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INTERNET DIFFUSION AND REGIONAL INTEGRATION IN CHINA

Abstract. *China's low regional integration has drawn ever-increasing attention. However, the effects of the Internet as a representative of information and communication technology have largely been ignored. To fill this research gap, the current study seeks to clarify the relationship between Internet diffusion and regional integration in China. An approach measuring regional integration is constructed using the retail price index data of various commodities from 2001 to 2009. The results of the panel data regression suggest that the Internet plays a positive, significant role in regional integration in controlling the economy level, governmental control, and international openness. These findings are robust, maintaining consistency across three measures of Internet variables and several alternative model specifications.*

Keywords**:** *Internet, Regional integration, Gravity equation, China.*

JEL Classification: F15, L86, O53

1. Introduction

"If you are a foreign company thinking about selling to a unified market of 1.3 billion people from a factory inside China, then think again." Bruce Gilley (2001).

China is undergoing a lengthy transition process toward becoming a market economy. However, its domestic market is highly fragmented. According to calculations, barriers to trade between Chinese provinces are closer in magnitude to those seen in international trade (within the EU or between Canada and the US, for example) than within a single country (inside Canada or the US) (Poncet 2003, 2005). In Alwyn Young's famous paper "The Razor's Edge" (2000), China is warned against losing its comparative advantage due to domestic market fragmentation. The spatial dimension of a well-functioning market within China is far from satisfactory, and much needs to be done for China to fully reap the benefits of its potentially large internal market.

According to Xu (2002), a less-than fully integrated Chinese regional economy is illustrated by the following facts: (1) regional price differences are frequent and substantial; (2) regional distribution of industrial output shows that each major industrial group can be found in virtually all provinces; (3) the ratio of interregional trade flow to total retail sales has actually declined in many provinces and on aggregate for the country as a whole; (4) interprovincial investment (one measure of capital mobility) as a proportion of total investment has also declined; and (5) integration in the regional mobility of labor is limited.

China's incomplete economic integration implies the unexploited static and dynamic gains to be achieved from production according to comparative advantage, from economies of scale, from diffusion of technical knowledge, and from the general benefits of increasing competition.

Since the publication of Young's study, researchers have paid increasing attention to China's market fragmentation via a series of studies on the factors involved in China's slow regional integration. The notable factors are as follows.

First, the state-owned economy (as a result of the central plan) may deter regional integration. As an example, Lin and Liu (2004) highlighted the negative influence of China's "catch up" strategy, which can lead to severe local protection. Similarly, Bai et al. (2004), also pointed out the negative relationship between the level of state ownership in the regional economy and the level of regional specialization.

Second, international openness, in terms of international trade or foreign investment, can also play a role. The argument is that more highly-integrated international trade would supplant inter-provincial trade and intensify domestic market segmentation, as stated by Poncet (2003).

Finally, the regional economy level could affect the degree of integration.

Higher economy levels have usually been found to correlate with higher market segmentation in China (Lu and Chen 2009).

Although a substantial body of research has studied the different factors affecting China's regional integration, the effect of the Internet as a representative of ICT has been largely ignored. Internet access can potentially improve sales performance by making it easier for enterprises to communicate with remote buyers, improving access to information about markets, consumers and producers, connecting enterprises with consumers in remote areas, and allowing enterprises to bid for contracts over the Internet and participate in business-to-business exchanges (Clark 2008). As mentioned in Thomas Friedman's famous book "The World is Flat", distances have shrunk due to widespread digital access.

The Internet has influenced every aspect of the global economy, and China is no exception. The city of Shanghai offers a simple example. It is over a thousand kilometers away from Beijing, but through the Internet, consumers in Shanghai can easily order Beijing ducks online anytime. Hence, the belief that the Internet can contribute to China's regional integration is reasonable.

So far, literature on the effects of the Internet on the macro economy has been relatively scant. However, some interesting and valuable attempts are available. Using cross-country panel data, Choi and Hoon Yi (2009) found evidence that the Internet plays a positive and significant role in economic growth after investment ratio, government consumption ratio, and inflation were used as control variables in the growth equation. Freund and Weinhold (2004) reported that Internet development helps explain trade growth and bilateral trade patterns from 1997 to 1999. Another study by Choi (2010) suggested that an increase in a country's Internet access will facilitate an increase in its service trade with other countries. However, Blum and Goldfarb (2006) stated that Americans are more likely to visit websites from nearby countries, even controlling for language, income, and immigrant stock, among others. Thus, they argued that gravity still holds in the case of digital goods consumed over the Internet that have no trading costs.

Considering the concerns above, the present study seeks to clarify the relationship between Internet diffusion and regional integration by focusing on China and using sub-national data. The data are compiled mainly from three sources: National Statistic Yearbooks, Internet Development Reports, and Information Almanacs, all of which are published by China's official agencies. To the knowledge of the authors, this article is perhaps the first research on the effect of Internet diffusion toward regional integration. The research design in this study

can also be applied to studies across countries, such as studying the influence of the Internet on European integration. However, this work only focuses on one country for the reason that using sub-national data avoids the difficulty of controlling institutional differences across countries (Davis et al., 1997; Bacchetta et al., 2001).

This study is organized into the succeeding segments as follows. In Section 2, the measurement of all the variables, the data sources, and the regression model are presented. In Section 3, several estimations are performed. Finally, Section 4 concludes with policy implications drawn from the findings of the study.

2. Methodology

In conducting this study, a measure of the regional integration is first constructed to accommodate the dependent variable. Next, a list of independent variables that affect regional disintegration are described. Summary statistics of key variables are then presented and discussed at the end of this section.

2.1 Measure of regional integration

Finding a credible measure of integration is critical to conducting empirical studies. Five approaches are listed in the literature.

First is the production structure approach, also called the regional specialization approach (Young 2000; Bai 2004). This approach attempts to measure the degree of economic integration by examining the similarity of production structure across different regions. The idea is that if the production structures of different regions are nearly the same (which indicates rare regional specialization), then the regional integration level should be very low.

Second is the trade flow approach, which involves the direct examination of data on interregional trade flow. This approach was applied by Naughton (1999) and Poncet (2003), yielding different results regarding China's regional integration.

The third is the business cycle approach, which assumes that a high integration level exists if different regions show the same position within the business cycle, especially if significant long-term co-movements are in evidence (Tang 1998; Xu 2002). The correlation between business cycle disturbances and responses is used as an indicator of integration among nations, along lines developed in the optimum currency area (OCA) literature initiated by Mundell (1961) and applied by Bayoumi and Eichengreen (1994).

The fourth is the survey approach. It directly surveys a large number of firms

in various regions of China (Li et al., 2006).

Finally, the fifth is the price approach, which is based on the law of one price (Parsley and Wei 1996; Chen et al., 2007). If the prices of the same commodities tend to be the same across different regions, then the integration level should be high.

For the purposes of the present research, the price approach is adopted, after considering both the strengths and weaknesses of the five measuring approaches stated above. The weakness of the price approach is that its accuracy is limited by a lack of available detailed information regarding goods and services categories (Tang 1998). For this reason, this research employs as much of the detailed information on goods and services as possible.

The reasons for setting aside alternative approaches are as follows. As argued by Naughton (1999), the production structural approach suffers from two major drawbacks: first is the lack of a theoretical yardstick with which to evaluate changes. Second is that changes in the production structure in China during the reform era sometimes reflect movement away from the inappropriate patterns of regional specialization imposed under planning. The same drawbacks apply for the business cycle approach. Either of these two approaches is a kind of indirect measure and needs to be analyzed more carefully. As for the trade flow approach, a larger volume of trade between two regions may be the result of economies of scale, even though trade barriers remain intact along the border (Engle and Rogers 2000). Finally, the survey approach offers an extensive and direct illustration of integration but the difficulty inherent in attempting to capture the dynamics of regional integration limits its use for long-term analysis.

The price approach is founded theoretically on the iceberg model (Samuelson 1954), which amends the original law of one price (LOP) theory. Generally, certain kinds of transportation costs, such as freight costs, are consumed during transactions, comparable to an iceberg melting. Only a fraction of the goods' value survives. This implies that perfect arbitrage requires only the relative price fluctuating within a range but not being constant. If Pi is the price of a product in location "i," and Pj is its price in location "j," the proportional transaction cost (wastage occurring as commodities are traded between two regions) is "c" ($0<c<1$). The necessary condition for the existence of arbitrage is $Pi(1-c)>Pj$ or $Pj(1-c)>Pi$, in which trade occurs. Otherwise, the relative price of product Pi/Pj falls into a non-arbitrage range [1-c, 1/(1-c)]. Under this pricipal, a higher variance of relative prices reflects a wider arbitrage interval and implies more serious segmentation.

Hence, a panel database of the interregional disintegration index can be constructed based on the retail price indices of different goods by region. The primary price data are sourced from the China Statistical Yearbook across various years. The Yearbooks provide as many as nine kinds of goods: grain, fresh vegetables, beverages, tobacco and liquor, garments, shoes and hats, traditional Chinese and Western medicines, newspapers and magazines, stationery and sports goods, daily use articles, and fuel. Previous studies have used one or two kinds of goods and constructed a similar index database, such as Goletti et al., (1995). Compared with the approach in these studies, the use of all available price information can provide more reliable results. The price approach requires a three-dimensional database (t×m×k), where the indices "t," "m," and "k" represent time, province, and goods, respectively. The database used in the present research covers nine years from 2001 to 2009 and 31 Chinese provinces. The year 2001 is chosen as the start because Internet access was not widespread in China before 2001.

This study follows Parsley and Wei (1996, 2001) in developing the price approach to measure regional integration. The approach starts with relative price variances of province pairs, as these kinds of data can be synthesized to provincial segmentation indices.

$$\Delta Q_{ijt}^{k} = \ln(\frac{P_{it}^{k}}{P_{it-1}^{k}}) - \ln(\frac{P_{jt}^{k}}{P_{jt-1}^{k}}) = \ln(\frac{P_{it}^{k}}{P_{jt}^{k}}) - \ln(\frac{P_{it-1}^{k}}{P_{jt-1}^{k}})$$

Four steps are taken in constructing China's regional disintegration index database:

(1) The absolute value of the relative price, $|\Delta Q_{ijt}^{k}|$, is calculated. This price is the first-order difference of percentage price difference of identical product "k" in two provinces, "i" and "j," at time "t." The consideration for taking absolute value is that ΔQ_{ijt}^{k} could be positive or negative for any province pair or time period. In fact, in the same year and with the same province pair, changing the order of "i" and "j" province will yield opposite results. The absolute value avoids this kind of inconsistency. According to the computation above, the vectors of the differential in the relative price index is obtained, containing 37,665 ($9*C_{31}^{2}*9$) observations without missing data.

(2) The cross-sectional variance is calculated with respect to goods, under the assumption that a higher variance means a wider arbitrage interval and implies

more serious segmentation. To abstract regional effects, the goods-specific effects must be removed first. For instance, in a certain period, the grain market experiences significant price fluctuation within two locations, "i" and "j." The cause could be divided into two parts: one is related to the nature of the grain market (for example, the price of grain changes markedly, given that grain yields are easily influenced by natural conditions), and the other is independent of the characteristics of goods but determined by market conditions between locations "i" and "j," or some random factors. Following Parsley and Wei (2001), de-mean is used to remove the good-specific effect.

(3) The regional disintegration index is the variance of q_{ijt}^{k}, defined as $var(q_{ijt})$. q_{ijt}^{k} is thus related only to regionally specific effects and other random effects; a total of 4,185 (C_{31}^{2}*9) observations are used in this study.

(4) Finally, the data are transformed by C_{31}^{2} province pairs to data by each province. Thus, the average variance of every province is calculated respectively. In this way, the average variance captures the magnitude of integration between one province and all other provinces. Therefore, this index is referred to as the regional disintegration index. The larger the index, the less the extent of integration.

2.2 Internet and other independent variables

Following Choi (2010), a modified gravity equation is adopted to examine the effect of Internet diffusion on regional integration in China. The regional integration variable is on the left side of the equation whereas the Internet variable is on the right. Three different approaches are adopted regarding the measure of the Internet variable. The correlation coefficients of the three Internet variables all reach a high level round of 0.8, which reflects a high consistency in the different measures.

The definition of each measurement is as follows:

Internet1- the number of websites in the jurisdiction. The data source is China's Internet Development Reports, provided by China Internet Network Information Center. To reduce possible heteroscedasticity, the log transformation treatment is adopted in the regressions.

Internet2- the proportion of the population that uses the Internet. The data source is China Statistical Yearbooks, published by China's Statistical Bureau.

Internet3- the regional information index. The data source is China's Information Almanacs. The index has been previously used in related studies (Bu et al., 2011).

Other independent variables include the regional economy level, international openness, and government control, as suggested by the literature (see section 1 for the details). The economy level is measured by the regional per capita GDP. International openness is measured by the sum of regional exports and imports divided by its GDP. Government control is measured by the proportion of state-owned job workers in the total number of regional job workers (Chen et al., 2007). According to previous studies, a high level of regional disintegration is expected to correlate with a higher economy level, or international openness, or a higher level of state ownership.

$$Di\sin tegration_{it} = \beta_0 + \beta_1 Internet_{it} + \beta_2 \ln PGDP_{it} + \beta_3 SOE_{it} + \beta_4 Openness_{it} + \eta_i + \upsilon_t + \varepsilon_{it}$$

2.3 Summary statistics

Section 2.1 discussed the construction of the regional disintegration index for each of the 31 regions in China using the regional retailing price data of nine industrial sectors from 2001 to 2009. By aggregating the disintegration index across all regions and plotting them against time, the time trend of regional disintegration in China may be observed. As shown in Fig. 1, the simple average across all regions was 9.35 in 2001, which then dropped to 3.34 in 2002. It reached 6.73 in 2004, and then maintained a downward trend. The weighted average (by regional domestic product) across all nine regions demonstrates a similar time trend. In 2001, the disintegration index was 6.86, which dropped to 3.02 in 2002. It reached 6.20 in 2004, and then maintained a downward trend. From the time trend of the aggregated index over the 10-year period, China's regional disintegration is evidently shrinking. This phenomenon is in clear contrast to the results obtained by Poncet (2003), in which aggregated data was used, but is consistent with the results reported by Naughton (1999), which used input-output data.

Fig. 1 Time trend of average (across all regions) disintegration index

More interestingly, and more importantly, substantial variations are seen in the degree of disintegration across regions. Figure 2 shows the averages (across time) of the disintegration index for different regions; the range is from 2.86 (Shandong Province) to 16.10 (Tibet Autonomous Region). If the extreme case of Tibet is excluded, the highest disintegration index is still sizeable at the value of 7.92.

Table 1 summarizes the mean and rank of other variables across regions. As for the Internet variable, the region with the highest degree of Internet usage is Beijing or Guangdong, and the regions with the lowest are Guizhou, Qinghai, and Tibet respectively for different measures. Among all the regions, Tibet, Qinghai, and Ningxia are the poorest three provinces by the measure of per capita GDP.

Table 1 also shows the substantial variances across regions in the degree of state ownership in the economy. Beijing tops the list at 0.22, whereas Zhejiang is at the bottom at only 0.04. Similarly, the measure of international openness also varies greatly. Shanghai is at the top, measured at 1.44, whereas Guizhou is at the bottom at 0.06.

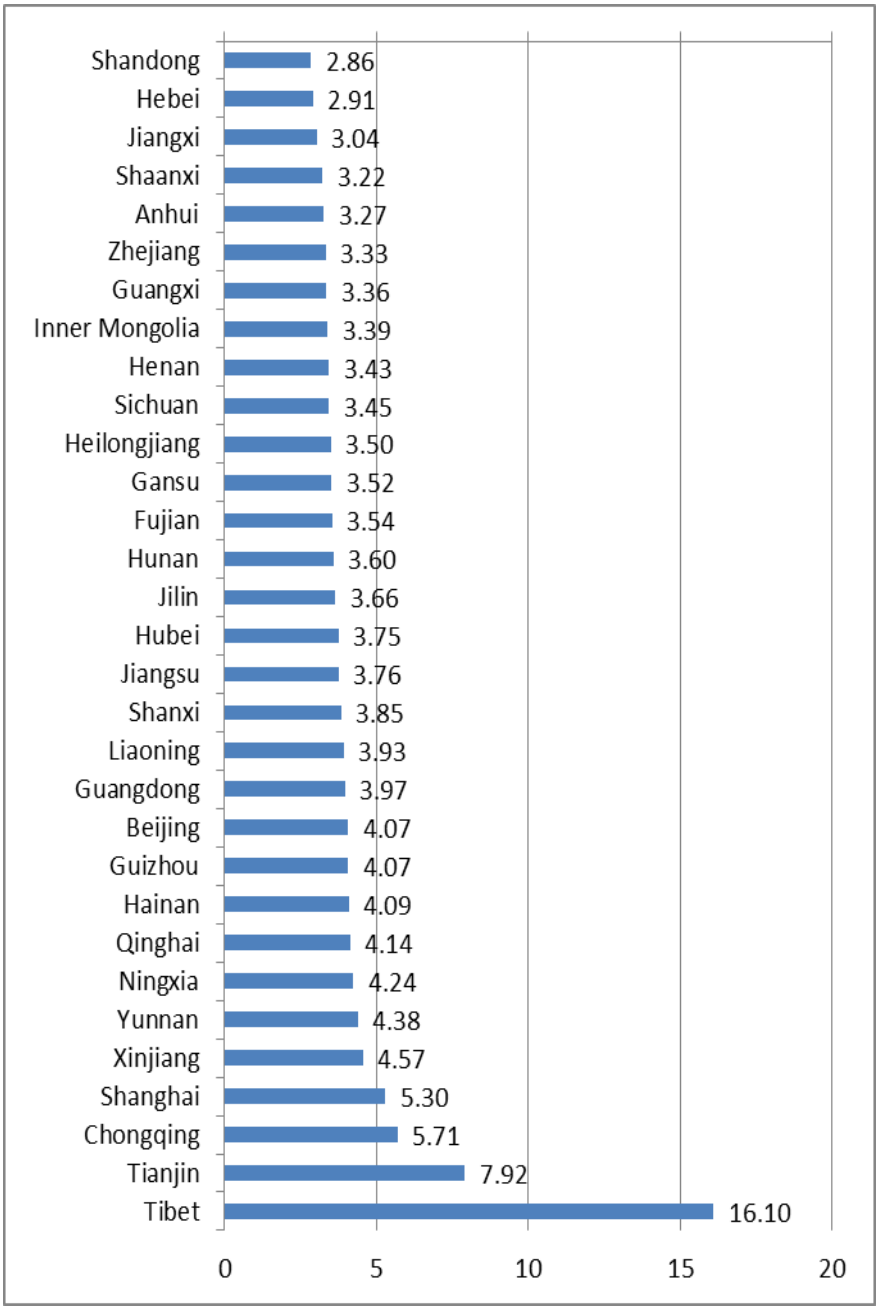

Fig. 2 Average (across time) disintegration index by region

Table 1. Mean value and rank of variables

	Disintegration index	rank	Internet1	rank	Internet2	rank	Internet3	rank	PGDP	rank	SOE	rank	Open	rank
Beijing	4.07	11	18.2	2	34.61	1	0.84	1	8.84	10	0.22	1	1.33	3
Tianjin	7.92	2	1.28	19	23.57	3	0.68	3	8.23	22	0.18	4	0.94	4
Hebei	2.91	30	2.66	11	9.87	18	0.56	17	9.19	6	0.06	20	0.12	15
Shanxi	3.85	14	0.87	21	11.84	11	0.57	14	8.32	17	0.12	7	0.11	17
Inner Mongolia	3.39	24	0.49	25	8.2	23	0.55	18	8.29	19	0.1	9	0.09	25
Liaoning	3.93	13	2.95	9	14.65	8	0.62	8	9.03	8	0.19	3	0.37	8
Jilin	3.66	17	0.75	22	10.94	13	0.58	11	8.24	21	0.11	8	0.15	12
Heilongjiang	3.5	21	1.51	14	9.94	17	0.57	12	8.60	15	0.16	6	0.14	13
Shanghai	5.3	4	11.05	3	33.56	2	0.78	2	9.11	7	0.2	2	1.44	1
Jiangsu	3.76	15	7.56	5	15.24	7	0.63	6	9.80	2	0.06	19	0.81	5
Zhejiang	3.33	26	10.61	4	20.58	5	0.66	5	9.49	4	0.04	31	0.59	6
Anhui	3.27	27	1.47	15	6.47	30	0.53	25	8.61	14	0.04	26	0.13	14
Fujian	3.54	19	5.56	7	18.21	6	0.63	7	8.83	11	0.04	25	0.58	7
Jiangxi	3.04	29	1.11	20	7.37	25	0.54	23	8.31	18	0.06	18	0.09	24
Shandong	2.86	31	5.66	6	12.06	10	0.58	10	9.79	3	0.06	21	0.32	9
Henan	3.43	23	2.29	13	7.15	26	0.53	26	9.24	5	0.04	24	0.06	30

Hubei	3.75	16	2.65	12	10.18	15	0.57	15	8.82	13	0.08	13	0.1	20
Hunan	3.6	18	3.42	8	8.26	22	0.55	19	8.82	12	0.04	23	0.07	28
Guangdong	3.97	12	18.47	1	23.18	4	0.66	4	10.01	1	0.05	22	1.4	2
Guangxi	3.36	25	1.3	17	8.6	20	0.54	24	8.32	16	0.04	27	0.1	18
Hainan	4.09	9	0.38	26	12.15	9	0.55	20	6.84	28	0.1	10	0.24	10
Chongqing	5.71	3	1.32	16	10.07	16	0.57	13	8.11	24	0.06	17	0.1	21
Sichuan	3.45	22	2.79	10	8.12	24	0.55	21	8.93	9	0.04	28	0.09	23
Guizhou	4.07	10	0.68	24	5.05	31	0.48	30	7.62	26	0.04	30	0.06	31
Yunnan	4.38	6	0.72	23	6.82	29	0.5	29	8.18	23	0.04	29	0.1	19
Tibet	16.1	1	0.14	30	7.09	28	0.44	31	5.53	31	0.08	14	0.08	27
Shaanxi	3.22	28	1.29	18	10.82	14	0.59	9	8.28	20	0.08	12	0.09	26
Gansu	3.52	20	0.36	27	7.11	27	0.52	27	7.58	27	0.07	15	0.1	22
Qinghai	4.14	8	0.09	31	9.24	19	0.52	28	6.33	30	0.06	16	0.06	29
Ningxia	4.24	7	0.2	29	8.55	21	0.54	22	6.47	29	0.09	11	0.12	16
Xinjiang	4.57	5	0.34	28	11.76	12	0.56	16	7.85	25	0.18	5	0.23	11

Table 2. Regression results.

	(1) OLS	(2) RE	(3) PCSE	(4) GMM	(5) OLS	(6) RE	(7) PCSE	(8) GMM	(9) OLS	(10) RE	(11) PCSE	(12) GMM
Internet1	-0.847***	-0.44	-0.847	-0.611**								
	(-2.75)	(-0.96)	(-1.43)	(-2.67)								
Internet2					-0.00075	0.0151	-0.00075	-0.0359				
					(-0.03)	-0.21	(-0.01)	(-0.88)				
Internet3									-50.76*	-51.00***	-50.76**	-19.42
									(-1.66)	(-4.46)	(-2.02)	(-1.19)
SOE	4.795	10.64	4.795	0.0899	12.93**	15.09	12.93**	5.525**	22.56*	23.83***	22.56***	7.631**
	-1.06	-1.11	-0.9	-0.03	-1.99	-1.6	-2.25	-2.2	-1.89	-2.98	-2.77	-2.44
Open	1.998**	1.239	1.998*	0.762	1.167*	0.548	1.167	0.507	4.579*	4.409**	4.579**	1.79
	-2.21	-0.71	-1.87	-0.62	-1.87	-0.27	-1.07	-0.51	-1.73	-2.56	-2.24	-1.06
PGDP	-0.0528	-0.5	-0.0528	0.986	-1.451	-1.2	-1.451	0.13	2.663*	2.758*	2.663	1.348
	(-0.06)	(-0.30)	(-0.07)	-0.77	(-1.16)	(-0.74)	(-1.60)	-0.21	-1.78	-1.69	-1.63	-0.92
Constant	15.32***	11.36**	15.32***	11.90***	7.232***	7.155***	7.232***	6.139***	31.17**	31.21***	31.17***	15.35*
	-3.66	-2.43	-2.89	-4.92	-4.87	-4.07	-7.15	-16.68	-1.99	-5.58	-2.64	-1.98
Hausman test		18.17				7.77				3.01		
Prob>chi2		0.111				0.803				0.996		
Hansen test				0.620				0.883				0.884
Observations	279	279	279	270	279	279	279	270	279	279	279	270
R-squared	0.196	0.202	0.196		0.179	0.211	0.179		0.257	0.225	0.257	

t-statistics in parentheses. Year dummies are included, *, **, and *** indicate significance at 10%, 5% and 1% level, respectively.

3. Empirical results

Having constructed a panel data set of 31 regions over the time period of 2001 to 2009, this study will next examine how the degree of China's regional disintegration is determined by the independent variables related to the Internet, per capita GDP, government control, and international openness. Table 2 presents the regression results for the joint determinants for regional disintegration on three measures of the Internet. For each measure, various estimation methods are adopted: (1) pooled ordinary least squares (OLS), (2) fixed effects, (3) random effects, (4) panels corrected standard errors (PCSEs), and (5) generalized method of moments (GMM) estimation.

On the measure of number of websites, the coefficient of the Internet is -0.847 and reaches the significant level of 1% according to the benchmark pooled OLS regression. Thus, if the amount of websites in one region increases by 1%, the degree of disintegration may decrease by 0.847 units. Both the fixed effect and random effect models are tried for the estimation. According to the results of the Hausman test, the random effect model should be chosen.

The coefficient of the Internet is also negative, and it fails to reach a significant level. The same happens to the estimation with PCSEs. In as much as explanatory variables such as per capita GDP and Internet can be influenced by regional integration, the GMM estimation is performed to take into account any endogeneity of the explanatory variables. The coefficient of the Internet is -0.611 and significant at the 1% level.

As for other independent variables, neither the sign of the coefficients of government control nor economy level is significant. However, the coefficients of international openness are mainly significant and positive, which is consistent with this study's previous prediction. Thus, the possible existence of the substitute effect of international markets for the domestic market may exist.

Next, the estimation of regional integration is performed with the second measure of the Internet. The coefficients of the Internet variable are mainly negative but without significance. The coefficients of government control are positive and mainly significant. The coefficients of international openness and per capita GDP are also similar to those in the estimation with the first measure of the Internet.

Finally, in terms of the results using the third measure of the Internet variable, results suggest that the Internet has a fairly strong effect toward regional disintegration. Although the GMM case fails to reach a significant level, the coefficients of the Internet are significant in all the OLS, random effect, and PCSE models. These results suggest that if the information index level increases by 0.01 units, then the degree of regional disintegration will decrease by about 0.51 units. As for the other independent variables, their coefficients are also mainly significant, and the signs are the same as the theoretic predictions.

To check the robustness of the results, one region (Tibet) is dropped from the sample. The results of the Internet show a general significant and negative effect on regional disintegration for all the three Internet measures. Similar results are

attained when two regions (Tibet and Xinjiang)[1] are dropped simultaneously. Overall, this study has found supporting evidence for the contribution of Internet diffusion to China's regional integration.

4. Summary and policy implications

Inspired by Young (2000), the heated debate about China's regional integration has never stopped. However, few studies have taken the Internet into account as a factor. The Internet can reduce communication costs across different regions. Therefore, increasing Internet access can be hypothesized as having a positive effect on regional integration. To test this hypothesis, the current paper first constructs a dataset of regional disintegration index, based on relative prices across different regions. Then, using panel data on Chinese provinces from 2001 to 2009, cross-regional empirical regressions are performed on a series of modified gravity models. The empirical results support the theoretical hypothesis. The diffusion of the Internet is found to decrease the degree of a region's disintegration significantly. This finding is robust, holding up for three measures of the Internet and several alternative model specifications.

Policy implications can be drawn as follows.

First, all of China's regions need a more strategic focus on promoting Internet diffusion as an important means of domestic integration. This should not be confined to upgrading Internet infrastructure and reducing the cost of Internet use. Instead, focus should be given to the eventual effects of Internet diffusion on integration. The benefits of Internet use far outweigh the related costs.

Second, the impact of Internet diffusion on regional integration suggests that promoting Internet technology is both urgent and strategic. Investing in broadband infrastructure, reforming the education system to better prepare people for the information age, and fostering Internet-enabled services, including e-government and e-commerce, should be top priorities.

Third, regions with low levels of Internet use should be more aggressive in promoting Internet diffusion. Modernizing Internet usage should be a top priority in any region in order to further regional integration.

Lastly, the progress of the Internet can be inferred to contribute to worldwide integration. In addition to regional and global institutions such as free trade areas, the WTO, etc., the Internet will be one of the main driving forces in the integration of the world economy, thus enhancing the welfare of all people.

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[1] The robust check results are available upon request.

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