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Effects of trade openness and market scale on different regions

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Abstract. This paper revisits the relationship between growth, trade openness and market scale. Empirical studies have provided that area develops lopsided problem in China is increasingly serious, while large trade openness and market scale bring about more economic growth. We use a number of data set from province-level's gross domestic product and socio-economic, as well as statistical methods panel ordinary least squares and instrumental variables estimation techniques to explore the effects of trade openness and regional market scale on the three major economic regions. The results indicate: Firstly, the impact of market scale and trade openness on economic growth is found to be positive. Secondly, the overall regional disparity is owing to the trade openness, market scale and macroeconomic policies. Thirdly, midland and western region should take advantage of regional geographical location and resource to expand exports and narrow the regional difference.

1. Introduction

Over the past several decades, foreign trade has become the most active part in China's economy. In 1978, import and export goods of China amounted to \$20 billion 500 million, which in the world trade only ranked thirty-second, accounting for less than 1%. In 2013, Chinese total import and export of goods amounted to \$4 trillion and 160 billion, of which exports amounted to \$2 trillion and 210 billion, imports amounted to \$1 trillion and 950 billion. According to the World Trade Organization Secretariat preliminary statistics, China has surpassed the United States to become the world's largest trade country.

At the meantime, unbalanced growth of regional economy has been one of the key development characteristics considered across China. The economic disparities is even more discernible between eastern coastal areas and western regions. For example, per capita GDP in Yunnan province in 1999 was 4,478 yuan, while per capita GDP in Shanghai was 27,561 yuan, there is a difference of 23,083 yuan. However, in 2013 per capita GDP of Yunnan province increased to 27,264 yuan, per capita GDP of Shanghai at this time already increased to 97,343 yuan, the gap between them is 72,731 yuan, which is 3.04 times in 1999. It means per capita GDP in China has increased year by year, inequality among individuals is growing among most regions.

Are there exist some connections between growth and openness? Theoretically, the influence of trade openness on economic fluctuation is uncertain. Openness will increase the external impact of economic shocks. Meanwhile, the degree of specialization of the industry makes it more vulnerable in the face of shocks from specific trade sectors.



To reflect the social and economic development of different regions and to provide the basic regional development policy for the national development, Chinese Seventh Five-Year Plan divided country into three economic regions, respectively they are east region, central and western region. We contributes to the literature by using province-level information to study and try to solve (1) the main factors behind unbalanced growth in China; (2) the effects of trade openness and regional market scale on the three major economic regions.

The remainder of this paper proceeds as follows: Section 2 briefly reviews the literature and introduces the instrumental variables; Section 3 describes the dataset and method; Section 4 presents the empirical results of three economic regions; Section 5 investigates the determinants of regional disparity; followed by conclusions and policy implication in Section 6.

2. Literature review

There have been rich discussions on effects of trade openness and market scale. According to the thoughts of early scholars, openness and trade scale these potential determinants of growth might be interlinked (see Magdalene, 2016). However, due to the different situation in regions and different research methods that adopted by scholars, there are several arguments of interaction effect between trade openness and market scale in explaining economic growth. On the one hand, most studies support the positive effect of trade openness on economic growth. Geoffrey (2014) suggested that open economies grow faster than closed economies. Kim (2016) showed that on average, greater international trade, promotes economic growth and amplifies growth volatility in the long-run, in the short-run, causes a negative short-run correlation between growth and growth volatility. Ma (2012) claimed that trade openness has a positive effect on economic growth and in the meanwhile it baffles the development of labour-intensive industries. On the other hand, as emphasized in Menyah (2014), trade liberalization and financial development may not have made a significant impact on growth.

Recent empirical work on Chinese research also focuses on relationship of openness, growth and other influencing factors. Xu and Meng (2015) estimated the relationship between human capital and growth though panel threshold model. The results indicated that there was negative association between openness and growth with a lower level of human capital, while there was significant positive association between these variables if with a higher level of human capital. By analysing panel data of 31 provinces in China from 1998 to 2012, Xu and Guo (2014) demonstrated that the energy consumption plays an important role in promoting regional economic growth, but the effect of trade liberalization on economic growth is not important in China's central and western area. Wang (2015) and Li (2011) drew a conclusion that carbon dioxide emissions is increasing due to trade openness in China, which means international trade has a negative impact on China's environment.

Previous cross-country studies on the openness-growth connection are subject to fundamental methodological and econometric problems, as pointed out by Mohammad et al.(2016). However the endogenous problem of trade openness may exist in various aspects of country: the more affluent provinces and autonomous regions, the greater the regional advantage to expand exports. Therefore researchers use the geographical distance from the provincial capital to the nearest coastline to measure the index of trade openness (Huang and Li, 2006), although in a certain extent this method can reflect the transportation cost, there still has a certain deviation between geographical distance and the actual transport distance.

So far there remains a lack of satisfactory measure of openness, and very little empirical evidence on the impact of the integrated economy on regional economic growth. Motivated by this idea, we investigate the research methods of Huang and Li (2006), using road distance from the provincial capital city to the nearest port which can more appropriately represent the transportation cost. Moreover, the geographical distance of the city at the prefecture level or above is taken as the instrumental variable, which can effectively solve the endogenous problem of the empirical study.

3. Model and data

Based on the model of Huang and Li (2006), we use the following empirical framework to investigate long-run growth. Accordingly, the author puts forward the corresponding with China's actual situation

of countermeasures, to narrow the regional economic disparities exist among regions. With a number of data set from province-level GDP and socio-economic, this paper introduces fixed effects into regressions to control the endogenous problem of trade openness and market scale. In general form, this model can be characterized as

$$g_{it} = \beta_0 + \beta_1 FMA_{it} + \beta_2 RMS_{it} + \beta_3 FMA_{it} \times RMS_{it} + \beta_4 \log y_{i,t-\tau} + \beta'_5 Z_{it} + \varepsilon_{it} \quad (1)$$

The data consists of $i=1, \dots, 28$ provinces, and $t=1, 2, \dots, 4$ period. Where β_0 and ε_{it} respectively for constant and error term. Explained variables g_{it} is the logarithm of the average growth rate of per provinces capita income in period t . $\log y_{it}$ is the logarithm of the initial capita income per province in period t . FMA_{it} is the trade openness of province in period t . RMS_{it} is a calculated measure of regional market scale:

$$RMS_{it} = \sum_{j \neq i} (Y_{ij} / D_{ij} + Y_{it} / D_{ii}) \quad (2)$$

Where D_{ij} is the shortest road distance between provinces i and j , D_{ii} is the provincial internal distance:

$$D_{ii} = \frac{2}{3} \sqrt{S_i \pi} \quad (3)$$

Where S_i is the land area of province i ; Y_{it} is the per capita GDP, Y_{ij} is the gross regional domestic product. $FMA_{it} \times RMS_{it}$ is the multiplicative interaction between trade openness and regional market scale, parameter β_3 is expected to be negative if the foreign and regional markets exhibit substitutes for each other. The variable Z_{it} represents a vector of control and environmental variables that are primarily determined by investment rate (INV_{it}), literacy rate (LR_{it}), as well as the proportion of the total area of the government consumption (GOV_{it}).

Data on literacy rate, used to measure the level of literacy in a country, currently we use the proportion of people who over school age (15 years old) could read and write in the corresponding population, also come from the National Bureau of Statistics of China. Data for geographical factors, distance inside and between provinces, are taken from electronic map. Considering the topography (such as the mountain plateau and desert, etc.), we use road distance from the provincial capital to the nearest port instead of straight-line distance.

The annual data for the period 1970-2010 is calculated using in this paper comes from the National Bureau of Statistics of China. We divide this period into four sections, and in the regression we take the arithmetic mean of variables in each time period. The cross-sectional data totals 28 provinces (not include Xizang, Chongqing and Hainan), hence the total data consist of 112 provincial-level observations of province GDP for four periods, every ten years as a time period. Notice that there are only 84 observations for literacy rate because of incomplete information in 1970s.

4. Empirical analysis

Following the definition of the variables and the methodology, we now turn to the empirical analysis. Table 1 reports the summary statistics for both complexity and the actual volatility. According to the regression Equation (1), the author uses the geographical distance of China provincial capital city from the nearest port (variable FMA) as the instrumental variable instead actual trade openness, obtained by two stage least squares results as shown in Table 2. The return of the three major economic zones of the east region, midland, and west region, the estimated results of different regions are obtained as shown in Table 3.

Table 1. Summary statistics

Variable	Obs	Mean	Std.	Min	Max
g_{it}	112	0.088	0.038	0.019	0.198
rms	112	0.297	0.394	0.008	1.847
fma	112	1.993	3.310	0.050	23.877
fma*rms	112	0.934	2.540	0.000	16.401

lny	112	5.712	1.417	1.977	9.134
gov	112	0.114	0.044	0.035	0.248
inv	112	0.442	0.160	0.172	1.008
lr	84	0.804	0.151	0.443	0.984

In Table 2 as a benchmark in column (1), we use the augmented model that explains differences in average growth rate of per provinces capita income across China by the geographical level in the previous period to mitigate the endogeneity problem, including the regional market scale (RMS_{it}), trade openness (FMA_{it}) and interaction $FMA_{it} \times RMS_{it}$, we observe that the effect of FMA_{it} and RMS_{it} are both positive and highly significant, and the interaction between trade openness and regional market scale $FMA_{it} \times RMS_{it}$ is negative across all formulas, and in column (3) and (5) significant at the five percent level. In column (2) (3) (4) we introduce a range of other possible control variables. Finally in column (5) we consider all of the variables, we can see that the results are still stable.

Table 2. Panel two-stage least squares estimation results

	(1)	(2)	(3)	(4)	(5)
fma*rms	-0.007** (-2.387)	-0.005* (-1.757)	0.005*** (-3.095)	-0.004** (-2.196)	0.005*** (-0.956)
rms	0.070*** -6.109	0.050*** -3.528	0.039*** -3.419	0.024* -1.894	-0.009 (-0.559)
fma	0.007*** -3.224	0.006** -2.621	0.004** -2.496	0.003* -1.894	0.001 -0.981
lny	0.010*** (-3.994)	-0.012*** (-4.692)	-0.005* (-2.019)	-0.007** (-2.673)	0.013*** (-5.491)
gov		0.286*** -3.579		0.239*** -3.455	0.042 -0.508
inv			0.135*** -5.582	0.126*** -5.531	0.088*** -3.563
lr					0.039 -1.282
_cons	0.118*** -7.926	0.106*** -6.169	0.043** -2.061	0.037* -1.884	0.098*** -4.241
N	112	112	112	112	84
R-sq	0.653	0.695	0.741	0.769	0.847

t statistics in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

And we consider to what extent do these variables matter for understanding differences in growth across different regions? Table 3 provides an analysis of economic growth focusing on the three economic regions of China for selected years.

Table 3. District data

	eastern area	midland	western area	all
fma*rms	-0.005*** (-4.329)	-0.034 (-1.066)	0.037* -1.88	-0.004** (-2.196)
rms	0.042* -2.177	0.074 -1.798	0.092*** -5.182	0.024* -1.894
fma	0.002 -1.763	0.025 -1.891	0.007* -1.872	0.003* -1.894
lny	0.010** -2.692	-0.002 (-0.514)	-0.014*** (-4.385)	-0.007** (-2.673)
gov	-0.145 (-0.875)	0.08 -0.655	0.229** -2.309	0.239*** -3.455
inv	0.107**	0.123**	-0.018	0.126***

	-2.257	-3.489	(-0.465)	-5.531
	-0.019	0.009	0.115***	0.037*
_cons	(-0.967)	-0.392	-3.6	-1.884
N	44	28	40	112
R-sq	0.775	0.87	0.894	0.769

t statistics in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

5. Results

The empirical result confirms the existence of research that market scale and trade openness have a positive impact on economic growth in the long run. For the regions with higher export openness, its growth will be faster in the provinces closer to overseas market. For the regions with higher dependence on domestic demand, its growth will be faster in the provinces with greater market scale.

We further evaluate $FMA_{it} \times RMS_{it}$ in different period and region, a remarkable substitutive effect is found to exist between markets at home and abroad.

Table 2 shows that investment rate and government consumption are significant at the 1% level across column (1)-(4). Since these variables are government controlled this result suggests that investment rate and government consumption is also important in understanding differences across regions. It can be seen however that literacy rate is not significant, one possibility is that there is migration across regions, while most internal trade in China is in agricultural products and processed products, this result is not unexpected.

In Table 3 the association of multiplicative interaction between trade openness and market scale is particularly significant in eastern area. One way to interpret this is that eastern area enjoys lower transport costs and experiences a high influx of foreign capital, hence it has a large substitution effect of domestic and foreign market.

In summary, unbalanced economic development is very common no matter with or between countries. To narrow the regional difference and promote the regional sustainable development is an important challenge at the present stage. Further research may be conducted to ascertain the following factors: (1) the relationship between spatial evolution mode and regional industrial structure; (2) the quality of infrastructure and how does it influence per capita income in China.

6. Policy suggestions

Our empirical research confirms that the growth is determined jointly by the trade openness and market scale. According to the above conclusions, this paper puts forward following policy suggestions:

(1) The difference of openness degree is one important reason for the difference of economic growth among regions. In a more open economy, the market mechanism may play a more obvious role, resulting in higher efficiency of resource allocation. Speeding up the reform and open-up in middle and western regions may also be an important lever for facilitating their economic growth. However, the openness is largely dependent upon exterior system, policy convergence is needed for the convergence of economic growth among regions.

(2) High-quality market environments should be established, backed by an improved legal system, with surveillance by social networks, the media, and individuals. For instance, our results suggest that border areas like Yunnan, a relatively closed economy by the measure of trade to GDP, would probably improve its overall market competitiveness if it moved from its current fixed regime to a more flexible one, such as be endowed with greater administrative and financial autonomy, etc. Only by achieving the transformation of primary processing products exports to high value-added exports, can these backward area expand its market scale.

(3) Provinces and regions in mainland China shall further improve transport infrastructure and weaken the geographical disadvantage in terms of international market association. Meanwhile, western provinces and regions shall give play to their own comparative advantages and expand their trade with neighbouring countries. Also, government could increase the intensity of economic support

and improve the local infrastructure construction, to be tilted to a certain extent in the tax system, which will accelerate the development of central and western provinces.

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