Digital Divide and Internet Use in China:
Can the Internet Facilitate Citizenship Engagement?

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Abstract

Analyzing the merged data from sample surveys conducted in all 31 provinces of the People's Republic of China, this study explores the relationship between Internet use and citizenship engagement in that transitional society. It depicts a picture of large variations in both levels of Internet penetration and citizen engagement across various socio-geographic units in this vast country. Such variations are shown to register the uneven socio-economic development. Placed in this context, individual-level analysis via multi-level modeling shows the effects of the variables on individuals' (1) possession of material and civic competence resources, (2) psychological involvement, and (3) media use, including Internet use, on the likelihood and extent of citizen engagement. The analysis also shows that the effects of media and Internet use vary significantly across geographic units. The paper situates empirical analyses in the theoretical context of social enbeddedness of the Internet and the conditions for democratizing effects of the medium.

With the penetration of the Internet in various facets of the Chinese society, many have attempted inferences about Internet-induced social and political changes. The Internet is said to offer "checks and balances" on the authoritarian regime (Kristof, 2006), provide pluralistic information sources for the general population (Zheng & Wu, 2005), broaden the "horizontal flow of communication" in contrast to the vertical "command communication" typical of the mass media system in the authoritarian China (Hung, 2006; Wu, 1994), induce citizen-initiated "disorderly communication" in contention with the state-directed "orderly communication" (Esarey & Xiao, 2008; Latham, 2007), and enable the rise of online public opinion to pressure the state (Hung, 2006), and even provide new opportunities for civic society organizations and venues for online activism (Yang, 2009),

Many have supplemented such optimistic views with more nuances and caveats. Some, for example, have cautioned about the multi-layered "digital divide" (e.g., Pan, Yan, Jing, & Zheng, 2011), others, while being encouraged by afore-mentioned observations of the celebrated impact of the Internet on individuals' engagement in the public life, also caution that what get unleashed in cyberspace also include uninformed populism, prickly nationalism, and tyranny of loudness and majority (e.g., MacKinnon, 2008; Shirk, 2007; Zhou, 2012). There are also reasons for us to question the extent to which the forms and patterns of the Internet usage in a society not only reflect but also reinforce the existing political economic order (e.g., Milner, 2006; Salter, 2009). Lurking behind these cautionary analyses is the thesis that any general claim of the democratizing role of the Internet in China's transition, or that of any other authoritarian society, needs

more systematic and broader empirical observations on individuals' actual Internet use and the citizen engagement with a democratic leaning.

This paper takes such a step by analyzing the data from a nation-wide random sample survey. The survey yielded a large random sample from each of the 31 Chinese provinces. The central question explored in this paper is how the Internet is being used and how such usage might be related to various manifestations of citizen engagement? But different from previous survey-based studies, this paper explores this question by explicitly taking into account of the vast geographic diversity in China. It addresses three inter-related research questions: (1) What are the patterns of geo-economic and geo-social diversity in not only Internet usages but also manifestations of citizen engagement in China? (2) What might account for such aggregate-level diversity? (3) What are the relationships between Internet use and civic engagement characteristics at the individual level and to what extent do such relationships vary among different geo-economic and geo-social contexts? Overall, the paper is aimed to depict a broad contour of Internet usage and manifestations of civic potentials in the Chinese society as a whole. Through this empirical inquiry, we hope to interrogate the extant theories on Internet and civically engaged citizenry in the context of democratic transition.

Socially Embedded Internet and Its Adoption

In the research on the political and social implications of the Internet, a widely accept thesis is that as all new technologies, including those that constitute what we call the Internet, are socially embedded. That is, it is in specific social, institutional, and political-economic contexts where they are developed, deployed, and utilized (DiMaggio, Hargittai, Neuman, & Robinson, 2001; Warschauer, 2003). Based on this premise,

"digital divide" is a multi-faceted construct. It encompasses, as DiMaggio and his colleagues point out, inequality in access to the technological infrastructure, acquisition of knowledge and skills in the usage of the available technological tools, quality of technological and social support that is part of the technological infrastructure, ability to evaluate information quality (or to integrate such information for practical problem-solving), and diversity of usage, namely the range of activities that one conducts with the Internet technology.

Following this logic, it stands to reason that, as the Internet becomes part of the infrastructure of a society, the distributional patterns of access and skills of usage in a society not only reflect but also reinforce the existing social inequality. The other side of the same coin is that for individuals as well as communities, investment in adopting and utilizing the Internet technologies could be an important venue to bring tangible benefits. For example, DiMaggio and Bonikowski (2008) shows with the data of the Current Population Survey in the US that in 2000-2001, still earlier years of the Internet diffusion in the US, Internet users experienced significantly higher earnings growth than non-users, after controlling for industry and job characteristics as well as many other demographic correlates of earnings and earnings growth. They interpreted the results as a support for the human capital model in that those with technology-utilization skills tended to be rewarded in the job market.

Adopting this conception and viewing the Internet in the context of community building, Ball-Rokeach and her associates (e.g., Ball-Rokeach, Kim, & Matei, 2001; Kim & Ball-Rokeach, 2006) have advanced a line of research to explore the extent to which the Internet and various facilities that enable more routine and effective usages of the

information technologies may be developed as part of the communicative infrastructure of a community and how the integration of such infrastructural components leads to consequences at both the individual and community levels, including individuals' civic participation and levels of community integration.

Adopting this line of reasoning to examine the advent of the Internet and its consequences in China, we would expect a significant degree of heterogeneity across different regions in Internet adoption. That is, Internet adoption is a part of building up the digital technological infrastructure of city or town and integrating it into the local economy, governance, and everyday life. Further, we would expect such variation to correspond to differences in levels of economic development, degrees of urbanization, and characteristics of the population of each region. Following the modernization tradition in the studies of social change (e.g., Rogers, 2003; Zheng & Wu, 2005) that is lurking behind this line of theorizing, we would expect that a key characteristic of the population conducive to the adoption and utilization of the Internet in various facets of a community is level of education, which may index the open-mindedness toward as well as competence in utilizing new technologies.

The similar set of contextual characteristics may also be associated with levels and patterns of citizen engagement across regions or locales. This is the case first and foremost because citizen engagement is constituted by the actual activities that local population undertakes. The individual-level research on citizen participation in advanced democracies has demonstrated convincingly (e.g., Verba, Schlozman, & Brady, 1995; Jacobs, Cook, & Delli Carpini, 2009) that individuals' command of material, social, and civic skills resources is a set of most reliable determinants of their participation. That is,

those who have advantages in the possession and utilization of such resources participate more, in terms of both the breadth and depth of activities. In a similar vein, Bekkers (2005) demonstrates with survey data from the Netherlands that individuals' socio-demographic characteristics that index their resource possession or the reduction of opportunity cost for participation are significant predictors of their participation in voluntary associations.

We have no reason to expect that such individual-level patterns will not hold in a transitional society such as China. Given the modernization thesis on the rise of the middle class and democratic transition (e.g., Bian, 2002; Cai, 2005; Epstein, Bates, Goldstone, Kristensen, & O'Halloran, 2006), such patterns are likely to hold in a transitional society with a rapid growth in economic and social inequality. Therefore, we thus expect to see regional variation in citizen engagement to correspond to the same characteristics of regions that predict Internet adoption rates, namely, levels of economic development, degrees of urbanization, and characteristics of the local population. Consequently, at the aggregate level, the levels of Internet penetration and citizen engagement ought to be positively correlated. In other words, the adoption of the Internet is an indication of not only the socio-economic development of an area but also the capacity of an area to absorb or utilize the Internet technology for local economic and social development. More generally, we are arguing that both Internet adoption and the rise of an engaged citizenry register the levels of socio-economic development in different areas.

Conceptualizing Internet Effect on Citizen Engagement

Such aggregate-level mutual facilitation between Internet adoption and citizen engagement is the context in which we examine and interpret the individual-level relationship between Internet use and citizen engagement. In this study, to better serve the goal of estimating the patterns in the national population as a whole, we will use the simplest possible measure of Internet use: whether one uses the Internet. In other words, our analytical focus at the individual level is on the differences between Internet users and non-users. We leave the questions related to the effects of different kinds of net use among Internet users on their citizen engagement to a follow-up analysis of the rich dataset utilized in this study.

For the other end of the equation, citizen engagement, we adopt the conception of citizen engagement that is commonly shared in various formulations of democratic citizenship (e.g., Delli Carpini, 2004; Jacobs et al, 2009). That is, citizens in a democracy must be minimally informed of the issues important in public life of a society, participate in various voluntary associations and the activities that they organize, express their opinions on issues of common concerns, and make their citizen's choices by casting their votes. We contend that citizen engagement in all these areas serves as a barometer of the democratic vitality in an established democracy and democratizing readiness of a polity in a transitional society. This thesis, we further argue, can be readily seen not only in the works of the empirical search on civic and political participation in democracies (e.g., Jacobs et al., 2009) but also in the works on involvement in civic associations, collective actions, and political participation in China (e.g., Cai, 2005; Chan & Nesbitt-Larking, 1995; Lei, 2010; Read, 2007; Yang, 2009)

Compared with several earlier studies (e.g., Cai, 2004; Jennings, 1997; Lei, 2010), we left out political participation—actual activities aimed at direct political influences such as attending Party meetings, taking part in protests, or engaging in collective appeals to government officials on shared grievances, etc. Due to the political restrictions by the regime, for most people, opportunities for engaging in antagonistic political activities are very rare and the cost for taking part in such activities is extremely high. As a result, they will either be less-than-voluntary within the Party-state regime (e.g., attending local Party meetings) or take place under some extraordinary circumstances (e.g., Cai, 2004).[1]

In comparison, the four manifestations of citizen engagement that we focus on share two common characteristics: They are all based on individuals' voluntariness, are allowed or at least tolerated by the regime, and indicate the public engagement aspect of people's everyday life. However, voting in China does not fit this conception of citizen engagement very well. Due to the absence of an institutional setup for open and fair elections and the fact that the opportunity structure for voting was configured in service to rural governance, voting could not be viewed as a universally accessed and voluntary act of engagement. Nonetheless, in the rural and semi-rural areas where such local elections were held, voting is an important mechanism of electoral connection between elected leaders and local residents (see Manion, 1996, 2000). Thus, we still consider it a key indication of citizen engagement in China but expect it to be more relevant among the rural population.

From the extant literature based primarily on the evidence from developed democracies, we can identify four basic sets of predictors of citizens' engagement in public life, (1) the socio-demographic variables that index individuals' possession of

material, and indirectly, social as well as civic competence resources, (2) the psychological variables that index individuals' interest in public life and their attitudes toward involvement, (3) social interaction and social networking variables that index individuals' possession of social capital and placement in the social ecology that facilitate their engagement, and (4) media use and other communicative activities that index individuals' interactions with their information environment, which can be viewed both a constituting part of individuals' engagement and a key venue to prepare them for engagement in other forms (e.g., Delli Carpini, 2004; Jacobs et al., 2009; Verba et al., 1995). Based on the available research evidence from China (e.g., Lei, 2011; Shen, Wang, Z. Guo, & L. Guo, 2009; Shyu, 2009), we expect to observe the similar patterns reported in the extant literature. That is, we expect individuals to show higher levels of engagement in each of the four areas if they possess more material resources, are more interested in public life, and have higher levels of political efficacy, carry out broader and more frequent social interactions with others, and utilize news media regularly.

It is situated in this explanatory framework that we assess the effect of the Internet. The literature based on the evidence from democratic societies shows that the Internet may contribute to citizens' public engagement via various processes (Polak, 2005). First, the Internet is a communication medium that contributes to lowering the opportunity cost for individuals to not only acquire information but also encounter information from diverse sources. To this extent, based on the informed citizenry thesis and the empirical evidence on the positive relationship between knowledge and engagement (e.g., Delli Carpini & Keeter, 1996), as citizens become better prepared, they also become more engaged in public life and engage in it more effectively. The Internet also lowers the cost

and provides the necessary tool, as well as space, for individuals to interact with others and to voice their own opinions. Both the information acquisition and interpersonal interactions via the Internet are found to be important predictors of citizens' civic participation. In addition, such Internet-utilizing communicative activities also mediate the effects of news consumption via the mass media (Shah, Cho, Eveland, & Kwak, 2005).

Second, the Internet is also a vast space, in addition to or augmenting the offline space, where a significant part of public life takes place. Examples include online forums on public issues and associations for collective actions. Consequently, netizens may encounter more engagement opportunities; by providing such opportunities on cyberspace, the Internet might even ease the socio-economic restrictions on participation among netizens. Studies on the effects of the Internet in both democratic societies (e.g., Jensen, Danziger, & Venkatesh, 2009) and China (e.g., Hung, 2006; Zheng & Wu, 2005) have explored some version of this proposition.

Third, in China, the Internet is also a significant conduit for information of plural sources, a window to the world beyond the representational confine of the state-controlled mass media, and a place for "horizontal communication" among citizens. As a result, the Internet is also a place where citizens may develop autonomous understandings and recognitions of their own efficacy, both as individual citizens and as potential collectives (see Hung, 2006; Shirk, 2007; Zheng & Wu, 2004). As Lei (2011) showed with the 2007 World Value survey data that compared with exclusive traditional media users and non-media users, Chinese netizens were more likely to be opinionated, more likely to be "politicized"—that is, simultaneously embracing the norms of democracy and

being critical of the current political conditions and the party-state—and more likely to have experiences in collective action.

Based on these theoretical arguments, we can develop two general expectations. First, the likelihood of a person becoming an Internet user is a function of all the variables that index individuals' possession of material resources and technological competence. In addition, it is also likely a function of socio-economic and technological condition of the specific locale (e.g., the city or town) where an individual is conducting his or her life. Evidence demonstrating this proposition provide interpretive credence to the regional variations in Internet penetrations.

Second, given that, taking into consideration of the social embeddedness of the Internet, namely, Internet use being endogenous to various socio-economic processes in which individuals are involved, we expect significant differences between net users and non-users in all four indications of citizen engagement. More specifically, we expect Internet users, compared with non-users, have higher levels of knowledge, openly express their opinions more frequently, and participate in voluntary associations and their activities more. We do not, however, have any direction-specific expectation on how net users and non-users might differ in the likelihood of voting in local elections. The reason is that experiments in such local elections emphasized more on rural towns and villages and institutional designs for them remain highly fluid and variable across different locales (see Manion, 2006; Shi, 1999). As a result, the factors contributing to the variations in the opportunity structure for voting in local elections may confound the potential effects of Internet use on voting. Thus, we expect that Internet use have differential impact on voting compared with on the other three citizen engagement measures. That is, the

differences between net users and non-users might differ between voting and the other three outcome variables in not only amounts but also in directions.

Methods

Data

The data analyzed came from a nationwide sample survey conducted between July 15 and October 23, 2010. In each of the 31 provinces (including 5 autonomous regions and 4 municipalities), a sample of 1,200 to 1,300 was drawn via a multi-stage cluster sampling procedure.[2] Trained interviewers were recruited from local areas to conduct face-to-face interviews in the needed dialect with the respondents in their respective locale. Each interview took, by average, about 61 minutes to complete. The final dataset contains 37,279 complete interviews from 31 province-level units. Computed with the WAPOR's recommended equation, the overall response rates were at 62% (in provincial capital cities) and 69% (in other cities or towns) respectively.

Each respondent was also located in a socio-geographic unit within each province (or autonomous region or municipality), which was defined operationally, in this study, as the "county-level" (*xian ji*) unit in the official administrative hierarchy. This means that, each county-level city constitutes a single unit, but a larger city (e.g., a provincial capital or a municipality) has multiple administrative districts, each at the county-level in the official administrative hierarchy, with some being officially designated as "urban districts" (*chengqu*) while others "suburban counties" (*jiaoqu xian*). Thus, such a city is represented by the multiple county-level units that are officially under its jurisdiction. From the smaller places, i.e., not named "city" (*shi*), but named "town" (*zhen*) or "village" (*xiang*), they were collapsed to the comparable administrative unit called "county" (*xian*)

to which they belong. Taking this approach, we were able to differentiate urban and non-urban units in the official state administrative hierarchy. Among the 624 socio-geographic units identified via this procedure, 323 (51.8%) of them are "cities" or urban units.

Each of the 624 units has as few as 24 (in rural counties) and as many as 736 (in all the urban districts of the four municipalities) individual respondents, with the median being 28. The disparities in sample size across the aggregate units resulted in part from the sampling framework that over-sampled the residents in these municipalities and the provincial capital cities.

Measures

Manifestations of citizen engagement. Four dependent variables were constructed from the data to capture the manifestations of citizen engagement: levels of knowledge on current affairs, frequencies of opinion expression, levels of civic participation, and ever-voted in local elections. These are at least theoretically applicable to all Chinese in that despite tremendous diversity across geographic locales, structurally, opportunities for individuals in developing their citizen engagement in each of these areas are at least potentially present and the conceptual framework for them to be similarly meaningful is present across the whole country.

Knowledge on current affairs was measured by asking 12 questions on topics ranging from the name of the President of the PRC (Hu Jintao) to the name of the foreign Internet company that announced its withdraw from the Chinese market (Google). For each item, the correct answer was coded into 1 and an incorrect answer or "don't know" was coded into 0. Partially correct answer was coded into 0.5. The proportion of getting

at least a partial correct answer ranged from 10% to 91% across the items. The sum was taken across the 12 items to form an overall index (M=4.89, SD=3.10, α = .868).

Expressive engagement was measured by asking the respondents to report how often (0=never, 5=very often) they expressed their views on a topic, issue or social problem: in one's own blogs, in posts on online discussion forums, by sending or distributing short text messages about it via cell phones, by contacting newspapers, radio or TV stations about it, by contacting a government agency about it, by filing petitions to a relevant business, by talking bout it among friends. Due to the low frequencies in most of these items, they were recoded into 0 (never) and 1 (at least occasionally). A sum across the items was used as an index of expressive engagement (α = .872). Because two of the items were about expressive activities on the Internet, the index score was divided by 7 for Internet users and 5 for non-users so that the resulting scale was comparable for the two groups. After that, the 0-1 scale was multiplied by 10 (M=2.98, SD=3.28) for the ease of interpretation.

Civic participation was measured via questions on whether respondents had in the past 12 months, participated in each of the 15 voluntary activities, ranging from gatherings of schoolmate groups or clansmen associations to meetings of homeowner associations or activities of voluntary or civic organizations, etc. Each respondent's civic participation score is the sum of these activities that he/she had participated in (α = .729). Given that four the activities could only take place online and thus inapplicable to non-users of the Internet, a scoring system that creates a standardized scale between users and non-users of the Internet was devised. It involved dividing individual's participation

score by the number of activities applicable (15 for users and 11 for non-users). The resulting 0-1 scale was multiplied by 10 (M=1.25, SD=1.47) for the ease of interpretation.

Finally, the respondents were asked in the past five years, (1) whether they ever voted in local village or resident committee elections and (2) whether they ever voted in elections of township or county representatives. Ever voted in any of these elections was coded as 1 and the others as 0. About 51% of the respondents in the whole sample reported having voted in at least one of these elections in the past five years.

Internet use. Respondents were first asked days per week they typically use the Internet, including the access to the Internet via a computer or cell phone. Via this variable, it was observed that 35.5% of the respondents in the whole sample reported using the Internet. This figure was slightly higher than the end-of-2010 figure of 34.3% reported by the official trade group, China Internet Network Information Center (CINIC, 2011).

Other media use. In addition, respondents were also asked how many days in a typical week they (1) watched TV, (2) read a newspaper, (3) listen to radio, and (4) read a magazine (converted from number of times per month). On each of these, use was recoded as 1 and others 0. The sum across four traditional media was used to assess the breadth in types of media used (M=1.25, SD=1.04). Among those who reported watching TV or reading newspaper, respondents were further asked how closely (1=almost no, 5=very closely) they paid attention to international, national, and local news respectively. The three items for TV were averaged into an index (M=3.49, SD=1.07, α = .749) and the three for newspaper were averaged into another (M=3.73, SD=0.97, α = .746). But nearly 60% of the respondents did not read a newspaper. Among newspaper readers, the

TV news and newspaper news indices were correlated at r=.59 (p < .001). Thus, a sum of the two indices (M=4.90 SD=2.57) was created as a composite measure of exposure to news on traditional media. This combined index was used in the subsequent analyses.

Psychological variables. Respondents were asked to indicate how much they agreed (1=strongly disagree and 5=strongly agree) with each of the following statements: "I'm very much interested in politics and public affairs"; "I often think about issues facing the country"; and "I'm very much concerned with the local government's policies." Taking an average across the three items led to an index of political interest (M=3.01, SD=1.07, α = .784).

A set of items on political efficacy, both internal (a person's belief of his or her ability to understand and participate in political processes) and external (a person's belief that the process is open and the system is responsive) efficacy, were adapted from the ones routinely utilized in citizen surveys in the US (e.g., Craig, Niemi, & Silver, 1990). On each of the six items, respondents indicated their opinion by using a Likert scale (1=strongly disagree and 5=strongly agree). A factor analysis of these items showed clearly two factors as expected. An internal political efficacy index (M=2.87, SD=.94, α = .671) was created by averaging across three items: "Every citizen including me can have an impact on government's policies and behavior." "I have a pretty clear understanding of the problems that need to be addressed via the government policies." "I have the ability to offer constructive opinions on government's policies and behaviors." An external political efficacy index (M=2.58, SD=.99, α = .804) was created by taking the average across the other three items: "Government officials of various levels basically won't care what ordinary citizens think." "Whatever ordinary citizens do, it'd have little

impact on government's policies and behaviors." "Nowadays, officials of all levels basically only care about their own interests rather than the interests of ordinary people."

Demographic variables. Based on the extant literature on what predict people's engagement in civic or political life, we included 11 socio-demographic variables that were deposits of culturally inhibitory and resource constraining forces: age, sex, years of schooling, personal monthly income,[3] number of electronic or other modern household items (not including media, all 16 items) owned, ever worked, urban residency status, Communist Party membership, holding a professional job, holding a managerial job, or doing agricultural work (being a peasant).

Aggregate-level variables. Several aggregate level variables were created to account for variations among the 624 locales. These include: (1) levels of urbanization (4=urban districts of municipalities or provincial capital cities, 3=urban districts of region-level cities, 2=county-level cities, and 1=non-city counties), (2) eco-geographic region (1=West, 2=Northeast, 3=Central, and 4=East), and (3) for each unit, averages in years of school, personal income, and number of modern or electronic appliances owned, as well as proportion of the sample respondents who were born in the locale where they were interviewed, who had the urban resident status, who were peasants, who were *Han* nationality, who ever worked, and who used the Internet.

Statistical analysis

The analyses were preceded in a step-by-step fashion. The first step involved exploring disparities in Internet penetration and uses, as well as the four measures of citizen engagement, across geographic regions, levels of urbanization, and the locales.

Built upon the results from the first step, we estimated a series of multi-level models. For knowledge, opinion expression, and civic participation, we estimated multi-level linear regression models; for voting, as well as for whether one engaged in an opinion expression activity or a civic activity, we estimated a multi-level logistic regression model. The multi-level logistic regression model is a special type of the generalized linear model where the link between the binary outcome variable and the predictors is expressed as a logit function. Therefore, for simplicity, we express the generic model that undergirds all the multi-level models estimated as an expansion of a simple linear regression model:

$$y_{ij} = u + \alpha_j + \beta x_{ij} + \beta_j x_{ij} + \varepsilon_{ij}$$

where, μ and β represent the fixed-effect parameters, namely population average in y when x_{ij} is at zero and average effect of x_{ij} across all J units respectively; α_j denotes the random intercept parameter, representing variation in means in y across the aggregate units, and β_j denotes the random slope parameter, representing the variation in the effect of x_{ij} among the aggregate units. At this stage, due to the absence of a clear theory as a guide, we refrained from extending the model estimation to include cross-level interaction parameters.

For each outcome variable, the same model was first estimated with the whole sample (N=37,275, J=624, average n_j=59.7). For these models, the only Internet use variable was whether using the Internet. But for the outcome of voting, 749 respondents did not supply any valid data on voting and they were excluded from the voting models (N=36,529, J=624, average n_j=58.5).

Results

Regional Heterogeneity

Table 1 shows the aggregate-level statistics on the descriptive and correlational patterns to provide a rough portrayal of regional diversity. The top panel shows the means or proportions of a set of socio-economic characteristics, Internet penetration rates, and the levels of the four citizen engagement outcomes across the four eco-geographic regions in China. The data are based on the provincial-level data in Appendix A. The data show large differences among the provinces in socio-economic condition and in Internet penetration rates. For example, Internet penetration rates varied from as low as 13.12% in Tibet to as high as more than 46% in Zhejiang, a coastal province in the East. Similarly, GDP per capita also varied in major ways, from as low as $2082.38 in Guizhou, a land-locked mountainous province in Southwest, and as high as $12,075.24 in Shanghai.

The four regions were differentiated in terms of levels of economic development. We can see such differences in the average GDP per capita, median personal income, and Internet penetration rates: The 10 coastal provinces in the East had the highest GDP per capita, median personal income and Internet penetration rate. The vast Western region with 12 provinces or autonomous regions and about 60% of the country's territory had the lowest GDP per capita and Internet penetration rate. Although such crude measures are highly limited, they still give us a glimpse of the vast diversity across China's provinces and eco-geographic regions (see Chovanec, 2009).

The bottom half of Table 1 shows that, as expected based on the modernization thesis, across the 31 provinces, levels of socio-economic development had significant and positive correlations with Internet penetration rates. But the same socio-economic development variables did not have similarly robust correlations with the aggregate levels

of citizen engagement measures, with the only exception of knowledge on public affairs. The populations with higher levels of education and in provinces with higher levels of socio-economic development appeared to have higher levels of knowledge. Another observation from the table is that the two indicators of levels of economic condition, GDP per capita and median personal income, also had significant positive correlations with voter turnout rates. The aggregate-level relationships between socio-economic development and citizen engagement, thus, are not as straightforward as the modernization thesis would suggest.

The results shown in Table 1 might be too crude, given the vast heterogeneity within each eco-geographic region or province. To get a more fine-grained assessment of regional differences, we estimated a series of regression models, predicting variations in the four citizen engagement variables across the county-level units. In each of the models, two types of predictors were constructed: three variables on location characteristics (whether located in a coastal province, in which of the four eco-geographic regions, and level of urbanization) and eight variables on local population characteristics, including averages in age, year of schooling, personal monthly income, number of modern appliances owned, percent ever employed, percent born in the place of the current residence, percent of registered urban residents, and percent of Internet users. The results are shown in Table 2.

The models predicted the aggregate-level variations in citizen engagement reasonably well. The percent of variance accounted for ranged from 18.6% in voter turnout to 63% in average levels of knowledge. The standardized regression coefficients of individual predictors showed that the most robust positive contributor of the aggregate-

level variations in the four citizen engagement measures was level of education of the population. Levels of economic affluence, measured by the average number of modern household or personal appliances owned, was also a positive contributor, with three of the four coefficients reached the statistical significance level. Average personal income had a significant and positive association only with the average levels of knowledge.

Accompanied with these results are the seemingly puzzling coefficients showing that (1) the average levels of civic participation and voter turnouts were significantly higher in less urbanized geographic units, (2) voter turnout rates were significantly higher in geographic units where there were higher proportions of rural residents in the local population, and (3) the least economically developed western region showed higher levels of citizen engagement, especially in terms of knowledge and civic participation. The first two coefficients could be accounted for by the fact that local elections were more prominent in the lives of small towns and rural villages and the possibility that in such rural and semi-rural locales, associative activities were more widely known and access to such opportunities was easier than in large cities. But there is also a possibility that in the vast Western region, the complete interviews were more skewed toward more reachable segments of the population in more accessible locales, resulting in a higher aggregate level of knowledge and civic participation.

Table 2 also provides an initial indication of the relevance of the Internet in the public life in China. Locales with higher Internet penetration rates also appeared to have higher prevalence of opinion expression activities as well as civic participatory activities, although only the former reached the statistical significance. Partly reflecting the vast urban-rural divide in Internet penetration, coupled with the fact that opportunity structure

for voting was much more restricted in urban areas, Internet penetration rates appeared to have a negative association with voter turnouts.

Predicting Internet Use

Both the theoretical arguments for the socially embeddedness of the Internet and the empirical evidence of regional variations in Internet penetration rates suggest that Internet use is endogenous to various socio-economic processes. If the Internet is conceived as a resource for improving one's position in society and getting better rewards (see DiMaggio, & Bonikowski, 2008), then, the opportunities and returns for accessing and utilizing the technology are likely distributed unequally, reflecting the impact of various structural and cultural inequalities. Such an impact may be in part indexed in the fixed (i.e., universal among the national population) effects of individuals' socio-demographic characteristics and in part reflected in variations among locales. Based on this reasoning, we estimated a multi-level logistic regression model to predict the likelihood of using the Internet. As our initial attempt, only a random-intercept model was estimated, to capture additional between-locale variation beyond those accounted for by the aggregate-level variables that were entered as fixed-effect predictors. The results are shown in Table 3.

Several overall indices can be used to assess the final model and interpret the meaning in the overall structure of the model. First, the model reached a respectable predictive power. The linear probability of the empty model (the "observed" probability) and the final predicted linear probability from the final model overlapped 24.7%. Second, the multi-level model was significantly better than the single-level logistic regression model. The log-likelihood ratio test showed a χ^2 value at 14.3 (df=1, p <.001). But it

also showed that, the fixed-effect dwarfed the random effect. Third, we took a hierarchical approach in fitting the model. In the first step, we estimated an empty model (or intercept-only model). Then, we entered the individual-level predictors and finally, the aggregate-level predictors. At each step, we conducted the log-likelihood ratio test via the logic of nested model testing. The results show that the model with individual-level predictors was a significantly improvement over the empty model (χ^2=21,563.49, df=11, p <.001). While the aggregate-level predictors improved the model further (χ^2=414.60, df=14, p <.001), the overall predictive strength was clearly far below that of the individual-level predictors. Overall, then, the individuals' likelihood of using the Internet was primarily a function of their socio-demographic characteristics and secondarily a result of socio-economic conditions of their location.

Coefficients (odds ratios) of the individual predictors tell the following stories about what affect the likelihood of Internet use in China. First, possession of material resources clearly contributed to improving the likelihood, as indicated by the odds ratios associated with income and number of modern appliances owned. They were significantly larger than 1. Second, possession of analytical and literacy skills and in employment positions that required technological skills and usage facilitated Internet adoption. The odds ratios associated with education and managerial as well as professional occupations were significantly larger than one while the odds ratio associated with doing farming work was less than 0.5. Third, variables indicating culturally based inequalities such as sex and Communist Party membership were both significant predictors of Internet use. Being a female meant only one-third reduction in

the likelihood of using the Internet compared with a male, while Party membership would improve the likelihood by the same amount.

The fourth story is that Internet adoption in China clearly remained an urban phenomenon and the one that added to the vast existing urban-rural divide in China. A couple of indications tell this story. One is that at the individual level, urban residency corresponded to 80% higher likelihood of using the Internet than rural residency. The other is that Internet penetration rate of a locale, which appeared practically a decisive determinant of individuals' likelihood of using the Internet. A significant portion of this impact could be attributed to urban condition, given that levels of urbanization and Internet penetration rates were highly correlated (r=.58, p<.001). It is worth pointing out that these factors, especially the Internet penetration rate, accounted all the average differences among the 624 locations, as when they were in the equation, other measures of the characteristics of the locations, including levels of urbanization (city level), average years of schooling and personal income, all have negative relationships with individuals' likelihood of using the Internet.

Predicting Citizen Engagement

Model Specification and Assessments. Based on the results showing how the likelihood of Internet use was endogenous to various social, economic, and cultural processes, including variations among geographic locales, we specified a series of multi-level random-coefficient models to assess the impact of Internet use on each of the four citizen engagement variables. Each model contained four sets of fixed-effect predictors, corresponding to four conceptually differentiated processes: (1) individual demographic characteristics for assessing the sociological resource model of citizen engagement

(Brady, Verba, & Schlozman, 1995), (2) variables on individual's psychological involvement in politics or public life that had been conceived as psychological resources for citizen engagement (Shyu, 2009), (3) media—including the news media and the Internet—use variables that would capture the communicative inducement or mobilization process (e.g., Lei, 2011), and (4) the aggregate-level variables that captured the process of geographic differences in China. While the first three corresponded to those that had been identified in the literature on citizen engagement in an advanced democracy (e.g., Jacobs et al., 2009), the last one served as statistical control of regional or area variations observed at the exploratory stage of our analysis. These models also served the purpose of using statistical control to account for the endogeneity of Internet use, as all the predictors in the Internet use model were also in these models. In addition, we also specified random slopes of three media use variables: news exposure, number of traditional media used, and Internet use, to explore cross-locale variation in the effects of each of these communication variables.

Table 4 displays the multi-level linear models predicting three outcome variables measured on a continuous scale: public affairs knowledge, expressive engagement, and civic participation. The fitness indices showed that these models fitted the data quite well. First, overall, these models accounted for a significant portion of variance in each of the three citizen engagement variables, with R^2 ranging from 31.4% in civic participation to 59.4% in knowledge. Second, across the three dependent variables, the random-slope model represented a significant improvement over the random-intercept-only model. The log likelihood ratio test showed χ^2-value ranging from 286.2 for the knowledge model to 379.48 for the civic participation model (df=9, p <.001 for all three). The multi-level

model also represented a significant improvement over a single-level linear model, with the χ^2-value from the log likelihood ratio test ranging from 2,378.75 for the expressive engagement model to 2,804.12 for the civic participation model (df=10, p <.001 for all three).

Table 5 displays the multi-level logistic models predicting the three binary variables. In addition to voting (1=yes and 0=no), we also dichotomized expressive engagement (33.97% zero) and civic participation (39.63% zero) variables in a similar way. This gave us a chance to give a different look at the latter two variables, as each of them had a significant portion of the sample received zero, namely having no engagement. The fitness indices show that these models also have strong predictive power. The R^2 between the "observed" linear probability obtained from the empty model and the predicted linear probability from the final random-slope model ranged from 45.4% in expressive engagement to 53.7% in voting. In addition, the multi-level model represented significant improvement over the single-level model (all three log likelihood ratio tests with 10 degrees of freedom are significant at p < .001 level); in each case, the random-slope model with 9 additional random parameters represented significant improvement over the random-intercept-only model (p <.001).

The Impact of the Factors in the Resource Model. Across the six models, the individual coefficients showed that across all locations in the vast country, individuals with more material resources and educational advantages were more likely to be engaged in the public life and engaged in it with higher levels of intensity. This observation was entirely consistent with the robust observations from advanced democratic countries (e.g., Verba et al., 1995; Jacobs et al., 2009).

In the Chinese context, beyond the results aligned with the resource model (Brady et al., 1995), it is worth noting three observations from these results. First, females showed significant disadvantages in both the likelihood and levels of engagement. They showed lower levels of public affairs knowledge, lower frequencies of expressive engagement (Table 4), and lower likelihood to vote (Table 5), although they did not seem to score lower than their male counterparts in civic participation.

Second, other than voting, younger people were more engaged than their older counterparts. They were more likely to engage in opinion expression and civic association activities (Table 5), and they engaged in each more frequently (Table 4). But they were less likely to vote than older people (Table 5). The vote-related result might be in part accounted for by the configuration of the opportunity structure in China: As more younger people migrated to cities, as a demographic group, they had less access to the opportunities of voting, which were more available in rural and semi-rural locations. Giving credence to this interpretation, Table 5 showed that urban residency meant more than 70% reduction in the likelihood of voting for an individual.

Third, the results showed that Communist Party membership brought with it higher likelihood and frequencies of citizen engagement. Table 4 showed that Party members had higher levels of knowledge, taking up expressive activities more frequently, and engaging in more civic activities. They were also about 50% more likely to vote (Table 5). It is also interesting to note that the odds for them to engage in associational activities—which did not include any organized by the Communist Party or other officially incorporated mass organizations such as the Communist Youth League or the

National Federation of Women (Cai, 2004). These results were consistent with those reported by Lei (2010).

The Impact of Psychological Involvement Variables. The two tables show that political interest, a measure of individuals' motivational involvement in public life, was a robust positive contributor to citizen engagement. People who reported higher levels of political interest showed higher levels of knowledge, more frequent engagement in expressive and civic activities (Table 4), and higher likelihood of voting (Table 5). Internal political efficacy was also a significant positive contributor to more frequent opinion expression and civic participation (Table 4) as well as higher likelihood of voting. These results are entirely consistent with those reported in studies based on advanced democracies (e.g., Gastil & Xenos, 2010).

However, the positive impact of internal efficacy on opinion expression must be qualified by the observation that those with higher levels of internal efficacy were also less likely to engage in opinion expression activities (Table 5). In other words, here we have a situation where internal efficacy was negatively related to the likelihood of engaging in opinion expressions, but positively to the frequency of such engagement after individuals had passed the engagement threshold.

The effect of external efficacy was more complex. It had a negative relationship with individuals' knowledge on public affairs, but a positive relationship with both opinion expression and civic participation (Table 4). But external efficacy had no significant effect on the likelihood of voting. Such a pattern of less than robust and often negative effects of external political efficacy was also consistent with those observed in, for example, the United States (e.g., Gastil & Xenos, 2010).

The Impact of the Media Use Variables. The results in the two tables show that media use, including Internet use, were significant contributors to individuals' citizen engagement. To this extent, the results were consistent with those reported in Lei (2010). However, Lei reported contrasting effects of the traditional media and the Internet with her construction of nettizens and traditional media users as mutually exclusive groups. This was not consistently the case in our results. First, frequency of consuming newspaper and television news showed a positive correlation with knowledge on public affairs (Table 4). This finding was entirely consistent with the observations from advanced democracies in the extant literature (e.g., Graber, 2001). It was also positively related to the likelihood of voting (Table 5). But it was negatively related to frequency of opinion expression and unrelated to levels of civic participation (Table 4).

Second, a different measure of traditional media consumption, the number of the four traditional media used, was a significant positive predictor of levels of knowledge, expressive engagement, and civic participation (Table 4), but not the likelihood of voting (Table 5).

Third, beyond the effects of the two traditional media use variables, Internet use showed robust and significant effects across the four citizen engagement outcomes. Netizens had higher levels of knowledge, engaged in opinion expression activities more frequently, participated in more civic associational activities (Table 4). They were also more than twice as likely than non-users of the Internet to express their opinions and to participate in civic associational activities. But they were also 30% less likely to vote in local elections (Table 5).

The random effects in the two tables also show that both the effects of the two traditional media variables and that of the Internet varied significantly across the geographical locations. In other words, for each of the media use variables, no single parameter would be an adequate estimate of its effect on each of the four citizen engagement outcomes. Rather, in each locale, the effect was likely to be unique, as a result of its contextual characteristics. Compared across the three variables, we could see that cross-location variations in the effect of Internet use was much larger than those of each traditional media use variable, suggesting the possibility that the effects of the Internet were much more varied across different locations in the country than that of the traditional media.

Interpreting the random effects is challenging. Logically, it makes sense to think that the random component of the effect of each predictor (denoted as β_{ij} in the model specification of the method section) could be a function of the variables representing the characteristics of the locations. Following this logic, to explore some possible interpretations of the random slopes of the media variables, we obtained the best linear unbiased predictions of the random slopes (or in the voting model, the random effects estimated in the multi-level logistic model) across the 624 locations and then regressed each via OLS on the aggregate-level predictors. The results were by and large disappointing in that these models had weak predictive power. Correspondingly, there were only a few coefficients that reached statistical significance. These coefficients are shown in Table 6.

A few observations from this table are worth noting here. First, both the effects of consuming more news on the traditional media and using the Internet on knowledge

seemed to be progressively stronger with the increasing levels of urbanization of various locations. In other words, people who lived in urban locations tended to learn more efficiently from both the traditional media and the Internet. Second, the ethnic composition of each locale seemed to moderate the effects of the two traditional media use variables. The effects of consuming TV and newspaper news on knowledge and expressive engagement were weaker in locales with higher percentages of *Han* nationality, but the effects of the number of media used on expressive engagement and civic participation were stronger in such locales. Third, material conditions of locales seem to interact with individuals' media and Internet use in complex ways. The effects of consuming TV and newspaper news on civic participation and voting grew stronger among the locales where the local residents owned by average more modern appliances. But the same location characteristic would weaken the effect of number of media used on voting and the effects of Internet use on knowledge, expressive engagement, and voting.

Conclusion and Discussion

This paper is an initial take of the highly complex national survey data from the People's Republic of China to address an issue that is entangled with various social, economic, cultural, and regional processes, namely, the impact of the Internet penetration in an area and Internet use among individuals on citizen engagement in the public life among the residents in that area. Four civic engagement indicators were identified based on the democratic theory of an engaged citizenry: knowledge on current affairs, opinion expression, civic participation, and voting, even though voting could not be viewed as comparable as the other three in terms of their democratic leaning.

Analyzing the data from a nationwide sample survey, this paper shows that both levels of Internet penetration and civic engagement varied among geographic regions, defined by location (e.g., coastal vs. inland regions, north vs. south) and socio-economic conditions (e.g., rural vs. urban, highly vs. less developed areas). Internet adoption was an indication and consequence of socio-economic processes. At the aggregate level, it was the process of uneven development; at the individual level, it was the process of acquiring material and technological competence resources. Although a causal direction could not be determined with the cross-sectional data, most likely, the causality between the two flows in both directions between Internet adoption and socio-economic processes.

Next, the paper shows that cutting across regional variations were some general patterns of what affected citizen engagement. Across the four measures, the results from the multi-level models showed strong support for the following explanations of citizen engagement: First, possession of material and civic competence resources (Brady et al., 1005) sustained higher levels of citizen engagement across all four aspects. Second, individuals' political interest and internal political efficacy indeed functioned as psychological resources (Shyu, 2009) for higher levels of citizen engagement. Third, media use had differential effects on the four engagement measures. While more frequent exposure to news on the traditional corresponded to higher levels of public affairs knowledge as well as the likelihood to vote, on expressive engagement and civic participation, it was the number of the traditional media used that played a significant positive role. Internet use was a significant, robust, and positive contributing factor for political knowledge, expressive engagement, and civic participation. It was worth noting also that Internet user had higher likelihood of engagement and upon passing the

threshold, engaged to a greater degree. Internet users, however, were less likely to vote, due to primarily, as we explained earlier, the nature of local elections. Fourth, there were significant variations across locations in how much media use, especially Internet use, affected individuals' citizen engagement. Even though in this initial treatment of the data, we were not able to conduct a full exploration to account for such variations, there are some clues that such variations were likely related to (1) levels of urbanization, (2) levels of economic development, and (3) ethnic composition of the local population.

There have been a precious few survey-based studies on the potential democratizing effects of the Internet in China (e.g., Lei, 2010; Shen et al., 2009). These and the earlier political science studies (e.g., Cai, 2004; Jennings, 1997; Zhong, 2004) mostly focused on political participation, namely, engagement in the activities that were aimed directly at influencing policy outcomes or other kinds of political changes. But as we argued based on the extant literature (e.g., Jacobs et al., 2009; Verba et al., 1995), in a democracy, citizens need to participate in various facets of the public life and prepare themselves for such participation. The idea has been expressed in the research on citizens' learning, opinion expression, civic as well as political participation (see Delli Carpini, 2004 for a recent review). Therefore, our study took the broader notion of citizen engagement, focusing more on learning and engaging in civic activities and opinion expression activities. It might be argued that these citizen engagement measures indicate the changing social fabric in preparation for democratic changes in the political arena.

Our results are consistent with the findings that Lei (2010) reported based on the 2007 World Value Survey (WVS) in China in that Internet users compared with non-

users were more politically engaged. Lei showed that netizens were more likely to hold political opinions, hold opinions that were critical of the current regime, and participate in collective actions such as joining boycotts or signing a petition. Based on such results, Lei concluded that the Internet as a medium in China contributed to fostering critical citizens. Placed in the Chinese context where political participation had always been state-directed involvement in support of the regime, Lei was quite right to interpret her evidence as an indication of the democratizing effect of the Internet in China.

Our results complement hers in two important ways. First, our results support her conclusion on the democratic potentials of the Internet. We showed that in less directly political arenas, individuals' voluntary engagement was significantly higher among net users than non-users. Internet users performed far better when measured by the normatively prescribed criteria for democratic citizens: being informed, expressing one's views, and participating in civic associations. Thus, our results extend the scope of Lei's conclusion to the arenas of changing civic and political cultures. With multilevel modeling, we were also able to draw the conclusion with more confidence in its general applicability across the nation's population.

Second, unlike the situation in the WVS (Lei, 2011), or the surveys of the World Internet Project (Shen et al., 2009), where China was practically treated as singular entity, we took into account of heterogeneity across geographic locations of the sample respondents. The general conclusion from our data thus is with such cross-location variation controlled for. In addition, we were also able to show significant cross-location variations in not only mean levels of both Internet use and citizen engagement but also the effect levels of media and Internet use. The latter part is particularly interesting in

that understanding such locale-specific effects of media and Internet use would yield great theory-refining insights in how the Internet may be incorporated into the social dynamics of a place (Kim & Ball-Rokeach, 2006; Warschauer, 2003). Our results thus pointed out this as a direction for future exploration.

These optimistic conclusions about the democratic potentials of the Internet must be qualified by two sets of considerations, each of which points to qualification in a specific direction. First, the evidence from different case studies (e.g., Esarey & Xiao, 2008; Hung, 2006; Yang, 2009) has demonstrated that not only the active netizens and civic groups would articulate discourses critical of the communist regime at focused and contentious moments but also discussions on web forums could be lively and diverse. Such evidence supports our conclusion based on the survey data because the Internet, by being a means for the flow of information from diverse sources and a venue for "horizontal" interactions among individuals, could indeed be contributing to enlightening and activating the democracy-leaning citizens in China (see Chan & Nesbitt-Larking, 1995). This is a qualification that strengthens our interpretation of the results reported in this paper. Put differently, the real strength of the Internet's democratizing effects in China could be somewhere between the strong effects demonstrated in the case studies at key moments and the significant but relatively small effects demonstrated in our survey study as averages among a population as a whole.

Second, the other qualification goes in a different direction. That is, our results must be interpreted in the context where the overall levels of citizen engagement were very low. To reiterate, while nearly half of the respondents in the nation never voted, 34-39% of them did not take up any of the opinion expression or civic associational

activities asked about in our survey. Such low levels of participation were widely noted and underplayed in the scholarly studies (Guo, 2007; Jennings, 1997; cf. Zhong, 2004). While the positive effects of the Internet were robust and statistically significant, they remained modest, when viewed in the context of the general low baseline and the strong effects of (1) material resources, (2) citizen competence provided by general education, and (3) psychological involvement. Further, such effects were conditioned upon the presence of some favorable social conditions during the transitional process where the control regime by the authorities left out many weak spots or gaps (see Zheng, 2008). The systemically significant impact of the Internet needs the continuous presence of such conditions that sustains the continued moderate but significant effects on a diverse population.

This paper represents only an initial take of a highly complex dataset. We limited the data analysis to a scope manageable in one paper. Given that, in this paper, we were unable to include the social networking variables to capture the process that has been shown impacted by the Internet and affects citizen engagement outcomes (e.g., Shah et al., 2005; Shen et al., 2009). In addition, the stringent statistical control employed in this study was not an optimal approach for drawing causal inferences about the impact of the Internet. In our further analysis, taking advantage of the abundance of the measures available in the data, we will explore the matching technique to better handle the endogeneity problem (see Nichols, 2007). Further, Internet use means more than simply access to the technology. It includes also the range and kinds of activities net users undertake with the Internet. In our further analysis, we will explore how different patterns of Internet use might affect netizens' citizen engagement.

Endnotes

[1] Cai (2004) shows that the most important mode of political participation in China is appeals (*shangfang*), including individuals making appeals to government officials or collective appeals by a group of individuals with shared grievances. Disruptive activities such as protests, strikes, or demonstrations are difficult to pursue. The appeals system thus creates institutional space within the authoritarian system for citizen participation. But such participation does not have all the characteristics of citizens' political participation envisioned in democratic theories in that it does not take place in an institutional space that is open to all, protects citizens' rights to participate, predicates on individuals' full autonomy and legitimacy in articulating their interests.

[2] The sample design varies slightly between the four provincial municipalities and the 27 provinces (including five "ethnic minority autonomous regions"). In each of the four municipalities (Beijing, Shanghai, Tianjin, and Chongqing), the county-level units in the urban district and the county-level units outside of the urban district form two clusters. In the first cluster, 72 residential or village committees were selected; in each, 10 households were selected; from the second cluster, 30 residential or village committees were selected and from each, 13-15 households were selected. From each of the selected households, a randomly selected adult was interviewed. In each of the 27 provinces or autonomous regions, three clusters of county-level units are differentiated: those in the provincial capital city, those in the region-level cities, and those in counties. Within each cluster, the same multi-stage random selection procedure was used. The design called for 36 residential or village committees in each provincial capital city, 10 such primary sampling units from the region-level cities, and 15 from the counties or county-level cities; from each of the primary sampling units, 15-30 households were selected. With this design, the probabilities of selection vary across the county-level units. A sample weight in the inverse to the probability of selection was thus constructed and used to weight the sample. In the implementation, the sampling design was adjusted for practical considerations (e.g., inaccessibility of certain areas due to the lack of modern transportation, political sensitivity, ethnic and linguistic barriers). The sample sizes among the 31 provincial units range from 899 in Tibet to 1,246 in Shanxi province, with an average sample size of 1,202.

[3] Personal instead of household income was used here because the latter cannot be measured reliably in a large-scale survey in China due to various and oftentimes, undocumentable ways in which households might earn income. Number of modern electronic means owned would be a much more effective measure. This measure was correlated to household income and personal income at .37 respectively.

References

Abbott, J. P. (2001). Democracy@Internet.Asia? The challenges to the emancipatory potential of the net: Lessons from China and Malaysia. *Third World Quarterly, 22*(1), 99-114.

Ball-Rokeach, S. J., Kim, Y. C., & Matei, S. (2001). Storytelling neighborhood: Paths to belonging in diverse urban environments. *Communication Research, 28,* 392-428.

Becckers, R. (2005). Participation in voluntary associations: Relations with resources, personality, and political values. *Political Psychology, 26*(3), 439-454.

Bian, Y. (2002). Chinese social stratification and social mobility. *Annual Review of Sociology, 28,* 91-116. doi: 10.1146/annurev.soc.28.110601.14823.

Brady, H. E., Verba, S., & Schlozman, K. L. (1995). Beyond SES: A resource model of political participation. *American Political Science Review, 89*(2), 271-294.

Cai, Y. (2004). Managed participation in China. *Political Science Quarterly, 119*(3), 425-451.

Cai, Y. (2005). China's moderate middle class: The case of homeowners' resistance. *Asian Survey, 45*(5), 777-799.

Chan, A. L. & Nesbitt-Larking, P. (1995). Critical citizenship and civil society in contemporary China. *Canadian Journal of Political Science, 28*(2), 293-309.

Chinese Internet Network Information Center (CINIC) (2011). *Statistical Report on Internet Development in China*. Retrieved on January 20th, 2012 from http://www.cnnic.cn/research/bgxz/.

Chovanec, P. (2009). The nine nations of China. The Atlantic. Retrieved on Feb. 21, 2012 from http://www.theatlantic.com/magazine/archive/2009/11/the-nine-nations-of-china/7769/.

Craig, S. C., Niemi, R. G., & Silver, G. E. (1990). Political efficacy and trust: A report on the NES Pilot Study items. *Political Behavior, 12*(3), 289-314.

Delli Carpini, M. X. (2004). Mediating democratic engagement: The impact of communications on citizens' involvement in political and civic life. In L. L. Kaid (Ed.), *Handbook of political communication research* (pp. 395-434). Mahwah, NJ: Lawrence Erlbaum Associates.

Delli Carpini, M. X. & Keeter, S. (1996). *What Americans know about politics and why it matters.* New Haven, CT: Yale University Press.

DiMaggio, P. & Bonikowski, B. (2008). Make money surfing the web? The impact of Internet use on the earnings of U.S. workers. *American Sociological Review, 73*(2), 227-250.

Epstein, D. L., Bates, R., Goldstone, J., Kristensen, I. & O'Halloran, S. (2006). Democratic transition. *American Journal of Political Science, 50*(3), 551-569.

Esarey, A. & Qiang, X. (2008). Political expression in the Chinese blogosphere: Below the radar. *Asian Survey, 48*(5), 752-772. doi: AS.2008.48.5.752.

Gastil, J. & Xenos, M. (2010). Of attitudes and engagement: Clarifying the reciprocal relationship between civic attitudes and political participation. *Journal of Communication, 60*, 318-343. doi:10.1111/j.1460-2466.2010.01484.x

Goldman, M. (2005). *From comrade to citizen: The struggle for political rights in China*. Cambridge, MA: Harvard University Press.

Graber, D. A. (2001). *Processing politics: earning from television in the Internet age*. Chicago, IL: University of Chicago Press.

Guo, G. (2007). Organizational involvement and political participation in China. *Comparative Political Studies, 40*(4), 457-482. doi: 10.1177/0010414005285751

Guillén, M. F. & Saurez, S. L. (2005). Explaining the global digital divide: Economic, political and sociological drivers of cross-national Internet use. *Social Forces, 84*(2), 681-708.

Howard, P. N. (2005). Deep democracy, thin citizenship: The impact of digital media in political campaign strategy. *Annals of the American Academy of Political and Social Science, 597*, 153-170. DOI: 10.1177/0002716204270139

Hung, C. F. (2006). The politics of cyber participation in the PRC: The implications of contingency for the awareness of citizens' rights. *Issues & Studies, 42*(4), 137-173.

Jacobs, L. R., Cook, F. L., & Delli Carpini, M. X. (2009). *Talking together: Public deliberation and political participation in America*. Chicago, IL: University of Chicago Press.

Jennings, M. K. (1997). Political participation in the Chinese countryside. *American Political Science Review, 91*(2), 361-372.

Jensen, M. J., Danziger, J. N., & Venkatesh, A. (2007). Civil society and cyber society: The role of the Internet in community associations and democratic politics. The Information Society, 23, 39-50. DOI: 10.1080/01972240601057528

Kim, Y. C. & Ball-Rokeach (2006). Civic engagement from a communication infrastructure perspective: A multi-level approach. *Communication Theory, 16*, 173-197. doi: 10.1111/j.1468-2006.00267.x

Kristof, N. D. (2006, June 20). In China, it's ******* vs. netizens. *The New York Times*, p. A17.

Latham, K. (2007). Sms, communication, and citizenship in China's Information society. *Critical Asian Studies, 39*(2), 295-314. doi: 10.1080/14672710701339493

Lei, Y. W. (2011). The political consequences of the rise of the Internet: Political beliefs and practices of Chinese netizens. Political Communication, 28(3), 291-322. DOI: 10.1080/10584609.2011.572449

MacKinnon, R. (2008). Flatter world and thicker walls? Blogs, censorship and civic discourse in China. *Public Choice, 134*, 31-46.

Manion, M. (1996). The electoral connection in the Chinese countryside. *American Political Science Review, 90*(4), 736-748.

Manion, M. (2000). Chinese democratization in perspective: Electorates and selectorates at the township level. *The China Quarterly, 163*, 764-782.

Milner, H. (2006). The digital divide: The role of political institutions in technological diffusion. *Comparative Political Studies, 39*(2), 176-199. DOI: 10.1177/0010414005282983

Nichols, A. (2007). Causal inference with observational data. *The Stata Journal, 7*(4), 507-541.

Pan, Z., Yan, W., Jing, G., & Zheng, J. (2011). Exploring structured inequality in the Internet use Behavior: Evidence from a Chinese metropolis. *Asian Journal of Communication*, 21(2), 116-132.

Polak, R. K. (2005). The Internet and political participation: Exploring the explanatory links. *European Journal of Communication, 20*(4), 435-459. DOI: 10.1177/0267323105058251

Read, B. L. (2007). Assessing variation in civil society organizations: China's homeowner associations in comparative perspective. *Comparative Political Studies, 41*(9), 1240-1265. doi: 10.1177/0010414007302340

Rogers, E. M. (2003). *Diffusion of innovations (5th Ed.).* New York: Free Press.

Salter, L. (2009). Colonization tendencies in the development of the World Wide Web. *New Media & Society, 7*(3), 291-309. DOI: 10.1177/1461444805050762

Shah, D. V., Cho, J., Eveland, W. P., Jr., & Kwak, N. (2005). Information and expression in a digital age: Modeling Internet effects on civic participation. *Communication Research, 32*, 531-565. doi: 10.1177/0093650205279209

Shen, F., Wang, N., Guo, Z., & Guo, L. (2009). Online network size, efficacy, and opinion expression: Assessing the impacts of Internet use in China. *International Journal of Public Opinion Research, 21*(4), 451-476. doi:10.1093/ijpor/edp046

Shi, T. (1997). *Political participation in Beijing*. Cambridge, MA: Harvard University Press.

Shirk, S. (2007). *China: Fragile superpower*. Oxford: Oxford University Press.

Shyu, H. (2009). Psychological resources of political participation: Comparing Hong Kong, Taiwan, and Mainland China. *Journal of International Cooperation Studies, 17*(2), 25-47.

Tolbert, C. J. & McNeal, R. S. (2003). Unraveling the effects of the Internet on political participation? *Political Research Quarterly, 56*(2), 175-185.

Verba, S., Schlozman, K. L., & Brady, H. E. (1995). *Voice and equality: Civic voluntarism in American politics.* Cambridge, MA: Harvard University Press.

Wu, G. (1994). Command communication: The politics of editorial formulation in the People's Daily. *The China Quarterly, No. 137*, 194-211.

Yang, G. (2009). *The power of the Internet in China: Citizen activism online*. New York: Columbia University Press.

Zhang, Q. (2004). The Internet's negative impact on the development of democracy. *Contemporary Chinese Thought, 35*(2), 91-99.

Zheng, Y. (2008). *Technological empowerment: The Internet, state, and society in China*. Stanford: Stanford University Press.

Zheng, Y. & Wu, G. (2005). Information technology, public space, and collective action in China. *Comparative Political Studies, 38*(5), 507-536.

Zhong, Y. (2004). Political culture and participation in the Chinese countryside: Some empirical evidence. *PS: Political Science and Politics, 37*(3), 445-453.

Zhou, Y. (2012). Essential characteristics, communication patterns, and social functions of Internet rumors in contemporary China: A meta-analysis of eight empirical studies. *China Media Report Overseas, 8*(1), 35-44 (in Chinese).

Table 1

Economic Indicators, Internet Penetration Rates, and Civic Engagement Indicators: Regional Differences and Correlation Coefficients[1]

Economic Regions	Population Size (M)	GDP per Capita (USD)	Average Year of Schooling (Years)	Median Personal Annual Income (USD)	Internet Penetra-tion Rate (%)	Average know. on public affairs (0-12)	Engaged in opinion expression activities (%)	Particip. in civic activities (%)	Voted in local elections (%)
Descriptive statistics									
Western (*n*=12)	360.38	3727.67	8.26	1338.49	30.96	4.85	66.97	65.39	48.41
Central (*n*=6)	356.72	3849.07	8.64	1612.96	37.28	4.84	65.77	56.71	51.93
Northeastern (*n*=3)	109.52	5345.50	9.14	1745.24	32.53	4.60	70.32	60.64	41.02
Eastern (*n*=10)	506.16	8202.10	8.83	2953.71	46.62	5.08	63.47	56.49	58.94
Correlation coefficients									
GDP per capita		1.000							
Average year of schooling		.581**	1.000						
Median personal annual income		.686**	.680**	1.000					
Internet penetration rate		.518**	.739**	.751**	1.000				
Average knowledge		.544**	.577**	.700**	.517**	1.000			
% engaged in opinion expression		-.218	.071	.205	.095	.248	1.000		
% participated in civic activities		-.193	-.027	-.003	-.097	.354†	.641**	1.000	
% voted		.502**	.127	.364*	.233	.358*	.089	.108	1.000

Note:

1. Population size statistics are from 2010 the 6th Census Main Statistics Report #2 (http://www.stats.gov.cn/tjfx/jdfx/t20110429_402722512.htm). The GDP per capita statistics are based on data provided by hjcn.org (http://www.tjcn.org/plus/view.php?aid=20051). The other statistics are from the survey.
2. The correlation coefficients are based on provincial level data (*n*=31).

† $p \leq .10$, * $p \leq .05$, ** $p \leq .01$.

Table 2
Predicting Aggregate-Level Citizen Engagement (OLS Regression, N=624)[1]

Predictors	Public aff. Knowledge (0.44-9.05)	Opinion Expression (0-9.50)	Civic Participation (0-3.63)	Voting (0-100)
Coastal province	-.018	-.097	-.141*	.069
Regions (Western as reference)				
Eastern region	-.110*	-.054	-.208*	-.035
Central region	-.076*	-.059	-.250***	-.029
Northeastern region	-.142***	-.067	-.148***	-.132**
Levels of urbanization (direct municipalities and provincial capitals as reference)				
Region-level city	-.109	.112	.140	.095
County-level city	-.095	.109	.111	.192*
Non-city county	-.117	.075	.212*	.245*
Average age	-.014	-.094*	-.083	.042
Average year of schooling	.477***	.190**	.303***	.254***
Average personal monthly income	.262***	.029	-.017	-.051
Average number of appliances owned	.121*	.063	.249***	.283***
% ever-worked	-.051	.144***	.049	.034
% born in the place of residence	.067*	.045	.027	-.012
% urban residents	.061	-.050	-.004	-.350***
% of Internet users	-.009	.277***	.106	-.233**
Adjusted R^2	.630	.203	.282	.186
F(15/608)	74.54	11.56	17.31	10.50

Note:

1. The first three dependent variables are averages within each administrative unit. The voting variable is the voter turnout in each administrative unit. All four are weighted by the sampling weight. The cell entries are standardized regression coefficients.

Table 3
Multi-Level Logistic Regression Model Predicting the Likelihood of Using the Internet (ML Estimates, N=37,378, J=624)[1]

Predictors	Internet Use
Fixed effects	
Demographic variables	
Sex	.672**
Age	.889**
Years of schooling	1.353**
Personal monthly income (*yuan*)	1.044**
Urban residency	1.817**
Ever worked or not	.976
Party membership	1.332**
Professional job	1.416**
Managerial job	1.733**
Farming job	.496**
Modern appliances owned (0-16)	1.252**
Aggregate-level variables	
Coastal province	1.186
Eastern region (vs. Western)	.846
Central region (vs. Western)	1.039
Northeastern region (vs. Western)	1.390**
County-level city (vs. County)	.968
Region-level city (vs. County)	.786**
Provincial capital or province-level municipality (vs. County)	.724**
Average years of schooling	.778**
Average personal monthly income	.892**
% born in the place of residence	1.141
% of *Han* nationality	1.460*
% of Internet users	953.054**
Random effects (σ_u^2)	
Intercept	.021*
Ave. observation per group	59.7
Wald χ^2 of the fixed effects (df=23)	8,435.63**
LR test (vs. single-level model, χ^2, df=1)	14.30**
Total R^2	.247**

Note:

1. The fixed effects presented here are the odds ratios from the final random intercept model. The random effect is the variance of the intercept (σ_μ^2). The R^2 was obtained by as the squared correlation coefficient between the predicted probability of using the Internet from the empty model (no fixed-effect predictor) and the predicted probability from the final model with all the parameters included.

*$p \leq .01$, ** $p \leq .001$.

Table 4
Multi-level Regression Models Predicting Citizenship Engagement (ML Estimates, *N*=37,279, *J*=624)[1]

Predictors	Public aff. Knowledge (0-12)	Opinion Expression (0-10)	Civic Participation (0-8.67)
Fixed effects			
Demographic variables			
Sex	-.883**	-.138**	.007
Age	-.001	-.037**	-.008**
Years of schooling	.184**	.063**	.034**
Personal monthly income (*yuan*)	.029**	.008*	.007**
Urban residency	.548**	-.008	-.087**
Ever worked or not	-.358**	-.172*	-.044
Party membership	.422**	.160**	.409**
Professional job	.246**	.240**	.202**
Managerial job	.341**	-.086	.031
Farming job	-.096*	.050	-.070**
Modern appliances owned (0-16)	.095**	.045**	.059**
Psychological variables			
Internal political efficacy	.011	.136**	.075**
External political efficacy	-.039*	.043*	.034**
Political interest	.191**	.338**	.136**
Media use variables			
TV and newspaper news exposure	.175**	-.041**	.010
Number of traditional media used (0-4)	.091**	.388**	.217**
Internet use (1=yes, 0=no)	.799**	1.485**	.111**
Aggregate-level variables			
Eastern region (vs. Western)	-.412**	-.204	-.342**
Central region (vs. Western)	-.201	-.059	-.229**
Northeastern region (vs. Western)	-.428**	-.188	-.246**
Levels of urbanization	-.072	.026	-.043
Average years of schooling	.053	-.018	.039
Average personal monthly income	.074**	.021	.009
% of born in the place of residence	.544**	.148	.064
% *Han* nationality	-.053	-.335	-.409**
Constant	1.160**	1.886**	.210
Random effects (Covariance matrix Σ)			
News exposure	.006**	.013**	.006**
Net use	.281**	.634**	.064**
Number of traditional media used	.066**	.155**	.029**
Intercepts	.601**	.891**	.209**
News exposure & net use	.011	.016	.001
News exposure & traditional media use	-.010	-.035	-.007**
News exposure & intercepts	-.007	.060**	.004
Net use & traditional media use	-.019	-.006	.005
Net use & intercepts	.047	-.037	-.065**
Traditional media use & intercepts	-.064	-.223**	-.029
Individual-level residuals	3.990**	7.224**	1.511**
Wald χ^2 (*df*=25)	15,907.48**	5,333.42**	4,761.53**

LR test (vs. the OLS regression, χ^2, *df*=10)	2,717.82**	2,378.75**	2,804.12**
LR test (vs. random intercept model, χ^2, *df*=9)	286.20**	329.13**	379.48**
Total R^2	.594**	.346**	.314**

Note:

1. For each of the three outcomes, a series of multi-level mixed-effect linear regression models were estimated via the "xtmixed" procedure in Stata. The average number of individuals in each aggregate unit is 59.7. The table shows, for the fixed effect part, the unstandardized regression coefficients from the final random coefficient models, and for the random effect part, the **Σ** matrix, which contains the variance of each random slope and intercept as well as the covariance among them. The final R^2 for each was obtained by as the squared correlation coefficient between the observed value of an outcome variable and the corresponding predicted values from the final model.

*$p \leq .01$, ** $p \leq .001$.

Table 5
Multi-level Logistic Models Predicting Citizenship Engagement (Whole Sample, *N*=37,279, *J*=624)[1]

Predictors	Expressed Opinion	Participated in civic activities	Voted[2]
Fixed effects			
Demographic variables			
Sex	.866**	.990	.912**
Age	.980**	.984**	1.028**
Years of schooling	1.055**	1.097**	1.010
Personal monthly income (*yuan*)	1.002	1.023**	.994
Urban residency	.993	.984	.217**
Ever worked or not	1.009	.803**	1.280**
Party membership	1.188*	2.331**	1.508**
Professional job	1.025	1.436**	.975
Managerial job	1.032	1.043	.843
Farming job	1.017	.884*	1.744**
Modern appliances owned (0-16)	1.079**	1.119**	1.076**
Psychological variables			
Internal political efficacy	.919**	1.048*	1.064**
External political efficacy	.984	1.030	1.013
Political interest	1.381**	1.246**	1.120**
Media use variables			
TV and newspaper news exposure	1.012	1.027	1.114**
Number of traditional media used (0-4)	1.265**	1.322**	1.039
Internet use (1=yes, 0=no)	2.715**	2.070**	.700**
Aggregate-level variables			
Eastern region (vs. Western)	.798	.414**	1.065
Central region (vs. Western)	.880	.527**	1.028
Northeastern region (vs. Western)	1.988	.510**	.700*
Levels of urbanization	1.032	.891	.910
Average years of schooling	.983	1.120*	1.123**
Average personal monthly income	.996	1.002	1.056
% of born in the place of residence	1.646	1.076	.902
% *Han* nationality	1.072	.572*	.704
Random effects (Covariance matrix Σ)			
News exposure	.019**	.007*	.018**
Net use	.191**	.176**	.165**
Number of traditional media used	.107**	.092**	.044*
Intercepts	1.656**	1.705**	1.611**
News exposure & net use	-.004	-.019*	-.012
News exposure & traditional media use	-.036*	-.019*	-.020*
News exposure & intercepts	.061*	.074**	.015
Net use & traditional media use	.046	.102**	.041*
Net use & intercepts	-.312**	-.326**	-.447**
Traditional media use & intercepts	-.283**	-.364**	-.176**
Wald χ^2 (*df*=25)	2,366.90**	3,490.56**	3,497.26**
LR test (vs. the logistic regression, χ^2, *df*=10)	3250.94**	2,702.20**	3,023.39**
LR test (vs. random intercept model, χ^2, *df*=9)	198.34**	137.38**	237.57**
Ave. observation per group	59.7	59.7	58.5

Total R^2	.454**	.461**	.537**

Note:

1. For each of the three outcomes, a series of multi-level logistic regression models were estimated via the "xtmelogit" procedure in Stata. The fixed-effect parameters are the odds ratios from the final random coefficient model. For the random effect part, the $\mathbf{\Sigma}$ matrix, contains the variance of each random slope and intercept as well as the covariance among them. The final R^2 was obtained by as the squared correlation coefficient between the predicted probability of each outcome from the empty model (the model without any of the fixed-effect predictors) and that of the corresponding final model with all the parameters included.
2. The valid sample (non-missing in the vote variable) was 36,529. The number of observations per administrative unit ranged from 16 to 727.

*$p \leq .01$, ** $p \leq .001$.

Table 6
Moderations of Individual-Level Media Use Variables by Characteristics of Aggregate Units[1]

	Civic Engagement Outcomes			
	Knowledge	Opinion Expression	Civic Participation	Voting[2]
Moderation of the effect of TV & newspaper news exposure by …				
Levels of urbanization	.004*	--	--	--
% of *Han* nationality	-.009†	-.026*	--	--
Average personal income				-.004*
Average appliances owned	--	--	.005*	.009**
Moderation of the effect of number of traditional media used by …				
Northeastern vs. western region	--	--	-.020†	--
Average years of schooling	-.010**	--	--	--
Average personal income	.007†	--	--	.023*
Average appliances owned	--	--	--	-.057**
% of *Han* nationality	--	.109**	.033*	--
Moderation of the effect of Internet use by …				
Central vs. western region	--	.095†	--	--
Northeastern vs. western region	-.099*	-.149*	--	--
Levels of urbanization	.046**	--	--	--
Average years of schooling	--	--	-.009†	--
Average personal income	.023*	--	-.013**	--
Average appliances owned	-.031*	-.037†	--	-.027**

Note:

1. The best linear unbiased predictions (BLUPs) of the random slopes estimated in the multilevel linear models on each civic engagement outcome (Table 3) are regressed (OLS) on a set of characteristics of the aggregate-level units (N=624), including three dummy variables representing the economic regions, levels of urbanization, average years of schooling, average personal income, average number of appliances owned, % of born in the place of residence, and % of Han nationality. These are the same aggregate-level predictors in the corresponding MLM. The cell entries are unstandardized regression coefficients. Each can be interpreted as an interaction parameter between the corresponding individual-level media use variable and the aggregate-level variable.
2. The dependent variables in these models are random effects estimated in the multilevel logistic model with voting as the outcome (Table 4).

† $p \leq .10$, * $p \leq .05$, ** $p \leq .01$.

Appendix A
Provincial Characteristics and Internet Penetration

Province	Population Size (M)	GDP per Capita (USD)	Average Year of schooling (Years)	Median Personal Annual Income (USD)	Internet Penetration rate (%)
Western (n=12)	***360.38***	***3727.67***	***8.26***	***1338.49***	***30.96***
Chongqing	28.85	4380.32	7.99	1189.68	29.42
Gansu	25.58	2557.62	8.20	1189.68	29.03
Guangxi	46.03	3209.37	8.59	1189.68	32.57
Guizhou	34.75	2082.38	7.50	872.22	25.99
Neimenggu	24.71	7515.40	9.25	1745.24	34.40
Ningxia	6.30	4263.49	8.23	1745.24	35.40
Qinghai	5.63	3827.78	8.90	1745.24	36.57
Shaanxi	37.33	4306.83	9.10	1189.68	37.84
Sichuan	80.42	3362.22	8.21	1507.14	31.07
Xizang (Tibet)	3.00	2749.05	4.79	435.71	13.12
Xinjiang	21.81	3977.30	9.43	1507.14	33.06
Yunnan	45.97	2500.32	8.89	1745.24	33.03
Central (n=6)	***356.72***	***3849.07***	***8.64***	***1612.96***	***37.28***
Anhui	59.50	3315.56	7.69	1745.24	31.85
Henan	94.02	3880.32	9.02	1507.14	43.84
Hubei	57.24	4429.52	8.51	1189.68	30.81
Hunan	65.68	3923.65	9.22	1745.24	35.83
Jiangxi	44.57	3373.49	8.04	1745.24	37.63
Shanxi	35.71	4171.90	9.38	1745.24	43.70
Northeastern (n=3)	***109.52***	***5345.50***	***9.14***	***1745.24***	***32.53***
Heilongjiang	38.31	4297.78	9.02	1745.24	32.20
Jilin	27.46	5015.71	9.24	1745.24	34.34
Liaoning	43.75	6723.02	9.17	1745.24	31.04
Eastern (n=10)	***506.16***	***8202.10***	***8.83***	***2953.71***	***46.62***
Beijing	19.61	12054.44	10.79	2538.89	45.52
Fujian	36.89	6353.17	8.31	1745.24	43.83
Guangdong	104.30	7100.95	8.54	1745.24	45.37
Hainan	8.67	3782.70	8.17	872.22	27.07
Hebei	71.85	4550.48	9.64	1745.24	46.29
Jiangsu	78.66	8387.30	9.01	2300.79	36.24
Shandong	95.79	6524.76	7.94	1507.14	30.12
Shanghai	23.02	12075.24	10.41	2538.89	43.18
Tianjin	12.94	11586.35	9.60	1745.24	38.77
Zhejiang	54.43	8208.10	8.83	2935.71	46.62
Overall	***2665.56***	***5303.17***	***8.70***	***1665.73***	***35.52***