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The Diffusion of Government Microblogging

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Abstract

Governments across many countries are adopting new social media (e.g. twitter), and police departments are engaging in the bandwagon too. We empirically examine the spread of police microblogging in Chinese municipal police departments from the perspective of organizational innovation diffusion. The results show that government size, internet penetration rate, regional diffusion effects and upper-tier pressure are positively and significantly associated with the adoption and earliness of police microblogging, whereas fiscal revenue, economic development and openness, E-government and public safety have no significant effects. We also find that police microblogging diffusion is contingent on different variables at different phases.

Key words

Microblogging/twitter, innovation diffusion, E-government, police department, China

THE DIFFUSION OF GOVERNMENT MICROBLOGGING

Evidence from Chinese municipal police bureaus

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INTRODUCTION

Social media tools (e.g. twitter or microblog) based on web 2.0 technology have been increasingly adopted by governments in many countries to accelerate intergovernmental communications and information exchange with citizens (Eggers, 2007). Facebook and Twitter are the platforms which have been used by terrorists or criminals to coordinate their offense, while governments have also responded by using social media technologies to communicate with residents and prepare for emergencies (Chavez *et al.*, 2010). Their adoption enables governments to rebuild social image and retrieve public trust in the time of economic crisis. Specifically, the launch of police microblog may contribute significantly to their work. For instance, police departments use microblogging to share information with their peer departments and communicate with netizens to acquire clues to break cases and response to emergencies (Heverin and Zach, 2011). The rapid and extensive spread of government microblogging raises an interesting and important question: why do governments engage in the bandwagon of microblogging? What drives the diffusion of microblogging among governments? As a pivotal question of both theoretical and practical significance, it has not been systematically examined in the literature.

To fill the gap in the literature, we study the diffusion of microblogging in government, adapting organizational innovation adoption and diffusion theories and using the case of municipal police microblogging in China. Although there are numerous studies concerning the diffusion of electronic government (E-government) and other management information systems (MIS) across governments (Lee *et al.*, 2011; Tolbert *et al.*, 2008), our understanding of social media technology and its diffusion in government is still deficit due to its rapid development and spread. To our knowledge, it is the first empirical study of the diffusion of this cutting-edge information technology (IT) innovation in public organization.

The adoption of microblogging by governments can be considered as a form of organizational IT innovation and we can study its spread from innovation diffusion perspective. In the article, we develop a unique dataset to empirically examine the diffusion of official microblogging and its determinants in Chinese municipal police departments, integrating organizational innovation and policy diffusion theories. The aim of this article is two-fold. First, we develop a theoretical framework to explain the diffusion of police microblogging in China from the perspectives of organizational innovation, policy diffusion and E-government and public safety. Second, we test the theoretical propositions using data from prefecture-level city police bureaus in China and contribute empirically to the literature on the topic.

The reminder of the article is structured as follows. We first retrospect and survey the diffusion course of police microblogging in China, and introduce the background of our study. The relevant theories are then reviewed, and the research hypotheses are proposed accordingly. The data and methods are reported, followed by the results of our analysis. Finally, we discuss the theoretical contributions and policy implications of our findings, and put forward avenues for future research.

THE DIFFUSION OF POLICE MICROBLOGGING IN CHINA

Local government system and police innovation in China

Structured by five administrative tiers, the government system in China is characterized by its unique Party-state regime and hierarchical control-and-command chain. The Chinese Communist Party (CCP) committee and its standing committee at all tiers are the *de facto* centre of authority, while the government runs as its administrative organ. Directly governed by the central government, the State Council, Provincial governments consist of 23 provinces (including Taiwan), four municipalities (Beijing, Shanghai, Tianjin and Chongqing), five autonomous regions and two special administrative regions (Hong Kong and Macao). Below provinces are over 300 prefectures and prefecture-level cities, nearly 3,000 counties, districts and county-level cities, and over 40,000 towns and sub-districts. Prefecture-level jurisdictions position at the pivot linking provinces and counties, and their healthy functioning is crucial for social stability and prosperity (Chung and Lam, 2004).

The dramatic socioeconomic transformation from central planned economy to market-oriented economy since the late 1970s has substantially changed the philosophy and operation of the government. Numerous innovation programs have been adopted by and spread across Chinese local governments over the past decades, in which economic globalization, political regime reform and IT play key roles (Wu *et al.*, forthcoming). Government reform and innovation, accompanying with the delegation of authority from the central government to local governments and from governments to social and private sectors, have increasingly made governments more transparent, responsive, accountable and effective. Recently, the central government has highlighted the importance of strengthening and innovating social management to replace the monolithic Party-state governance model and advance social justice and public trust (Yu, 2011).

As a huge transition economy with notable regional socioeconomic disparities, social stability and public safety is highly emphasized by the Party in China. Police bureau is the formal agency responsible for combating crime and protecting public safety in China, and it is also in charge of traffic safety, household registration, floating population management and other social affairs. Police bureau is prioritized in the government system, and its head is usually appointed as a member of the Party standing committee and the secretary of the committee of political and legislative affairs. Previously, the police interacts little and ineffectively with the public, and its social image is not satisfactory due to mandatory and intrusive enforcement manner (Wu and Sun, 2009). Police bureaus have been considered to be important potential adopters of social management innovation in recent years, and their service performance has been improved considerably. By harnessing IT applications other than traditional means such as patrol and call centre, the interaction between the police and the public has also been strengthened. The police as a street-level bureaucracy are closely related with citizens' everyday life, and its innovations often influence the public extensively.

The diffusion of municipal police microblogging in China

Government microblogging have spread rapidly in China over the past several years. As of 20 March 2011, more than 2,400 government microblogs (including 1,708 government agencies and 720 government officials) have been launched, making 'microblogging politics' become a new trend of digital government in China (Zhang and Jia, 2011).¹ Microblogging have become popular with local public security bureaus in China, and police bureaus pioneer in the bandwagon of microblogging. More and more public security authorities in China have been involved in a nationwide campaign opening their official microblogs to communicate with netizens and collaboratively defend public security.

The first official police microblog 'Ping'an Zhaoqing' was launched by Zhaoqing Municipal Police Bureau in south China's Guangdong Province on 25 February 2010.² After then, numerous police microblogs have been launched and attracted extensive social attentions. They are usually named with 'Ping'an' to denote their mission of protecting citizens and maintaining public safety. The opening of official microblogs has improved the social image of polices, and some of them even become famous. For instance, the amount of followers of 'Ping'an Zhaoqing' has been over 1,200,000 while the population of Zhaoqing is only about 4,000,000. The Ministry of Public Security (MPS) also urges the use of police microblogs as a new platform and tool at a national conference recently held (Reuters, 2011). A recent survey shows that about half of the activated government microblogs are launched by police departments, and top ten prestigious government microblogs are all police microblogs (Zhang and Jia, 2011). The statistics reported by the MPS on 26 September 2011 demonstrates that public security organs have opened over 4,000 official microblogs and about 5,000 police officers have registered personal microblogs (Xinhua, 2011).

Microblogging has been the key platform for police departments to release, collect, share and communicate information with other stakeholders including peer departments, media and citizens. Microblogs are used by police departments to actively release important notices about public safety to facilitate citizens' life and work. For instance, timely notifications on traffic control and jams can help citizens to reasonably choose their transport tunnels. Police departments may request help from active and extensive microbloggers to acquire clues to break cases. Emergencies reported online could be quickly communicated to the police and enable them to respond accordingly. Police microblogging is also used to help police departments to fight child trafficking and help abducted children return home, which is a very severe social problem due to the lasting tradition of son preference in China. The application of microblog in the fight against child trafficking at the end of 2010 attracted much social attention and dramatically advanced the spread of police microblog. Microblogs and their groups also facilitate police departments across different regions and tiers to share information and collaboratively break cases. The interlocking of police microblogs enables online

cross-jurisdiction police collaboration to share information and resources among police departments located in different regions (Xinhua, 2011).

A recent reported case demonstrates the power of police microblogging in China. Microblogs are used to help the police to catch murderers in Xiamen City in south China. The photo of a victim was posted by Xiamen Public Security Bureau on its official microblog and was quickly transmitted to over 10,000 microbloggers, shortly resulting in numerous hits and over 2,000 comments. The information posted and updated by microbloggers witnessing the case helped the police to find the victim and arrest the suspects (Xinhua, 2010).

To depict the process and patterns of police microblog diffusion, we focus our attention on the city level. We search the official microblogs of prefecture-level city police bureaus with their real identities verified (marked with ‘V’) at weibo.com, a leading microblog platform in China.³ As of 31 July 2011, 148 of the 283 prefecture-level-cities in China have launched their official microblogs, accounting for 52.3 per cent of the population and growing at the monthly rate of 40.06 per cent. The number of prefecture-level police microblogs becomes 188 on 31 December 2011, accounting for 66 per cent of total police bureaus. The monthly amount of new-launched police microblogs and accumulative per cent of police microblogs are depicted in Figure 1. We can find that the growth pattern of police microblogging seems like a classic S-curve of innovation diffusion (Rogers, 2003). At the initial phase of spread, few microblogs were launched. The amount of microblogs opened grew gradually and then climbed the peak of the wave in March 2011. With the rest of urban police bureaus being unaware of or resisting microblogging, the course of its diffusion slowed down at the later phase.

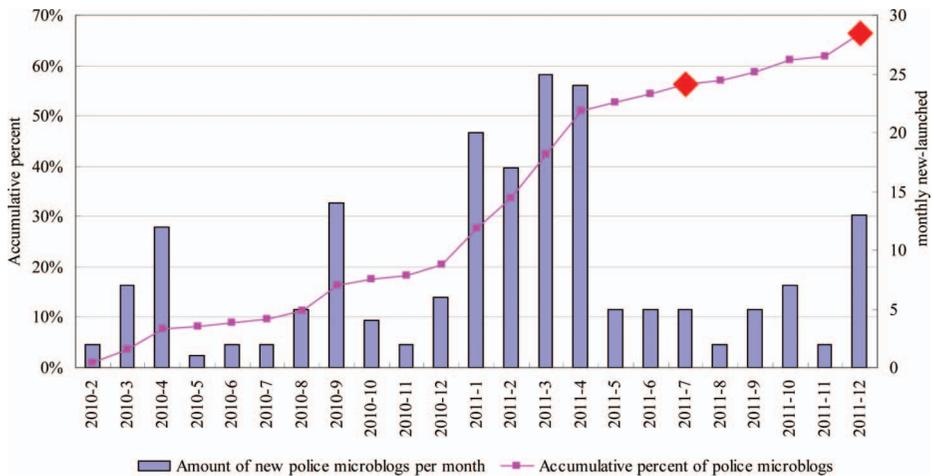


Figure 1: The diffusion of city police microblogs in China

Notes: The red diamond-points in bold are the time points at which the microblogging data were collected.

Police microblogs have been adopted extensively, but their distribution and development varies across different regions and administrative levels. Comparatively police departments in east and south China keep ahead of their counterparts in west and north (Zhang and Jia, 2011), and the geographical disparity of police microblog deserve us to empirically explain its adoption.

THEORIES AND HYPOTHESES

The launch and spread of microblogging by police bureaus can be examined from the perspective of organizational innovation adoption and diffusion. Innovation is generally defined as something new to the adopting unit (individual or organization), e.g. ideas, tools, technologies, practices and so forth (Rogers, 2003). Organizational innovation is the adoption of something new to organizations, in which organization is the adopting unit and focus of analysis (Damanpour, 1991). Diffusion refers to a process by which an innovation is communicated over time in a social system (Rogers, 2003). Public organizational innovation can be classified into service innovations, process innovations (marketization, organizational and technological innovations), and ancillary innovations (Walker *et al.*, 2011). Technological innovation is typically the adoption of IT in public organization (Walker, 2006). Microblogging is a typical technological innovation for the adopting police bureaus, and we can analyse its diffusion from this lens.

Innovation is a complicated and multifaceted construct, and many attributes are created to depict and compare it (Damanpour, 1991; Mohr, 1969). Compatibility, relative advantage, and complexity are found to be consistently and significantly associated with innovation adoption (Tornatzky and Klein, 1982), and cost and impact are also important characteristics (Damanpour and Schneider, 2009). When compared with other IT innovation (e.g. government portals and MIS), we can find distinct differences of government microblogging in innovation characteristics. Microblogging as the typical application of Web 2.0 technology is cheaper, easier and compatible, while it is more relative advantageous with higher social impact simultaneously. Theoretically, cost and complexity are negatively related to innovation adoption, whereas compatibility, relative advantage and impact are positively related to innovation adoption (Damanpour and Schneider, 2009; Tornatzky and Klein, 1982). Thus, government microblogging will be adopted rapider and diffused broader than government portals and MIS. The evidence also justifies the theoretical prediction, as depicted in Figure 1.

The mainstream theories represent the generalized logic of innovation adoption and could be used to explain its diffusion, though microblogging is very different from its predecessors. Three perspectives are employed to explain the adoption and diffusion of police microblogging, namely organizational innovation (Damanpour, 1991; Mohr, 1969), policy diffusion (Berry and Berry, 1999) and characteristics concerning specific innovation area (E-government and public safety) (Lee *et al.*, 2011; Weisburd and Eck,

2004). First, the organizational innovation literature emphasizes the importance of organizational attributes (organizational size, structure and resources) and environmental characteristics for the adoption of organizational innovation. Second, although organizational and jurisdictional attributes are emphasized, the intergovernmental relationship (vertical and horizontal) is argued to be the key antecedents of policy diffusion by political scientists. Finally, the specific attributes of the focal policy area and technological domain of police microblog (E-government and public safety) are also crucial for its diffusion. We discuss these perspectives concerning the adoption of police microblogs and propose relevant hypotheses to be tested.

Organizational innovation

Innovation is usually argued to be risk-taking and associated with large organizations, because these organizations can devote a large scale of personnel and financial resources to innovation. Large organizations are often structured complexly and the intraorganizational configurations and communications may also benefit knowledge transfer and innovative idea generation (Damanpour, 1991). Thus, organizational size is beneficial to organizational innovation. The organizational size-innovation nexus has been studied numerously by prior scholars, and two meta-analyses report the positive relationship between organizational size and innovation (Camison-Zornoza *et al.*, 2004; Damanpour, 1992). Evidence from governments also shows the significant effects of organizational size on innovation adoption (Franzel, 2008). We can hypothesize organizational size is positively associated with the adoption of police microblogging.

Organizational innovation is a capital-intensive activity and extensive organizational resources are vital for its success (Damanpour, 1991). Technological innovation commonly requires large-scale investment of technological, personnel and monetary capital, and its reliance on resources often becomes an obstacle facing innovators (Mohr, 1969). The operation of official microblogging also needs investment of personnel, offices and IT, though it is characterized by freedom and openness (Eggers, 2007). Thus, organizational resource base is hypothesized to be positively correlated with its adoption.

Economic development represents the revenue base of governments, and is a key proxy of fiscal resource and citizens' income (Tolbert *et al.*, 2008). Citizens resided in economic developed jurisdictions are usually political participative and demand more from governments, which may encourage governments to adopt new practices (Putnam, 2001). Thus, governments located in economic developed jurisdictions are more likely to adopt innovation than those in less developed regions. We can hypothesize that jurisdictional economic development is positively correlated with the adoption of police microblogging.

Economic openness refers to the extent of economic integration of jurisdictions into the global economy, and we argue it is positively associated with the adoption of police

microblogging. Economic openness accelerates the information communication and knowledge exchange across different regions and countries, which in turn contributes to the generation and spread of innovative ideas (Aguilera and Cuervo-Cazurra, 2004). This is particularly the case for local governments in China, because they have to compete with peers in other regions to attract foreign direct investment (FDI) (Huang, 1996). Local governments pursuing competitive advantages are motivated to imitate innovations of other governments, and their tendency may be stronger in more economic open regions. The adoption of police microblogging is thus hypothesized to be positively associated with jurisdictional economic openness.

In line with the theoretical predictions of organizational innovation, we propose the following four hypotheses.

- H1: Government size is positively associated with the adoption of microblogging by police bureaus.
- H2: Government fiscal resource is positively associated with the adoption of microblogging by police bureaus.
- H3: Jurisdictional economic development is positively associated with the adoption of microblogging by police bureaus.
- H4: Jurisdictional economic openness is positively associated with the adoption of microblogging by police bureaus.

Policy diffusion

The diffusion of new policies among countries and governments has been studied numerously by political scientists to understand the process of policy change. The antecedents of policy diffusion have been classified into two groups, namely internal attributes and external interactions (Berry and Berry, 1999). The internal attributes include both organizational and jurisdictional characteristics, and most of them have been analysed in the organizational innovation literature (Mohr, 1969). We focus our attention herein on the external interactions of governments with their peers and upper-tiers.

The institution theory emphasizes the importance of institutional logic for the diffusion and isomorphism of organizational practices. Organization may follow others' practices due to institutional pressures from their peers, theorizing experts and regulatory institutions (Tolbert and Zucker, 1983). The mimic pressure from peers drives organizations to adopt the practices that have been already adopted by the majority of the community. The coercive pressure motivates organizations to adopt the practices mandated or recommended by regulatory institutions or upper-tier authorities (Dobbin *et al.*, 2007). In sum, both horizontal and vertical diffusion effects play important roles in the process of policy diffusion (Daley and Garand, 2005).

The regional diffusion model stresses the role played by peer governments in the policy diffusion (Berry and Berry, 1990). Governments are particularly affected by their

neighbours or analogies because they could learn from their experiences and lower the cost of information search and policy conceiving (Berry and Berry, 1999). The adjacent or similar governments are usually regarded as competitors, and copying their policies benefits them to acquire competitive advantages (Mooney, 2001). Thus, both learning and competition may motivate governments adopt innovations that have been adopted by most of other adjacent or similar governments.

The coercive mandates or incentives provided by upper-tier authorities may push governments to adopt the policies they prefer (Daley and Garand, 2005; Welch and Thompson, 1980). The incentive effects coming from upper-tier authorities may be even stronger in a unitary state like China than that of federalism in the United States and other European countries. Both performance appraisal and personnel decision-making are controlled by the upper-tier authorities *per se*, and officials working in subordinate governments have to ingratiate themselves with them to get favour (Huang, 1996). When the central government prefers an innovation, local governments would quickly adopt them even though it is not required or necessary for their local development.

Both peer and high-level departments may drive police departments to adopt official microblogging. Police departments may adopt official microblogging when their neighbouring or similar counterparts adopted it. We can hypothesize that the adoption of police microblogging is positively correlated with the per cent of neighbouring police departments that have launched official microblogging. Given the higher police department launching its official microblogging, the subordinate police bureaus may hereafter launch their official microblogging to ingratiate themselves with their higher authorities in the hope of managing impression or avoiding punishment. As with the horizontal and vertical diffusion of police microblogging, we thus propose the next two hypotheses.

H5: The per cent of neighbouring governments launching police microblogging is positively associated with the adoption of microblogging by police bureaus.

H6: The launch of microblogging by the upper-tier police departments is positively associated with the adoption of microblogging by low-tier police bureaus.

E-government and public safety

The diffusion of innovation among governments is not only influenced by organizational, jurisdictional and intergovernmental characteristics, but also contingent on the attributes of its specific policy area and technological domain (Berry and Berry, 1999; Daley and Garand, 2005). In the case of police microblogging, both E-government and public safety may affect its diffusion. E-government performance and Internet penetration rate are important infrastructure for the adoption of police microblogging, whereas the status of public safety is also a key prediction of police innovation.

The severity of issues may trigger the adoption of corresponding innovations to solve them, which is the basic motivation of organizational innovation (Mohr, 1969). For instance, the severity of environmental problems encourages the adoption of environmental protection programs (Daley and Garand, 2005). For the adoption of police innovation, we believe that the level of public safety (or the rampancy of violence) in jurisdictions may push police departments to adopt the innovation.

Microblogging refers to the application of IT and could be regarded as one type of E-government or Government 2.0 (Eggers, 2007). Governments with advanced E-government may also equip themselves with other IT applications, and microblog could be their natural choice (Lee *et al.*, 2011). The development of E-government also represents the tendency of governments concerning the adoption of new technologies, and such innovation orientation may also encourage the adoption of official microblogging. Thus, E-government performance should be positively associated with the adoption of police microblogging.

Microblogging, like mostly other similar IT applications, requires the support of large-scale netizens and network effects. Jurisdictions with high Internet penetration rate (the per cent of the amount of netizens to total population) may pull governments to invest in E-government and relevant IT applications (Tolbert *et al.*, 2008). Governments are also likely to supply extra E-government services when they face numerous clients, because their service could be consumed rather than remaining in deep freeze. Thus, police microblogging is more likely to be adopted in jurisdictions with higher Internet penetration rate.

To sum up, we propose the next three hypotheses concerning the specific technological and policy characteristics of police microblogging.

H7: Jurisdictional public safety is negatively associated with the adoption of microblogging by police bureaus.

H8: Jurisdictional E-government performance is positively associated with the adoption of microblogging by police bureaus.

H9: Jurisdictional Internet penetration rate is positively associated with the adoption of microblogging by police bureaus.

METHODS

Sample and data sources

We collect our data from 282 prefecture-level cities (excluding Lhasa, the capital of Tibet, due to data missing) in 27 provinces and autonomous regions (excluding municipalities and Hong Kong, Macao and Taiwan) in China. The unit of analysis is urban police bureau. The acceleration of urbanization in China makes its city system inflated and complicated (Chung and Lam, 2004). The administrative system of China is

constituted of five tiers, including central, provincial, prefecture, county and township governments. Cities could be found in three of the five tiers in Chinese administrative hierarchy, namely province-level municipality (e.g. Shanghai), prefecture-level city (e.g. Hangzhou) and county-level city (e.g. Kunshan). We focus our analysis on prefecture-level cities due to comparability of their governance structure and availability of data. The administrative rank of prefecture-level cities could also be classified into two tiers, namely 268 prefecture-level cities and fifteen vice-province-level city (most of them are also capitals of provinces), in that the latter enjoy extra administrative authorities granted from the central government.

We collect data on the dependent variables from weibo.com, the dominant microblogging platform in China, using its official search engine. We only capture the official microblogs with real identities verified to exclude those opened by individual netizens. The personal microblogs opened by police officers are not covered by the survey because we only examine organizational microblogging. Data on the independent variables are derived from the latest *China City Statistical Yearbook* compiled by NBSC (National Bureau of Statistics of China, 2011) and *Yearbook of China City Competitiveness* (Gui, 2008), as well as relevant research reports and statistics. The main characteristics of the key variables used in the analysis are summarized in Appendix 1.

Dependent variables

Whether and when adopting innovation are two different decisions, and they may be explained by different categories of variable. Two measures are used to gauge the adoption of police microblogging, all from the search results at weibo.com, the dominant microblog platform in China. The first measure captures the adoption of police microblogging, while the second one gauges the earliness of its adoption (Rogers, 2003).

First, a dichotomous variable is used to measure whether urban police bureaus have launched official microblogs before the time point of our search, the ending date we searched the platform. The 1 denotes the adoption of police microblogging and 0 not.

The second measure is the number of days from the date of its launch to the time point of our search. The larger the measure is, the earlier the launch of police microblogging. Since there is not official information on the accurate date of microblog launching, we use the date of the first original post of police microblogs as the date of their launch. For those have yet not adopted police microblog, we code them as 0.

The adoption of innovation may be explained by different groups of variable in different phases, e.g. initiation, adoption and implementation. Evidences from American city administrative innovations find that antecedents are in the same direction of effects but different in the significance of effects on the phases of innovation

adoption (Damanpour and Schneider, 2006). In other words, the phases of innovation adoption may change the significance of their antecedents' effects, though their effects are in the same direction. Thus, the choice of time point is not a severe problem to test our hypotheses. However, it is appropriate to cover the full category of potential adopters at the final stage of the diffusion to avoid estimation bias (Rogers, 2003). Two time points are chose to gauge the adoption and earliness of police microblogging to generate robust results concerning their determinants. The first is 31 July 2011 and the second is 31 December 2011. As shown in Figure 1, both phases are located in the final course of the diffusion, and it is appropriate to choose the two time points to run the empirical examination.

Independent variables

The government-wide measures could be used as proxies when accurate data on specific sectors are lacking because they are usually highly correlated (Berry and Berry, 1999). We have no detailed data on urban police bureaus, and we measure their attributes via those of urban governments in most case. Government size is measured by the total number of urban government employees as per cent of total urban population. Government fiscal resource is measured by budgetary revenue per capita of urban government. Jurisdictional economic development is gauged by gross regional production (GRP) per capita, and economic openness is measured by FDI as per cent of GRP.

Previous studies usually use the per cent or number of adjacent governments adopting the specific innovation to measure regional diffusion effects (Berry and Berry, 1990). Some scholars also recommend using governments with similar sociopolitical attributes to gauge regional diffusion effects (Mooney, 2001). We argue that cities in China may be influenced more by peer cities within the same province because they face the same provincial performance measurement and personnel management systems and competition among them is vital for their survival and political career of their leaders (Huang, 1996). The per cent of other urban police bureaus within the province (excluding the focal urban police bureaus) launching police microblogging is used to measure horizontal diffusion effects. Vertical diffusion effects are measured by whether the provincial police department launches official microblogs, and 1 denotes launched and 0 not. Since we collect data at two time points, and the horizontal and vertical diffusion effects are measured twice.

We use the public safety index comprised of crime incidence rate, crime detection rate and citizens' satisfaction of public safety to measure jurisdictional public safety (Gui, 2008). E-government performance is from the comprehensive scores of government website performance developed and assessed by the China Software Testing Center (CSTC, 2010). China Software Testing Center annually assesses the performance of official websites of governments at all administrative tiers in China,

covering five dimensions including open information, online business, user satisfaction, properties and design and daily operation. Since the amount of urban microbloggers has not been published, the number of netizens is used to calculate approximating Internet penetration rate. Jurisdictional Internet penetration rate is measured by per cent of netizens as of total population.

Control variables

Three variables are controlled in the estimation model according to the literature and characteristics of Chinese cities. First, jurisdictional population size measured as the total population at the end of the year is controlled. Second, we controlled administrative rank of cities, using the political advantage index developed by Gui (2008). The index ranges from 0 to 1 and the larger the higher rank of cities. Finally, geographical distribution of cities may influence their tendency to adoption police microblog, and two dummies for eastern and western regions are controlled by convention, using the central region as the reference category.⁴

Data analysis

Multivariate regression analysis is used to test our hypotheses against the evidence from municipal police bureaus. One of our dependent variables is dichotomous, and we apply logit regression to analyse the effects of independent variables on the launch of police microblog. Although the second dependent variable is continuous, it encounters the problem of left censoring and Tobit regression is appropriate for its estimation (Wooldridge, 2002).⁵

RESULTS

The descriptive statistics and correlations of key variables are reported in Appendix 2. We can find that most of our hypotheses are preliminarily supported by the high correlations among the independent and dependent variables, except for public safety hypothesis. Correlations among most independent variables are lower than 0.7, except for that of economic development and fiscal resources ($r = 0.847$). The variance inflation factors (VIF) of independent variables are range from 1 to 3 and much lower than the usual diagnosis criterion (10), and the risk of multicollinearity is not severe for the regression models (Wooldridge, 2002).

The logit and Tobit regression analyses of the midyear police microblogging adoption are reported in the second and third columns in Table 1, respectively. The Chi-square is statistically significant for the two estimation models (both are significant at the level of

Table 1: Results of the regression analyses

Independent variables	Logit regression	Tobit regression	Logit regression	Tobit regression
	of the adoption of police microblogging (midyear)	of the earliness of police microblogging (midyear)	of the adoption of police microblogging (year-end)	of the earliness of police microblogging (year-end)
Size	4.599*** (1.432)	321.2*** (98.99)	3.406** (1.519)	399.5*** (111.3)
Revenue	-0.0931 (0.376)	-28.55 (31.19)	0.0259 (0.407)	-1.988 (35.83)
GRP	-0.286 (0.368)	-21.79 (29.50)	-0.415 (0.309)	-40.39 (34.43)
Open	0.543 (0.709)	68.54 (48.75)	0.620 (0.871)	61.96 (56.65)
Near	3.018*** (0.725)	103.3* (56.80)	1.261 (1.032)	120.0 (80.39)
Upper	0.922** (0.432)	142.6*** (31.90)	2.430*** (0.756)	157.5*** (50.67)
Safety	-0.236 (1.031)	-81.23 (78.31)	-0.130 (1.097)	-30.79 (87.42)
E-gov	0.0118 (0.0187)	1.397 (1.201)	0.0374 (0.0258)	2.600* (1.375)
Netizen	0.0630 (0.0384)	4.744*** (1.340)	0.0450 (0.0280)	5.224*** (1.577)
Population	0.537* (0.289)	39.23 (23.92)	0.669** (0.335)	73.53*** (27.41)
Rank	-0.962 (1.640)	-65.84 (98.92)	-2.168 (1.831)	-238.2** (115.5)
East	0.479 (0.496)	189.4*** (36.23)	0.270 (0.485)	145.6*** (35.79)
West	0.296 (0.479)	31.08 (35.59)	0.721 (0.497)	-6.491 (38.26)
Log likelihood	-131.91021	-1040.6179	-112.62348	-1314.7005
χ^2	92.02***	181.41***	95.91***	196.20***
Pseudo R^2	0.3237	0.0800	0.3772	0.0693

Notes: $N=282$. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$ (two-tailed). Coefficients and standard errors of constants are not reported to save space.

0.0000), and thus they received sufficient support from our evidence. The pseudo R -square is 0.3237 for the logit model and 0.08 for the Tobit model, and both models explain a large extent of variation.

We can find that government size is significantly and positively associated with the adoption and earliness of police microblog and H1 is supported by the evidence. Fiscal resource is negatively associated with two dependent variables, though it is insignificant. Economic development and openness are also not significantly correlated with the adoption and earliness of police microblog. In sum, H2, H3 and H4 are not supported by our results.

It is found that the per cent of urban police bureaus in the same province adopting microblogging and the adoption of official microblogging by provincial police departments are both significantly and positively associated with the adoption and earliness of police microblog. Thus, we obtain robust support for the vertical and horizontal diffusion hypotheses (H5 and H6).

Although the regression coefficients of public safety for both independent variables are negative, they are not significant. Thus, H7 is not supported by the evidence. E-government performance is positively associated with the adoption and earliness of police microblogging, but they are not significant. H8 is not supported by our results. Internet penetration rate has significantly positive correlations with the earliness of microblogging but statistically insignificant for its adoption, and thus H9 is partially supported.

We find similar results concerning the year-end regressions, as shown in the final two columns in Table 1. Consistent with prior findings concerning the adoption of innovation in different phases (Damanpour and Schneider, 2006), the significance of effects of several antecedents for the year-end models are slightly different from those of midyear. However, we could generate similar results concerning the main hypotheses. Specifically, horizontal diffusion effects become insignificant for both year-end models, though their signs are the same. Although insignificant for the midyear models, E-government becomes significant for the year-end earliness model.

Most of our control variables are insignificantly associated with the two dependent variables. Population size is significantly and positively correlated with the adoption and earliness of police microblogging for three models, but it turns insignificant for the midyear earliness model. Administrative rank of cities is negatively associated with the adoption and earliness of police microblog, though they are only significant in the year-end earliness model. The dummies of cities located in eastern and western China are both positively associated with the adoption of police microblogging, though they are both insignificant except for the east dummy becoming significant for the earliness of police microblogging.

DISCUSSION AND CONCLUSIONS

In the article, we develop a unique dataset to empirically examine the diffusion of police microblogging and its determinants in Chinese municipal police bureaus. Three theoretical perspectives (organizational innovation, policy diffusion and characteristics

concerning specific innovation area (E-government and public safety)) are employed to explain the adoption of police microblog and they are partially supported by our empirical evidence. The results show that government size, internet penetration rate, regional competition and learning and upper-tier pressure are positively and significantly associated with the probability of police microblog launch and its earliness of adoption. We find no evidence to support significant correlations of the adoption and earliness of police microblog with fiscal revenue, economic development, economic openness, E-government performance and public safety. We also find that the adoption and earliness of police microblogging are contingent on different groups of variables at different phases of diffusion.

Although fiscal resources and economic conditions are crucial for the adoption and implementation of E-government, they are not the case for government microblogging. Different from the vast investment of E-government (e.g. official website, geographical information systems and intranet), microblogging is wholly free and open, and financial and technological resources are not the important prerequisites of its adoption and implementation. Even governments with insufficient public money could afford to adopt microblogging to ameliorate their communications with citizens. Rich governments like to install expensive information infrastructures and work systems to impress their higher authorities and citizens, and this tendency can explain the positive link between wealth and E-government (Tolbert *et al.*, 2008). In contrast, poor governments prefer cheap innovations to expensive investment, and that is why we find negative associations of fiscal revenue and economic development with police microblogging, though they are not statistically significant. Wealth is only important for innovations deserving extensive investments and resources, and it becomes unimportant for cheap innovations (Mohr, 1969). Our results on the adoption of police microblog confirm the argument.

Economic openness is positively associated with the adoption and earliness of police microblogging, though they are insignificant. It may be due to the domestic focus of police departments, and international attentions are not as important as the domestic affairs. Although public safety is the priority of police departments, we find no evidence to support its significantly negative correlation with the adoption of microblogging. A possible explanation is that the relative effects of microblogging are not comparable with other traditional means (e.g. tightening control and increasing patrols), and the sensitiveness of police microblogging to public safety is not significant enough to drive its adoption.

We find evidence to support the positive effects of Internet penetration rate but not E-government performance on the adoption of police microblogging. The network effects of large user base can push governments to adopt microblogging to respond netizens' need and retrieve their legitimacy. E-government concerns numerous investments of governments, and its performance may not be correlated with the adoption of free and open microblog.

To our knowledge, this is the first empirical study of the diffusion of government microblogging. Theoretically, we find both similar and distinct results with the diffusion of E-government and other technological innovations among governments (Lee *et al.*, 2011; Tolbert *et al.*, 2008). Intergovernmental diffusion effects are most important for the diffusion of police microblogging, and government size and internet penetration rate are also key antecedents of its adoption. We find no evidence to support the positive effects of fiscal and economic conditions, which is in contrast with studies of E-government and other policy diffusion.

Empirically, our studies on government innovation in China, the representative of transition economies and developing countries, respond to the call for more international studies in the field of public management (Hou *et al.*, 2011). Most studies on innovation diffusion in public organizations are from Western countries, and our reports from China contribute new evidences for future comparative studies on the diffusion of social media innovations among governments across countries (Wu *et al.*, forthcoming).

Our findings are also relevant to public management practices concerning government innovation. For governments aiming at promoting entrepreneurship and innovation, our results imply they could rely on the intergovernmental relationship among different regions and tiers. Both vertical and horizontal diffusion effects should be emphasized in designing appropriate systems to induce the adoption and diffusion of government innovation. For instance, the central government could encourage local governments to innovate through relevant mandates or grants.

Some limitations of our study should be addressed, and the avenues for future research are also presented. First, our findings are from cross-sectional dataset, and future research could use pooled time-series cross-sectional data analysis to test our findings when relevant data were available. Second, although we examine vertical diffusion effects from the upper-tier, more attention could be paid on the bottom-up diffusion channel (Shipan and Volden, 2006). The effects of opinion leaders or champions, which are particularly pivotal for the diffusion of Internet-based technological innovations, can also be investigated in future studies (Rogers, 2003). Effects of individual-level variables, e.g. demographics and psychologies of organizational leaders and members, could also be investigated in future research. Finally, we do not analyse the post-adoption behaviour and influences of government microblogging, and future studies could examine its implementation and performance implications (Ahuja and Jason Bennett, 2005).

Our findings demonstrate that to comprehensively understand the diffusion of microblogging among governments, we should synthesize theoretical perspectives from organizational innovation, policy diffusion and specific policy and technological attributes of microblog. We provide the preliminary empirical evidence on the diffusion of official microblog in Chinese urban police bureaus, and find results both similar with and distinct from those of E-government and other IT applications in governments. Specifically, government size, Internet penetration rate and horizontal and vertical

diffusion effects are found to be positively and significantly associated with the adoption and earliness of police microblog. Our study results contribute theoretically and empirically to the literature on the adoption and diffusion of public organizational innovation, and future research could further replicate and test our findings in other sectors and contexts.

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NOTES

- 1 Popular foreign social media applications like Facebook and Twitter are blocked in China and domestic Internet sites launch microblogs instead to allow their users to issue opinions and comments not more than 140 Chinese characters (Reuters, 2011).
- 2 'Ping'an' means peace or safety in Chinese, and the police microblog uses this phrase to imply its mission of protecting the safety of citizens. Most police microblogs opened later usually follow the naming of 'Ping'an'.
- 3 Although there are many microblog platforms in China, weibo.com is the biggest platform and can be regarded as the China version of Facebook or Twitter. It has more than 140 million users registered, accounting for the majority of microbloggers in China (Kan, 2011). Most governments and police departments in China also launch their microblog at weibo.com because of its large-scale users and extensive influences. Both domestic Internet monitoring institutions and the MPS mainly depend on weibo.com to collect their data about government or police microblogs (Xinhua, 2011; Zhang and Jia, 2011). Thus, our analysis of this platform can represent the primary sample of police microblogs in China.
- 4 The standard socioeconomic trichotomy of China divides it into eastern, central and western regions. The eastern eleven provinces, including Beijing, Fujian, Guangdong, Hainan, Hebei, Jiangsu, Liaoning, Shandong, Shanghai, Tianjin and Zhejiang are commonly regarded as developed regions, whereas the twelve western provinces, including Chongqing, Gansu, Guangxi, Guizhou, Inner Mongolia, Ningxia, Qinghai, Shaanxi, Sichuan, Tibet, Xinjiang, Yunnan are relatively less developed. The remaining eight provinces, including Anhui, Heilongjiang, Henan, Hubei, Hunan, Jiangxi, Jilin and Shanxi are geographically and socio-economically between the above regions.
- 5 We also run ordinary least square (OLS) regressions to test whether they are different from the estimations of Tobit regression, and we find the results are substantially similar.

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Appendix 1. Main characteristics of the variables used in the analysis

<i>Categories</i>	<i>Variables</i>	<i>Labels</i>	<i>Year</i>	<i>Sources</i>	<i>Expected signs</i>
<i>Dependent variables</i>	The launch of police microblog by urban police bureaus (midyear and yea-end)	Launch (1) Launch (2)	2011	The author	
	The days from its launch (midyear and yea-end)	Days (1) Days (2)	2011	The author	
	Government size	Size	2007	Gui (2008)	+
<i>Independent variables</i>	Fiscal resource	Revenue	2009	NBSC (2011)	+
	Economic development	GRP	2009	NBSC (2011)	+
	Economic openness	Open	2009	NBSC (2011)	+
	The per cent of neighbouring cities launching police microblog (midyear and yea-end)	Near (1) Near (2)	2011	The author	+
	The launch of police microblog by provincial police departments (midyear and yea-end)	Upper (1) Upper (2)	2011	The author	+
	Public safety index	Safety	2007	Gui (2008)	-
	E-government performance	E-gov	2009	CSTC (2010)	+
<i>Control variables</i>	Internet penetration rate	Netizen	2007	Gui (2008)	+
	Population size	Population	2009	NBSC (2011)	?
	Administrative rank	Rank	2007	Gui (2008)	?
	The dummy of cities located in eastern region	East	2011	The author	?
	The dummy of cities located in western region	West	2011	The author	?

Notes: For the expected signs, +, - and ? denote hypothesized positive, negative and unknown correlations between independent and dependent variables, respectively.

Appendix 2. Descriptive statistics and bivariate correlations

Variables	Mean	SD	Min	Max	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
1. Launch (1)	0.52	0.50	0	1	1																		
2. Days (1)	122.68	154.37	0	622	0.76	1																	
3. Launch (2)	0.66	0.47	0	1	0.76	0.57	1																
4. Days (2)	215.80	208.45	0	765	0.81	0.93	0.72	1															
5. Size	0.32	0.12	0.08	1	0.19	0.19	0.09	0.18	1														
6. Revenue	7.14	0.91	4.90	10.49	0.16	0.22	0.14	0.24	0.29	1													
7. GRP	10.01	0.70	4.60	11.81	0.13	0.19	0.09	0.21	0.24	0.85	1												
8. Open	0.28	0.29	0	1.38	0.23	0.30	0.20	0.30	0.04	0.51	0.42	1											
9. Near (1)	0.53	0.33	0	1.08	0.56	0.54	0.52	0.60	0.11	0.14	0.16	0.28	1										
10. Upper (1)	0.38	0.49	0	1	0.40	0.44	0.45	0.49	0.05	0.04	0.04	0.18	0.61	1									
11. Near (2)	0.66	0.33	0	1.77	0.47	0.45	0.58	0.51	0.00	0.15	0.12	0.25	0.82	0.63	1								
12. Upper (2)	0.54	0.50	0	1	0.45	0.43	0.59	0.49	0.05	0.14	0.14	0.20	0.69	0.71	0.84	1							
13. Safety	0.43	0.18	0.09	1	0.13	0.21	0.11	0.23	-0.03	0.33	0.25	0.27	0.14	0.11	0.15	0.09	1						
14. E-gov	27.59	13.38	4.31	76.13	0.24	0.28	0.21	0.31	0.10	0.54	0.47	0.48	0.23	0.13	0.17	0.09	0.33	1					
15. Netizen	9.20	10.59	1.14	100	0.20	0.37	0.16	0.35	0.22	0.65	0.51	0.35	0.13	0.06	0.14	0.09	0.28	0.45	1				
16. Population	5.83	0.67	3.04	7.10	0.26	0.21	0.27	0.26	-0.14	-0.24	-0.17	0.01	0.33	0.22	0.31	0.21	0.16	0.29	-0.06	1			
17. Rank	0.18	0.14	0.1	0.6	0.05	0.06	0.02	0.04	0.25	0.44	0.34	0.26	-0.07	-0.03	-0.08	-0.04	0.17	0.45	0.42	0.16	1		
18. East	0.35	0.48	0	1	0.35	0.54	0.29	0.54	0.04	0.41	0.38	0.40	0.53	0.13	0.40	0.34	0.48	0.36	0.32	0.16	0.02	1	
19. West	0.29	0.46	0	1	-0.32	-0.33	-0.24	-0.37	-0.09	-0.23	-0.27	-0.41	-0.48	-0.44	-0.33	-0.39	-0.41	-0.33	-0.13	-0.23	-0.06	-0.47	1

Notes: $N = 282$. Correlation coefficients larger than 0.130 are statistically significant at the level of 0.05 (two-tailed).

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