). However, in authoritarian regimes, the general public are usually excluded from the process of policy-making, thus might result in the relative low trust in the process of policy making.

[22] T=5.7682***

[23] KMO=0.8429, which means it's very suitable to do factor analysis.

For perceived risk, we average perceived risk of health hazards and uncertain hazards as the final measurement of perceived risk of health. As shown in Figure 3, majority of the respondents perceives high level of health risk under smog pollution (mean = 4.27[24]). Meanwhile, the general public does not connect traffic inconvenience to smog control policy directly at descriptive level (mean = 2.43). The internal causal effect relationship between the two is further tested in the regression result session.

Figure 4 shows the distribution of perceived fairness, which varies between different policy instruments: majority of respondents have high level of perceived fairness in terms of equity to driving restriction policy (mean = 3.85[25]) and to congestion fee policy (mean = 3.58), whereas, citizens have high level of perceived fairness in terms of equality to driving restriction policy (mean = 3.93) but low perceived fairness to congestion fee policy (mean = 2.70). It seems to us that citizens regard these two policies to be similar in the sense of their equity and to be different in the sense of their equality.

Table 3 shows that almost all the respondents hold a pro-environmental attitude (mean = 4.17[26]). We also notice that citizens show low willingness to pay for smog controlling (mean = 1.01[27]), this might suggest that citizens prefer regulatory policy over market-based policy since they don't have to contribute money on it. Further analysis could be found in sector 5.2.4.

Table 3
Variables and descriptive statistics

Variables		Mean	Std. Dev.	Scale
Dependent variables	Public acceptance towards driving restriction policy	3.64	1.05	1-5
	Public acceptance towards congestion	3.09	1.21	1-5

[24] In risk measurement, 1 means "not risky at all" and 5 means "extremely risky".
[25] We use 5-likert scales to measure fairness and 1 as "not fair at all" and 5 as "totally fair".
[26] In environmental attitude measurement, 1 represents "not important at all" and 5 represents "extremely important".
[27] Willingness to pay is measured from 0 as "not willing to pay at all" to 5 as "I would like to pay more than 300 yuan per month for smog control".

	fee policy				
Independent variables	Political trust in capacity	Commitment	2.98	1.20	1-5
		Advice	2.94	1.12	1-5
		Impact	2.57	1.10	1-5
		Instruments	2.74	1.11	1-5
		Effectiveness	2.56	1.03	1-5
		Capacity_short	2.92	1.04	1-5
		Capacity_long	3.32	1.07	1-5
	Political trust in process	Openness	2.83	1.12	1-5
		Transparency	2.71	1.07	1-5
	Perceived risk of healthy		4.27	0.82	1-5
	Perceived cost of traffic inconvenience		2.43	1.07	1-5
	Perceived equality fairness to driving restriction		3.93	1.00	1-5
	Perceived equality fairness to congestion fee		2.70	1.24	1-5
	Perceived equity fairness to driving restriction		3.85	1.00	1-5
	Perceived equity fairness to congestion fee		3.58	1.11	1-5
	Knowledge		4.33	1.27	0-8
Control variables	Car ownership		0.61	0.69	0-3
	Pro-environmental attitude		4.17	0.99	1-5
	WTP		1.01	1.13	0-5
	Age		31.18	7.67	14-69
	Female		0.44	0.50	0 or 1
	Education		3.27	0.74	1-4
	Income		3.99	1.29	1-7

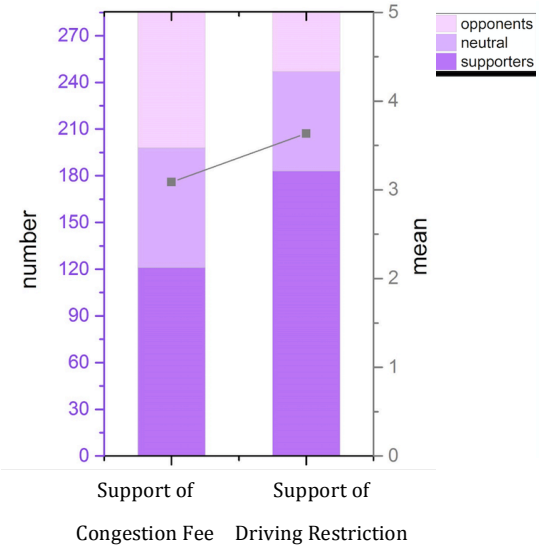

Fig. 2. Distribution of the acceptance towards policies

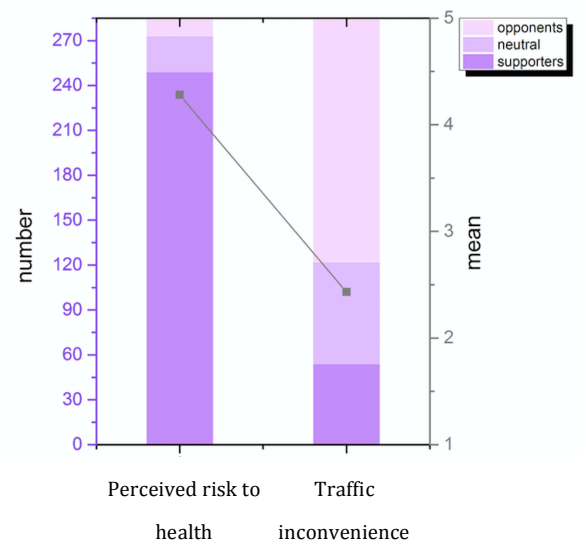

Fig. 3. Distribution of perceived risk and benefits

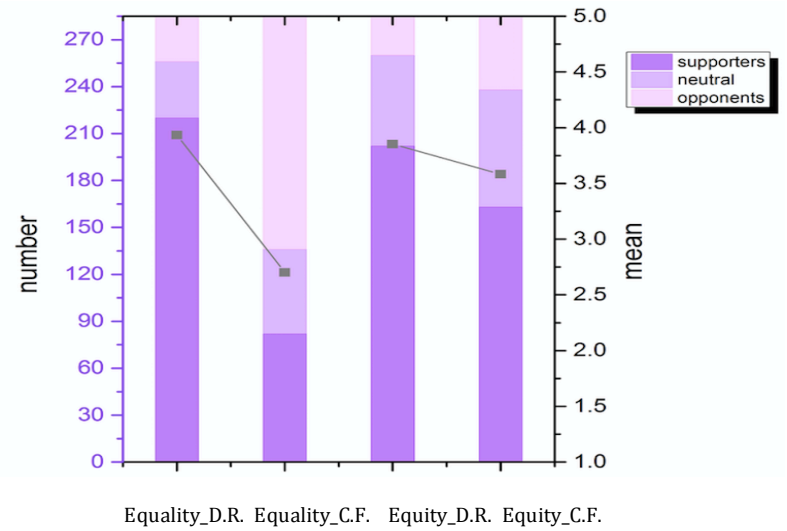

Fig. 4. Distribution of perceived fairness[28]

4.2 Regression results and discussions

Since we used ordinal measurement (5 point Likert-scale), we adopted ordered logistic regression for data analysis. We firstly ran a base model of Equation (3) (Model 1 in Table 4) to test what were influential factors of public acceptance controlling for policy type (driving restriction policy marked as 0 and congestion charge policy marked as 1). Then we ran the second model of Equation (4) to test how

[28] D.R. is short for Driving Restriction, while C.F. is short for Congestion Fee.

possible interactions among factors (especially with policy type) influence public acceptance. Detailed results could be found in Table 4.

Table 4
Regression results for public acceptance

	Model 1		Model 2	
	Coef.	T	Coef.	T
Car owner	**-0.35*** **	-2.82	**-0.34*** **	-2.74
Risk perception towards health	0.07	0.64	0.06	0.59
Worry about traffic inconvenience	**-0.15***	-1.87	**-0.16***	-1.94
Political trust in Govt. capacity	0.12	1.13	0.14	1.33
Political trust in policy process	**0.34*** **	3.42	**0.34*** **	3.47
Perceived fairness of equality	**0.44**** **	5.64	**0.40**** **	4.92
Perceived fairness of equity	**0.22*** **	2.62	**0.24*** **	2.85
Knowledge about the smog	0.09	1.41	0.08	1.23
Policy type	**-0.45** **	-2.47	**-0.54*** **	-2.92
Pro-environmental attitude	**0.25*** **	2.74	**0.25*** **	2.71
Willingness to pay (WTP)	**1.13**** **	6.55	**1.16**** **	6.71
Policy type * Car owner			**-0.51** **	-2.16
Policy type * WTP			**0.60***	1.84
Policy type * Pro-environmental attitude			-0.21	-1.22
Policy type * Trust in Govt. capacity			0.10	0.48
Policy type * Trust in policy process			0.18	0.98
Policy type * Perceived fairness of equality			-0.03	-0.19
Policy type * Perceived fairness of equity			**-0.37** **	-2.25
Age_group				
20-40	0.60	0.85	0.55	0.76
41-69	0.54	0.72	0.50	0.66
Female	**-0.38** **	-2.36	**-0.92** **	-2.39
Education				
Middle school and lower	-0.51	-0.97	-0.51	-0.97
College degree	-0.63	-1.35	-0.63	-1.34
Graduate school and higher	-0.50	-1.05	-0.49	-1.02
R^2	0.1248		0.1334	
N[29]	570		570	

Note: *p<0.1, **p<0.05, ***p<0.01, ****p<0.001

5.2.1 The general public prefer regulatory policy over market-based policy

[29] As each respondent was asked for his/her acceptance level towards driving restriction and congestion fee, the number of observation was doubled in our regression.

Both the descriptive statistics and regression results show that policy instrument type matters: citizens have higher level of oppositions to congestion fee policy (Coef.=-0.54, $p<0.01$), which verifies Hypothesis 1. In other words, citizens had significant preference over regulatory policy over market-based policy with regarding to smog control when everything else being equal. Despite policy system difference, this conclusion is similar to western country experience where citizens are more sensitive to market related policies (Loukopoulos et al., 2005). Experts indicated that concurrent Chinese legal system only allowed road charges to cover operating cost and to return commercial loans. Congestion charge, in this sense, lacks of proper legal basis[30].

The general public, might not being aware of this legal explanation, had similar interpretations from their own perspectives. This paper held semi structural interviews with 10 people in November 2016 asking detailed reasons why they objected congestion fee policy[31]. Respondents opposed the policy because of three reasons. Firstly, congestion fee, as a visible direct cost, was considered as an extra burdensome to the public. Secondly, the public was not that confident about the implementation capacity of government agencies, worrying about technically feasibility and unfairness in the fee collecting and usage process. Additionally, car owners that lived or worked within low emission areas were strongly against the congestion charge, stating that it was unreasonable and unfair for them to pay for the routine commute they could not avoid.

5.2.2 Political trust in policy process positively influence public acceptance while political trust in capacity does not show significant influence

Hypothesis 2.1 is verified by regression results: although political trust in government

[30] Source: http://news.163.com/16/0602/15/BOIJRKEB00014AEE.html

[31] Starting from MPA students in Tsinghua University, we chose the interviewees following the "snow-ball" strategy (Noy, 2008). Among 10 respondents, there are 5 males and 5 females, with age distributed from 27 to 56. Additionally, two respondents work in companies, one is student and the left are government employees.

capacity doesn't have significant effects on public acceptance, political trust in policy-making process positively influences public acceptance significantly (Coef.=0.34, $p<0.001$). In the monolithic administration system, Chinese people trust their government usually in terms of its capacity, by which the government could perform its functions and responsibilities appropriately and effectively (Li 2004; Zhu and Zhou 2011). Yet, with the development of civil society and improvement of citizens' political efficacy, the general public is able to access to information from various resources, which increase their capable to participate in policy-making process, especially via online community and social media (Zhou, 2011). The raise of self-expression values reduced the importance of trust in government capacity but replaced it with democratic preference (Wang 2005). Thus, consistent with regression results, the general public in China started to value more on the openness and transparency of policy making process, which became a precondition of public acceptance in smog control policies.

With regarding to policy type difference, however, Hypothesis 2.2 was not fully supported when this paper checked the interaction of policy type and two types of political trust. Policy type didn't show any statistically moderate significance on either form of trust to public acceptance. In other words, the general public didn't feel significant difference between regulatory policy and market-based policy in the sense of what important role political trust might play to policy acceptance. From policy design point of view, congestion fee policy is a repressive market-based policy that restricts or prevents citizens' ability to take certain actions via market instrument of fee. From citizens' perspectives, repressive policy is more like governmental regulations compare to stimulate market-based policy; therefore, the general public might have hard time differentiating driving restriction policy from congestion fee policy under the authoritarian mindset.

5.2.3 Perceived fairness has significantly positive influence on public acceptance

while the standard of equity shows negative effects on public acceptance towards congestion fee

Additionally, we found strong support for Hypothesis 3.1 that perceived fairness had significantly positive relationship with public acceptance both in terms of equality and equity (equality: Coef.=0.40, $p<0.001$; equity: Coef.=0.24, $p<0.01$). Confirming existing literatures, this research found that individuals who felt they were treated equally for the distribution of burdens and costs (i.e. every car owner has to obey the same rule for driving restriction or pay the same amount for congestion fee) would be more likely to accept these policies. The direct policy implication, therefore, is that government authorities should consider citizen's perceived fairness in the policy-making process; otherwise, significant perception bias might directly harm the policy legitimacy.

On the other hand, policy type did matter and showed different moderator effects to acceptance. Results showed that the interaction of policy type and equality fairness was not significant but the interaction of policy type and equity fairness was significant. Simply put, the moderator effect for equality fairness was not significantly different between regulatory policy and market-based policy. Yet, hypothesis 3.2 was verified as the influence of equity fairness was significantly reduced in market-based policy than that in regulatory policy. What is more, the overall impact of fairness towards market-based policy was even negative, which meant people would less likely to accept congestion fee policy if they emphasized more on equity value. In the descriptive statistics, we found that citizens felt larger difference in terms of equality and equity for regulatory policy, but less difference for market-based policy. We elaborate this finding in two perspectives. Firstly, echoing to existing literatures, Chinese citizens also took equality as more important when they evaluated regulatory policies. In other words, equity standard was less relevant to driving restriction policy. On the other hand, similar to what we found in political trust hypothesis, people might

regard both smog control policies as coercive following the authoritarian mindset. Even though congestion fee was mainly designed following equity principle, citizens still regarded it as high in equality standard.

5.2.4 Smog control policy is regarded more as traffic control and environmental policy rather than health policy

Policies that reduce $PM_{2.5}$ emission by traffic control have to face the natural tradeoff between air quality improvement and traffic inconvenience. Similar logic applies to public acceptance in this research: even though the descriptive statistics showed that the public didn't perceived a direct connection between smog control policy and traffic inconvenience, perceived traffic inconvenience had significant negative effects on public acceptance of smog control policy, which verified Hypothesis 4. In traffic policy studies, the public would like to generate higher level of oppositions towards a policy when they noticed more infringement on freedom (Jakobsson et al., 2000). Combined with regression results on perceived health risk and knowledge of smog, none of which had significant impact on public acceptance, this paper found that Chinese citizens regarded health risk to be high, yet, they didn't regard health consideration as significant for their acceptance to either driving restriction policy or congestion fee policy. In other words, smog control policy was more as a traffic control policy than a health oriented policy. Along the same line, Chinese citizens regarded smog control policy as environmental policy since pro-environmental attitude showed significant positive influence on public acceptance (Coef.=0.25, $p<0.01$).

Overall, WTP had statistically significant positive influence over public acceptance (Coef.=1.16, $p<0.001$). In particular, its influence on public acceptance was exaggerated in market-based instrument, in which people with higher level of WTP would be more willingly to accept congestion fee policy than to driving restriction policy.

5.2.5 Other determinants on public acceptance towards smog control policy

With regards to control variables, car ownership significantly opposed the smog control polices (Coef.=-0.34, $p<0.01$), and this effects had been exaggerated in the congestion fee charge policy. It was true that car owners opposed both the traffic restriction and economic cost from smog control policies so that they generated lower level of acceptance. But it was also true that car owners could avoid driving restriction policy more easily by having the second car or borrowing others' car, yet, it was harder for them to escape congestion fee charge. This could explain the reason why car owners preferred driving restriction policy over congestion fee policy.

6. Conclusions and Policy Implication

Policy instrument is more than a technical tool in policy design and implementation; rather, it has political meanings that may influence the general public in policy acceptance and compliance. This paper takes policy instrument type as endogenous and reveals the different influential pattern between regulatory tools and market-based tools. Using two smog control policies in Beijing as the study objects, this paper reveals three key conclusions. Firstly, the general public does generate different acceptance level towards regulatory and market-based policies. In this case, general public shows larger opposition to market-based policies. Smog control policy combines multiple goals at the same time: environmental protection goals, health goals, traffic control goals, and others. Chinese citizens, who get used to powerful authoritarian government adopting regulatory policies, might need mindset transition to understand how different duties should be distributed among stakeholders in each policy instrument. In our interview, some argued that smog control should be government's duty and citizen should not pay for it. The bond between citizen's trust to the government and their expectations from the government is still relatively strong in China, which makes the design and implementation of market-based policy tools more difficult. Successful introduction of mixed policy tools means learning by doing

process in market-based instrument design, with educational context both to government sectors and to the public of appropriate stakeholder duties, and means institutional and contextual changes in the society.

Secondly, this research answers the question: how does policy instrument type leverage influential effects of other determinants on public acceptance? Market-based type policy tool (i.e. congestion fee policy) enlarges the influential effect of WTP and car ownership: people with higher level of WTP becomes more likely to accept the market-based policy tool comparing with regulatory tool, while car owners show larger degree of oppositions to market-based policy than to regulatory policy. Meanwhile, perceived outcome fairness is positively related to public acceptance formation and people who feel they are treated with equality and equity would be more likely to accept the policy. Yet, people take equity fairness much more important than equality fairness in market-based policy in a negative way: those who emphasize equity are less likely to accept market-based policy. But this policy type difference is not found in driving restriction policy. It is not this research's purpose to reveal why different policy instruments generate different moderator effect to public acceptance, yet, results in this research call for further exploration of the relationship between policy instrument and individual reflections on them: are different policy tools stimulate different values among the public? If so, how could policy instrument design be adjusted to better fulfill its policy goals?

Thirdly, back to smog control policy design in Beijing, this research implies three changes in policy design. On the one hand, regulatory policy design should be more transparent and the government should try to put the public back into policy making process, which, comparing to increasing government capacity, would increase public acceptance in a larger sense. On the other hand, market-based policy design should start from citizen education that may increase citizen WTP gradually and introducing proper distributional standard like equity fairness. Lastly but not the least, concurrent

smog control policies, be it driving restriction rule or congestion fee policy, are more regarded as traffic policy with possible environmental externality, other instruments could be designed with direct smog control goals, such as reducing pollutant source by re-structuring local industry or design information policy so as to stimulate active actions from the citizen's side.

Appendix I. Variables definitions and measurements

Variables		Questions
Dependent variables	Acceptance towards driving restriction policy	I support the driving restriction policy in Beijing
	Acceptance towards congestion fee policy	I support the congestion fee policy in Beijing to alleviate air pollution
Independent variables	Political trust	I think the process of making smog control policy is open
		I think the process of making smog control policy is transparent
		I think local government has strong will for smog control
		I think local government would like to consider opinions and suggestions from the public, the expert and the media
		I think my opinion is influential to local government's smog control policy design
		I think local government has enough instruments for smog control
		I think smog control instruments adopted by local government are effective
		I think local government is capable to solve smog problem in the near future
		I think local government has the capacity to improve its policy design in the long run for smog control
	Perceived fairness	I think each car owner should have the same obligation to obey driving restriction policy
		I think each car owner should pay the same amount of congestion fee
		I think cars with higher emissions should be restricted more
		I think cars with higher emissions should pay more congestion fee
	Knowledge level	Objective assessment on knowledge level: such as 'which pollutants is the main component of smog?'
	Perceived risk	Smog may create health hazards
		Smog may create other uncertain hazards
	Perceived cost	Smog control will bring travel inconvenience to people's daily life
Control variables	Pro-environmental attitude	I take environment protection as an important issue.
	WTP	How much money are you willing to pay for smog control per month?

Appendix II: Policy characteristics of driving restriction and congestion charge instruments

Policy instrument	Policy type	Launch date (year)	Initiated agency	Policy Goal/Content
Driving restriction	Regulation	2008, renewed every year	People's Government of Beijing Municipality	*Policy goal:* Alleviating air pollution *Policy content:* One-day-a-week driving licensing scheme from 7:00 a.m. to 8:00 p.m. inside (excluding) 5th ring road; odd-even number driving restriction scheme on severe smog days.
Congestion charge	Market-based	Proposed in 2013, still under policy discussion	People's Government of Beijing Municipality Beijing Municipal Commission of Transportation, Beijing Municipal Commission of Development and Reform Beijing Municipal Environmental Protection Bureau	*Policy goal:* Alleviating traffic congestion and air pollution *Policy content:* A fee charged on most motor vehicles operating within the Low Emission Area in central part of Beijing. Charging hours as well as charging amount is still under discussion.

Source: '2016 Beijing Driving Restriction on the Peak Hours during Weekdays' and 'the 2013-2017 Beijing Clear Air Action Plan'

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