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Why the transforming of cable operators in China is delayed?

Abstract

China's national cable operator should be established by the end of 2012 while it has not been accomplished so far. This paper analyzes the key factors in the transformation of China's provincial cable operators and explores answers to the question why the transforming of cable operators in China is delayed. An empirical analysis on the transformation speed and quality was performed using data from 1999-2010. The results are not only about speed but tradeoffs between speed and quality. First, the capital-driven model was positively determined to affect both transformation speed and quality. However, the complete control by capital-driven entities could only promote the transformation speed but not quality. The government-driven model positively affects transformation speed but negatively affects transformation quality. Second, the competition with telecom operators delayed cable's transformation but enhanced the transformation quality. Third, close cooperation between cable operators and content improved transformation quality while slowing down the speed of transformation. To a limited degree, these findings provide suggestions for well accelerating ongoing transformation of China's national cable operator, including the well-balanced combination of capital-driven and government-driven entities, the exploration on the comparative advantage of cable operators over telecom companies and the cooperation between cable companies and upstream content partnerships.

Keywords: cable operators, influential factors, speed and quality, competition and cooperation, Probit model.

JEL Classification: L96, L98.

Introduction

The "Three-Network Convergence" project, the bundling of television, Internet and telecom services, began to be introduced in January 2010 after a decade of preparation by the Chinese government (Wei, 2010; Hu & Hong, 2011). The policy will allow cable television providers to offer other telecommunications services, such as broadband Internet access and IP telephone. Currently telecommunications services in China are offered by three national telecom carriers with their nationwide networks, however, the national cable network has been divided into scattered pieces of four separate administrative levels – central, provincial, prefectural, and county since 1983. Nationally, the cable network continues to be operated by an inefficient government monopoly, the State Administration of Radio, Film, and Television or SARFT, and its branch bureaus. Cable in China thus needs a transformation to strengthen cable companies' competitiveness in the upcoming triple play market.

The Three-Network Convergence plan projects that, from 2010 to 2012 (trial period), China will focus on the ways that broadcasters and telecom services can expand to provide cable, broadband, and telecom services. It also projects that the bundling plan will be formally introduced in 2013 and that by 2015 the convergence of the three networks will be fully completed (Lo, 2010). To lead the integration of China's cable networks, a national cable operator should be established before the trial period ended. Actually, the establishment of the national cable company was initiated in the middle 2010. A director and two deputy directors of the upcoming national

cable operator were even selected in August 2010. The State Council issued the Document No. 184 to approve the establishment of national cable network company in November 2012 (Tencent Tech, 2012). The merge between SARFT and GAPP (General Administration of Press and Publication) in March 2013 created new obstacles to the transformation (Xinhua News, 2013a). And the official news agency (2013b) indicates that this company has not formed till the middle 2013.

Why the process is delayed? Basically, the establishment of the national cable operator needs a fundamental transformation on scattered local cable operators in China. It is more difficult than any previous transformation or reform in other sectors in China. As mentioned before, national cable networks have thousands of scattered pieces operated with four administrative levels in China. These could not be transformed into a single national cable operator directly. As with many other bottom-up reforms in China, the national cable transformation could probably start on the local level and finally finish the national level after learning from local practices. In fact, the transformation within cable started in 1999 on the provincial level. Market-oriented cable operators were established in province and municipality, as well as affiliated prefectural and county branches (Feng et al., 2009). When approaching the end of the provincial transformation, a national cable operator would accomplish its transformation (Lo, 2010). It should be before the end of 2012 according to the original timetable while the process is obviously delayed now. Thus this paper will focus on the changes that will happen to Chinese cable television as a result of these shifts, and try to provide possible answers to the question listed in the title of this paper.

The Chinese telecom sector, by contrast, was transformed almost two decades ago (Zheng & Ward, 2011). Telecommunication service in China had been operated by the monopoly of Ministry of Post and Telecommunications (MPT) until 1994 when China Telecom and China Unicom, were separated from the ministry (which remains the national telecoms regulator and became listed companies). The two companies have had their shares listed on both the New York and Hong Kong stock exchanges since 2002.

Cable television service in China needs to be similarly transformed. Cable companies cannot properly compete if they remain controlled by traditional government departments. Although it is not absolutely optimal or necessary to establish national cable operators, the history of telecom in China suggests that the national company will be a more reliable result. There were over ten regional telecom operators in 1999 that in 2008 were finally consolidated into three national operators (Loo, 2004; Fu & Mou, 2010). A similar process should happen with cable – i.e. a company should be separated from the previous administrative monopoly and given the authority to compete with those national telecom operators.

Previous studies have focused on the issues during the transformation of China's telecom sectors (Zheng & Ward, 2011; Fu & Mou, 2010; Hu et al., 2012). However, to the best of our knowledge, there has been little similar research on cable's transformation, except for some preliminary discussion on the technologic features of digital transition (Wan et al., 2009; Huang, 2013) or the terrestrial television in China (Zhang et al., 2010). Although Feng et al. (2009) argued the obstacles from conflicts of economic and political interests during the transition to digital TV in China, and Liu (2013) examined the uneven path to triple-network convergence, the transformations concerning the cable operators and related regulation reform have not been investigated. During the transformation, provincial media could have national policy influence through policy implementation and learning (Chin, 2011). Thus the provincial actors should be focused in this study. Meanwhile, the obstruction during the transformation is not only because of the uncertainty in the ongoing reform, but also about the complexity, e.g. the vertically-related industrial structure of television programming and cable network operating, the horizontal cross-business behaviors by various network operators in the triple play context. From the market demand side, the growth of pay-TV subscribers is not optimistic (Zeng & Heng, 2013;

Zeng & Dai, 2013), which constrains the revenue of cable operators after the transformation. And this has reminded us about cable's interaction with program networks. Overall, for a better understanding on the transformation of cable operators in China, we need to identify the key influential factors.

Since local cable operators have been initiated for over a decade, the lessons of these local providers could offer lessons for the successful creation of a national Chinese cable operator. Therefore, in this paper, we will look at the provincial transformation of cable operators to try to gain some ideas for the reason of the delayed national transformation. The rest of this paper is structured as follows. Section 1 presents the analysis on identifying key influential factors in cable transformation and lists some research questions. Section 2 outlines the description of the model and data. Accordingly, econometric models will be empirically tested in section 3. The final section concludes the paper.

1. Identifying key influential factors

Cable's transformation in China, on the local or national level, is not the same as the "liberalization" or "privatization" in sectors as telecommunications, cable and electricity in several OECD countries, although the basic idea of market-orientated reforms is to some extent similar (Hukill, 1994; Jones, 2006; Jin, 2006; Osborne & Gaebler, 1993; Lenkowsky & Perry, 2000; Thatcher, 1998). It is also unlike past practices in China's telecommunications. The reason is due to the nature of Chinese political institutions. The central government is cautious about the political, culture and information security in cable networks and tries to control public opinion via radio and television. The cable sector thus could not be "liberalized" nor "privatized". This is a possible explanation for the delay of the transformation in China's cable sector compared with the telecom sector. That's also why we refer to cable "transformation" rather than "privatization" in this paper. This case thus provides a special case that is different from the experiences in many other democracy countries and practice in China's telecom sector since cable television is a somewhat politically sensitive field in China. However, the political context is just part of the reason for the delaying, not the whole explanation.

In addition to the network convergence as well as generalized external factors, some internal factors must be considered as well. To better identify the key influential factors in cable's transformation, the basic structure of cable industry, including internal and external participants are outlined in Figure 1 as follows.

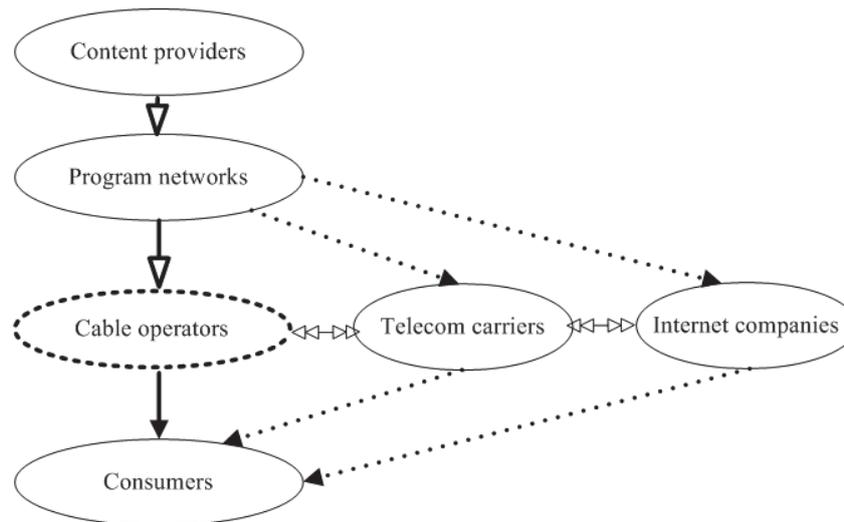


Fig. 1. Analytical framework in the transformation of cable operators

1.1. Alternative leaderships in transforming cable operators. The analysis begins with cable operators, which are the central objects in both provincial transformation and the current round of national transformation. Before the provincial transformation, there were numerous operators on various levels. During the provincial transformation, either capital-driven or government-driven leaderships have been applied. “Capital-driven” means that the transformation was accomplished by private listed (or to-be-listed) companies and that capital played a significant role in the whole process. “Government-driven” corresponds to the transformation promoted by executive power so that these provincial cable operators are state-owned enterprises directly controlled by local governments.

The capital-driven model with typical market features in some provinces, interestingly, is admitted and even recommended by the central government. A typical example is the Hangzhou model, which was highlighted in CCBN 2010 (China Content Broadcasting Network Exhibition, the highest level official annual conference). The keynote speech by the vice president of Hangzhou Wasu Group (cable operator in Hangzhou City, capital city of Zhejiang Province) was arranged so that he spoke after the deputy secretary from SARFT but before the chief engineer from CCTV (China Central Television). This signified the importance of Hangzhou Wasu Group in the practical field of Chinese cable transformation. The basic experience of Wasu is to connect all cable operators in Hangzhou City and Zhejiang Province with capital that greatly enhances the market value of cable assets. Hangzhou Wasu Group is also actively exploring various converged business, even including 3G mobile TV and Internet TV and providers of digital content (National Communications Commission, 2010; Multiscreen Digest, 2012).

One of the two deputy directors of the upcoming national cable operator comes from Guizhou province, signaling that the SARFT wants to learn from the Guizhou model. The transformation of cable in this province has heavy administrative features. Cable transformation in Guizhou started in July 2007, and finished by the end of 2009, one year faster than the schedule proposed by the central government. The provincial government strongly promoted the transformation plan, ensuring that the plan was efficiently conducted (SARFT.net, 2012).

The methods used by the leadership in the transformation are unique to China. Research on the importance of leadership has focused on the importance of organizational culture (Hennessey, 1998) or human potential (Zajac & Al-Kazemi, 1997). Studies in television and communications have considered more specific factors, such as the CEO and directors of a company (Shao, 2010) or how leaders function in international organizations devoted to telecommunications (McPhail, 2010). Those factors are connected with the differences in the corporate cultures of government administrations and private companies. In China, the different leadership approaches in cable’s transformation might correlate with the specific conditions within each province. These conjectures lead to an interacting research question:

RQ1. What effects do alternative leaderships, capital-driven and government-driven, have on cable’s transformation?

Although cable is a sensitive industry strictly controlled by the Chinese government, we believe that the key issue is based on economic factors. It is possible that more developed areas have more economic conflicts that must be settled before decisions are made. Leaders are mostly capital-

driven; consistent with the theory proposed by Lucas (1990) that capital always flows towards rich areas. In less well-off areas, the marginal revenue in transformation is more significant, and it would be easier for the leadership party to coordinate change than it would in areas with less available capital. Therefore, the government, though with limited experience operating for-profit enterprises, could play the leading role in cable transformation. When comparing private and public leaderships, however, it could be easily found that provinces which have finished the transformation the fastest have mostly adopted a government-driven approach, especially the less developed areas in China in the center and western parts of the country. Also, according to studies on technological trajectory, latecomers can catch up with a faster adoption speed though they have less potential demand density (Ding, Haynes & Li, 2010). We therefore look at the differences between capital and government leadership of cable transformation and the economic consequences resulting from these differences:

RQ2. Does a better economic condition have negative effect on the transformation?

1.2. Horizontal competitions. The increasing horizontal competition among various network operators is obviously a key factor in determining the cable transformation. As discussed in several theoretical and empirical studies, facing the competition from telecom, cable reduced prices, market shares or investment (Levin & Meisel, 1991; Preiskel & Higham, 1995; Höffler, 2007). In China, the telecom sector began its transformation in the mid-1990s when the Internet and mobile technology was not mature. Although telecom carriers in China experienced three rounds of restructuring, still remain a powerful oligopoly. Current cable operators, however, are facing increasing challenges from China Mobile, China Telecom and China Unicom, which are Fortune Global 500 companies like Comcast, AT&T and Verizon in the United States. Chinese cable operators are apparently weaker than their telecom rivals. In 2010, the net *profit* of China Telecom was 15.8 billion CNY, and China Mobile 119.6 billion CNY, while the overall *revenue* of cable operators was only 50 billion CNY. With the progress of network convergence, telecom operators are producing parallel channels for television program transmission. Meanwhile, cable operators would like to enter the new market for data and voice services, but they currently lack the integrated infrastructure to compete with telecom companies. Most importantly, the transformation of cable, unlike telecom, is still unfinished. Concerning the impacts of horizontal competition from telecom operators, accordingly, we propose:

RQ3. Does horizontal competitors place negative effects on cable's transformation?

However, opportunity for cable operators may still exist. As for mobile operators, they lack access to many household resources since telecom service for households are carried mostly via fixed network landlines. In addition, telecom operators have to access the content resources via the authority system controlled by cable sectors before they launch such business as mobile TV (Lin, 2012), a key component in the trial plan of Three-Network Convergence included for reasons of political and information security (She, 2011). Previous literatures on the competition among networks have also considered the spatial dimension (Goettler & Shachar, 2001; Hausman, Sidak & Singer, 2001). From a broad view, the overall competition effect on cable's transformation might have some differences between fixed-line telecom operators and mobile operators. Moreover, there exists some space for the two kinds of telecom companies to cooperate. Thus we lead to:

RQ4. Does competition have positive effects on cable's transformation?

1.3. Cooperation with content. The vertical cooperation with content is an exclusive characteristic for cable operators. Cable operators should have their own comparative advantages, especially concerning content resources and program licenses. However, cable operators in China have been forced to be separated from their upstream programming partners since 1999, as a consequence of a policy called Document No. 82 (Dougoud, 2012; Internet Weekly, 2012). This significantly harms cable operators since they mostly depend on revenue from basic network maintenance, while content is controlled by the Propaganda Department of the Central Committee of the Chinese Communist Party to promote its nation-building ideology. This maintenance fee amounts to around 70 percent of cable operators' revenue. Government policies allowing the creation of some tax-free enterprises (such as digital television) have helped the operators¹. These policies have only provided short-term relief. However, in some provinces, the local cable operators have initiated some unofficial cooperation with content providers.

In March 2010, shortly after the issue of the Three-Network Convergence plan, SARFT proposed a relatively formal "interaction" mechanism between

¹ For example, until the end of 2010 two types of enterprises were allowed to operate tax-free: culture enterprises transformed from government departments (March 2009), and digital television companies (January 2008). In September 2010, these new enterprises were allowed to operate tax-free for another three years until 2013.

cable operators and program networks¹, which allowed cable companies, for the first time since 1999, to collaborate with content providers. The change from separation to interaction suggests a more intense struggle for scarce content resources. Fortunately, according to the trial plan for Three-Network Convergence project, the nationwide content access and distribution platform is now under authority of cable sectors (Lo, 2010). Therefore, cable's transformation involves the cooperation or even to some extent integration with content providers, unlike earlier network restructuring in telecommunications. This would bring cable operators relatively more administrative jurisdiction in the transformation.

As for the vertical cooperation with content, related economic theories indicate the positive effect from economies of scale and potential negative effects from monopolization. Hazlett (2005, 2006), Waterman & Weiss (1996), and Ahn & Litman (1997) have noted the positive total effect of vertical cooperation. Considering the barriers imposed on Chinese cable companies given strict barriers between these companies and content providers, cable companies should be better off when they can cooperate with content providers. Therefore we are led to the following research question:

RQ5. What consequent does cooperation between program networks and cable operators reach?

Moreover, do regulators and consumers influence cable's transformation? Regulatory reform in cable has not started in China, and independent regulatory agencies have not been formed. Therefore, regulators will be put aside in this analysis. As for consumers, since a majority of cable users in China are basic rather than premium subscribers, most cable consumers in China have little choice over content. They therefore do little to influence the platform competition among various network operators (Distaso, Lupi & Manenti, 2006). Therefore, consumers have little influence on cable transformation.

To summarize, the key influences on cable's transformation in the context of network convergence in China, include leaderships (market-driven and government-driven), horizontal competitors (telecom carriers and Internet companies) and vertical cooperation (with program networks). We will test the research questions in the following sections.

2. Description of model and data

There are at least two difficulties when empirically examining the influential factors on Chinese cable

transformation. First, it is not easy to measure the result or performance of transformation objectively and directly, i.e. the dependent variables here. Second, since cable's market transformation has a relatively short history and varies widely among provinces, we have a serious shortage of available data. Some indirect indicators are collected in this study. We believe they have some degree of persuasive evidence but also have some limitations.

2.1. Dependent variables. To get an indicative measurement of successful transformation, we use two dependent variables that are constructed by two dummy variables, the speed and quality of provincial transformation. Speed is the central research question in this article and is measured by *integrate*, which equals 1 when the transformation has been accomplished in province *i* at time *t*. The time baseline for the identification of this variable in 2010 is July, when the *People's Daily*, the official newspaper of the Central Committee of the Communist Party of China, listed the provinces that already finished their integration as provincial operators (*People's Daily*, 2010). Before 2010, information is from the publicly accessible websites of listed companies and other official media sources. Since government departments strictly control the media agencies, all those data sources are consistent with one another. And the judgment over how much each province has accomplished is very formal and strict though it is only observed at one point in time.

The speed variable is not enough, however, since in some scenarios the delay of provincial transformation is due to the consideration on "quality". Without the transformation on quality dimension, cable operators might not be able to provide converged network services, though they are established in advance. And the transformation quality is measured by *trial*, which equals 1 if some city within a province or the municipality itself was qualified as one of the first group of twelve trial regions/cities in July 2010. The fundamental qualification for selecting trial cities is the quality of the cable network, including the digitalization, two-way transmission upgrade and penetration rates. Those qualifications require a certain transformation quality from the perspectives on technically, market and operation. Therefore, whether the region/province/city was listed in the trial program could be considered as a proxy variable for the transformation quality.

In sum, the speed variable could directly indicate the efficiency while the quality variable indirectly indicates the effectiveness of the transformation. The two dependent variables together could make the empirical study here more reliable. However, the limitation of the two dependent variables might be

¹ This idea was from the CCBN 2010 keynote speech by Haitao Zhang the Deputy Secretary of SARFT.

due to the lack of economic information, especially for the quality variable. Obviously the best quality variable may be an economic indicator that reflects the improvements that brought by transformation. However, currently we have no systematic data in the cable industry; cable operators are quite different in each province and reliable statistics are difficult to acquire. With these constraints, we could only use the dependent variables that only take two values as the binary dummy variables, and the Probit model is the most common estimation method. The model is constructed as:

$$\text{Probit}(\text{integrate}_{it}, \text{trial}_{it} = 1) = \alpha_0 + \alpha_1 \text{leadership}_{it} + \alpha_2 \text{competitors}_{it} + \alpha_3 \text{cooperation}_{it} + \beta X_{it} + \varepsilon_{it}. \quad (1)$$

2.2. Independent variables. The independent variables cover the influential factors summarized in previous section. Again, most of them are indirect proxy measurements.

Leadership contains variables of the listed cable companies as well as government cable agencies, indicating alternative leaderships in transforming cable operators. The rate of capital accumulation (*capital*), as a direct measure of capital activity by provincial operators, could be constructed from the CSMAR database (<http://us.gtadata.com>), a professional database system on the Chinese financial market. The intervention degree by governments (*gov*) in the fields of cable television industry, determined by the proportion of public financial expenditures in culture, broadcasting and television, could be collected from the *China Statistical Yearbook* (various years), which is an official database published by the National Bureau of Statistics of China. We believe there should be a highly correlated relation between this variable and the actual leadership during the transforming process of provincial cable operators. Moreover, to distinguish the controlled ranges by cable operators in each provinces/municipalities, a dummy variable (*ctrl*) was set as a measure. It equals 1 if the cable network in a certain province is totally operated (one hundred percent controlled) by listed companies and equals 0 if partially controlled by these companies. In addition, we use the gross domestic product (GDP) per capita, treated in natural logarithms (*lngdp*), to reflect the economic conditions in each province.

Competitors are measures of threats from other competitors, including local telephone subscribers (*phone*), mobile telephone subscribers (*mobile*) and telecommunication service volume (*tele*). Also, the data source is the *China Statistical Yearbook* in various years. All variables are in natural logarithms, so we get *lnphone*, *lnmobile* and *lntele*, as described in Table 1. Since the three major telecom operators in China always control the telecom business in each

province via their provincial branches, the data here is exactly the same with the measurement of number or size of competing organizations, which are more widely used.

Content is an indicator to measure the cooperation behavior by provincial cable operators. A dummy variable *content* equals 1 if the cable operator owns content business or program networks¹. As mentioned in section 1.3, some local cable operators have initiated this kind of unofficial cooperation and the information could be easily accessed via their publicly disclosed information. Thus an interaction term *capital*content* was constructed. The source of this variable is publicly accessible website information from listed companies and news reports from official media.

An additional set of control variable X_{it} was considered to eliminate the possible scale effects among provinces. The “number of regions at county level” (*county*) is a proxy variable for provincial size. It is collected from the *China Statistical Yearbook* in various years. We are aware that the most direct measures for the purpose here might be the size of cable subscribers or the amount of revenues by cable operators in each province. However, since each province is under the control of various types of operators, the statistical methods and scales are not consistent, which might lead to imprecise results. Based on these considerations, the variable of county could be a suitable measure.

2.3. Summary statistics of variables. All of the data was collected since 1999, the first year of the provincial transformation. The dataset includes all provinces connected with listed cable companies. There are overall ten provinces/municipalities which have cable service controlled totally or partially by listed companies². This dataset therefore covers almost one-third of China’s provinces/municipalities, while the other provinces’ cable systems are totally administrative controlled by governments and are thus not suitable for the comparable test between alternative forms of leadership. Table 1 reports summary statistics of the variables for the 1999-2010 periods.

¹ Although some professional listed companies produce television content there is no geographic monopoly by them. The cable operators that provide content and operate program networks simultaneously could cover a specific market within provinces.

² There are five provinces/municipalities which have cable systems totally controlled by listed companies, Beijing (SHA: 600037), Hebei (SHE: 000839), Shanxi (SHA: 600831), Hunan (SHE: 000917) and Shanghai (SHA: 600832). Five more provinces have partial controlled systems, including Jiangsu, Anhui, Shandong, Henan (SHE: 000839) and Hubei (SHE: 000665). Also, one city, Shenzhen, has, since 2008, a cable system controlled by a listed company (SHE: 000839). The six numbers in parentheses are the stock codes, and SHA/SHE is the abbreviation for Shanghai or Shenzhen Stock Exchange. Since Shenzhen only has three years of data and is a city and not a province, Shenzhen was dropped from our dataset.

Table 1. Variable summary statistics, 1999-2010

Variable name	Obs	Mean	SD	Minimum	Maximum	Data source
<i>integrate</i>	120	0.225	0.419333	0	1	(1) and (3)
<i>trial</i>	120	0.600	0.491952	0	1	(1)
<i>capital</i>	120	0.333194	0.750541	-0.6849	4.214487	(2)
<i>ctrl</i>	120	0.500	0.502096	0	1	(3)
<i>gov</i>	120	0.213107	0.056722	0.059185	0.32184	(4)-S. 8
<i>lngdp</i>	120	9.528606	0.809936	6.703188	11.29795	(4)-S. 2
<i>lnphone</i>	120	6.91357	0.615642	5.203328	8.078937	(4)-S. 16
<i>lnmobile</i>	120	6.729164	1.112749	4.065653	8.583318	(4)-S. 16
<i>intele</i>	120	5.670877	0.894159	3.579731	7.41385	(4)-S. 16
<i>content</i>	120	0.191667	0.395263	0	1	(3)
<i>county</i>	120	104.9833	49.12067	16	172	(4)-S. 1

Notes: (1) = official media reports (*People's Daily*, Xinhua News; both are subordinates to the China's State Council and the Communist Party of China's Publicity and Public Information Departments); (2) = CSMAR database; (3) = public accessible company websites (addresses can be searched by the stock code listed in the first footnote of this section); (4) = *China Statistical Yearbook*, published by National Bureau of Statistics of China in various years (free web edition can be accessed via <http://www.stats.gov.cn/english/statisticaldata/yearlydata/>).

In the original dataset some data were missing for one or two years in 1999 and 2000. There are probably two causes. First, some provinces have no official statistics on mobile data since mobile was an emerging technology and the digital divide significantly existed in some regions in China. Second, some cable companies were not created until 2001. To avoid distorting impacts and variability for estimates of independent variable influence, we filled those empty values forward or backward when necessary since the values were almost stable over time. For example, operators always have specific plans on their network construction and business expansion.

From Table 1, we can observe as least four preliminary findings. First, the relatively low mean of *integrate* indicates the slowness of transformation. In fact, most of the provincial transformations were not finished until 2008 or 2009. Second, the mean of *trial* reveals over half of the cities in our sample have been selected as trial cities, inferring that the participation of listed companies might promote transformation quality. Third, the mean values of *capital* and *gov* are quite close but the standard deviations show a huge gap. The less standard deviation of *gov* might be caused by the public finance budget while the listed companies can carry on operations with flexibility. Fourth, for the cooperation behaviors, the integration with *content* is not quite common during the transformation. This might be caused by the separation of content and networks policy as well as the sensitivity of content providers in China.

3. Results and discussions

3.1. Results. Before the regression result generated, independent variables were standardized. Also, for the panel data to be regressed, the likelihood-ratio test

of $\rho = 0$ was applied as the selection criterion between xtprobit and probit. If the significance level is above 10%, probit is selected, otherwise xtprobit. The results of probit regressions are presented in Table 2, in terms of the marginal effects of a one-unit change in each of the independent variables. We present the results in the table and the discussion below in the order in which we developed our research questions.

Column (1) reports the regression results for the model with transformation speed (*integrate*) as the dependent variable. Column (2) presents the results for the model with transformation quality (*trial*) as the dependent variable.

The model shows that the rate of capital accumulation (*capital*) of cable operators positively determines both transformation speed and quality. However, the complete control (*ctrl*) over the cable business in a province has positive effects on the transformation speed but negative effects on quality. Similarly, the governments (*gov*) as the leadership have positive and negative impacts on transformation speed and quality respectively. Therefore, as for RQ1, the results show insufficient and relatively limited influences on transformation speed from both when capital and government are leaders.

Further, the estimation indicates the transformation speed is negatively influenced by the variable of GDP per capita (*lngdp*) while the transformation quality is positively influenced by it. This is partially confirmed RQ2 that the economic condition in a certain province could only place negative influence on its transformation speed. From both regressions we could not find strong relations between alternative leaderships and the economic conditions in a region.

Influences from competitors are quite complex. Local telephone subscribers (*Inphone*) are negatively associated with the transformation speed but positively associated with the transformation quality. The results of mobile telephone subscribers (*Inmobile*) and telecommunication service volume (*Intele*) are just the opposite. Thus RQ3 could not be fully answered. However, these differences might indirectly connect with the special features of mobile networks, as was questioned in RQ4.

For those companies that participate in content, a disadvantage could be found for their transformation speed while an advantage was found for the transformation quality. The interaction term (*capital*content*), however, covers the capital-driven samples only. A possible explanation is that if a capital-driven operator cooperates with television program content, its transformation would be delayed but the quality the operator provides is relatively higher. Again, although the evidence here incompletely answers RQ5, it could be indicated that vertical cooperation is important for transformation quality.

Finally, as for the control variable *county*, which is used to present the scale effect, negative and significant determinants could be found. Therefore, the size of a certain region has influenced its transformation, and this further explains why cable transformation in the central and western regions is faster than the eastern coastal regions.

Table 2. Influential factors on transformation speed and quality

Variable	(1) <i>integrate</i>	(2) <i>trial</i>
<i>capital</i>	1.150039* (.6522278)	0.0064505 (0.5652696)
<i>ctrl</i>	3.319847*** (1.289391)	-1.51602** (0.7006005)
<i>gov</i>	11.77559* (7.061232)	-23.8877*** (5.567413)
<i>lngdp</i>	-2.796412* (1.658262)	6.445947*** (1.525983)
<i>Inphone</i>	-2.067903* (1.14996)	2.667333*** (1.028372)
<i>Inmobile</i>	6.590164** (2.801022)	-1.9704*** (0.6324001)
<i>Intele</i>	1.436092 (1.560772)	-2.519012*** (0.8589431)
<i>capital*content</i>	-11.37327** (4.934946)	2.45619 (4.741191)
<i>country</i>	-0.0457797** (0.0222462)	-.0282451* (.0149009)
<i>_cons</i>	-16.20942* (9.702678)	-41.81446*** (9.887673)
<i>obs</i>	120	120
<i>LR test</i>	92.94***	108.54***
<i>Pseudo R²</i>	0.7263	0.6720
<i>Log likelihood</i>	-17.508566	-26.493237

Notes: Standard errors are reported in parentheses; significance levels: *** = 1%, ** = 5%, * = 10%.

3.2. Discussions. The main goal of the empirical section is to test the influences in the provincial transformation and offer possible solutions to the question why the transforming of cable operators in China is delayed. These outcomes have either positive or negative answers for the research questions.

For the leadership factors, it is found that while capital-driven companies could promote the transformation, it might not be good for these companies to gain absolute control over cable operations in a certain province. Meanwhile, government as leaders in cable transformation could accelerate the speed, as indicated in some cases (e.g. Guizhou model). However, government cannot be guaranteed to provide quality. This may well be caused by the nature of cable television in China in that it is not only an information industry and culture industry, but also a public utility, which is strictly controlled by governments. Therefore, the completely capital-driven companies could place a negative effect on the transformation to some extent. The solution to make the transformation with satisfactory speed and quality might be the combination of these two strategies. This is also similar with Hauge, Jamison & Gentry (2008) where they found the government-owned telecommunication enterprises would show complementarities rather than competitive threats to private entrepreneurs. In this empirical study, we found a significant role by both capital and government in transformation speed. Moreover, the level of economic development in a province could promote the transformation quality since wealthier market and consumers require higher quality and diversified content, a finding with the income effect over weight substitution effects in Wan et al. (2009). It might also be that the key role by government in promoting industrial growth and consumption demand, which are two of the goals in promoting China's Three Network Convergence in context of the financial crisis of 2008-09 and subsequent economic recovery.

With the network convergence project pushed forward, it is possible that competition and cooperation might both exist. The competition could delay cable's transformation but is ultimately good for quality. However, pressure from mobile operators will negatively affect network quality. This parallels the case in US when cable operators encountered competition from direct broadcast satellites, which ultimately acquired a third of the market (Goolsbee & Petrin, 2004). It is also likely that all-around competition would arise in the digital television era. Chinese cable operators might have to transform from pure network operators to multiple service operators (MSOs) so as to elevate the value of ARPU

(Average Revenue per User, defined as the total revenue divided by the number of subscribers) (Moorthy, 2009).

Since program networks have not been fully operated under the market in China, the strict mandatory control on content by SARFT might slow down the transformation speed. This might be due to historical reasons. Cable operators are separated from their upstream programs and are not encouraged by central government policies either to participators in content provision or invest in program networks. They would bear a heavy burden (both economic and political) for collaboration with networks or content providers. This is quite different from western countries, where program networks are mature and developed (Debrett, 2007, 2010; Shao, 2010).

In addition, there are some limitations to the empirical results. First, our sample size is too small for a Probit model, which may cause some imprecision to the regression (Griffiths et al., 1987). Second, we only covered the speed and quality of transformation using two dummy variables. There might be some bias since no economic indicators to the performance of transformation have been used. Third, since there is currently no systematic dataset on provincial cable operators, we collected some indirect variables from various sources. Results based on those crude but informative indicators might be inaccurate or even have some potential errors.

Conclusions and implications

This paper reports on various factors in the transforming process of China's provincial cable operators and explores answers to the question why the transforming of cable operators in China is delayed. We considered several factors including leaderships (market-driven and government-driven), horizontal competitors (telecom carriers and Internet companies) and vertical cooperation (with program networks). The Probit model using a sample consisting of provincial operators has tested those factors. The results are not only about speed but tradeoffs between speed and quality. Some basic findings are as follows: (1) The

capital-driven model could accelerate the transformation but could not guarantee improvements in quality. The government-driven model has similar positive and negative impacts on transformation speed and quality. (2) Competition from telecom operators may both accelerate and delay cable's transformation. (3) Cooperation with content providers could promote transformation quality while slowing down the speed of transformation.

Due to the limits in the empirical analysis, some of the interpretations are indirect or even imprecise. Meanwhile, most of these conclusions are specifically related to Chinese institutions, such as the special character and function of China's broadcasting and television industry and the delay of market-oriented reforms in cable compared to telecom.

In a limited way, our findings might show how the ongoing transformation of China's national cable operator might proceed. Although the transformation has been delayed over one year, the evidence suggests that a well-balanced combination of capital-driven and government-driven investment would produce a sound and efficient transformation in cable. Also, the comparative advantage of cable operators in the competition with telecom should be well explored. Finally, cable needs to strengthen the cooperation with the upstream content partnerships.

A future study will keep tracking the national cable operator establishment in China. The internal structure and function of this operator, as well as its external environment and challenges of this operator should be summarized in the future. We also plan to test the econometric model in this paper in a few years when better data sets could be collected, producing more reliable results and stronger arguments.

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