Trade-cum-FDI, Human Capital Inequality and Regional Disparities in China: the Singer Perspective

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Abstract This paper explores the causes of regional disparities in China in the light of the Singer Hypotheses. The impact of inter-regional economic relationships and trade-cum-FDI on regional income inequality and the transmission mechanisms are investigated. The interactions between economic structure, trade-cum-FDI, human capital inequality and regional income gap, and the role of the fiscal and financial systems are analysed in the regional development context. It finds that the centre-periphery type of economic relationship between the coastal and the inland regions and the trade-cum-FDI in the coastal regions have all contributed to the regional income inequalities in China. Increasing human capital inequality is one of the major transmission mechanisms. Policy implications are discussed, emphasizing the role of the state, human capital and openness.

Keywords Trade-cum-FDI · Economic structure · Human capital inequality · Regional disparities · Singer · Chinese economy

1 Introduction

Increasing income inequalities between the coastal and the inland regions in China is a topic that has attracted considerable concern in recent years. Received explanations for such inequalities include preferential government policies in the coastal regions, as well as favourable geographical location and superior infrastructure facilities in the coastal regions. This paper explores the causes of regional disparity in the light of the celebrated Singer Hypotheses. The analysis of

anchored in Singer's hypotheses of dualism for several reasons. First, several features of China's foreign trade and FDI are of the trade-cum-FDI type that Singer (1950, 1974) analyses. Second, the economic relationship between the coastal and the inland regions of China is of the classic centre-periphery type that Singer expounds in the context of developing and developed countries.

This paper is organised as follows. Section II outlines the Singer hypotheses. Section III discusses, in the light of the Singer hypotheses, the economic relationship, human capital inequality, and the unequal distribution of gains between the coastal and inland regions. The impact of trade-cum-FDI on the dualism in China is also analysed. Section IV provides empirical evidence. Section V presents conclusions.

2 The Singer hypotheses

Singer argues that the gains from international trade and investment are distributed unevenly between investing and borrowing countries because of the centre-periphery kind of economic relationship between them, which resides in the characteristics of different types of commodities (Singer I, 1950) and economies (Singer II, 1974). One of the major negative consequences of such trade and investment for the host developing countries is the dualism of the economy.

2.1 Uneven distribution of gains between investing and host countries

In his 1950 paper on distribution of gains from international trade and investment between investing and borrowing countries, Singer analyses the impact of foreign-funded primary exports on the economies of developing countries in the 19th century. Singer argues that specialisation in foreign-funded primary commodities production and export is unfavourable to the developing countries because of ownership, opportunity costs and terms-of-trade effects. First, most of the production and export of minerals and plantation products is on account of foreign investment. Foreign ownership removes most of the secondary and cumulative effects of investment from the host country to the investing country. Second, specialisation in primary commodities production deprives developing countries of the sort of technical progress that manufacturing provides, hinders their development in human capital, and aggravates the human capital inequality between the developing and developed countries. Third, there is a tendency for the long-run terms of trade of primary commodities to deteriorate.

For the developed countries, however, such investment results in several benefits. First, the developed countries can enjoy the fruits of technical progress in primary production, which is reflected in lower primary commodity prices, and the gains from expanded manufacturing industries. Second, the developed countries gain the opportunity for fast growth in human capital through building up exports of manufactured goods and thus transferring their population from low-productivity to high-productivity occupations. They can therefore enjoy the dynamic stimuli radiating from manufacturing industries located at home.

In his 1974 article, Singer elaborates on the essence of the central/periphery relationship. It lies in the characteristics of economies, while the observed difference in types of commodities is a superficial phenomenon. As Singer asserts, 'the investing countries are seats of the multinational corporations, the homes of modern autonomous appropriate technology, and are economically integrated societies'. The concentration of technological power and enjoyment of rapid accumulation of human capital in the developed investing countries determines that gains from trade and investment will be unevenly distributed between the partners. The developed countries 'tend to be the chief gainers from any kind of relationship, whether the trade or investment or transfer of technology which involves primary or manufactured goods'. Even if the developing countries are not specialised in food or raw materials, but rather in simple manufactured products such as textile and footwear, the above principle still applies.

Growth in developed countries is generated in the most dynamic sectors supported by innovation from R&D and human capital accumulation. In the framework of the new growth theory, these are the most important factors for economic growth in the long run. The increased human capital inequality between the developed investing countries and the developing host countries determines that these countries will grow at different pace, which leads to the divergence of income between the two economies.

2.2 Dualism in the host developing countries

Not only will the gains from trade and investment be unevenly distributed between the developed investing and the developing host countries; also, the trade-cum-investment type of export and foreign investment will be likely to induce dualism in host countries. The dualism caused by trade-cum-investment may emerge in forms splitting between foreign versus the domestic sector, export versus the non-export sector, regions enjoying huge volumes of trade-cum-FDI versus the other regions and the employed versus the unemployed.

Trade-cum-FDI in recent years usually relates to foreign-funded processing trade attracted by financial and fiscal incentives in the developing countries. The foreign-funded processing trade, especially the assembly-type, is likely to generate limited backward linkages and knowledge spillovers because its objective is mainly to take advantage of cheap labour that requires limited skill training. So no matter where the foreign firms are located, either in various export processing zones or geographically scattered throughout the host country, they turn out to be 'enclaves' in an economic sense. This results in dualism in the host country's economy. The foreign financed sector enjoys high labour productivity, while other domestic sectors lag behind. When exports and related FDI are concentrated in certain regions of a country, the overall income and productivity in these regions may be much higher than in the rest of the economy.

Moreover, foreign firms usually pay higher wages than the indigenous firms. This may create a middle-income class in the regions where foreign firms cluster. Such a division is likely to expand because of agglomeration effects. The high wage rates paid by foreign firms also attract educated, skilled labour to migrate from

low-wage-rate region to the regions where foreign firms cluster. This may also aggravate the human capital inequality between the regions.

In sum, Singer's arguments can be summarised into two interrelated hypotheses. First, when the economic relationship between two economies is of the centre-periphery type, the gains from trade and investment are distributed unevenly. The centre will be the chief gainer in any sort of economic relationship. Concentration of the power of technology in the developed economies is the fundamental attribute.

economic structure, trade-cum-FDI and human capital inequality on regional income inequality remains to be explored.

As stated earlier, Singer's thesis is relevant to China's dual economy for two reasons. First, economic relationships between the coastal and the inland regions of China are of the classic centre-periphery type that Singer expounds in the context of developing and developed countries. Second, the features of China's foreign trade and FDI are of the particular trade-cum-FDI type that Singer has analysed. Therefore, in what follows, we analyse the sources of dualism between the coastal and inland regions of China in the light of the Singer hypotheses.

3.1 Inter-regional economic relationship and regional dualism

Excluding Hong Kong, Macao and Taiwan, mainland China consists of 31 provinces, autonomous regions and municipalities. Twelve of them are located along the coastal lines in the east. The inland regions include the 4000-meter high Qinghai-Tibetan Plateau in the west and the highlands and basins in the centre. Until Tang Dynasty the central regionswerethe economic centreof Chinawithrelatively high agricultural productivity, while the north and west regions were mainly engaged in farming. The inland regions are abundant in minerals and energy resources.

The coastal regions of China are mainly hills and plains that are less than 1000 metres high. They enjoy better natural environment, superior infrastructure and easier access to the international market than inland regions. The coastal regions have turned out to be the economic, political and cultural centres of China since the Song Dynasty, when the capitals weremoved from the centre region to citiesin the

Table 1 Industrial structure of inland and coastal regions

	GDP structure %, 19999			Industrial structure, 1995, %									
	Agriculture	Industry	Services	Mining	Food	Metal product	Energy	Wood product	Chemical	Non-metal processing	Textile& Clothing	Machinery	Electronics
Coastal regions	15	45	40	3	11	8	4	4	17	6	19	19	7
Inland regions	22	42	36	12	15	13	6	4	16	6	9	17	2
	GDP (100 million yuan, 1999 current price)			Industrial output (100 million yuan, 1995 current price)									
Coastal regions	6803	24842	19919	811	2557	1997	1030	960	4108	1421	4251	4447	1685
Inland regions	7820	15915	12372	2195	2759	2414	1046	731	2965	1120	1562	3043	440
	GDPPC (100 million yuan, 1999 current price)			Industrial output Per capita (100 million yuan, 1995 current price)									
Coastal regions	15973	58328	46769	1904	6004	4689	2418	2254	9645	3336	9981	10441	3956
Inland regions	20322	41359	32152	5704	7170	6273	2718	1900	7705	2911	4059	7908	1143

Source: China Statistical Yearbook, 2000; the Third National Industrial Census of P.R. China, 1995.

the developing and developed countries. Gains from trade between the coastal and the inland regions will be unevenly distributed for the reasons indicated by Singer.

First, coastal regions that specialise in the production of manufactured products will enjoy the opportunity to build up manufacturing industries and the dynamic stimuli radiating from accumulated human capital. They also enjoy the fruits of technological progress in primary production in terms of lower prices.

Second, the presence of manufacturing activities and greater openness in the coastal regions provide them with the growing points for increased technical knowledge, accumulated human capital, as well as external economies. In the case of the inland regions, trade with the coastal regions diverted them into types of activity offering less scope for technical progress, and withheld them from the accumulation of human capital, which is crucial for long run growth. As a result, human capital in these two regions grows at different pace. The existing gap enlarges. In 2004, the average transaction value in technological markets in the coastal regions, including transactions of technology transfer, technical consultation, technical services and technical training, was about 4 times higher than that in the inland regions (Figure 2). The coastal regions host most of China's leading research institutions, top universities and R&D activities. They also enjoy more active entrepreneurship. This technological / human capital dualism, as noted by Singer, was the real source of economic dualism. Figure 3 plots human capital inequality against income inequality between the regions. The result shows a clear positive relationship between them.

Third, the economic structure of the inland regions also obstructs the upgrading of their industrial structures. Industries such as mining, energy and metal product manufacturing usually consist of large-scale firms. Such firms are often less flexible and will incur heavy costs of exit. As a result, adjustment of economic structure to

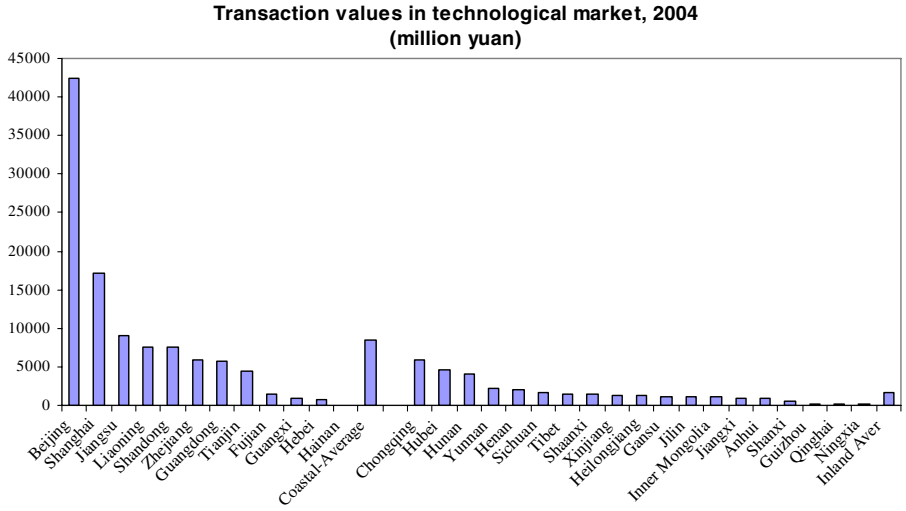


Fig. 2 Transaction values in technological market, 2004. Notes: Technological transactions include technology transfer, technology consultation, technical service, technical training, technology-equity share exchange, technology intermediation and various research-production co-operations. Data source: China Statistical Yearbook

Table 2 GDP of inland and coastal regions by expenditure approach, 1999

Region	Population	Gross Domestic Product				Savings	S-I	Investment in capital construction By source of funds %				
	10000 persons	(100 million yuan)	Final Consumption Expenditure	Gross Capital Formation	Net Export of Goods and Services			State Budgetary Appropriations	Domestic Loans	Foreign Investment	Fund-Raising	Others
Beijing	1257	2174	954	1526	□306	1220	□306	26	16	5	47	6
Tianjin	959	1450	717	723	11	733	11	4	32	21	34	9
Hebei	6614	4569	1984	2184	401	2585	401	7	23	6	46	18
Liaoning	4171	4172	2331	1284	557	1841	557	16	26	8	41	10
Shanghai	1474	4035	1719	1929	386	2315	386	5	19	17	50	10
Jiangsu	7213	7619	3340	3554	725	4280	725	8	21	7	56	8
Zhejiang	4475	5370	2355	2520	495	3015	495	9	26	9	47	8
Fujian	3316	3540	1831	1674	35	1709	35	11	21	13	40	15
Shandong	8883	7662	3809	3653	200	3853	200	7	30	7	46	10
Guangdong	7270	8464	4512	3252	700	3953	700	4	23	15	51	7
Guangxi	4713	1953	1343	646	□35	610	□35	12	19	10	40	19
Hainan	762	470	259	224	□12	212	□12	9	24	14	41	12
Coastal Regions Average	**4259**	**4290**	**2096**	**1931**	**263**	**2194**	**263**	**10**	**23**	**11**	**45**	**11**
Shanxi	762	1501	857	685	□41	644	□41	6	30	20	26	17
Inner Mongolia	3204	1255	725	554	□24	530	□24	17	22	7	32	22
Jilin	2362	1680	1030	659	□9	650	□9	15	20	3	44	18
Heilongjiang	2658	2874	1731	961	182	1144	182	12	20	4	40	24
Anhui	3792	2909	1861	1050	□3	1047	□3	15	21	2	46	16
Jiangxi	6237	1912	1172	747	□7	740	□7	20	26	4	35	15

Table 2 continued

Region	Population	Gross Domestic Product				Savings	S-I	Investment in capital construction By source of funds %				
	10000 persons	(100 million yuan)	Final Consumption Expenditure	Gross Capital Formation	Net Export of Goods and Services			State Budgetary Appropriations	Domestic Loans	Foreign Investment	Fund-Raising	Others
Henan	4231	4576	2358	1965	253	2218	253	15	24	6	37	18
Hubei	9387	3807	1983	1812	12	1823	12	17	23	3	38	19
Hunan	5938	3327	2212	1131	□16	1114	□16	18	19	3	42	18
Chongqing	3075	1480	924	593	□37	556	□37	21	29	3	32	16
Sichuan	6532	3712	2247	1466	□2	1464	□2	7	29	7	42	16
Guizhou	3075	912	726	431	□245	186	□245	17	30	7	35	11
Yunnan	8550	1856	1256	744	□145	599	□145	10	30	2	45	14
Tibet	256	103	59	44	0	44	0	51	4	0	34	11
Shaanxi	3710	1488	904	679	□95	584	□95	18	27	3	33	20
Gansu	4192	931	548	411	□28	383	□28	14	31	3	32	20
Qinghai	256	241	151	140	□50	90	□50	15	38	1	28	17
Ningxia	3618	241	154	142	□55	88	□55	20	30	3	36	11
Xinjiang	2543	1169	745	582	□158	423	□158	13	27	2	42	15
Inland Regions Average	**3848**	**1893**	**1139**	**779**	**□25**	**754**	**□25**	**17**	**25**	**4**	**37**	**17**

Source: China Statistical Yearbook, 2000.

was the only bank. It engaged in both central and commercial banking operations serving central government's plans and policies. During the first episode of reforms over the period 1978–1992, the monopolistic banking system was transformed into a two-tier banking system. Four specialised banks were established[1], while the PBC remained as the central bank. The second episode of reforms began in 1993 aimed at transforming the state banks into genuine commercial banks by separating policy lending from commercial lending. Three policy banks were established in 1994 to separate the policy-related operations from commercial banking business.[2] A number of joint-equity commercial banks were established to introduce competition. These new banks and their branches are mainly located in the coastal regions[3], and contributed to the regional development.

In the reform process, the state-owned banks have become more market-oriented than before. Although there is still a long way to go before the banks become fully market oriented, the state banks have begun to pursue an objective of profit maximisation and strengthened credit risk management. Loans to loss-making SOEs have contracted. As a result, capital flows of the banks were diverted to the coastal regions, where firms exhibit a better performance and more stable cash flows. All this has provided the coastal regions with a more advantageous development financing environment. In 1999 the average amount of loans of all financial institution for the coastal regions was 2.2 times that for the inland regions, an increase of 16 per cent from 1.9 in 1990 (Table 3). Given the importance of government funding in the inland regions, the faster financial development in the coastal regions, the commercialisation of the state banks, and the weakened government income redistribution are all likely to aggravate the regional disparities.

3.2 Trade-cum-FDI and dualism in the regions

Reforms since 1978 in China have not only changed the fiscal and banking system; more importantly, they have gradually opened up the economy to foreign trade and investment. Export-oriented FDI has been encouraged through fiscal and financial incentives such as tax holidays, tax-rebates for exports and the establishment of various Export Processing Zones. Exports of foreign-invested enterprises (FIEs), which are mainly on account of processing trade, have increased rapidly in the coastal regions. In 1999 exports of foreign-invested enterprises (FIEs) accounted for 45 per cent of China's total exports of US$ 325.6 billion. About 57 per cent of China's exports were resulted from processing-trade[4] (Figure 4). More than 90 per cent of these exports are concentrated in the coastal regions.

[1] They are the Bank of China, China Commercial and Industrial Bank, China Construction Bank and China Agricultural Bank.

[2] They are China Import and Export Bank, China Agricultural Development Bank and China National Development Bank.

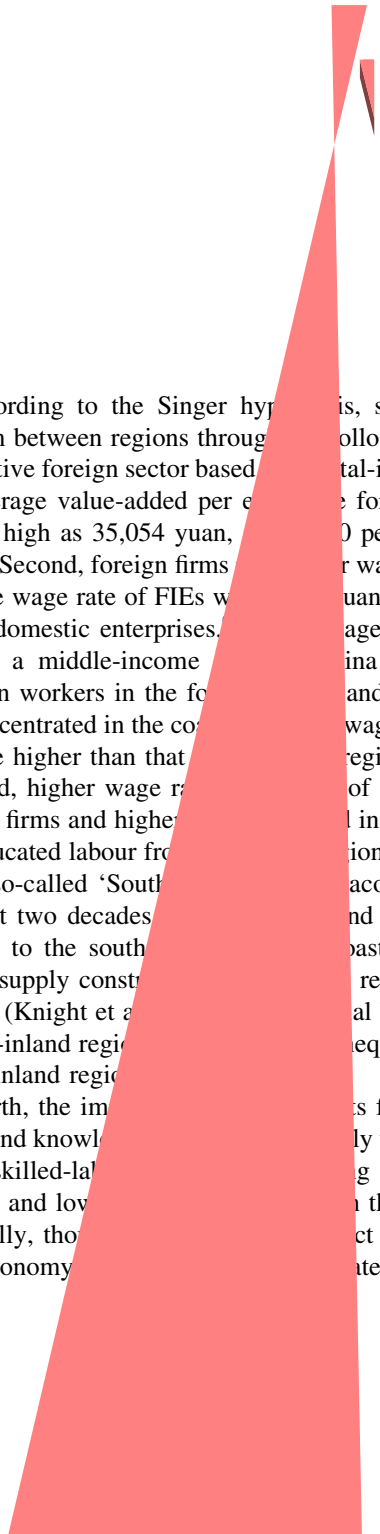
[3] For example, Shenzhen Development Bank Co. Ltd, Guangdong Development Bank, Shanghai Pudong Development Bank, China Merchants Bank, China Everbright Bank and China Mingshen Banking Corp. Ltd, Fujian Industrial Bank. Business for most of these new banks are first restricted to the local regions. In the mid-1990s their business gradually expanded to other provinces, mainly other coastal provinces.

[4] Data source: www.moftec.gov.cn.

Table 3 Total loans of all financial institutions, 1990 and 1999 100 million Yuan

	Total loans of all financial institutions	
	1990	1999
Beijing	72.1	4008
Tianjin	415	1825
Hebei	807	5425
Liaoning	963	4834
Shanghai	631	4167
Jiangsu	1009	5535
Zhejiang	616	4651
Fujian	382	2256
Shandong	1168	5680
Guangdong	1699	10935
Guangxi	157	882
Hainan	326	1719
Coastal Sum	**8245**	**51916**
Coastal Average	**687**	**4326**
Shanxi	357	1612
Inner Mongolia	273	1909
Jilin	507	1364
Heilongjiang	704	2580
Anhui	401	3104
Jiangxi	338	2181
Henan	637	1696
Hubei	733	4358
Hunan	519	3528
Chongqing	772	2408
Sichuan	174	3924
Guizhou	251	1013
Yunnan	17	1824
Tibet	385	75
Shaanxi	226	2106
Gansu	72	1211
Qinghai	70	398
Ningxia	35	338
Xinjiang	360	1387
Inland Sum	**6831**	**37016**
Inland Average	**357**	**1948**
Coastal/Inland Sum	**1.21**	**1.40**
Coastal/Inland Average	**1.92**	**2.22**

Source: China Financial Statistical Yearbook, 2000.



According to the Singer hyp is, such trade-cum-FDI is likely to induce dualism between regions throug ollowing channels. First, FDI creates a more productive foreign sector based tal-intensive production technology. In 1995, the average value-added per e for the foreign invested enterprises (FIEs) was as high as 35,054 yuan, 0 per cent higher than that for the domestic firms.[5] Second, foreign firms r wages than the domestic firms. In 1995, the average wage rate of FIEs w uan per worker, 40 per cent higher than that in the domestic enterprises. ages paid by MNEs to their employees has created a middle-income ina and generated a growing income gap between workers in the fo and the domestic sector. As trade-cum-FDI are concentrated in the co wage rates and income in the coastal regions become higher than that egions.

Third, higher wage r of obtaining training and experience in the foreign firms and highe in the coastal regions have attracted young and educated labour fr ions to the coastal regions. A vivid example is the so-called 'South acocks' phenomenon, which occurred over the past two decades nd skilled labour migrated from the inland regions to the south astal regions. Such migration has relaxed labour supply const regions, enabled them to sustain their fast growth (Knight et a al brain drain, however, has aggravated the coastal-inland regi equality and exacerbated the backwardness of the inland regi

Fourth, the im s from trade and FDI, such as learning by doing and knowl ly to be limited for the inland regions due to the unskilled-la g feature of trade-cum-FDI in the coastal regions and lov the inland regions (Fu, 2004).

Finally, tho ct of FDI is often cited as a benefit to the host economy te different effects on the labour markets579l16*.38b

simultaneously. On the one hand, FDI may generate more job opportunities; on the other, FDI may reduce employment through decreased demand for labour because of increased wage rate and competition and crowding out effects (Driffield and Taylor, 2000). In the regional context, FDI may create more jobs in those coastal regions where foreign firms are clustered. But it may also bring about more unemployment in the inland regions where firms are less efficient compared to the foreign-funded firms. The more competitive foreign firms may out compete domestic firms in both domestic and international markets. Competition may even lead some domestic firms to go bankrupt or lay off more workers than they otherwise would have. This creates the dualism in terms of employment status and aggravates the dualism among regions.

In sum, the centre-periphery type economic relationships between coastal and inland regions are likely to generate significant human capital inequalities between the two regions and thereby widen the income gap between them. Meanwhile, the trade-cum-FDI, which has been concentrated in the coastal region, tends to further aggravate the regional income inequalities. The market-oriented reforms of the state-owned banks and the unequal regional financial development are likely to fuel the unequal regional growth and further widen the income gap.

4 Empirical evidence

Empirical evidence can be investigated in two steps. First, we may test the correlation coefficients between economic structure and human capital inequality. Second, we test the proposition that trade-cum-FDI, human capital inequalities and better development financing in the coastal regions are likely to exacerbate the regional income inequalities in China in a log-linear panel data model of the following form

$$gap_{it} = \alpha + \xi gex_{it} + \chi ghc_{it} + \phi gloan_{it} + \mu_{it}$$

where i and t denote regions and time respectively. μ_{it} is a disturbance term that varies across regions and time and possesses the usual properties. *gap* is income gap measured by the ratio of average GDP per capita of coastal regions to that of inland province i; *gex* is exports gap measured by the ratio of average exports in coastal region to exports of inland province i; and *gloan* is development funding gap measured by the ratio of average balance of state-bank loans in the coastal regions to that in inland province i.

Human capital not only includes the knowledge that people obtain through education but also includes technology acquired through innovation, technology transfer and learning by doing. The non-conventional human capital, entrepreneurship, is also an important component of human capital. Technology and entrepreneurship are, however, difficult to quantify, although some researches measure technology stock by R&D investment. Due to difficulties in measurement and data availability, in this study we opt to use education attainment, which is widely accepted in empirical literature, as a proxy for human capital. *Hence*, human

capital gap (*ghc)* is measured by the ratio of average share of university graduates in total population in coastal region to that of inland province i.

As stated earlier, human capital inequality between the regions tends to generate income inequality. Income inequality, on the other hand, may also lead to human capital inequality as richer regions may invest more in human capital than do poorer regions. Hence there is a possible endogeneity between income inequality and human capital inequality. Therefore a Wu-Hausman specification test is applied to examine the endogeneity between the two variables. One year lagged gap_{it} and ghc_{it}, and other exogenous variables are used as instrumental variables because of the short time period of the data set (Nair-Reichert and Weinhold, 2001). If there is endogeneity between exports and growth, we utilise a 2-stage fixed effects model for estimation; otherwise we use normal fixed or random effects models. The chosen of fixed or random effects model depends on the indication of Hausman statistics. Large values of the Hausman statistic argue in favour of using the fixed effects model over the random effects model. In order to check for the robustness of the results, we also present results based on different panel data techniques.

The analysis is based on a panel of data for 16 out of 19 inland regions of China over the period 1990–1998. Tibet and Qinghai are omitted due to lack of reliable data. The data for Congqing are combined with that for Sichuan. The data are collected from the Comprehensive Statistical Data and Materials on 50 Years of New China and various issues of China Population Statistical Yearbook. Because the divergence of per capita income between the coastal and inland regions became highlighted in the early 1990s, we concentrate on the time period of 1990s for the current study.

Table 4 reports the Pearson correlation coefficients between economic structure and human capital indicates. The share of college graduates in total population and transaction values in technical markets are negatively correlated with the share of food, mining and energy output in total industrial output, and are statistically significant at the 1 per cent level. The ratio of technical markets transaction values

Table 4 Correlation coefficients between economic structure and human capital

	LSTR	*LCOLLEGE*	*LTECHMY*	*LTECHM*
LSTR	1 .	□0.505** (0.007)	□0.435* (0.023)	□0.546** (0.003)
LCOLLEGE	□0.505** (0.007)	1 .	0.653** (0.000)	0.423* (0.028)
LTECHMY	□0.435* (0.023)	0.653** (0.000)	1 .	0.842** (0.000)
LTECHM	□0.546** (0.003)	0.423* (0.028)	0.842** (0.000)	1 .

Note: Pearson correlation coefficients are reported. p-value for significance test are in parentheses.

** Correlation is significant at the 0.01 level (2-tailed). *Correlation is significant at the 0.05 level (2-tailed).

LCOLLEGE= Share of college graduates in total population, *LTECHM*= Value of technical market transactions, *LTECHMY*= Ratio of technical market transactions/GDP, *LSTR*= Share of food, mining, energy output in total industrial output. All variables are in logarithms. *LSTR* data are estimated from 1995 national industrial census data.

Date source: China Statistical Yearbook, 2000 and The Third National Industrial Census of P.R. China, 1995.

to GDP is also negatively associated with the share of primary, raw material production in the economy with statistical significance at the 5 per cent level. All these facts suggest that economic structure and human capital accumulation are closely correlated.

Table 5 reports the estimated results. As the Wu-Hausman test indicates, significant endogeneity between income inequality and human capital inequality, a 2-stage fixed effects model is preferred to the other models. The 2-stage fixed effects model has not only provided a way to control for the endogeneity between income inequality and human capital inequality, it has also controlled for the regional-specific effects. This is important because the inland regions are themselves heterogeneous in terms of development levels and natural conditions. These are also important factors in the regional disparities. Nevertheless, estimation results of different panel techniques are presented in order to check the robustness of results.

As expected, the exports gap variable exhibits a significant positive effect on regional income gap. A one per cent increase in exports in the coastal region relative to the inland provinces will increase the income gap by 0.149 per cent. This fact suggests that the more the trade-cum-FDI in the coastal regions, the higher will be the income gap between the coastal and inland regions.

The human capital gap variable also exhibits a significant positive effect on the income gap. Although the magnitude of the estimated coefficient is very small, it is statistically significant, which suggests that human capital inequality between the coastal and inland regions serves as an important factor in the increasing regional income inequalities. The significant endogeneity between the human capital and income gaps indicated by the Wu-Hausman statistic also implies a two-way causality between the two variables. While human capital inequality leads to income inequality, income inequality, in return, also leads to greater human capital

Table 5 Determinants of income gap between the coastal and inland regions: estimation results

Independent Variables	Dependent Variable: *gap*					
	Fixed-effects		Random-effects		2S-Fixed-effects	
	Coefficients	P-value	Coefficients	P-value	Coefficients	P-value
gex	0.1494***	0.0001	0.1645**	0.0000	0.1388***	0.0000
ghc	0.0403***	0.0079	0.0710***	0.0000	0.0001***	0.0000
gloan	0.1056	0.2120	0.1284*	0.0763	0.1031	0.2818
Constant			0.2949***	0.0000		
Adjusted R-squares	0.9040		0.7110		0.8990	
Lagrange Multiplier	116.000	0.0000				
Hausman statistics (H0: Random effects)	14.1100	0.0300				
Wu-Hausman (p-value) (H0: Exogeneity)		0.000				

Note: White-heteroscedasticity corrected results for fixed effects model. ***significant at the 1 per cent level. ** Significant at the 5 per cent level. * Significant at the 10 per cent level

inequality. The small magnitude of the estimated human capital gap variable is likely due to the fact that human capital is measured by the share of higher education graduates in total population in current study. The long-term effect of education on income growth through promotion of technology advance and innovation may not be very well reflected by the current sample, which covers a relatively short time period.

The estimated coefficient of the development funding gap variable is positive, as we would expect, which implies that inferior development financing in the inland regions is positively associated with the increasing income gap. The estimated coefficient is, however, not statistically significant. This is likely due to fact that the development financing variable is proxied by balance of state-bank loans, while in China, state-banks' behaviour is still influenced by government intervention, although the state-owned banks have undergone considerable reforms. As Woo (2003) points out, 'most of the problem SOEs remain clients of the parent banks and continue to create new non-performing loans (NPLs). What has facilitated the creation of the NPLs is the intermittent pressure on the banks from the government

Admittedly, there will be dynamic gains from trade and FDI for the participating economies. However, the extent of the gains depends on the type and composition of the trade and FDI and the absorptive ability of the economies. In the context of income inequality between the centre-periphery type partners, however, the Singer thesis has captured the fundamental factor that determines the unequal distribution of gains and divergence of income: the different nature of the economies, the concentration of technological power in the centre and different opportunity for human capital accumulation. These factors determine that the centre and the periphery will grow at different rates and will result in divergence of incomes.

The policy implications from this study are that, when the economic relationship between regions of a country is of the centre-periphery type, gains from domestic trade are not distributed evenly. Human capital inequality is likely to worsen, and incomes of these regions are likely to diverge. Therefore, there is a role for the central government to redistribute the gains among the regions through fiscal system and increase government investment, particularly in education and R&D to promote human capital and technological capabilities in the less developed regions.

Moreover, instead of closing the door and restricting migration, it would be more beneficial for the government to grant greater openness to the less developed regions, thereby promoting its exports and encouraging domestic and foreign investment to the less developed regions. In this way, the less developed regions could enjoy greater gains from trade and FDI, and also attract human capital to go to or stay at the less developed regions.

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