FDI, Chinese foreign relationship and Labour Market

– Empirical Evidence from China

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by

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Abstract

Combined with five research articles, this thesis aims to elaborate the ongoing investigations on Chinese economy in the field of its development studies with emphasis on its utilization of FDI including both inbound and outbound investment and labour market. From the 1st opium war a century ago, China was suffering from the un-unified sovereignty as a colonized country. Its economy and development were left far behind. After a century since that, the economic reform of China in 1978 has achieved great success in the sense that it enables China to become the most rapidly growing country and the second largest economy in the world. This opening up strategy, followed by a series of polices has made China one of the most favourite host countries for receiving FDI. As a result, the inward FDI can bring the benefit of economic growth for China on the one hand, but it has long been argued that it can also affect the labour allocation and income inequality on the other. How the previous Chinese-foreign relationship matters in the relationship between inward FDI and Chinese labour market and whether the FDI enlarges the income inequality as the literature suggested will be answered in the following chapters. Also, the China's outward FDI has been increasing rapidly as China has gained important international status and increasingly played a more crucial role in international economy in recent years. What determines the Chinese outward FDI from a Chinese-foreign relationship (the cultural aspect) is the major motivation for another empirical research. The external factors such as FDI are important to understand the Chinese Economy. Yet, the internal factor such as rural labour transfer should not be neglected. Therefore, we also conduct 2 research papers on labour economics by investigating the rural labour on-farm transfer decisions and the role of grandparenting-life quality-life satisfaction.

Therefore, this thesis consists two articles to illustrate the relationship between inward FDI and labour market and income inequality, respectively. In the 1st article, we show that the relationship between inward FDI and employment is affected by different previous colonial powers in either positive or negative ways due to the different institutions they may have left. In the 2nd paper, I revisit the relationship between inward FDI and vertical income inequality in China. I find that inward FDI

should not be blamed for the increasing of income inequality in China as it should in some other cases. Next, we study the Confucius Institute and the Chinese outward FDI, the results of which provide evidence on how cultural familiarity ties China with the world and boots its outward FDI as placed in the 3th paper. The 4th empirical study looks into the Chinese labour market more specifically with major focus on the rural labour transfer. We find that different capital endowments play key roles on rural households' on-farm transfer decisions. The last research article investigates the grandparenting-life quality-life satisfaction and shows that the grandparenting has a favourable effect on grandparents' life quality and life satisfaction.

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Chapter 1
Introduction

Starting from the 1st Opium war in 1839, China was forced to cede more than 80 concessions and treaty ports to different foreign powers. Its development and economy were left far behind compared to the developed countries. After the communist took over in 1949, China was subject to central planning, price control and tight regulations. This has not been changed until the economic reform initiated by Xiaoping Deng at the 3rd plenary of the 11th central committee in 1978. Economic development was highlighted as the major target of the economic reform which gradually reintroduced elements of capitalism to China. In 1992 during Deng's southern tour, the concept of "special economic zone" (SEZ) introduced in 1980 was strengthened and a number of SEZs have been set up to better facilitate trade and attract more foreign direct investment. During this process of the China's economic transition, inward FDI is considered to have been the major force contributing to great success on economic development in the literature. While much attention has been placed on the inward FDI-economic growth relationship, I explore how inward FDI affects the employment in the labour market in Chapter 2. I study it from a historical perspective by questioning how the different colonial legacies in Chinese modern history shape the impact of inward FDI on the labour market. Inward FDI was largely flowing into manufacturing sector in the early stage. Yet, the service sector starts to attract higher volume of inward FDI recently, which signals that the tertiary sector plays more and more important role in Chinese economy. Accordingly, the analysis utilizes a provincial panel on overall employment and employment in the service sector during 2006 to 2015. We find that inward FDI significantly promotes employment and that this relationship is stronger in regions once colonized by Western countries. Conversely, regions with a legacy of Japanese colonization display a weaker, and even negative, relationship between FDI and employment. These findings are robust to controlling for the length and intensity of colonization, as well as for endogeneity of inward FDI.

A few decades after the start of economic reform, China has stepped into the “ normal era with slowing economic growth but increasing inequality. Among several possible factors, inward FDI has been argued to reallocate labour, which in turn causes increasing income disparity. As a hidden factor for social conflict and institutional change for income redistribution (Acemoglu & Robinson, 2006), the income inequality is one of the paramount issues impeding China from achieving balanced development. Therefore, Chapter 3 revisits the relationship between inward FDI and income inequality from the angle of rural-urban wage inequality, while accounting for the heterogeneity of inward FDI with respect to ownership types and sectoral distribution. On the basis of a panel dataset covering 30 provinces in China from 2000 to 2016, we first revisit the direct effect of inward FDI on rural urban wage inequality, followed by a Spatial Durbin Model (SDM) to account for the spatial spillover effect of FDI. The results show that inward FDI in the primary (traditional) sector and FDI in coastal provinces taking the form of cooperative joint venture help reduce rural urban wage inequality. In contrast, wholly foreign owned enterprises in coastal provinces increase rural-urban wage inequality. This is mainly due to the comparative advantage of rural workers working in the traditional sector on the one hand and CJV in coastal area tends to hire more migrating workers on the other (Ouyang and Yao, 2017).

As one of the largest FDI recipients, China also encourages Outward FDI. Followed by the “Going out” Policy launched in 1999, the “One Belt One Road” (also known as Belt Road Initiative) proposed by President Xi in 2013 aims at constructing a better connection with the world and promoting the trade and economic development worldwide. The Confucius Institute (CI), as an important channel of promoting Chinese culture and language abroad, has the potential to play a crucial role in promoting also China’s external economic and trade relations. After the first Confucius Institute branch established in Seoul in 2004, there are by now more than 500 branches set up across more than 140 countries and regions. The Confucius Institute is also shown to have a favourable effect on the Chinese-world economy in terms of trade, tourism and foreign studies (Lien & Co, 2013; Lien et al., 2012; Lien et al., 2014). It is interesting to study how the Confucius Institute perform under the Belt Road Initiative as the role of CI should have strengthened after the introduction of the Belt-Road Initiative, which appoints strategic importance to the CI. Therefore,

based on a panel dataset containing Chinese enterprises' cross-border mergers and acquisitions (CMA) in 66 Belt-Road countries and 75 non Belt-Road countries from 2006 to 2017, Chapter 4 investigates the impact of the CI on Chinese enterprises' CMA. The findings are as follows. First, the establishment of CI has had a significant positive effect on the Chinese enterprises' CMA, and on their success this effect is stronger in Non Belt-Road countries than Belt-Road countries. Second, the effect of CI on Chinese CMA activities is strengthened after the introduction of Belt Road Initiative and such effect is shown to be stronger in the Road countries than Belt countries. Third, the institutional quality and Chinese culture influence in the host countries also play an important role.

Admittedly, FDI is an important external factor for driving the Chinese economy. We should not neglect the internal issues in China such as the rural development. There have been a large portion of rural-urban migrant workers as a course of unbalanced rural-urban development. Due to the *Hukou* system, an institution that has long been established in China with the power to restrict population mobility and prevent the rural labourers from working in urban area, the Chinese labour market has not yet reached full efficiency. As such, there are a great number of labourers in rural area, it is important to study the occupational choice and allocation of these rural stayers While much research on China has focused on rural to urban migration and transitions of rural households away from agriculture, little is known about the changes within the rural agricultural sector. Yet, the agricultural sector continues to account for a large share of employment. In Chapter 5, we study the determinants of transitions from subsistence farming into either formal agricultural employment or agricultural self-employment. We pay particular attention to the role of capital endowments. We find that financial capital plays a relatively limited role. In contrast, natural, human, social and political capital are important determinants of rural households' transitions to on-farm employment and self-employment.

Introduced in 1979, the One-child policy has served the function of controlling the population in China for decades. While this policy has loosened to a two-child policy in 2015, its consequence of aggravating the trend of aging population brings challenges to the social and economic development. The rural area may suffer more from this aging population issue as the rural stayers are more likely to be older

people. Utilizing the 2015 wave of the China Health and Retirement Longitudinal Study (CHARLS) that covers 7045 households, we study the effect of grandparents looking after grandchildren on old peoples' quality of life and their life satisfaction in the last paper. We find evidence of important favourable effects of grandparents providing grandchild care not only allows older people have better mental health and receive more financial support from their (adult) children but also increases their life satisfaction. These favourable effects are proportionate to the amount of time spend caring for grandchildren and increase with the number of grandchildren looked after. The favourable effects on mental health seem limited to grandparents living in rural areas and apply especially to grandfathers. The favourable effect on life satisfaction is primarily directly attributable to caring for grandchildren rather than being incurred indirectly due to better health or financial situation of grandparents.

Based on the case of the large emerging economy, China, this thesis contributes to the literature of development studies by providing evidence for both international economics and labour economics, especially from the empirical site. The rest of the thesis is organized as follows. The next chapter displays the impact of inward FDI on labour market in a historical perspective. Chapter 3 revisits whether the income inequality has been changed by the inward FDI. Chapter 4 explores what determines the rural labour's on-farm transfer. In Chapter 5, we study the Confucius Institute's effect on the Chinese firms' cross-border mergers and acquisitions and Chapter 6 concludes.

Chapter 2

Growing against the Background of Colonization?

2.1 Introduction

Starting in the 16th century, European powers actively sought to colonize various parts of the world, including Asia. While China avoided being colonized outright, it ceded control of certain areas during the 19th century to various European countries, United States, and Japan.[1] This process of gradual encroachment on Chinese sovereignty, which started with Chinese defeats in the First Opium War (1839–1842) and the Second Opium Wars (1856-1860), resulted in the establishment of over 80 foreign concessions and treaty ports across China.[2] The concessions had their own legal systems and law enforcement, allowed foreign settlement and investment (including proselytizing), and served to facilitate trade with the colonial power and the rest of the world.

Japan initially joined the Western powers in establishing concessions in ports and trading centers. Its involvement grew dramatically with its occupation of northeast China in 1931, when the nature of its involvement changed from trade facilitation to territorial expansion. This was followed by a full-blown Japanese invasion of China in 1937.

Most concessions were dissolved in the course of the Second Sino-Japanese War (1937-45) or in its immediate aftermath. The main exceptions were the British possession Hong Kong (returned to Chinese sovereignty in 1997) and the Portuguese possessions Macau (returned in 1999).

[1] The Portuguese settlement in Macao predates this by several centuries, as it was established already in 1557.

[2] These concessions were held by Austria-Hungary, Belgium, France, Germany, Italy, Japan, Portugal, Russia, United Kingdom and United States.

After the communist takeover in 1949, nearly all former concessions were integrated fully back into Chinese legal, political and economic systems and, as the rest of China, were subject to political repression, central planning and price controls. Consequently, their ties with the rest of the world were tightly restricted. This changed only after the reform and opening of the Chinese economy initiated by Deng Xiaoping at the 3rd Plenary Session of 11th Central Committee in 1978, when economic ties with the rest of the world again became possible.

The effects of colonial status persist long after formal ties are severed. Former colonies often continue to trade extensively with their former colonial power and other former colonies that shared the same colonizer. Deterioration of these special relations tends to be gradual (see e.g. Head, Myer and Ries, 2010, Fidrmuc and Fidrmuc, 2003).

A number of studies, including Acemoglu, Johnson and Robinson (2001, 2005), La Porta, Lopez-de-Silanes and Shleifer (2008), Becker et al. (2015), also show that former colonies inherit long-term legacies in terms of formal institutions, legal systems, informal values and attitudes that have profound long-term economic consequences.

The legacy of the foreign influence in China has received surprisingly little attention from economists. The paper closest to ours is Jia (2014) who considers the long term legacy of the former treaty ports along the Chinese coast and the Yangtze River. While their demographic path of these port areas was similar to most during the Maoist period when China was almost entirely closed off to the world, she finds that they experienced higher population growth after the opening began in 1978. She attributes the difference in population growth predominantly to internal migration from other parts of China.

Chen, Kung and Ma (2017) find evidence of even longer-term effects, concluding that areas with higher density of scholars as certified by the Chinese civil examination system (keju) during the Ming (1368-1644) and Qing (1644-1912) eras have populations with higher educational attainments in present.

Mattingly (2017) notes that areas of northeast China once occupied by Japan have experienced positive effects in terms of higher wealth, better schooling, better health, and greater bureaucratic density. Mattingly attributes these lasting positive effects to state building efforts by the Japanese in northeast China. In contrast, Che et al. (2015) find that Chinese areas that suffered greater civilian casualties during the occupation have received lower investment by Japan and trade less with Japan. They argue that the lower intensity of bilateral economic ties with these areas is due to less favourable opinions and low trust in the Japanese by the residents. Similarly, Gao et al. (2018) analyze the performance of Japanese FDI in China and show that the historical legacy of conflict negatively affects the Japanese FDI performance. Colonization and occupation, therefore, can have long term economic effects, and these effects can be either positive or negative.

Finally, Wang (2013) considers the creation of special economic zones (SEZs) after 1978. She concludes that the SEZs have been more successful than other regions in attracting foreign direct investment (FDI), achieving higher technological progress, and boosting wage growth. This effect is most pronounced for the earliest SEZs.

Here, we consider the legacies of European and Japanese colonization as a factor conditioning the effect of FDI on employment. While previous research is concerned with the lasting (and time-invariant) effect of historical legacies, we focus on the interaction of colonial legacy with the labour-market effect of FDI. In other words, we are not primarily interested in knowing whether regions with colonial legacies have received more FDI. That question is fraught with considerable endogeneity problems: geography or market access that made these regions attractive to foreigner traders and colonizers in the past, are likely to make them attractive to foreign investors also at present. Rather, our concern is whether FDI that flows into China finds more or less fertile ground depending on the region's historical experience with colonization.

There are several reasons why colonial past might have a lasting effect on the labour market and FDI. The former foreign concessions can benefit from continued (or re-established) ties with the former colonial power. These ties can become rekindled either because the Chinese counterparts were able to maintain or re-establish them, or because of initiative and effort by the foreign partners who are able to capitalize

on the legacy of former ties and/or familiarity with specific regions of China. Another possibility is that the former concessions have inherited greater stocks of physical and human capital: colonial powers have invested into construction and infrastructure[3] and set up schools in the concessions that they controlled. Since most foreign concessions were governed externally, there may be differences in bureaucratic efficiency or quality of public services.[4] Similarly, colonial rule may have engendered greater (or lower) trust in foreigners, including investors, among the region's inhabitants. Of course, all of these arguments are speculative and the preceding list is not meant to be complete and exhaustive (we hope that future work will shed more light on this interesting question).

The economic impact of colonial legacies should crucially depend on the nature of the colonization experience. Was the colonial power primarily interested in fostering investment and trade, territorial conquest or extraction of wealth? In this respect, we expect that areas of China colonized by Western powers should have a more favourable colonial legacy than those controlled by Japan. Western concessions were primarily motivated by the desire to trade with China, whereas Japanese colonialization was driven by territorial expansionism.

Following China's gradual opening since 1978, FDI has been an important contributor to Chinese economic growth (Zhang, 2001; Iamsiraroj, 2016) and exports (Zhang and Song, 2001)[5] Existing studies, however, mainly estimate the impact of FDI on manufacturing, ignoring FDI in other sectors. The reason for this emphasis is

[3] Examples include European style buildings in Shanghai and Tianjin and the sewer system in Qingdao.

[4] For this argument to work, the tradition of better bureaucracy would somehow have to survive the 30 or more years since the dissolution of the last concessions, during which all of China was exposed to strict Maoist regime and the upheavals of the Great Leap Forward and the Cultural Revolution. The chance such traditions have survived is therefore slim, although not zero.

[5] There is an extensive literature on the impact of FDI on the labour market (e.g. Feenstra and Hanson, 1997; Greenaway, Hine and Wright, 1999; Wu, 2001; Brown, 2002; Fu and Balasubramanyam, 2005; Jenkins, 2006; Nunnenkamp, Schweickert and Wiebelt, 2007; Molnar Pain and Taglioni, 2008; Crinò, 2009; Karlsson Lundin, Sjöholm and He, 2009; Waldkirch, Nunnenkamp and Bremont, 2009).

obvious: manufacturing FDI provides more than capital to the host country economy: it comes also with technology transfer and numerous other benefits.

As a country develops, however, the service industry increasingly becomes the dominant sector in the economy. FDI arguably plays a crucial role in this post-industrial transformation. Therefore, given China's current state of development, we consider the effect of FDI on employment for both the economy as a whole and the service sector specifically. Besides colonial legacies, we account for the role played by human capital, based on the theoretical models of Greenaway et al. (1999) and Fu and Balasubramanyam (2005).

Our results suggest that colonial legacies shape the nature of the relationship between FDI and employment. This relationship is stronger in provinces with a legacy of Western colonization, and weaker in those colonized by Japan. We speculate that this may be due to the lasting effect of colonization on institutions (both formal and informal) left behind, although without reliable information on quality of institutions at the regional level, we cannot pursue this avenue further. We find that human capital is positively correlated with employment in the economy as a whole, but has little influence on employment in the service sector. This may reflect the fact that China's service industry is still relatively lagging behind in terms of development, so the demand for skilled labour is still fairly low. These findings are robust to using dichotomous or continuous measures of colonial legacy, as well as to controlling for the possible endogeneity of FDI.

The remainder of the paper is as follows. Section 2.2 discusses the mechanism at play and our hypotheses. Section 2.3 presents our methodology and the underlying theoretical framework. Section 2.4 describes the evolution of the Chinese service industry and carries out our empirical analysis. Section 2.5 offers discussions on the estimation results. Section 2.6 explores the robustness of our results. Section 2.7 concludes.

2.2 Inward FDI and the Labour Market

2.2.1 Short- and long-term FDI effects

The labour-market effect of inward FDI depends on the nature of investment, and may differ in the short and long term. Over the short term, the magnitude and the sign of the effect exerted by FDI on employment is determined by the entry mode of FDI, ownership type of FDI and relationship between domestic capital and FDI. Local employment can be expected to rise as large numbers of workers are required in the initial phase when FDI takes the form of green-field investment. If the FDI is infused through acquisition or merger with an existing local firm, however, the effect on employment is ambiguous. Here, FDI tends to translate into productivity gains through transfers of advanced technology, management efficiency and the influx of new and sophisticated physical capital. Whether such investment leads to higher employment depends on whether the new physical capital and advanced technologies complement or replace labour. If FDI substitutes for local labour, it may depress employment in the host labour market.

The labour-market impact also depends on the relationship of the FDI and domestic capital. If the FDI competes with domestic enterprises, it can crowd out locals and increase unemployment. If the FDI is complementary to local firms, job opportunities are created and the labour market booms. Therefore, the short-term effect on employment of service-sector FDI may be positive or negative.

FDI affects employment over the long run through relationships with firms other than the FDI recipient. Spillover effects are particularly likely in the service sector. If the FDI takes the form of producer services, for example, it may promote development of related industries by creating a demand for more sophisticated intermediate services. The subsequent development of the upstream and downstream industries increases demand for services, creating a virtuous feedback loop that boosts the labour market and creates additional job opportunities. On the other hand, when FDI takes the form of consumer services (i.e. serving final consumers), the labour market effect exerted by the FDI on other firms is likely to be negligible.

Service FDI can play a crucial role in restructuring and upgrading the industrial structure of the service sector: modernization of service provision should lead to greater demand for skilled labour while demand for unskilled labour can fall. Transfers of modern technologies should lead to greater substitution of capital for labour, so that the net effect on employment can be again either positive or negative. Therefore, as with the short-term effect, the overall long-term effect of FDI on employment can go either way.

2.2.2 Human capital

A number of recent studies focus on the relationships between human capital and trade or human capital and employment (Bryant and Allen, 2009; Auer, 2015; Conti and Sulis, 2016). FDI can influence various aspects of the labour market, including wage rates, wage differentials, productivity growth and skill upgrading.

Owning to productivity differences, foreign firms tend to pay higher wages than the industry average (Driffield, 1996; Driffield and Taylor, 2000). The technological advantages and the skill premium of inward FDI, however, can be transferred to domestic companies through the learning process (Barrell and Pain, 1997; Figini and Görg, 1999). To the extent that technology favors highly skilled workers, it is possible that FDI promotes their employment by increasing the demand for human capital.

Salike (2016) finds that the human capital in China has been one of the most important factors in attracting FDI. However, the net effect on overall employment is ambiguous, as the greater input of skilled labour associated with FDI inflows may substitute for unskilled labour. Therefore, the overall effect of FDI and human capital on employment is ambiguous.

2.2.3 Colonial legacy

Historical legacies can be mainly categorized into institutional legacy and industrial legacy. Both may be advantageous or disadvantageous (Acemoglu et al, 2001, 2005; Greve and Rao, 2014; Che et al., 2015; Becker et al., 2015). Although intangible, institutional legacy plays a more essential role than industrial legacy. A favourable institutional legacy entails fair and stable polices to protect the property rights along

with safe and fair bureaucratic environment to encourage production and innovation. By the same token, adverse institutional legacy refers to the lasting effects of actions and policies that suppress regional development. Advantageous industrial legacy, in turn, refers to the construction of infrastructure such as the railways, schools and the health-care system. Disadvantageous industrial legacy refers to the destruction of such infrastructure.

In China, many colonial targets were originally little developed areas. Hong Kong, for instance, was initially a remote fishing village. It became a developed region as a British colony created under the Treaty of Nanking. Of course, whether colonization leaves behind an advantageous or disadvantageous legacy does not depend only on the region's level of development during its colonial period.

What factors determine whether advantageous or disadvantageous legacy was left behind? Due to the different intentions and culture, the identity of the colonist matters as various motivations could lead to different or even opposite outcomes.

In the Chinese context, the identity of the colonists can be categorized into Eastern and Western colonial rule. The Eastern influence is represented by Japan. Western powers are represented by the UK, US, Germany, France, Belgium, Portugal, Italy, Russia and Austria-Hungary, even though each colonized only a relatively small part of China and the duration of their colonization was limited.

The motivation of the Western powers was mainly to establish trade relationships and promote their exports to China. Thus, they would be more likely to introduce inclusive institution into the regions that they colonized. In addition, Western colonization often left behind also an advantageous industrial legacy. For instance, Tsingdao (Qingdao), a German concession that existed for a relatively brief period (1898–1914), continues to benefit even now from well-preserved German infrastructure such as the railway and drainage systems. Furthermore, communication between countries has a positive effect on FDI flows (Kok and Ersoy, 2009). The colonial past may strengthen such communication, making some regions more appealing to FDI. Lastly, good institutional heritage creates a trusting and safe environment conducive to economic growth (Acemoglu et al., 2001, 2005; Becker et

al., 2015). When people in a region have greater trust in foreign companies, we can expect that this increases efficiency and lowers rent-seeking behaviors. Based on the discussions above, we expect Western colonized experience to translate into a positive effect on the labour market via FDI.

The colonization motives of Japan centered around access to resources and territorial conquest at the expense of China, a neighbor with vast territory and abundant resources. As a result, extractive policies dominated Japan's treatment of colonized regions. Japan initially instituted a puppet state in Manchuria (Manchukuo) in 1931. This was followed in 1937 by open warfare and conquest of territory. Mistreatment of local populations, including the Nanking massacre and field testing of biological weapons in Manchuria (Che et al., 2015), likely eroded trust and encouraged rent-seeking.

The legacy of this ugly past shows up in such actions as boycotts of Japanese goods, which have been particularly strong in regions once colonized by the Japanese army. Due to this legacy of mistrust, inward FDI is expected to have a less favourable effect on the local labour market and employment in regions with a history of Japanese colonization.

Finally, the nature and intensity of colonization could matter. This should affect especially the legacy of Japanese colonization, where the main distinction is between northeast China and other Japanese possessions. Japan was present in Manchuria from 1931 onwards and actively engaged in state building. Its concessions elsewhere, however, were held only shorter periods. In contrast, the Western colonial presence was longer lasting. Many foreign concessions were established by the mid- to late 1800s, although they typically remained limited in geographical scope. We expect to find more profound effects in areas held for longer periods.

2.3 Methodology

The Heckscher-Ohlin-Samuelson (HOS) model provides a framework for describing the interplay between trade and the labour market. Applying the HOS framework with

a Cobb-Douglas production function, Greenaway et al. (1999) show that trade may lead to a decrease in labour demand. Similarly, Hine and Wright (1998) argue that a defensive response of the labour market is formed as a result of trade and FDI, thereby supporting the conclusions of Greenaway et al. (1999).

Fu and Balasubramanyam (2005) extend these two studies by putting FDI into total factor productivity and accounting for technical efficiency and knowledge spillovers generated by inward FDI. While growth of exports increases employment, they show it does not necessarily have a positive effect on labour efficiency.

In our methodological framework, we follow Greenaway et al. (1999) and Fu and Balasubramanyam (2005). We start with the Cobb-Douglas production function with constant returns to scale as follows:

$$\mathrm{Q_{it}} = \mathrm{A_{it}^{\gamma} K_{it}^{\alpha} N_{it}^{\beta} H_{it}^{\theta}} \tag{2.1}$$

where $\mathrm{Q_{it}}$ denotes the real output of region i at time t. $\mathrm{K_{it}}$, $\mathrm{N_{it}}$ and $\mathrm{H_{it}}$ refer to the capital stock, labour and human capital of region i at time t, respectively. A refers to total factor productivity. α, β, θ and γ represent the shares of factors.[6] It is assumed that a profit-maximizing region would choose to employ capital and labour at the levels where the marginal revenue product of capital is equivalent to the user cost (c) and the marginal revenue product of labour is equivalent to the wage (w). Eliminating capital stock K from equation (2.1) allows us to derive the following:[7]

$$\mathrm{Q_{it}} = \mathrm{A_{it}^{\gamma}}\left(\frac{\alpha \mathrm{N_{it}}}{\beta}\frac{\mathrm{w_i}}{\mathrm{c}}\right)^{\alpha}\mathrm{N_{it}^{\beta} H_{it}^{\theta}} \tag{3.1}$$

After taking logarithms, the labour demand function can be rearranged to solve for N as a function of Q as well as the other parameters, as follows:

$$\ln \mathrm{N_{it}} = \emptyset_0 + \emptyset_1 \ln(\mathrm{w_i/c}) + \emptyset_2 \ln \mathrm{Q_{it}} + \emptyset_3 \ln \mathrm{H_{it}} + \gamma \ln \mathrm{A_{it}} + \varepsilon_{it} \tag{2.3}$$

[6] See Fu and Balasubramanyam (2005) for further details on the derivation.

[7] By taking the first difference of the equation (2.1) with respect to K and N, we get the marginal product of capital: $A_{it}^{\gamma} * \alpha K_{it}^{\alpha-1} N_{it}^{\beta} = c$ and the marginal product of labour: $A_{it}^{\gamma} K_{it}^{\alpha} * \beta N_{it}^{\beta-1} = w_i$ when maximizing the profit; and then by combining these two equations we get $K = \frac{\alpha N_{it}}{\beta}\frac{w_i}{c}$.

where $\emptyset_0 = -(\alpha \ln \alpha - \alpha \ln \beta)/(\alpha + \beta)$; $\emptyset_1 = -\alpha/(\alpha + \beta)$; $\emptyset_2 = -1/(\alpha + \beta$; and $\emptyset_3 = -\theta/(\alpha + \beta)$.

We assume that the total factor productivity A, incorporates the spillover effect of FDI, market competition due to export penetration, which can both promote technology and improve efficiency, and the historical legacy since the institutions of the colonizing power might have had a lasting influence on technology and efficiency. Thus, A can be replaced with the following:

$$A_{it} = e^{\delta_0 T} XS^{\delta_1} FDI_{it}^{\lambda_i \delta_2}, \quad \delta_0, \delta_1, \delta_2 > 0 \tag{2.4}$$

where XS denotes the export penetration index measured by export-output ratio, λ_i is the colonial legacy of region i and FDI_{it} denotes the inflows of foreign direct investment of region i at time t. T is time trend. Thus, the labour demand equation (2.4) can be re-written as:

$$\ln N_{it} = \emptyset_0 + \emptyset_1 \ln(w_i/c) + \emptyset_2 \ln Q_{it} + \emptyset_3 \ln H_{it} + \emptyset_2 \ln XS_{it} + \emptyset_5 \ln \lambda_i + \emptyset_6 \ln FDI_{it} + \mu_0 T + \varepsilon_{it} \tag{2.5}$$

To capture time-specific effect of FDI on the labour market as discussed above, we also estimate equation (2.5) with lagged FDI (up to a lag of three years). This allows us to capture both the short-term effects of FDI, and their longer-term effects. As a further extension, we also add an interaction term between FDI and human capital, to allow for the effect of FDI to be contingent on the stock of human capital. Depending on whether foreign investment and local human capital act as complements or substitutes, this interaction effect can be either positive or negative. Similarly, we also augment the model to allow for FDI and human capital to have non-linear effects.

We replace the colonization indicator, λ_i, with two dummy variables in line with the previous discussion on the potentially different effects depending on the nature of colonization. Thus, we get:

$$\ln N_{it}\, \emptyset_0 + \emptyset_1 \ln(w_i/c) + \emptyset_2 \ln Q_{it} + \emptyset_3 \ln H_{it} + \emptyset_4 \ln XS_{it} + \emptyset_5 \ln FDI_{it} + \emptyset_6\, WC \ln FDI_{i,t} + \emptyset_7\, JC \ln FDI_{i,t} + \mu_0 T + \varepsilon_{it} \tag{2.6}$$

where WC and JC represent Western and Japanese colonization, respectively.

2.4 FDI and China's Labour Market

2.4.1 Development of China's service sector

Driven by the economic reform in 1978, China has undergone a series of far-reaching changes that resulted in high, sustained economic growth over recent decades. Cheap labour and the government's preferential policies to welcome and promote inward FDI have made China a top destination for inward FDI over the past fifteen years.

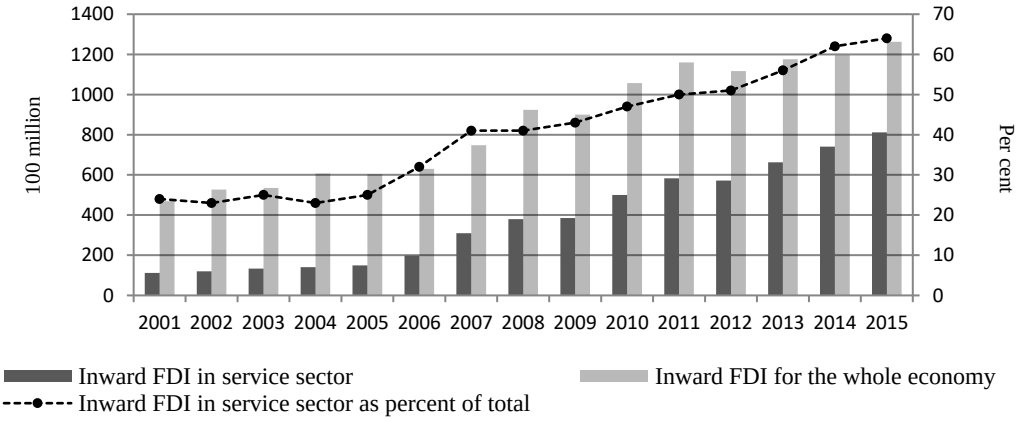

Fig. 2.1 Inward FDI of China from 2001 to 2015.
FDI: foreign direct investment; left axis: inward FDI in service sector and inward FDI for the whole economy; right axis: inward FDI in service sector as percent of total.
Source: NBSC.

As shown in Fig. 2.1, inward FDI for the whole economy climbed swiftly from around $500 million in 2001 to over $1.2 billion in 2015. The time-profile of inward FDI flowing to the service sector was similar. Moreover, inward FDI in the service sector grew both in terms of amount and as a proportion of overall FDI, from 24 % in 2001 to 64 % in 2015. As the new driver of economic growth, China's service industry plays an ever-increasing role in attracting FDI.

The growing importance of the service sector is confirmed by Fig. 2.2 The share of the service sector in employment and GDP has grown steadily, with services now accounting for the bulk of investment in physical capital in the Chinese economy. Wages in the service sector also tend to exceed those in the economy as a whole.

This may be due in part to the fact that the service sector relies more heavily on highly-skilled labour than the rest of the economy.

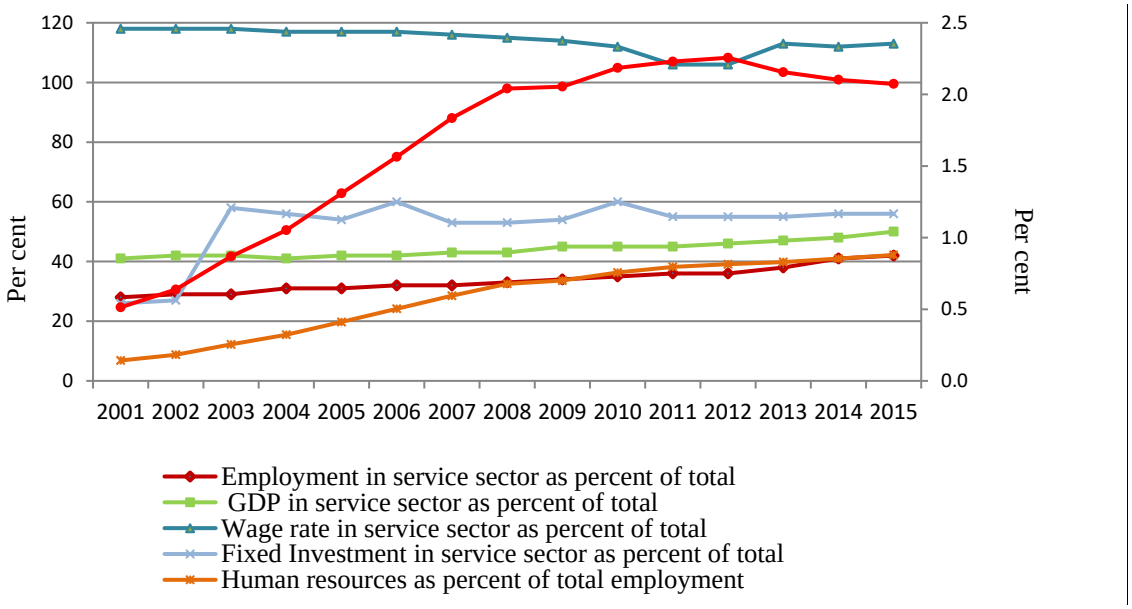

Fig. 2.2 Development of relevant indicators for China, 2001–2015.
Left axis: employment in service sector as percent of total, GDP in service sector as percent of total, wage rate in service sector as percent of total and fixed investment in service sector as percent of total. Right axis: human resources as percent of total employment and human resources as percent of service sector employment.
Source: NBSC

2.4.2 Colonized regions in China

Table 2.1 shows the names of the colonized regions along with the colonizing power. Fig. 2.3 and Fig. 2.4 show the colonized regions in China since the 1st Opium War. We use blue to denote the regions which were once colonized by Western powers and red for the regions colonized by Japan.[8] Regions in blue were colonized only partially, while regions in red were fully colonized.

Table 2.1 Colonized regions

	Colonized regions
Japan	Beijing, Heilongjiang*, Jilin*, Liaoning*, Hebei, Inner Mongolia*, Shaanxi, Jiangsu, Zhejiang, Henan, Hunan, Guizhou
Western powers	Beijing, Tianjin, Shandong, Shanghai Guangdong, Yunnan, Fujian, Guangxi, Jiangxi, Hainan

Notes: * denotes regions that were colonized by Japan from 1931 to 1945 and were organized into a separate vassal state, Manchukuo.

[8] In collecting this information, we relied on two books on modern Chinese history (Fenby, 2009; Dillon, 2010) and Wikipedia.

Several provinces with a Western colonial presence were later invaded by Japan in the course of the 2nd Sino-Chinese War. We only consider the first colonial influence as the Western presence was generally sustained for a longer period of time than Japanese occupation during the war. However, as a robustness check, we measure the extent and intensity of Western and Japanese colonization using continuous indexes. These results are presented in Section 2.6.

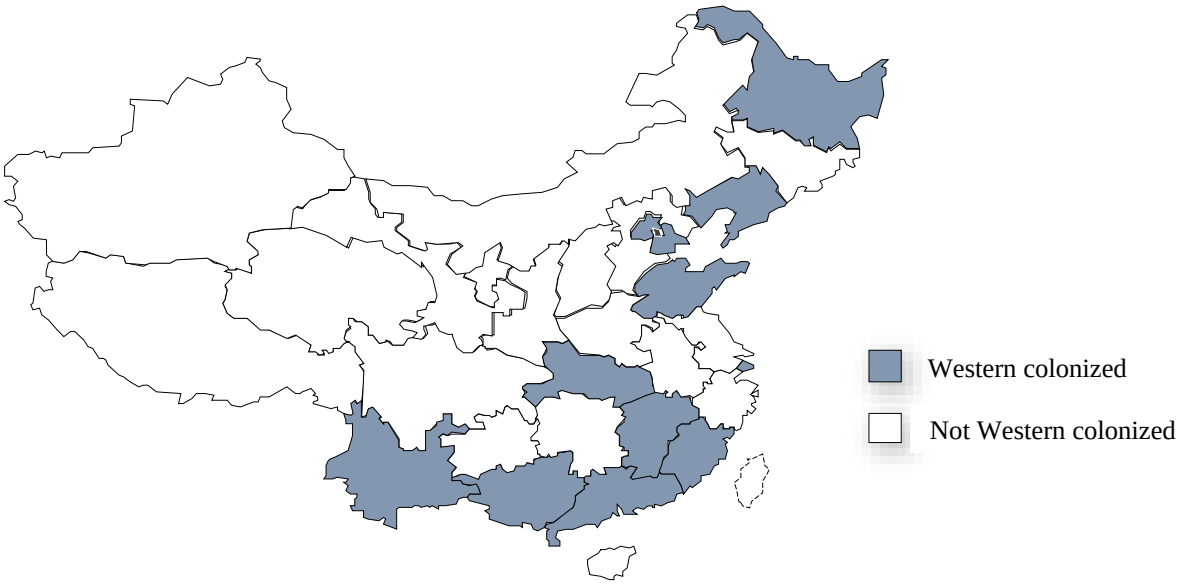

Fig. 2.3 The geographic distribution of Western colonized regions in Chinese modern history.
Sources: Fenby (2009), Dillon (2010), and Wikipedia.

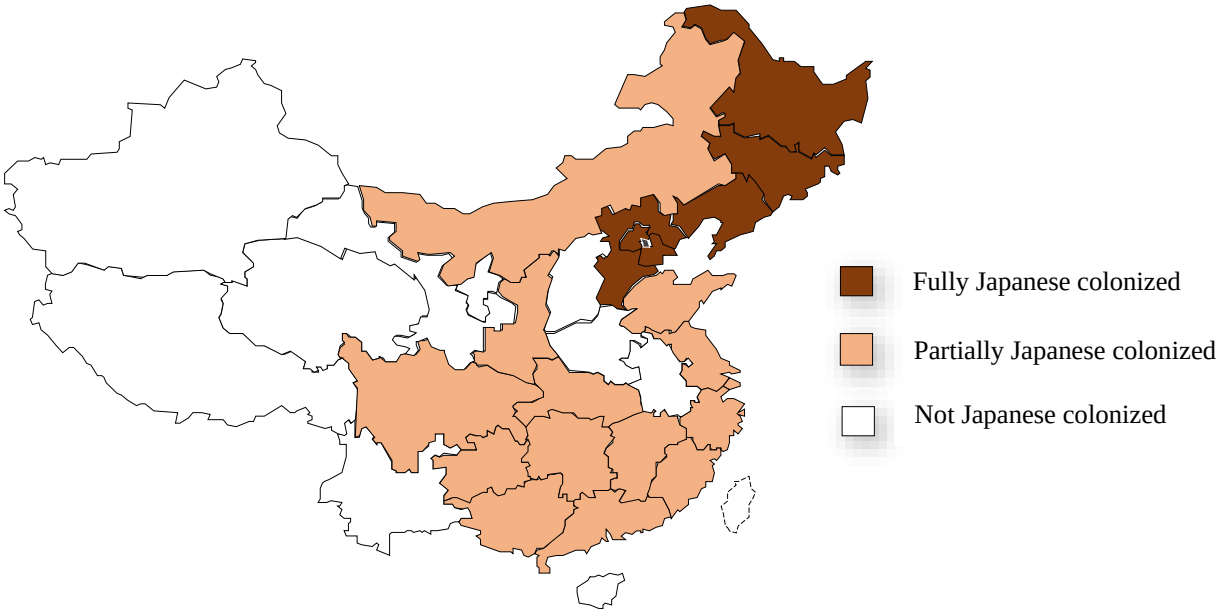

Fig. 2.4 The geographic distribution of Japanese colonized regions in Chinese modern history.
Sources: Fenby (2009), Dillon (2010), and Wikipedia.

2.4.3 Data and variables

The data used in this study are based on the National Bureau of Statistics of China (NBSC) annual panel dataset, which includes all 31 mainland provinces of China, for the years 2006 to 2015. Data are collected for the service sector, non-service sector and all sectors as a comparison in the empirical analysis. Table 2.2 presents the descriptive statistics of the main variables.

Table 2.2 Descriptive statistics

Var.	Description	N	Mean	S. D.	Mean Western Colonized	Mean Japanese Colonized	Mean Not Colonized
N^S	Total employment in service sector (in tens of thousands)	307	871.3	557.01	1067.92	1502.95	513.05
N^N	Total employment in service sector (in tens of thousands)	294	1667.84	1243.11	2687.89	3210.16	795.51
N	Total employment in all sectors (in tens of thousands)	294	2524.32	1751.88	3224.15	4331.14	1619.75
FDI^S	Inflow of FDI to service sector (in hundreds of millions of USD)	310	29.56	36.18	40.95	46.12	12.48
FDI^N	Inflow of FDI to non-service sector (in hundreds of millions of USD)	306	34.25	45.42	13.31	29.56	38.67
FDI	Inflow of FDI in all sectors (in hundreds of millions of USD)	306	63.83	72.69	87.08	111.82	19.92
Q^S	GDP contribution of service sector (in hundreds of millions of RMB)	307	7057.29	8130.81	8990.68	12415.53	3134.88
Q^N	GDP contribution of non-service sector (in hundreds of millions of RMB)	307	8490.61	7080.67	8277.57	11356.91	5530.56
Q	GDP for all sectors (in hundreds of millions of RMB)	308	15519.9	13754.55	20628.78	27023.14	7939.87
W^S	Average annual service sector wage (in tens of thousands of RMB)	309	4.14	1.81	4.51	5.18	2.75
W^N	Average annual non-service sector wage (in tens of thousands of RMB)	281	4.09	1.76	4.93	4.29	2.36
W	Average annual wage in all sectors (in tens of thousands of RMB)	281	3.81	1.58	3.89	4.93	2.56
XS	Export penetration index measured by export-output ratio, %)	306	0.03	0.03	0.05	0.03	0.02
H	Human resources measured as fraction of people holding a bachelor's degree or higher (in tens of thousands)	302	18	12.31	22.38	31.89	9.1
JC	Regions colonized by Japanese power set as a dummy variable	310	0.65	0.48	/	/	/
WC	Regions colonized by Western power set as a dummy variable	310	0.29	0.45	/	/	/

Notes: The service sector consists of wholesale and retail, trade, transportation, storage and post, hotel and catering, information, transmission, software and information technology, financial services, intermediation, real estate leasing and business service, scientific research and technical services, water management, environment and public facility service, household service, repair and other service, education, health and social services, culture, sports entertainment, public management, social security and organization services.

2.5 Estimation Results

We estimate the employment functions for the service sector and the whole economy separately.[9] The panel data regression results for the service sector are reported in Table 2.3. For purposes of comparison, Table 2.4 follows the same estimation strategy for the whole economy.

2.5.1 Results for service sector and non-service sector

In Table 2.3, the Chi square values from Hausman test indicate that the fixed effect estimation is efficient. The fixed effects also account for any time-invariant effects, including geography, history, culture and language/dialect. For this reason, colonial legacies are only included as factors shaping the effect of FDI on employment (interaction effects), and not as level effects. In column (1) and (2), both the contemporaneous inward FDI and its one-period lagged value in the service sector have a significantly positive short-term effect on employment, thus supporting our hypothesis. Columns (3) and (4) report the effects lagged by two and three periods, which are also positive, indicating that the inward FDI boosts employment with both a short-term effect and longer-term effect. Current wage affects employment negatively, while the growth of current output affects employment positively. Both effects are statistically significant.

We find no positive correlation between the number of highly educated people and the employment in service sector, i.e. human capital does not significantly impact employment in the service sector.

In column (5) and (6), we investigate how the effect of inward FDI in the service sector on employment varies with the stock of human resources by introducing an interaction term of human capital and FDI. The sign of the interaction is negative and statistically significant at 5 %, indicating that the inward FDI in the service sector promotes much more employment in provinces where the quality of human resources is comparatively low. This may reflect substitution between skilled and

[9] The result of Breusch-Godfrey test suggests there is no serial correlation in this panel.

unskilled labour. Provinces that receive more FDI and skilled labour have lower demand for unskilled workers. Therefore, the quality of region's human capital stock plays a significant role and is determinative on the impact of inward FDI on service employment. We also allow both human capital and FDI to have a non-linear effect on employment in the service sector. The effect of human capital indeed appears hump-shaped, with intermediate values of human capita associated with higher levels of employment than either low or high values. Importantly, allowing for a non-linear effect of human capital does not affect the interaction between human capital and FDI.

Column (7) shows that the two colonizer groups, Japan and the Western powers, have different mediating effects on the impacts of inward FDI on employment in the service sector. As expected, the sign of the interaction with the Japanese colonized regions and the inward FDI in the service sector is negative and statistically significant at 1 %. This shows that the positive effect of current inward FDI on employment in the service sector is lower in the Japanese-colonized regions. In contrast, the effect is stronger in the Western-colonized regions. The coefficient of the interaction term between the Western-colonized regions and inward FDI in the service sector is positive and statistically significant at 5 %. This suggests that the Japanese colonization left an adverse historical legacy in terms of institutions, infrastructure or both. The opposite is the case for Western-colonized regions.

Column (8) estimates the effect of extent and duration of colonization on employment in the service sector via inward FDI. Here, the main distinction is between the provinces in northeast China that were included in Manchukuo from 1931 (Heilongjiang, Jilin, Liaoning and part of Inner Mongolia), and the areas conquered by Japan during and after 1937. In Japan saw itself remaining for the longer term in Manchukuo, so it engaged in building up infrastructure, schools and public administration. In provinces invaded during the war, the Japanese presence was much shorter lived and far more traumatic for the local populations.

The results suggest that the negative interaction effect associated with Japanese colonization on service employment stems from the areas conquered by Japan during the war. This is in line with Mattingly's (2017) finding that in northeast China,

which was colonized in 1931, Japan maintained a longer presence and engaged in state building.

Finally, when we control for the colonial legacy, the signs and significance of the current inward FDI, wages, human capital and output in service sector are consistent with the estimations in columns (1), (2), (3) and (4).

Table 2.3 Effects of FDI, human capital and colonial legacies on service employment, FE

$\ln N^S_{i,t}$	Short-run effect		Medium-run effect		Human capital effect		Colonization effect	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\ln FDI^S_{i,t}$	0.072***				0.126***	0.241*	0.111***	0.103***
	(3.90)				(4.30)	(1.80)	(4.46)	(4.23)
$\ln FDI^{S\ 2}_{i,t}$						-0.089		
						(-1.35)		
$\ln FDI^S_{i,t-1}$		0.060***						
		(3.22)						
$\ln FDI^S_{i,t-2}$			0.075***					
			(3.66)					
$\ln FDI^S_{i,t-3}$				0.065***				
				(2.98)				
$JC * \ln FDI^S_{i,t}$							-0.061***	
							(-2.69)	
$WC * \ln FDI^S_{i,t}$							0.050**	0.071***
							(2.10)	(2.86)
$JCNE * \ln FDI^S_{i,t}$								0. 152***
								(4.08)
$JCR * \ln FDI^S_{i,t}$								-0.081***
								(-3.61)
$\ln H_{i,t}$	0.043	0.042	0.033	0.025	0.088**	1.152**	0.052	0.058
	(1.14)	(1.01)	(0.76)	(0.52)	(2.09)	(2.04)	(1.40)	(1.61)
$\ln H_{i,t}^{\ 2}$						-0.532*		
						(-1.89）		
$\ln H_{i,t} * \ln FDI^S_{i,t}$					-0.017**	-0.015**		
					(-2.34)	(-2.33)		
$\ln W^S_{i,t}$	-0.349***	-0.372***	-0.479***	-0.547***	-0.313***	0.096	-0.328***	-0.326***
	(-3.15)	(-3.03)	(-3.60)	(-3.68)	(-2.81)	(0.90)	(-2.97)	(-3.04)
$\ln XS_{i,t}$	-0.042*	-0.036	-0.038	-0.024	-0.052**	-0.045**	-0.045**	-0.345
	(-1.93)	(-1.57)	(-1.51)	(-0.74)	(-2.35)	(-2.36)	(-2.11)	(-1.65)
$\ln Q^S_{i,t}$	0.444***	0.478***	0.556***	0.625***	0.402***	0.153*	0.407***	0.407***
	(5.00)	(4.94)	(5.18)	(5.00)	(4.49)	(1.84)	(4.59)	(4.73)
No. of obs.	298	268	237	206	298	298	298	298
Adjusted R^2	0.8938	0.8942	0.8942	0.8934	0.8836	0.8520	0.8251	0.7665
Hausman test (χ^2)	19.96	19.12	17.05	15.92	23.90	48.76	25.94	45.16

Notes: FDI: foreign direct investment; H: human capital. JC and WC stand for Japanese and Western colonized regions, respectively. JCNE and JCR stand for Japanese-colonized northeast (Heilongjiang, Jilin, Liaoning, and Inner Mongolia) and Japanese colonized rest, respectively. See Table 2.2 for further details. Significance: *10%, **5%, ***1%. Robust t-values are in parentheses. We also include FDI square in column 6 but it is omitted due to multi-collinearity in this case.

As a comparison, table 2.4 report the estimation results for the effects of FDI on non-service sector. Similarly, we find that the coefficients remain expected sign while the effects are slightly weaker than those in service sector. Both in the short run and

medium-run, FDI flowing in non-service sector has a positive effect as shown in column (1) to (4). We also observe the human capital only displays the statistical significance in when we interact it with the FDI. Again, the colonization effects of FDI are consistent with table 2.4.

Table 2.4 Effects of FDI, human capital and colonial legacies on non-service employment, FE

$\mathbf{lnN_{i,t}^N}$	Short-run effect		Medium-run effect		Human capital effect		Colonization effect	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\mathbf{lnFDI_{i,t}^N}$	0.045***				0.114***	0.193*	0.178***	0.114***
	(3.69)				(4.26)	(1.67)	(6.66)	(3.87)
$\mathbf{lnFDI_{i,t}^{N\ 2}}$						-0.054		
						(-1.21)		
$\mathbf{lnFDI_{i,t-1}^N}$		0.047***						
		(2.52)						
$\mathbf{lnFDI_{i,t-2}^N}$			0.069***					
			(3.12)					
$\mathbf{lnFDI_{i,t-3}^N}$				0.061***				
				(2.94)				
$\mathbf{JC * lnFDI_{i,t}^N}$							-0.059***	
							(-2.51)	
$\mathbf{WC * lnFDI_{i,t}^N}$							0.039**	0.048**
							(2.10)	(2.52)
$\mathbf{JCNE * lnFDI_{i,t}^N}$								0. 139***
								(4.01)
$\mathbf{JCR * lnFDI_{i,t}^N}$								-0.074***
								(-3.55)
$\mathbf{lnH_{i,t}}$	0.037	0.035	0.031	0.046	0.088**	1.152**	0.052	0.058
	(1.19)	(0.89)	(0.72)	(0.37)	(2.09)	(2.04)	(1.40)	(1.61)
$\mathbf{lnH_{i,t}^{\ 2}}$						-0.532*		
						(-1.89)		
$\mathbf{lnH_{i,t} * lnFDI_{i,t}^N}$					-0.017**	-0.015**		
					(-2.34)	(-2.33)		
$\mathbf{lnW_{i,t}^N}$	-0.323***	-0.387***	-0.452***	-0.565***	-0.313***	0.096	-0.328***	-0.326***
	(-3.18)	(-2.98)	(-3.52)	(-3.48)	(-2.81)	(0.90)	(-2.97)	(-3.04)
$\mathbf{lnXS_{i,t}}$	-0.039*	-0.023	-0.035	-0.022	-0.035**	-0.042**	-0.041**	-0.371*
	(-1.75)	(-1.41)	(-1.43)	(-0.89)	(-2.12)	(-2.16)	(-2.29)	(-1.69)
$\mathbf{lnQ_{i,t}^N}$	0.479***	0.483***	0.713***	0.817***	0.406***	0.149*	0.419***	0.417***
	(5.12)	(4.72)	(6.18)	(5.49)	(4.29)	(1.71)	(4.59)	(4.79)
No. of obs.	298	268	237	206	298	298	298	298
Adjusted R^2	0.8938	0.8942	0.8942	0.8934	0.8836	0.8520	0.8251	0.7665
Hausman test (χ^2)	15.43	16.42	17.89	17.84	21.90	48.87	26.76	46.79

Notes: FDI: foreign direct investment; H: human capital. JC and WC stand for Japanese and Western colonized regions, respectively. JCNE and JCR stand for Japanese-colonized northeast (Heilongjiang, Jilin, Liaoning, and Inner Mongolia) and Japanese colonized rest, respectively. See Table 2.2 for further details. Significance: *10%, **5%, ***1%. Robust t-values are in parentheses. We also include FDI square in column 6 but it is omitted due to multi-collinearity in this case.

2.5.2 Results for the whole economy

We investigate the role of inward FDI and the colonial impact on employment in the whole economy in Table 2.5 As it can be seen from columns (1), (2), (3) and (4), the

positive values of the coefficients of inward FDI and its lags show that inward FDI promotes jobs in the whole economy in both the short and medium run. This effect is considerably stronger than for the service sector alone.

Table 2.5 Effects of FDI, human capital and colonial legacies on total employment, FE

$\mathbf{lnN_{i,t}}$	Short-run effect		Long-run effect		Human capital effect		Colonization effect	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\mathbf{lnFDI_{i,t}}$	0.099***				0.080***	-0.006	0.119***	0.045**
	(7.63)				(4.20)	(-0.35)	(8.33)	(3.15)
$\mathbf{lnFDI_{i,t}^2}$						-0.010		
						(-1.57)		
$\mathbf{lnFDI_{i,t-1}}$		0.082***						
		(4.41)						
$\mathbf{lnFDI_{i,t-2}}$			0.041*					
			(1.90)					
$\mathbf{lnFDI_{i,t-3}}$				0.068***				
				(3.04)				
$\mathbf{JC * lnFDI_{i,t}}$							-0.098***	
							(-4.19)	
$\mathbf{WC * lnFDI_{i,t}}$							0.054**	0.048**
							(2.08)	(2.10)
$\mathbf{JCNE * lnFDI_{i,t}}$								0.036
								(0.93)
$\mathbf{JCR * lnFDI_{i,t}}$								-0.074***
								(-3.18)
$\mathbf{lnH_{i,t}}$	0.362***	0.454***	0.488***	0.518***	0.343***	0.926**	0.346***	0.144***
	(9.11)	(9.86)	(10.10)	(9.91)	(8.16)	(2.23)	(8.877)	(3.88)
$\mathbf{lnH_{i,t}^2}$						-0.410**		
						(-1.98)		
$\mathbf{lnH_{i,t} * lnFDI_{i,t}}$					0.009	0.015***		
					(1.36)	(2.85)		
$\mathbf{lnW_{i,t}}$	-0.265***	-0.374***	-0.529***	-0.605***	-0.294***	-0.559***	-0.213**	-0.495***
	(-5.47)	(-6.95)	(-9.09)	(-9.98)	(-5.56)	(12.72)	(-4.28)	(-11.88)
$\mathbf{lnXS_{i,t}}$	-0.000	-0.378**	-0.018	-0.022	-0.006	-0.023*	0.010	-0.007
	(-0.01)	(-2.29)	(-1.07)	(-1.13)	(-0.39)	(-1.69)	(0.63)	(-0.56)
$\mathbf{lnQ_{i,t}}$	0.079**	0.145***	0.261***	0.290***	0.091**	0.551***	0.068*	0.494***
	(2.10)	(3.58)	(5.96)	(5.76)	(2.37)	(10.96)	(1.87)	(9.95)
No. of obs.	280	249	218	187	280	280	280	280
Adjusted R^2	0.7999	0.8463	0.8891	0.8815	0.8090	0.8713	0.6237	0.7565
Hausman test (χ^2)	43.93	31.57	15.88	17.10	41.51	24.95	54.95	44.73

Notes: FDI = foreign direct investment; H = human capital; and JC and WC = Japanese and Western colonized regions. JCNE = Japanese-colonized northeast China (Heilongjiang, Jilin, Liaoning, and Inner Mongolia); and JCR = Japanese colonized rest. See Table 2.2 for details. Significance: *10%, **5%, ***1%. Robust t-values are in parentheses. We also include FDI square in column 6 but it is omitted due to multi-collinearity in this case.

The estimated coefficients of human capital are positive and statistically significant at the 1 % level (unlike in our estimations for the service sector). The interaction term of human capital and inward FDI is positive but not significant in column (5), but becomes significantly positive when we allow for a non-linear relationship between employment and human capital (column 6). The effect of human capital is again hump-shaped, as in the service sector, whereas the positive effect of FDI vanishes.

Together, these results suggest that human capital plays a more important role in boosting employment in the whole economy than in the service sector, and also that the positive effect of FDI may in fact be driven by its correlation with human capital and/or their positive interaction.

In columns (7) and (8), the colonization effect for the whole economy is similar to the results obtained for the service sector. In the Japanese-colonized regions, inward FDI has a smaller effect on employment than in regions never colonized. In contrast, Western colonial legacy strengthens the positive FDI effect on employment compared to regions that were not colonized. When considering the extent of colonization, the negative effect of Japanese colonization again seems to be limited to provinces invaded during the war.

2.6 Robustness Check for the Colonization Effect

2.6.1 Indices of colonial legacy

In the above discussion, we treated Western and Japanese colonial influence as dichotomous, using mutually exclusive dummy variables. However, some Chinese areas hosted both Western and Japanese concessions. Additionally, some cities and provinces had multiple foreign concessions. Dummy variables fail to capture the intensity of exposure to colonial influence. Thus, we construct a continuous measure of Western and Japanese influence that allows for both types of colonial legacies to be present simultaneously, and considers duration and intensity as well.

Specifically, we consider the share of the colonized area, computed by dividing the area of the colonized city or prefecture by the area of the entire province. This is combined with the duration of the occupation as a proportion of the period during which foreign concessions were present in China. Our starting point is 1841, the year when the United Kingdom occupied Hong Kong Island.[10] Our end point is the formal dissolution of the last remaining concession, the Italian concession in Tianjin, in 1947.

[10] The UK occupied Hong Kong Island at the outset of the 1st Opium War, in January 1840. It was subsequently ceded to the UK in 1842 under the Treaty of Nanking.

In this way, the Western colonization index (WCI) and Japanese colonization index (JCI) are constructed as follows:

$$\mathrm{WCI_p} = \sum_{\mathrm{w}} \sum_{\mathrm{g}} \frac{\mathrm{A_{pgw}}}{\mathrm{A_p}} * \frac{\mathrm{D_{pgw}}}{\mathrm{T}} \tag{2.7}$$

and

$$\mathrm{JCI_p} = \sum_{\mathrm{g}} \frac{\mathrm{A_{pgj}}}{\mathrm{A_p}} * \frac{\mathrm{D_{pgj}}}{\mathrm{T}} \tag{2.8}$$

where $\mathrm{WCI_p}$ and $\mathrm{JCI_p}$ stand for indexes of Western and Japanese colonization influence, respectively, of province p. $\mathrm{A_{pgw}}$ and $\mathrm{A_{pgj}}$and stand for the area of city g in province p occupied by western country (w) or Japan (j), respectively. $\mathrm{A_p}$ is the area of the province p. $\mathrm{D_{pgw}}$ and $\mathrm{D_{pgJ}}$ are the duration of Western (w) and Japanese (j) occupation, respectively, of city g in province p. Finally, T is the length of the colonial period in modern Chinese history, from 1841to 1947, i.e. 107 years.[11] As a result, the colonial influence by a single foreign power can attain the maximum value of 1, which would be the case if the foreign power held control over the entire province for the full 107 years.

In the case of Japanese colonization index, this is indeed the maximum possible value. In the case of the Western colonization, we further allow for the influences by various foreign powers to be mutually reinforcing to allow the WCI index to exceed 1. Noting that in case of Japanese colonization, we consider both trading concessions and territories occupied through military conquest.

The actual values of the WCI and JCI indices for the Chinese provinces with colonial history are reported in Table 2.6 (provinces not shown in this table have no colonial legacy). The provinces with strongest Western influence are Tianjin, Shanghai and Beijing. Japanese influence was at its strongest in Tianjin and in Chongqing (which

[11] We ignore areas outside mainland China: Macau (Portuguese from 1557 to 1999), Hong Kong (under British control from 1841 to 1997), and Taiwan (under Japanese occupation 1895–1945, and outside of PRC control after 1949.

features an important inland port on the Yangtze River and in which Japan held a trade concession from 1897).

Table 2.6 Colonization influence indices (Western and Japanese)

Province	WCI	JCI
Beijing	0.79439	0.08411
Tianjin	3.30841	0.51402
Liaoning	0.00933	0.17665
Jilin	0	0.14019
Heilongjiang	0.06216	0.14019
Shandong	0.03135	0.08669
Shanghai	1.23365	0.08411
Chongqing	0	0.43925
Zhejiang	0	0.07161
Hubei	0.06278	0.07740
Jiangsu	0	0.12045
Fujian	0.01596	0.00841
Guangdong	0.14269	0.04673
Jiangxi	0.07060	0.01682
Yunnan	0.02265	0
Inner Mongolia	0	0.03224
Hebei	0	0.06542
Guangxi	0	0.05608
Hunan	0	0.01682
Guizhou	0	0.00561

Notes: 1. WCI = Western colonization index; JCI = Japanese colonization index; 2. Please see Table A2.1 and A2.2 for more detail in appendix for this chapter.

Table 2.7 Colonization effect of FDI for service sector, non-service sector and whole economy

$\mathbf{lnN_{i,t}}$	**Service Sector**		**Non-service Sector**		**Whole Economy**	
	OLS	2SLS	OLS	2SLS	OLS	2SLS
	(1)	(2)	(3)	(4)	(5)	(6)
$\mathbf{lnFDI_{i,t}}$	0.069***	-0.042	0.045***	0.036	0.032**	-0.034
	(3.67)	(-0.46)	(3.97)	(1.06)	(2.60)	(0.23)
$\mathbf{JCI * lnFDI_{i,t}}$	-0.089	0.43	0.231***	-0.194**	-0.260***	-0.192*
	(-0.87)	(0.28)	(3.87)	(-2.28)	(-2.72)	(-1.87)
$\mathbf{WCI * lnFDI_{i,t}}$	0.057**	0.051**	0.091***	0.047**	0.082***	0.071***
	(2.60)	(2.19)	(2.69)	(2.21)	(4.44)	(3.64)
$\mathbf{lnH_{i,t}}$	0.049	0.052	0.179***	0.152***	0.165***	0.158***
	(1.30)	(1.31)	(2.83)	(3.35)	(4.45)	(4.11)
$\mathbf{lnW_{i,t}}$	-0.337***	-0.919***	-0.414***	-0.816***	-0.523***	-0.624***
	(-3.03)	(-4.16)	(-3.64)	(-4.36)	(-13.88)	(-11.98)
$\mathbf{lnXS_{i,t}}$	-0.024	-0.001	-0.024	-0.002	-0.004	-0.021
	(-1.08)	(-0.03)	(-0.38)	(-0.63)	(-0.31)	(-1.45)
$\mathbf{lnQ_{i,t}}$	0.426***	0.418***	0.526***	0.538***	0.490***	0.641***
	(4.79)	(4.45)	(5.79)	(8.57)	(10.00)	(8.88)
No. of obs.	298	298	298	298	280	280
Adjusted R^2	0.8013	8.1418	0.8285	8.4142	0.7294	0.7901
F statistic	56.50	48.11	53.47	51.26	133.15	130.26
F-statistic 1st stage	/	6.16	/	12.48	/	40.28

Notes: FDI = foreign direct investment. H = human capital. JC and WC stand for Japanese and Western colonization influence parameters, respectively. Significance: *10%, **5%, ***1%. Robust t (z) values are in parentheses.

The results of this exercise are reported in columns (1), (3) and (5) of Table 2.7 for the service sector , non-service sector and the whole economy, respectively. The regressions paint a similar picture as the previous analysis with dichotomous measures of colonization. The effect of FDI on employment is positive and further reinforced by the legacy of Western colonization or weakened by a Japanese colonial legacy (the latter is not significant in the case of the service sector).

2.6.2 Controlling for endogeneity of FDI

The previous results could suffer from endogeneity of FDI due to possible reverse causality between FDI and employment, or because both are caused by a third unknown factor (Greenaway et al., 1999; Fu and Balasubramanyam, 2005). To check for this, we adopt the two stage least squares (2SLS) methodology (Greene, 1997), and use foreign trade of provinces and distance from the provincial capital to the nearest of the four main ports (Dalian, Tianjin, Shanghai, and Shenzhen) interacted with trade to construct the instruments for FDI. The 2SLS results are given in columns (2), (4) and (6) of Table 2.7. Note that since we only have one instrument, we only instrument FDI; the interaction terms containing FDI are left in their original form. The endogeneity bias, if present, is likely to affect the original endogenous variable the most, relative to interaction terms that contain it. Importantly, the colonial legacy variables (which also enter the interaction terms) should be exogenous, as they reflect historical developments that predate the period covered by our analysis.

The F statistics in the first stage confirm the validity of these instruments. The results are broadly consistent with those previously obtained, but inward FDI does not show any significant effect on employment in the absence of colonial history. It is positive in provinces with a Western colonial legacy and negative (insignificant in the case of the service sector) in those with a history of Japanese colonization.

2.7 Conclusions

Given its high and steady growth rate in the recent decades, China has long been one of the most favored destinations for FDI. Applying the framework introduced by Greenaway et al. (1999) and Fu and Balasubramanyam (2005), this study

investigated whether different colonization experiences of Chinese provinces left lasting historical legacies that are determinative as to the effect of inward FDI on employment.

We show that the inward FDI has a significantly positive effect on employment in the China's service sector, non-service sector and the economy as a whole. Furthermore, our findings show that the significantly positive impact of FDI on employment is stronger in the regions once colonized by the Western countries but lower (and even negative) in regions subject to Japanese colonization. We believe this finding reflects the objectives of two types of colonial powers. Western countries primarily pursued economic cooperation with China by means of investment and trade. Japan sought to annex territory and extract wealth.

We also distinguish the nature of Japanese colonization, differentiating between the areas of China that were colonized for a longer time (northeast China, which was under Japanese control from 1931) and areas controlled by Japan for a relatively short period (the regions invaded during the 2nd Sino-Chinese War, 1937–1945). After making this distinction, we find that the negative effect shows up mainly in regions invaded by Japan during the war and not in the north-eastern regions. The nature of colonization therefore matters as well, with military conquest leaving a more negative legacy than state-building. These findings are robust to the potential endogeneity of FDI, and are obtained both with dichotomous and continuous measures of colonial legacy (based on dummy variables and measures reflecting both duration and extent of colonial presence, respectively).

Interestingly, we find that human capital is significantly related to employment in the economy as a whole, but has little influence on employment in the service sector. This difference seems to be explained by the fact that China's service industry is still relatively underdeveloped and can therefore rely on fairly unskilled labour.

Our hope is that this study serves as a first step toward better understanding of the relationship between FDI, institutions and the labour market in China, as well as economic development in general. Future studies could use the framework to collect additional evidence from other countries to investigate the impact of colonization on

FDI inflows and outflows across countries. Further research could also be fruitful in examining the influence of other potential factors, especially those related to various socio-political contexts, on the relationship between FDI and labour market development.

2.8 Appendix

Table A2.1 Western colonies in China, 19th and 20th centuries

Western colonization	Foreign enclave	Location (modern name)	Province	Established	Dissolved	Duration	Area share	AS*D/L
International	Beijing legation quarter	Beijing	Beijing	1861	1945	85	100%	0.794393
United Kingdom	British concession in Dalian	Dalian	Liaoning	1858	1860	3	9.07%	0.002544
Russia	Russian Dalian	Dalian	Liaoning	1898	1905	8	9.07%	0.006783
Soviet Union	Soviet concession in Dalian	Dalian	Liaoning	1945	1955	11	9.07%	0.009327
France	French concession in Shamian island, Guangzhou	Guangzhou	Guangdong	1861	1946	86	4.13%	0.033233
France	French concession in Kouang-Tchéou-Wan	Port of Zhanjiang/ Zhanjiang	Guangdong	1898	1946	49	6.94%	0.031812
United Kingdom	British concession in Shamian island, Guangzhou	Guangzhou	Guangdong	1861	1945	85	4.13%	0.032847
United Kingdom	British concession in Zhanjiang	Zhanjiang	Guangdong	1861	1929	69	6.94%	0.044796
United Kingdom	British concession in Hankou	Hankou/Wuhan	Hubei	1861	1927	67	4.56%	0.028612
Germany	German concession in Hankou	Hankou/Wuhan	Hubei	1895	1917	23	4.56%	0.009914
France	French concession in Hankou	Hankou/Wuhan	Hubei	1896	1946	51	4.56%	0.021779
Russia	Russian concession in Hankou	Hankou/Wuhan	Hubei	1896	1924	29	4.56%	0.012384
Russia	Chinese eastern railway, Harbin	Harbin	Heilongjiang	1896	1952	57	11.66%	0.062159
France	French railway, Kunming	Kunming	Yunnan	1904	1940	37	5.33%	0.018444
United Kingdom	Trading warehouses at Tengchong	Tengchong	Yunnan	Late 19th	1935	30	1.50%	0.004208
Germany	Kiautschou bay leased territory	Qingdao	Shandong	1898	1914	17	7.04%	0.011192
United Kingdom	Weihaiwei leased territory	Weihai	Shandong	1898	1930	33	3.46%	0.010672
United Kingdom	Liugong island	Weihai	Shandong	1930	1940	11	3.46%	0.003557
United Kingdom	British concession in Shanghai	Shanghai	Shanghai	1846	1863	18	100%	0.168224
United States	American concession in Shanghai	Shanghai	Shanghai	1848	1863	16	100%	0.149533
France	French concession in Shanghai	Shanghai	Shanghai	1849	1946	98	100%	0.915888
International	Shanghai international settlement	Shanghai	Shanghai	1863	1945	83	100%	0.775701
United Kingdom	British concession in Jiujiang	Jiujiang	Jiangxi	1861	1927	67	11.27%	0.070611
United Kingdom	British concession in Tianjin	Tianjin	Tianjin	1860	1943	84	100%	0.785047
United States	American concession in Tianjin	Tianjin	Tianjin	1860	1902	43	100%	0.401869
France	French concession in Tianjin	Tianjin	Tianjin	1861	1946	86	100%	0.803738
Germany	German concession in Tianjin	Tianjin	Tianjin	1895	1917	23	100%	0.214953
Japan	Japanese concession in Tianjin	Tianjin	Tianjin	1898	1943	46	100%	0.429907
Russia	Russian concession in Tianjin	Tianjin	Tianjin	1900	1924	25	100%	0.233645
Italy	Italian concession in Tianjin	Tianjin	Tianjin	1901	1947	47	100%	0.439252
Austria-Hungary	Austro-Hungarian concession in Tianjin	Tianjin	Tianjin	1902	1917	16	100%	0.149533
Belgium	Belgian concession in Tianjin	Tianjin	Tianjin	1902	1931	30	100%	0.280374
United Kingdom	British concession in Amoy	Xiamen	Fujian	1852	1930	79	13.99%	0.010335
International	Gulangyu island	Xiamen	Fujian	1903	1945	43	13.99%	0.005625

Notes: AS is short for Area Share, D for Duration, and L for length of time from the 1st Opium War to end of all concession dissolutions.

Table A2.2 Japanese colonies in China, 19th and 20th centuries

Foreign Enclave	Location (modern name)	Province	Established	Dissolved	Duration	Area Share	AS * D/L
Japanese concession in Chongqing	Chongqing	Chongqing	1897	1943	47	100%	0.439252
Kwantung Leased Territory/South Manchuria Railway Zone	Dalian	Liaoning	1905	1945	41	9.07%	0.034764
Liaodong Peninsula	Dalian	Liaoning	1894	1895	2	9.07%	0.001696
Japanese concession in Hangzhou	Hangzhou	Zhejiang	1897	1943	47	16.3%	0.071609
Japanese concession in Hankou	Hankou/Wuhan	Hubei	1898	1943	46	4.56%	0.019644
Kiautschou Bay leased territory	Qingdao	Shandong	1914	1922	9	7.04%	0.005925
Japanese concession in Weihai	Weihai	Shandong	1895	1898	4	3.46%	0.001294
Japanese concession in Shashi	Shashi/Jingzhou	Hubei	1898	1943	46	7.56%	0.032535
Japanese concession in Suzhou	Suzhou	Jiangsu	1897	1943	47	8.27%	0.036341
Japanese-controlled Manchukuo	Liaoning (full control)	Liaoning	1931	1945	15	100%	0.140187
Japanese-controlled Manchukuo	Jilin (full control)	Jilin	1931	1945	15	100%	0.140187
Japanese-controlled Manchukuo	Heilongjiang (full control)	Heilongjiang	1931	1945	15	100%	0.140187
Japanese-controlled Manchukuo	East Inner Mongolia	Inner Mongolia	1931	1945	15	23%	0.032243
Japanese occupation of Beijing	Beijing (full control from 2nd Sino-Japanese War)	Beijing	1937	1945	9	100%	0.084112
Japanese occupation of Tianjin	Tianjin (full control from 2nd Sino-Japanese War)	Tianjin	1937	1945	9	100%	0.084112
Japanese occupation of Shandong	Shandong (full control at early stage of 2nd Sino-Japanese War; partial control in later stage)	Shandong	1937	1940	4	100%	0.037383
		Shandong	1940	1945	6	50%	0.028037
Japanese occupation of Guangdong	Guangdong (partial control in early stage of 2nd Sino-Japanese War; more control in late stage)	Guangdong	1937	1940	4	20%	0.007477
		Guangdong	1940	1945	6	70%	0.039252
Japanese occupation of Hubei	Hubei (partial control in 2nd Sino-Japanese War)	Hubei	1937	1945	9	30%	0.025234
Japanese occupation of Jiangsu	Jiangsu (full controlled in 2nd Sino-Japanese War)	Jiangsu	1937	1945	9	100%	0.084112
Japanese occupation of Fujian	Fujian (partial control in 2nd Sino-Japanese War)	Fujian	1937	1945	9	10%	0.008411
Japanese occupation of Hunan	Hunan (partial control at later stage of 2nd Sino-Japanese War)	Hunan	1940	1945	6	30%	0.016822
Japanese occupation of Jiangxi		Jiangxi	1940	1945	6	30%	0.016822
Japanese occupation of Guangxi	Guangxi (full control in later stage of 2nd Sino-Japanese War)	Guangxi	1940	1945	6	100%	0.056075
Japanese occupation of Hebei		Hebei	1940	1945	6	100%	0.056075
Japanese occupation of Guizhou	Guizhou (partial control in later stage of 2nd Sino-Japanese War)	Guizhou	1940	1945	6	10%	0.005607

Notes: AS is short for Area Share, D for Duration, and L for length of time from the Opium War to end of all concession dissolutions.

Chapter 3

A spatial analysis of inward FDI and urban-rural wage inequality: Evidence from China

3.1 Introduction

The ongoing globalization has ensured that foreign direct investment (FDI) and its effects remain one of the most heated topics in academic and popular discussions alike. There is by now an extensive body of literature devoted to the interplay of FDI with economic development and inequality. Most studies argue that attracting inward FDI is one of the most efficient ways to boost the economy of the host countries. A related issue is the potential influence of FDI inflows on inequality. However, due to the complexity of measuring inequality, heterogeneity of inward FDI and sample diversity, the literature on this topic remains far from having reached a consensus.

Tsai (1995) uses data for 33 developed and less developed countries, showing that less developed countries report increases in income inequality in the wake of inflows of FDI. Choi (2006) supports this argument, finding that FDI increases income inequality in developing countries but not in developed countries. Basu and Guariglia (2007) obtain similar findings based on 119 developing countries and show that the inward FDI can exacerbate inequality. Taylor and Driffield (2005) investigate the case in the U.K. and find that the increase of wage inequality can be explained by the inflows of FDI. Figini and Görg (2011) provide similar result by comparing OECD and non-OECD countries. Their result suggests that income inequality first increases with inward FDI but decreases once a turning point has been reached. Herzer and Nunnenkamp (2013) show that FDI negatively affects the income inequality in most European countries whereas Asteriou et al.(2014) hold a completely opposite view, arguing that the highest contribution to inequality stems from FDI on the basis of an EU-27 analysis. Mah (2003), in contrast, reports that the inequality is unaffected by FDI inflows in Korea. Similarly, Sylwester (2005) does not find any significant

relationship between inward FDI and income inequality in a sample of 29 less developed countries.

As one of the largest FDI recipients, China, with its increasing inequality, has drawn considerable attention. An early attempt by Zhang and Zhang (2003) ascribes the growing regional disparities to the effects of inward FDI and trade openness. Wan et al. (2007) argue that globalization substantially aggravates regional inequality and that this is largely due to the dramatic increase of inward FDI. Lessmann (2013), comparing China with other 54 countries, argues that inward FDI tends to raise income inequality in poorer regions. Mah (2013) adopts dynamic ordinary least squares from 1985 to 2007 to show that trade globalization and trade openness have strong and positive effects on income inequality while the impact of inward FDI is mixed. Similarly, Jalil (2012) shows that the relationship between openness and income inequality in China displays a pattern similar to the Kuznets curve: income inequality increases when openness grows but decreases later. From firm level perspective, Chen et al. (2011) show that inward FDI raises wage inequality because foreign invested enterprises report higher wage growth rate and discourage wage growth in domestic firms.

On the other hand, Yu et al. (2011) use simultaneous equation model and Shapley value regression-based decomposition approach and argue that FDI has no impact on income inequality in China. Wei et al. (2009) separate the regional data into three groups: east, west and central. They find that although income inequality climbs in the period they analyze, there is no consistent evidence that FDI should be blamed for this since the western regions receive far less FDI but still suffer from rising income inequality.

FDI can affect inequality not only in the regional dimension, but also across sectors. Studies that do not differentiate sectoral FDI may result in biased and ambiguous results (Wang, 2009; Doytch & Uctum, 2011). Yu et al. (2011) point out that the inward FDI has been unevenly distributed across sectors in China. In addition, recent studies have indicated that the importance of ownership patterns of FDI should be considered. The loosening of restrictions on establishing wholly foreign-owned enterprises has led to changes in the structure of FDI (Girma et al., 2015). Ouyang

and Yao (2017) argue that FDI in equity joint ventures (EJV) has a positive impact on economic growth, whereas the impact of FDI in cooperative joint venture (CJV) is negative.

The main aspect of income inequality in China has been the increasing rural-urban income differential (Yang, 1999, 2002; Yao, 1999; Xie & Zhou, 2014). Based on a sample of 100 cities in China from 1988 to 1993, Wei and Wu (2001) find that the urban to rural income ratio is negatively affected by trade openness. Kanbur and Zhang (2005) confirm this finding with a longer provincial level panel dataset from 1952 to 2000. They suggest that overall regional inequality, urban-rural income inequality and costal-inland inequality stem from the Great Famine in the 1950s, Cultural Revolution in the 1960s, and the global integration afterwards. Using provincial level data from 1999 to 2013, Greaney and Li (2017) find that the entry of multinationals does not have significant effect on urban-rural wage inequality in general.

Finally, a major concern is that inward FDI may not only affect inequality in the region where it is located, but also may have spatial spillovers effects on other regions. To take this into account requires proper spatial econometric techniques. This article aims to close this gap by investigating the spatial effect of inward FDI on rural-urban wage inequality in China. While doing so, we account for the different ownership types and sectoral distribution of FDI. Specifically, we divide ownership types of FDI into equity joint venture (EJV), cooperative joint venture (CJV) and wholly foreign owned enterprises (WFE). We also account for the distribution of FDI into the primary, secondary and tertiary sectors.

The rest of the paper proceeds as follows. The next section provides a literature review on why spatial spillovers matter in this context and background of different types of inward FDI in China. Section 3.3 describes the methodology and data in use. Section 3.4 includes the empirics and discussions. Section 3.5 concludes.

3.2 The Theoretical Framework

3.2.1 The explanation for inward FDI's direct effect on inequality

As in one of the earliest international trade theorem (Stopler & Samuelson, 1941), on the background of trade liberalization, a labor-intensive developing country will display higher returns to laborers with lower returns to capitalists, thereby leading to lower income inequality. Conversely, higher income inequality will arise in a capital-abundant developing country.

However, the returns differ in a model with two types of labor: skilled and unskilled. The demand for skilled workers increases in a developing country with the entry of inward FDI, which leads to a higher wage for skilled workers. Consequently, income gap is widened. Feenstra and Hanson (1997) make this point in a theoretical analysis and offer empirical evidence on the case of Mexico which contrasts the predictions of Stoper and Samuelson (1941).

Based on the framework of Aghion and Howitt (1998) who consider FDI as an important tool for general purpose of technology, Figini and Görg (2011) propose a two-stage model: both skilled and unskilled workers are employed when the technology starts to improve at stage 1. The wage inequality (led by high wage for skilled workers and low wage for unskilled workers) starts to expand as a result. From stage 1 to stage 2, this wage inequality keeps increasing but with a diminishing marginal rate since the productivity gap between skilled and unskilled labor is gradually narrowed and the remaining unskilled workers will be obsolete at stage 2.

The framework developed by Basu and Guarglia (2007) is also inspiring. In a dual economy, FDI enlarges the disparity between agricultural (rural) sector and the urban (modern) sector. Precluded from the FDI-based technology in the modern sector, the low productive rural workers remain lower paid. As such, the rural-urban inequality is exacerbated, which eventually leads to a deterioration of income inequality.

In the case of China, scholars also provide several theoretical frameworks to explain the skill-unskilled wage inequality from different dimensions including foreign capital (Pi & Zhou, 2014). They construct a four-sector general equilibrium model to investigate how an inflow of foreign capital influences the skilled–unskilled wage inequality in the presence of the endogenous public infrastructure provision. Given the special characteristics of China's *Hukou* system, they stand from rural-urban migration perspective to further explore such inequality (Pi & Zhang, 2016; Pi & Zhang, 2017). Following these frameworks, we discuss how rural-urban inequality and skill-unskilled wage inequality are interlinked in section 3.2.

3.2.2 Spatial spillovers of FDI on rural-urban wage inequality via migration

Rooted in the model of rural-urban dual economy (Lewis, 1954; Harris & Todaro, 1970), the literature has explicitly recognized that the rural-urban inequality is crucially affected by rural-urban migration. In evidence, the rural-urban migration plays a significant role in determining the rural-urban inequality (Kanbur & Zhang, 1999; Yang, 1999; Yang & Zhou, 1999; Pi & Zhang, 2016). This effect is in general shown to reduce the rural-urban inequality as the migration improves the rural income level and reduces rural poverty (Du et al., 2005; Zhu & Luo, 2010) via higher level of remittances from migrant workers (Howell, 2017). These studies imply that the rural-urban migration serves as a major channel accounting for the relationship between inward FDI and rural-urban wage inequality.

In China, the bulk of rural-urban migration occurs between different provinces, primarily with workers moving from inland and less developed regions to developed provinces on the coast. The large cities with more job opportunities such as Beijing, Tianjin, Shanghai, Hangzhou, Guangzhou and Shenzhen are all on the coast. However, most previous research only focuses on rural-urban migration at the intra-provincial level and does not consider this labor mobility at the interprovincial level, except a few studies that recognize the importance of inland-coastal interplay (Kanbur & Zhang, 1999; Ouyang & Yao, 2017). Nonetheless, they do not account for the overall interplay between regions. In this article, we adopt a proper spatial model

to capture the not only the inland-coastal interaction but also a general interprovincial interaction between regions.

In the previous section, we discuss several FDI-inequality explanations with more focus on the skilled-unskilled wage inequality. However, these explanations still principally apply to the rural-urban wage inequality in China based on two major reasons. First, Chinese rural workers are largely unskilled. Compared to the urban education system, the rural education remains at a much lower level (see de Brauw & Rozelle, 2008; Yi et al., 2012 and many others). This rural-urban gap in the quality of education and the lack of modern industrial-skill training means also that the rural migrants struggle to get fully integrated in the industrial sector in urban areas.

Second, even if rural-urban migrants are mostly skilled workers, they are often treated as unskilled workers in the urban areas because of the household registration system (*Hukou*). Although the reform in 1984 liberalizes rural labor mobility, the essence of the *Hukou* system has not been changed. The rural migrants suffer severe discriminations in the urban job market: they are excluded from a certain jobs (Chan & Buckingham, 2008), face employment barriers (Shi et al, 2011) and receive far less social welfare such as health insurance and pensions (Yang, 1999; Ha et al., 2016). The *Hukou* system has segmented the urban laborers into two different groups (Shi et al., 2011): without the urban *Hukou*, the rural migrants are less likely to be employed as skilled-workers even if they are skilled.

3.2.3 The effects of different types of FDI in China

(1) Sectoral distribution of inward FDI

Most of the literature focuses on the impact of FDI on the manufacturing sector. Secondary (manufacturing) sector FDI contributes to productivity improvement mainly by technology transfers (Wang, 2009; Newman et al. 2015; Lu et al. 2017). In China, manufacturing FDI takes the form of both high-tech FDI and low-tech FDI; yet they have different direct and spillover effects on productivity, with some studies arguing that the effect is U-shaped (Liu et al., 2014; Anwar & Sun, 2014). Another major benefit the host countries can obtain from manufacturing FDI is the promotion

of exports, given that manufacturing FDI is the most export oriented among sectoral FDI (Zhu & Fu, 2013; Tang & Zhang, 2016; Latorre et al. 2018).

As one of the few studies focusing on the tertiary sector (service) FDI, Fernandes and Paunov, (2012) find that service FDI fosters innovation and promotes productivity in the manufacturing industry. Similarly, Latorre et al. (2018) analyze the link between sectoral FDI and Chinese economy by adopting computable general equilibrium (CGE) model. They suggest that service FDI benefits the host country welfare. Doytch (2015) applies system GMM to examine the effects of FDI in different sectors on business cycle in several Asian countries. She shows that the financial service FDI can play a significantly positive role with respect to the host country business cycle while FDI in other sectors do not seem to be influential. This influence can extend to inequality since the service industries in China are still under-developed and rely heavily on low-cost migrant workers. Therefore, the inequality gap can be reduced as the tertiary FDI pulls up the lower quantile income.

There is limited research so far on the impact of FDI on the primary sector. Chaudhuri and Banerjee (2010) have developed a three-sector general equilibrium model to show that flow of FDI into agriculture improves the social welfare by mitigating unemployment. Agricultural production and food security have been promoted via the direct effect of agricultural FDI and its favorable externalities such as know-how, R&D and technology transfer (Slimane et al., 2016). They emphasize the importance of primary FDI and ascribe China's success in both economic growth and poverty mitigation to improvements in agriculture. Santangelo (2018) finds that agricultural FDI from developed countries has positive effect on host countries while the effect of FDI from developing countries is negative. As for its effect on income inequality, it can be expected that there should be a negative relationship between income inequality and the primary FDI as the rural workers can benefit from higher wages that the multinationals offer, thus helping them catch up with the better paid urban workers.

As shown in Fig. 3.1a. and Fig. 3.1b., sectoral FDI in China displays a noticeably uneven distribution. As a traditionally agricultural country, China has achieved remarkable agricultural growth since the rural reforms in 1978. However, primary-

sector FDI into China has remained the lowest among the three sectors. It reached its highest point in 2002 at close to 2% of the total. The secondary-sector FDI has grown gradually from 34.79 billion USD in 2001 to 53.26 billion USD in 2008, only to fall again to 40.21 billion USD in 2016. As a share of the total, it has fallen steadily, from 74.23% to less than 32% over the same period. However, the service FDI has increased rapidly both in terms of volume and share. It was 24% of total FDI in 2001 and has risen to more than 65% in 2016.

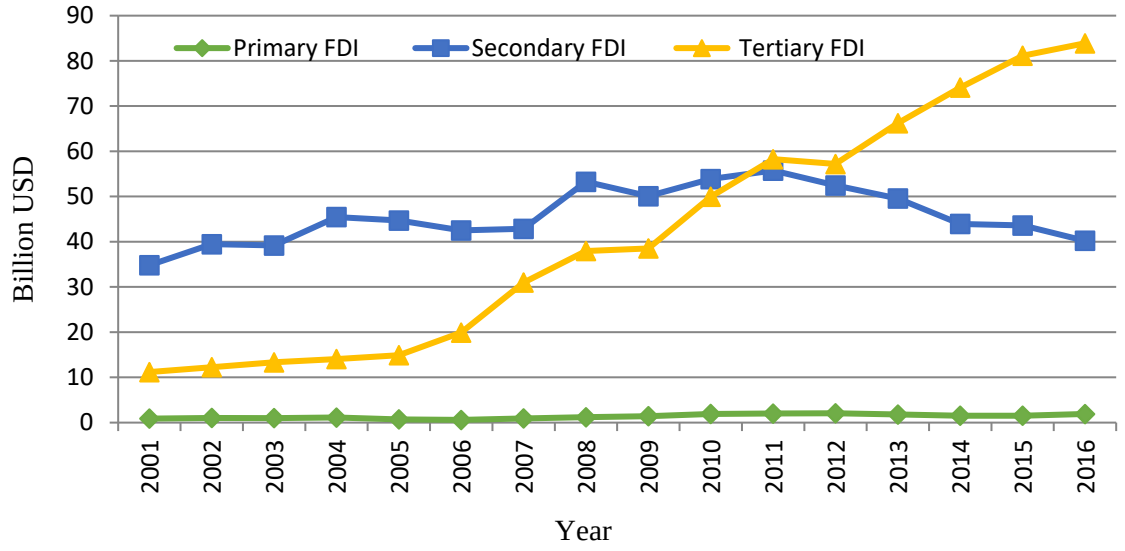

Fig. 3.1a The trend of inward sectoral FDI flows as volume from 2001 to 2016.
Source: The authors' calculations according to NBSC.

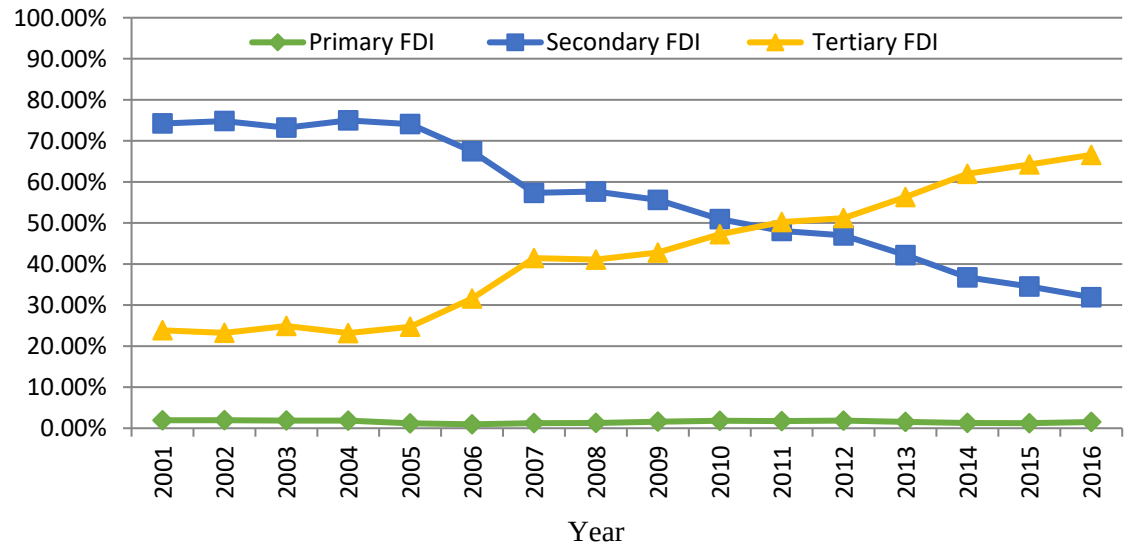

Fig. 3.1b The trend of inward sectoral FDI flows as percentage from 2001 to 2016.
Source: The authors' calculations according to NBSC.

(2) Ownership patterns of inward FDI

There are three types of FDI in China with respect to ownership types, namely cooperative joint ventures (CJV), equity joint ventures (EJV), and wholly foreign owned enterprises (WFE). The main differences between these three ownership types are as follows: WFE is FDI that is fully owned by the foreign investor. CJV and EJV are both Sino-foreign co-operations, with the former based on a cooperation contract and the latter based on a joint investment. The CJV accounts for the smallest portion among the three forms, and its importance has been falling over time. In Fig. 3.2a and Fig. 3.2b, CJV can be seen going from 6.21 billion USD and 13% of all FDI in 2001 to 0.83 billion USD, less than 1%, by the end of 2016. Unlike CJV, the amount of EJV has increased from 15.74 billion USD in 2001 to 30.20 billion USD in 2016, while its share has fallen from 33.57% to 23.97% as presented in Fig. 3.1a and Fig. 3.1b. As the most popular format of FDI, WFE has grown from 23.87 billion USD and 53.17% of the total in 2001 to 86.13 billion USD or 75.37% in 2016 as shown in Fig.3.2a and Fig.3.2b.

The association between wage inequality and inward FDI regarding to ownership types starts from the General Purpose Technology (GPT) model introduced by Aghion and Howitt (1998). The higher capacity of technology innovation the foreign invested enterprise has, the more likely the wage inequality will increase in the short run (Figini & Görg, 2011) as more skilled workers are used to implement the new technology (Ucal et al., 2016). As they argue, in the long run the when the domestic firms follow up the inequality can be reduced.

Therefore, it is of essential importance to control for the ownership forms of FDI as they are associated with diverse R&D capabilities and different level of technology innovations. In contrast to Asiedu and Esfahani (2001) and Javorick and Saggi (2010) who show that WFE is with the highest level technology rather than the joint ventures (CJV and EJV), Girma et al. (2015) find that foreign invested enterprises with minority (with more than 25% but less than 50% foreign capital) experience higher likelihood of R&D and conclude the joint ventures can positively contribute to the technology innovation. In line with this finding, Ouyang and Yao (2017) further argue that the joint ventures mentioned in Girma et al. (2015) as the EJV employs political

elites while the CJV is lower cost labor driven, more open to the rural migrant workers without *Hukou*. Building on these studies, we examine how the rural-urban wage inequality responds to joint ventures and wholly foreign owed enterprises both in the short run and long run.

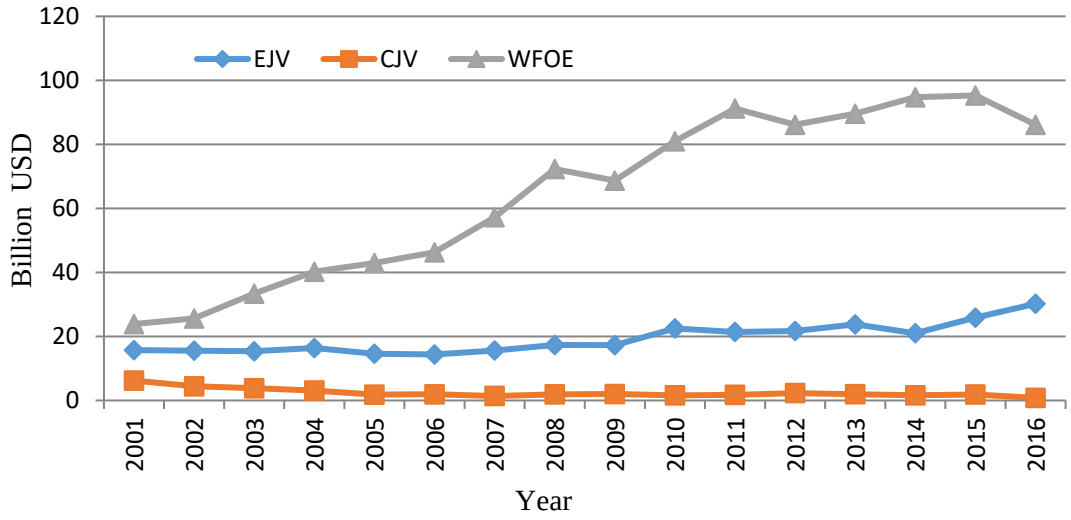

Fig. 3.2a The trend of inward FDI flows by ownership type as volume from 2001 to 2016.
Source: The authors' calculations according to NBSC.

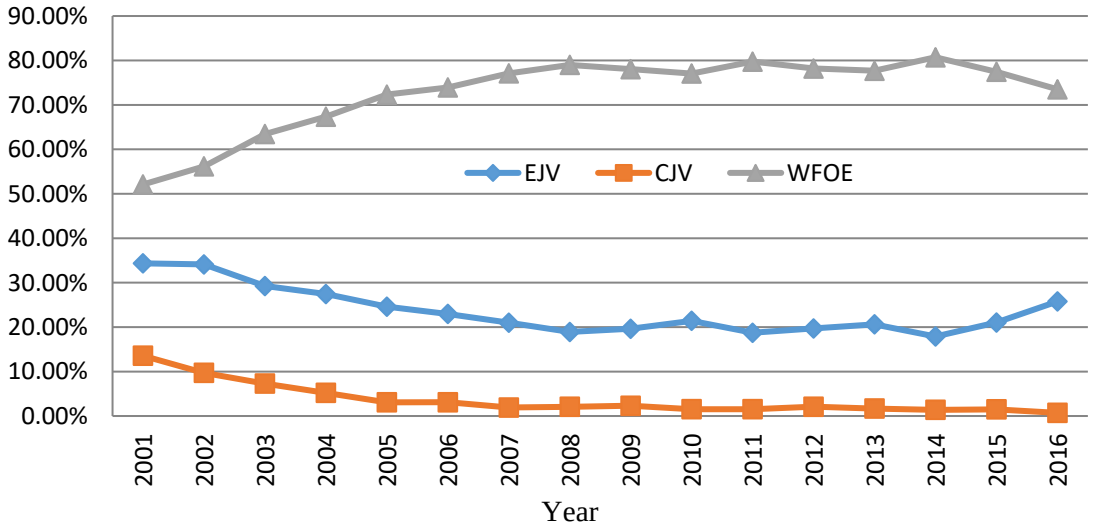

Fig. 3.2b The trend of inward FDI by ownerships type as percentage from 2001 to 2016.
Source: The authors' calculations based on NBSC.

(3) Regional distribution of inward FDI in China

The regional disparities in economic development and inequality are caused by the uneven distribution of inward FDI (see Madariaga & Poncet, 2007; Ouyang & Yao, 2017). The regions that have higher level of international trade, lower wages, more favorable environment for R&D, higher GDP growth rates, better infrastructure, higher returns on physical and human capitals, larger market size, better labor force and more beneficial policies have higher absorptive capacity for FDI (Wei et al., 1999; Cheng & Kwan, 2000; Sun et al., 2002; Cassidy & Andreosso, 2006; Salike, 2016). Moreover, the Special Economic Zones (SEZ) program has played a significant role in attracting foreign capital and shaping the relationship between the FDI and the local economies (Wang, 2013). As shown in Fig. 3.3, regional distribution of FDI in China has not changed much until 2016. The coastal regions still receive the largest portion of inward FDI, whereas the western regions receive the smallest share. This uneven distribution of inward FDI can lead to spatial spillovers, especially from the coastal regions to inland areas (Kanbur & Zhang, 1999; Ouyang & Yao, 2017). Our consideration not only covers inland-coastal spillovers but also the overall picture of inter-regional interactions.

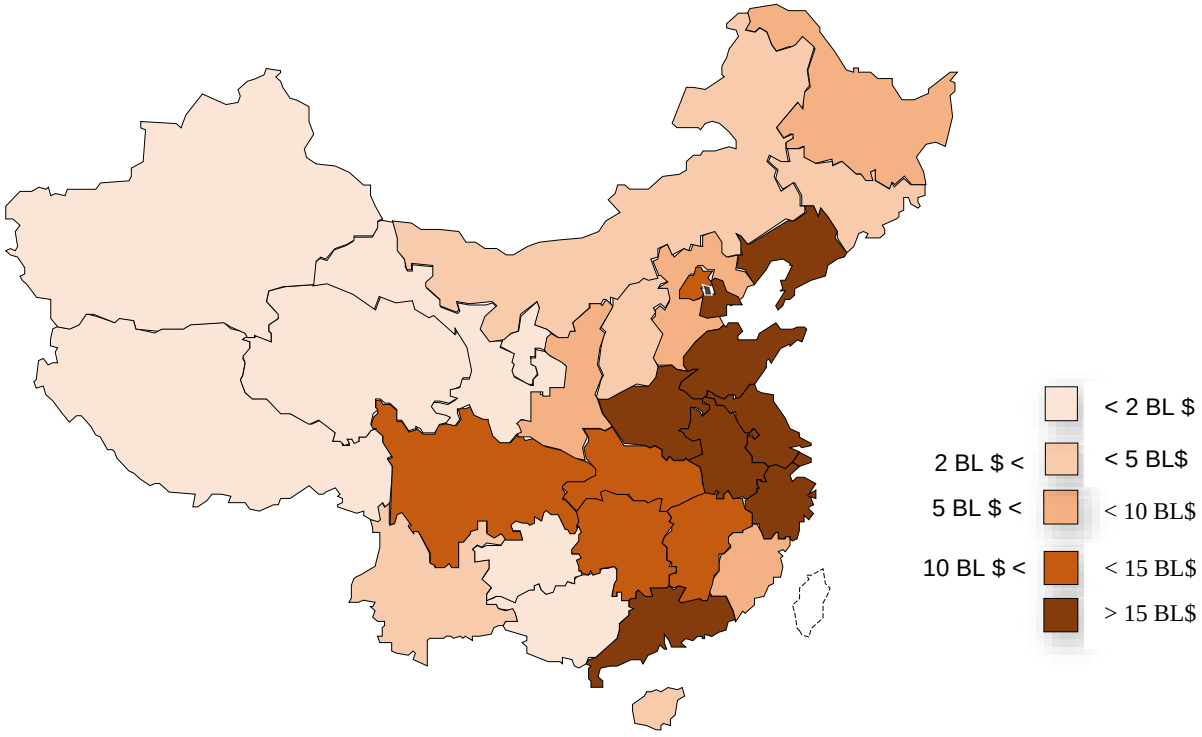

Fig. 3.3 Regional distribution of inward FDI in China in 2016.
Source: The authors' calculations based on NBSC.

3.3 Methodology and Data

3.3.1 The empirical model

We construct the general nesting spatial (GNS) model as follows subject to the spatial correlation tests:

$$Y_{it} = \alpha \sum_{j=1}^{N} w_{ij} Y_{jt} + \beta_1 FDI_{it} + \theta_1 \sum_{j=1}^{N} FDI_{jt} + \beta_2 X_{it} + \theta_2 \sum_{j=1}^{N} w_{ij} X_{jt} + \sigma_i + \mu_t + \varepsilon_{it} \quad (3.1)$$

where Y_{it} is rural-urban wage inequality in region i at time t, X is a vector of control variables; FDI is a vector of different types of FDI intensity measured by FDI to GDP ratio in region i at time t; j represents the another region ($j \neq i$) which can be the source of the spillover; α is the spatial autocorrelation. β and θ are coefficients to be estimated; w_{ij} are elements in the spatial weight matrix; σ_i is the unobserved region fixed effect that is constant over time, μ_t is the unobserved time effect, and ε_{it} an error term. We break down FDI in two ways: according to ownership types into CJV, EJV and WFE, and by sector into primary, secondary and tertiary FDI. The control variables include the overall provincial per capita GDP and its square term to account for the relationship between economic development and income equality (Kuznets, 1955; Li and Zou, 1998; Forbes, 2000; Rubin & Segal, 2015); proxy for human capital (Figini & Görg, 2011; Yang & Qiu, 2016; Campos et al., 2016); and the rural-urban capital and labor ratios (Zhang & Zhang, 2003; Molero-Simarro, 2017).

3.3.2 Data

The data set we use in this study comprises 30 provinces in mainland China from 2000 to 2016. The data sources include the national and provincial statistical yearbooks of the National Bureau of Statistics of China (NBSC). The descriptive statistics of the variables in use are presented in Table 3.1. The trend of rural-urban wage inequality, Gini index and FDI in different sectors and ownership types are presented in Fig. 3.4.

Table 3.1 Descriptive statistics of the variables in use.

Variable	Description	Obs.	Mean	S.D
WI	Rural-urban annual average wage ratio	510	1.44	0.730
CJV	Inward FDI as CJV to GDP ratio (%)	510	0.15	0.003
EJV	Inward FDI as EJV to GDP ratio (%)	510	0.75	0.007
WFE	Inward FDI as WFE to GDP ratio (%)	510	1.81	0.023
PRI	Inward FDI in primary sector to GDP (%)	510	0.08	0.001
SEC	Inward FDI in secondary sector to GDP (%)	510	1.62	0.014
TER	Inward FDI in tertiary sector to GDP ratio (%)	510	1.07	0.012
AGG	Aggregate level inward FDI to GDP (%)	510	2.77	0.023
LR	Urban rural labor ratio	510	72.42	142.85
KR	Urban rural domestic investment ratio	510	2.74	4.51
$PGDP$	Per capita GDP (yuan /person)	510	29312.14	23124.4
EDU	University level graduates to total population (%)	510	0.35	0.0021
TRD	Trade to GDP ratio (%)	510	5.89	7.15

Notes: The primary sector consists of farming, forestry and fishing; the secondary sector consists of manufacturing, mining, production and distribution of electricity, gas and water, and construction; the tertiary sector consists of wholesale and retail, trade, transportation, storage and post, hotel and catering, information, transmission, software and information technology, financial services, intermediation, real estate leasing and business service, scientific research and technical services, water management, environment and public facility service, household service, repair and other service, education, health and social services, culture, sports entertainment, public management, social security and organization services.
Source: The authors' calculation based on NBSC.

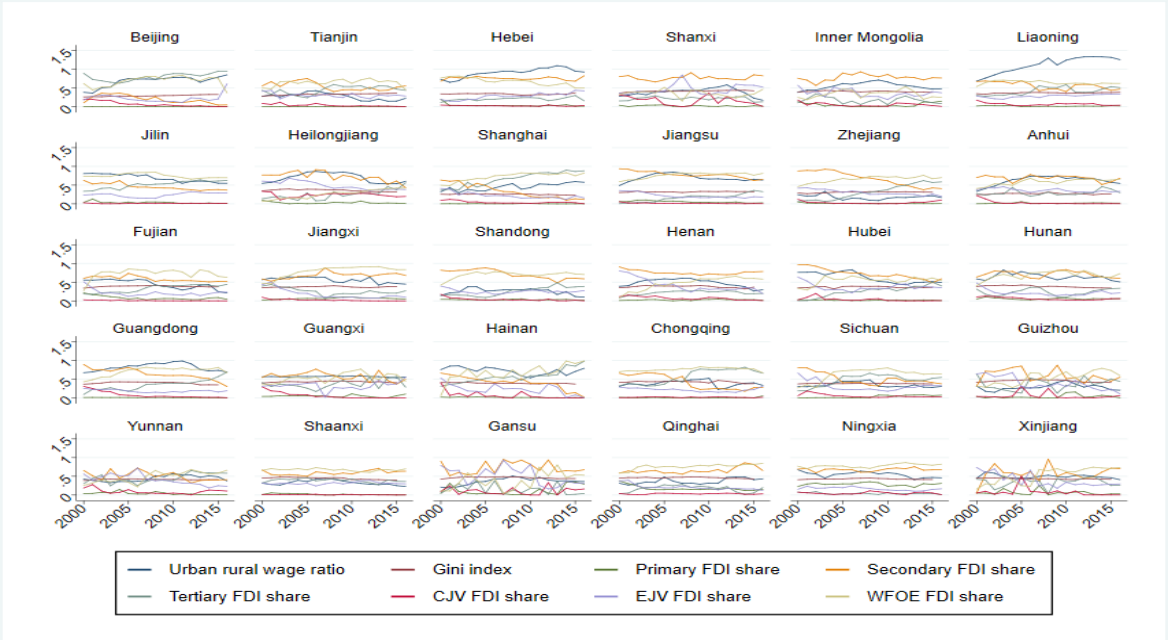

Fig. 3.4 Rural-urban wage inequality, Gini index and inward FDI intensity according to different ownership types and sectors for 30 provinces, 2000-2016.
Note: Gini index at provincial level suffers severe missing data issue, which cannot be used in spatial econometrics that requires strongly balance data.
Source: The authors' calculations according to NBSC.

3.3.3 Spatial econometric model selection

As for the spatial spillover effect of FDI on income inequality, the spatial dependence of FDI should be first identified by the Moran's I test (Moran, 1950), which is the most widely used test for the spatial interdependence. If the outcome of Moran's I test rejects the null hypothesis that there is no spatial dependence, the Lagrange multiplier (LM) test developed by Anselin et al. (1996) for the spatial autoregressive pattern is applied. The LM test provides suggestions for spatial model selections. If the test results reject the null hypothesis that there is neither spatial nor error dependence, spatial Durbin model (SDM) is superior to other spatial models. Then, Wald spatial lagged test and Wald spatial error test should be conducted for the proper form of SDM since it is the general form of spatial autoregressive model (SAR), Spatial Lagged variables (SLX) and Spatial Error Model (SEM) (Vega & Elhorst, 2015) (see Fig. 3.5). If the Wald spatial lagged statistic rejects the null hypothesis, $H_0: \theta = 0$ and the Wald error statistic rejects the null hypothesis, $H_0: \theta = -\rho\beta$ at the same time, the original form of SDM most properly captures the spatial issue in terms of data (Elhorst, 2014).

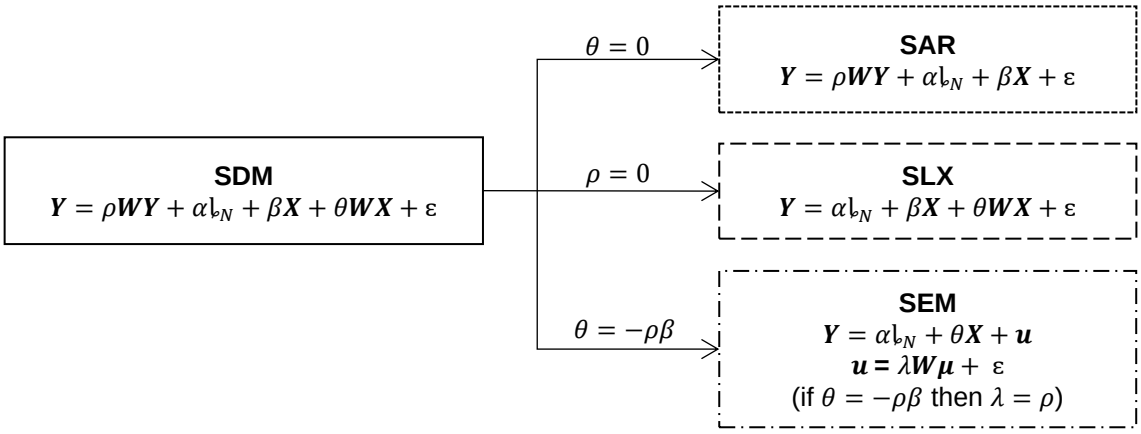

Fig. 3.5 Comparison of different spatial econometric model specifications originated from SDM.

3.4 Empirical results

3.4.1 Spatial correlation test

Both the results of the Moran's I test and Geary's C test (Geary, 1954) shown in Table 2 reject the null hypotheses that the inward FDI and rural-urban wage

inequality in different regions are spatially independent at the 1% statistical significance level. Therefore, a spatial econometric model is required to capture the inward FDI spillovers on rural-urban wage inequality. Further, the results of the LM and robust LM tests both reject the null hypotheses, which support the adoption of the SDM model.[12] Besides, both the results of the Wald spatial error test and Wald spatial lag test reject the null hypothesis at the 1% statistical significance level suggesting that the original form of SDM should be selected as we previously discussed in section 3.3.3.

Table 3.2 Tests for spatial issues.

		Inward FDI in different sectors		Inward FDI in different ownership types	
		Statistic	P-value	Statistic	P-value
Spatial dependence	Moran's I	0.2885	0.0000	0.3702	0.0000
	Geary's C	0.7314	0.0000	0.6410	0.0000
	Wald	787.6164	0.0000	1006.9035	0.0000
Spatial error	LM (B)	278.7285	0.0000	458.8209	0.0000
	Robust LM	353.2603	0.0000	512.7190	0.0000
Spatial lag	LM (A)	22.4012	0.0000	8.8928	0.0029
	Robust LM	96.9330	0.0000	62.7909	0.0000

Notes: 1. LM, Lagrange multiplier test; 2. LM (A), Lagrange multiplier test (Anselin); 3.LM(B), Lagrange multiplier test (Burridge).

The prerequisite for spatial models is that the elements in the spatial weight matrix have to be exogenous, or the validity of the empirical models cannot be guaranteed (Anselin and Bera, 1998; Keller, 2002). The spatial weight matrix used for the spatial tests and the SDM model relies uniquely on the geographic distance between provinces. We use the actual geographic distance for the construction of the matrix as proposed by Madariaga and Poncet (2007) instead of contiguity (Lesage, 1999; Kelejian et al., 2013; Huang & Chand, 2015. The spatial weight matrix is constructed as $W_{ij} = 1/D_{ij}$ where D_{ij} is the geographic distance between province i and province j.

[12] See detailed explanations in both theoretical and practical ways in Elhorst (2014), Huang and Chand (2015).

3.4.2 Rural-urban wage inequality and inward FDI in different sectors

Table 3.3 presents the estimation results for the effect of inward FDI in different sectors on rural-urban wage inequality. Model 1 includes three different types of inward FDI with respect to sectors in one regression while model 2, 3, and 4 separate them into different regressions.[13] In model 5, we introduce total FDI aggregated across all three sectors. The coefficients of FDI are mostly insignificant except that the FDI in primary sector is negative at 10% significance level in model 1 and 5% significance level in model 2. In terms of spatially lagged FDI, only FDI in aggregate level has a weakly significant and negative effect on the rural-urban wage inequality. Table 3.3 provides us with an overview of interaction among regions for the FDI's impact on rural-urban wage inequality. However, solely reliance on these spatial estimators can lead to incomplete and even biased conclusions due to two reasons. First, the spatial estimators do not present the marginal effect of variations in independent variables. Second, the spatial estimators may cause divergences in different specifications of spatial regression models (Lesage & Pace, 2009; Huang & Chand, 2015; Huang et al., 2017). Therefore, in Table 3.4, we also report the partial derivative summary indicators introduced by Lesage & Pace (2009), distinguishing the direct[14], indirect and total effect of the explanatory variables. Note that the direct effect refers to the feedback effects to the neighboring regions and back to the host region, the indirect effect is the difference between total effect and direct effect to capture the spillover effect.

Table 3.3 SDM: Impact of inward FDI in different sectors on rural-urban wage inequality.

Variables	Model (1)		Model (2)		Model (3)		Model (4)		Model (5)	
PRI	-0.007**	(-2.38)	-0.006**	(-2.38)						
SEC	0.008	(0.90)			-0.001	(-0.12)				
TER	-0.007	(-0.96)					-0.006	(-1.03)		
AGG									0.011	(1.13)
EDU	-0.027	(-0.93)	-0.027	(-0.91)	-0.026	(-0.89)	-0.024	(-0.82)	-0.034	(-1.15)
TRD	-0.017	(-1.00)	-0.019	(-1.19)	-0.017	(-1.04)	-0.016	(-0.97)	-0.019	(-1.15)
LR	0.014	(0.39)	0.009	(0.25)	-0.001	(-0.05)	0.010	(0.29)	-0.001	(0.25)

[13] Some studies include all types of FDI in one regression (for example, see Girma et al., 2015; Ouyang & Yao, 2017) while some others separate them in different regressions (for example, see Huang et al., 2017; Wang et al., 2018). Here, we include both as a comparison.

[14] The direct effect captures the endogenous interplay between the host regions and its neighbour regions that triggers feedback effects.

KR	0.027***	(2.76)	0.026***	(2.69)	0.025**	(2.56)	0.024**	(2.53)	0.026***	(2.66)
$PGDP$	-0.052	(-0.26)	0.008	(0.04)	-0.097	(-0.48)	-0.067	(-0.35)	-0.159	(-0.38)
$PGDP$	-0.005	(-0.48)	-0.008	(-0.82)	-0.003	(-0.27)	-0.004	(-0.45)	0.001	(0.08)
$W \times PRI$	-0.020	(-1.60)	-0.022*	(-1.79)						
$W \times SEC$	-0.004	(-0.05)			-0.055	(-0.94)				
$W \times TER$	-0.001	(-0.04)					-0.020	(-1.03)		
$W \times AGG$									-0.110*	(-1.74)
$W \times EDU$	0.358***	(4.21)	0.367***	(4.68)	0.418***	(5.10)	0.402***	(4.97)	0.414***	(5.26)
$W \times TRD$	0.057	(0.61)	0.017	(0.29)	0.058	(1.06)	0.064	(1.19)	0.055	(1.00)
$W \times LR$	-0.446**	(-2.53)	-0.477***	(-2.87)	-0.545***	(-3.21)	-0.477***	(-2.81)	-0.483***	(-2.83)
$W \times KR$	0.051	(1.13)	0.053	(1.20)	0.051	(1.11)	0.047	(1.04)	0.045	(1.01)
W × PGDP	-1.361	(-1.53)	-1.531*	(-1.76)	-1.864**	(-0.90)	-1.899**	(-2.21)	-1.575*	(-1.80)
$W \times PGDP^2$	0.070	(1.60)	0.078*	(1.84)	0.946**	(2.20)	0.096**	(2.28)	0.079*	(1.85)
Fixed effect	Yes		Yes		Yes		Yes		Yes	
Observations	510		510		510		510		510	
R-squared	0.2527		0.2093		0.2000		0.2137		0.2054	

Notes: 1. Independent variable is urban rural wage ratio; 2. All variables are in logarithms; 3. Significant at *10 percent, **5 percent, ***1 percent; 4. Robust z-values are in parentheses; 4. W is the distance weight matrix.

Table 3.4 shows that the total effect of FDI in the primary sector is negative at 5% significance level. This indicates that 1% increase in primary sector FDI reduces rural-urban wage inequality by 2.1%. Out of this, 1.5% is due to the spatial spillover effect. Although such effect is small given the small share of the primary sector in overall FDI, this confirms our finding that the inward FDI in the traditional sector such as agriculture and forestry is beneficial for the rural workers in terms of offering higher wage and better opportunities. However, there is no significant relationship between inward FDI in other sectors and the rural-urban wage inequality. This is in line with Yu et al. (2011) and Greaney and Li (2017) who find no evidence that rural-urban wage gap links to the activities multinationals.

Table 3.4 Direct, indirect and total effect: Impact of inward FDI in different sectors on rural-urban wage inequality.

Variables	Model (1)		Model (2)		Model (3)		Model (4)		Model (5)	
Panel A: Direct effect										
PRI	-0.006**	(-2.16)	-0.006**	(-2.14)						
SEC	0.008	(0.89)			0.000	(0.01)				
TER	-0.006	(-0.88)					-0.006	(-0.91)		
AGG									0.013	(1.27)
EDU	-0.034	(-1.17)	-0.034	(-1.21)	-0.033	(-1.19)	-0.031	(-1.11)	-0.042	(-1.46)
TRD	-0.017	(-1.05)	-0.018	(-1.13)	-0.016	(-1.00)	-0.015	(-0.95)	-0.018	(-1.12)
LR	0.023	(0.63)	0.016	(0.48)	0.006	(0.17)	0.016	(0.48)	0.006	(0.17)
KR	0.026***	(2.60)	0.025***	(2.73)	0.024**	(2.59)	0.023**	(2.57)	0.025***	(2.70)
$PGDP$	-0.032	(-0.15)	0.041	(0.22)	-0.066	(-0.34)	-0.032	(-0.18)	-0.131	(-0.68)
$PGDP^2$	-0.006	(-0.55)	-0.010	(-1.00)	-0.004	(-0.42)	-0.006	(-0.64)	-0.001	(-0.18)
Panel B: Indirect effect										
PRI	-0.014	(-1.43)	-0.015*	(-1.71)						
SEC	-0.008	(-0.17)			-0.045	(-1.00)				
TER	0.002	(0.06)					-0.015	(-0.66)		
AGG									-0.091*	(-1.87)
EDU	0.279***	(5.11)	0.292***	(5.76)	0.342***	(5.99)	0.328***	(5.98)	0.338***	(6.33)
TRD	0.018	(0.40)	0.017	(0.37)	0.049	(1.08)	0.054	(1.21)	0.047	(1.04)
LR	-0.354***	(-2.71)	-0.376***	(-3.09)	-0.440***	(-3.35)	-0.387***	(-3.07)	-0.387***	(-3.08)
KR	0.032	(0.90)	0.035	(1.03)	0.035	(0.99)	0.032	(0.92)	0.031	(0.87)
$PGDP$	-0.973	(-1.58)	-1.239*	(-1.92)	-1.518**	(-2.29)	-1.558**	(-2.41)	-1.261*	(-1.92)
$PGDP^2$	0.052*	(1.71)	0.065**	(2.06)	0.078**	(2.38)	0.081**	(2.51)	0.065**	(2.00)
Panel C: Total effect										
PRI	-0.020**	(-2.03)	-0.021**	(-2.32)						
SEC	-0.001	(-0.01)			-0.046	(-1.01)				

TER	-0.004	(-0.15)					-0.021	(-0.97)		
AGG									-0.078	(-1.59)
EDU	0.245***	(4.39)	0.257***	(4.98)	0.308***	(5.44)	0.296***	(5.47)	0.295***	(5.61)
TRD	0.001	(0.03)	-0.001	(-0.02)	0.033	(0.78)	0.039	(0.94)	0.028	(0.69)
LR	-0.331***	(-2.63)	-0.360***	(-3.13)	-0.434***	(-3.50)	-0.371***	(-3.06)	-0.382***	(-3.19)
KR	0.058	(1.56)	0.061	(1.05)	0.060	(1.57)	0.056	(1.50)	0.056	(1.50)
$PGDP$	-1.005*	(-1.67)	-1.199*	(-1.88)	-1.584**	(-2.46)	-1.591**	(-2.49)	-1.391***	(-2.17)
$PGDP^2$	0.046	(1.56)	0.056*	(1.78)	0.074**	(2.34)	0.074**	(2.36)	0.064**	(2.04)

Notes: 1. All variables are in logarithms; 2. Significant at *10 percent, **5 percent, ***1 percent; 3. Robust z-values are in parentheses.

Similarly, in Table 3.5 and Table 3.6 we report and interpret the effect of inward FDI according to different ownership formats on the rural-urban wage inequality. There is no significant relationship between CJV and rural-urban wage inequality. EJV has a positive direct effect on the rural-urban wage inequality. This indicates that the EJV causes a significant interplay between the host region and nearby regions. 1% increase in the EJV increases rural-urban wage inequality by 2.3%. This is in line with Girma et al. (2015) and Ouyang and Yao (2017) who argue that EJV has the highest capability for technology innovation and increases the rural-urban wage inequality in the short run. Yet, the indirect effect and total effect are insignificant. Among the three ownership types of inward FDI, WFE is found to have a negative indirect effect and total effect on the rural-urban wage inequality at 5% significance level. Note that the total effect is mainly driven by the spatial spillover effect, which indicates that the WFE help reduce the rural-urban wage inequality. A possible explanation is that the wholly foreign owned enterprises are to some extent lower labor cost driven. They create more job opportunities with less restriction on Hukou than the Chinese owned joint ventures. As they are located primarily in the coastal developed provinces, they cause the spatial spillover effects via the rural migrant workers from inland regions.

Table 3.5 SDM: Impact of inward FDI by ownership type on rural-urban wage inequality.

Variables	Model (1)		Model (2)		Model (3)		Model (4)		Model (5)	
CJV	0.003	(1.37)	0.003	(1.38)						
EJV	0.023***	(2.78)			0.017**	(2.20)				
$WFOE$	-0.014	(-1.51)					-0.002	(-0.24)		
AGG									0.011	(1.13)
EDU	-0.025	(-0.87)	-0.021	(-0.73)	-0.028	(-0.95)	-0.028	(-0.97)	-0.034	(-1.15)
TRD	-0.009	(-0.52)	-0.016	(-0.96)	-0.017	(-1.01)	-0.016	(-0.98)	-0.019	(-1.15)
LR	0.013	(0.37)	0.001	(0.03)	0.003	(0.09)	0.003	(0.10)	-0.001	(0.25)
KR	0.023**	(2.43)	0.023**	(2.36)	0.027***	(2.78)	0.022**	(2.30)	0.026***	(2.66)
$PGDP$	-0.199	(-0.99)	-0.109	(-0.57)	-0.142	(-0.74)	-0.124	(-0.62)	-0.159	(-0.38)
$PGDP$	0.003	(0.27)	-0.002	(-0.23)	-0.001	(-0.01)	-0.001	(-0.09)	0.001	(0.08)
$W \times CJV$	0.019	(1.57)	0.010	(0.84)						
$W \times EJV$	-0.019	(-0.42)			-0.041	(-0.94)				
$W \times WFE$	-0.134***	(-2.69)					-0.110**	(-2.30)		
$W \times AGG$									-0.110*	(-1.74)
$W \times EDU$	0.556***	(5.96)	0.434***	(5.16)	0.396***	(5.09)	0.472***	(5.56)	0.414***	(5.26)
$W \times TRD$	0.064	(1.16)	0.069	(1.29)	0.062	(1.13)	0.064	(1.17)	0.055	(1.00)
$W \times LR$	-0.491***	(-2.83)	-0.479***	(-2.78)	-0.542***	(-3.25)	-0.529***	(-3.80)	-0.483***	(-2.83)

$W \times KR$	0.013	(0.30)	0.039	(0.86)	0.039	(0.87)	0.032	(0.72)	0.045	(1.01)
$W \times PGDP$	-2.248**	(-2.48)	-2.322**	(-2.54)	-1.820**	(-2.12)	-1.789**	(-2.08)	-1.575*	(-1.80)
$W \times PGDP^2$	0.108**	(2.46)	0.116***	(2.61)	0.093**	(2.21)	0.089**	(2.10)	0.079*	(1.85)
Year fixed	Yes		Yes		Yes		Yes		Yes	
Region fixed	Yes		Yes		Yes		Yes		Yes	
Obs.	510		510		510		510		510	
R-squared	0.2194		0.2110		0.2075		0.2047		0.2054	

Notes: 1. Independent variable is urban rural wage ratio; 2. All variables are in logarithms; 3. Significant at *10 percent, **5 percent, ***1 percent; 4. Robust z-values are in parentheses. 4. W is the distance weight matrix.

Table 3.6 Direct, indirect and total effect: Impact of inward FDI by ownership type on rural-urban wage inequality.

Variables	Model (1)		Model (2)		Model (3)		Model (4)		Model (5)	
Panel A: Direct effect										
CJV	0.003	(1.22)	0.003	(1.31)						
EJV	0.023***	(2.84)			0.017**	(2.22)				
$WFOE$	-0.012	(-1.21)					-0.001	(-0.01)		
AGG									0.013	(1.27)
EDU	-0.036	(-1.28)	-0.029	(-1.05)	-0.035	(-1.24)	-0.037	(-1.32)	-0.042	(-1.46)
TRD	-0.010	(-0.61)	-0.016	(-0.94)	-0.016	(-0.98)	-0.016	(-0.96)	-0.018	(-1.12)
LR	0.023	(0.66)	0.008	(0.24)	0.011	(0.32)	0.011	(0.33)	0.006	(0.17)
KR	0.024**	(2.32)	0.023**	(2.40)	0.027***	(2.81)	0.022**	(2.34)	0.025***	(2.70)
$PGDP$	-0.169	(-0.81)	-0.066	(-0.36)	-0.109	(-0.59)	-0.091	(-0.48)	-0.131	(-0.68)
$PGDP^2$	0.002	(0.11)	-0.004	(-0.45)	-0.002	(-0.23)	-0.003	(-0.25)	-0.001	(-0.16)
Panel B: Indirect effect										
CJV	0.013	(1.45)	0.006	(0.72)						
EJV	-0.022	(-0.66)			-0.034	(-1.13)				
WFE	-0.094**	(-2.30)					-0.087**	(-2.38)		
AGG									-0.091*	(-1.87)
EDU	0.414***	(7.19)	0.344***	(6.36)	0.322***	(6.15)	0.378***	(6.57)	0.338***	(6.33)
TRD	0.049	(1.18)	0.057	(1.31)	0.052	(1.15)	0.053	(1.20)	0.047	(1.04)
LR	-0.367***	(-2.90)	-0.379***	(-2.85)	-0.435***	(-3.43)	-0.421***	(-3.36)	-0.387***	(-3.08)
KR	0.003	(0.08)	0.025	(0.72)	0.025	(0.71)	0.021	(0.59)	0.031	(0.87)
$PGDP$	-1.549**	(-2.58)	-1.892***	(-2.76)	-1.464**	(-2.27)	-1.423**	(-2.22)	-1.261*	(-1.92)
$PGDP^2$	0.076**	(2.59)	0.093***	(2.87)	0.077**	2.39)	0.073**	(2.27)	0.065**	(2.00)
Panel C: Total effect										
CJV	0.016*	(1.87)	0.009	(1.12)						
EJV	0.002	(0.06)			-0.021	(-0.63)				
WFE	-0.105**	(-2.51)					-0.087**	(-2.00)		
AGG									-0.078	(-1.59)
EDU	0.378***	(6.50)	0.314***	(5.80)	0.287***	(5.50)	0.341 ***	(5.99)	0.295***	(5.61)
TRD	0.039	(1.00)	0.042	(1.04)	0.036	(0.86)	0.037	(0.91)	0.028	(0.69)
LR	-0.343***	(-2.89)	-0.371***	(-2.99)	-0.424***	(-3.35)	-0.409***	(-3.48)	-0.382***	(-3.19)
KR	0.008	(0.17)	0.047	(1.29)	0.052	(1.39)	0.043	(1.15)	0.056	(1.15)
$PGDP$	-1.718***	(-2.99)	-1.892***	(-2.91)	-1.573**	(-2.48)	-1.515**	(-2.43)	-1.391***	(-2.17)
$PGDP^2$	0.078***	(2.78)	0.088***	(2.78)	0.075**	(2.37)	0.070**	(2.27)	0.064**	(2.04)

Notes: 1. All variables are in logarithms; 2. Significant at *10 percent, **5 percent, ***1 percent; 3. Robust z-values are in parentheses.

3.4.3 Robustness check: the impact of inward FDI over longer periods

So far, we presented results obtained with annual data. This has the advantage of capturing the short-term fluctuations in the data as well as having a large number of degrees of freedom. However, the downside is that while FDI flows can fluctuate considerably from one year to another, wage inequality tends to be rather persistent

and changes only slowly. Therefore, as a robustness check, we re-estimate the analysis also with longer periods. It is common in the literature to work with average values over five-year periods. Since our data covers the period from 2000 to 2016, we construct three sub-periods, namely, 2000 to 2005 (six years), 2006 to 2011 (six years) and 2012 to 2016 (five years). The purpose of this analysis is to confirm whether the pattern obtained with annual data holds also in longer term.

Table 3.7 shows that in the estimation with period averages, the coefficient of inward FDI in the primary sector and tertiary sector is statistically negative while the coefficient of inward FDI in the secondary sector is statistically significant and positive. Yet, in terms of spatially lagged inward FDI, there is no significant relationship. The results in Table 3.8 further confirms that there is neither significant total effect nor spillover effect, which is broadly consistent with the previous results in the short term.

The results in table 3.9 and 3.10 show that in the longer period the WFE also has a negative total and indirect effect on the rural-urban wage inequality (mainly from the spatial spillover effect), consistent with the previous results. 1% increases of WFE decreases the rural-urban wage inequality by 17.5%/20.9% in model 1 and 17.5%/18.2% in model 3 from the spillover/total effect. Comparatively, this effect is stronger when estimated with period averages than in the short run estimation in Tables 3.5 and 3.6. In addition, EJV, which does not have any significant effects in the short run, turns to be negatively related to the rural-urban wage inequality in the longer period. These results in the longer period are theoretically and empirically consistent with (Aghion & Howitt, 1998; Figini & Görg, 2011; Ucal et al., 2016) in the sense that in a longer period when domestic firms manage to mitigate and learn the know-how via the technology spillovers of multinationals, the wage inequality decreases. These results are also in line with Wei and Wu (2001) who argue that the globalization has helped reduce, rather than increase the rural-urban wage income inequality and with Jalil (2012) who finds that income inequality rises with the increase of openness and falls after a certain point, which suggests that China has passed the early stage of hosting inward FDI.

Table 3.7 SDM: Impact of inward FDI in different sectors on rural-urban wage inequality: averages.

Variables	Model (1)		Model (2)		Model (3)		Model (4)		Model (5)	
$PRI_{Average}$	-0.021***	(-4.72)	-0.011***	(-2.75)						
$SEC_{Average}$	0.078***	(7.25)			0.013*	(1.77)				
$TER_{Average}$	-0.065***	(-6.63)					-0.026***	(-3.42)		
$AGG_{Average}$									0.012	(1.36)
$EDU_{Average}$	0.017	0.027)	0.037	(1.32)	0.017	(0.62)	0.028	(1.09)	0.011	(0.41)
$TRD_{Average}$	0.051***	(7.59)	0.033***	(5.12)	0.037***	(6.04)	0.042***	(6.48)	0.036***	(5.98)
$LR_{Average}$	-0.027	(-0.88)	-0.090***	(-3.21)	-0.099***	(-3.57)	-0.065**	(-2.23)	-0.086***	(0.25)
$KR_{Average}$	0.004	(0.34)	-0.004	(-0.31)	-0.003	(-0.28)	-0.006	(-0.44)	-0.009	(-0.64)
$PGDP_{Average}$	-0.664***	(-3.95)	-0.418***	(-2.67)	-0.681***	(-4.26)	-0.402***	(-2.69)	-0.643***	(-4.15)
$PGDP^2{}_{Average}$	0.021**	(2.49)	0.008	(0.007)	0.023*	(2.84)	0.008	(1.16)	0.022***	(2.82)
$W \times PRI_{Average}$	-0.028	(-1.04)	-0.015	(-0.66)						
$W \times SEC_{Average}$	0.051	(0.51)			-0.215***	(-2.88)				
$W \times TER_{Average}$	0.029	(0.54)					-0.029	(-0.55)		
$W \times AGG_{Average}$									-0.321***	(-4.07)
$W \times EDU_{Average}$	0.509***	(3.80)	0.754***	(7.83)	0.951***	(8.76)	0.814***	(7.20)	0.988***	(9.53)
$W \times TRD_{Average}$	0.448***	(6.77)	0.462***	(6.61)	0.473***	(7.48)	0.482***	(7.85)	0.496***	(8.15)
$W \times LR_{Average}$	0.363*	(1.81)	-0.217	(-1.36)	-0.332*	(-2.07)	0.041	(0.22)	-0.160	(-0.99)
$W \times KR_{Average}$	-0.037	(-0.42)	-0.001	(-0.01)	-0.041	(-0.91)	-0.001	(0.01)	-0.088	(-0.95)
$W \times PGDP_{Average}$	-2.230**	(-2.37)	-4.573***	(-5.38)	-4.801***	(-5.63)	-4.769***	(-5.40)	-4.935***	(-5.87)
$W \times PGDP^2{}_{Average}$	0.092*	(2.10)	0.211***	(5.22)	0.215***	(5.34)	0.213***	(5.16)	0.217***	(5.47)
Year fixed	Yes		Yes		Yes		Yes		Yes	
Region fixed	Yes		Yes		Yes		Yes		Yes	
Observations	90		90		90		90		90	
R-squared	0.3613		0.2549		0.2495		0.2589		0.2550	

Notes: 1. All variables are measured as period averages. 2. All variables are in logarithms; 3. Significant at *10 percent, **5 percent, ***1 percent; 4. Robust *z*-values are in parentheses.

Table 3.8 Direct, indirect and total effect: Impact of inward FDI by sector on rural-urban wage inequality: averages.

Variables	Model (1)		Model (2)		Model (3)		Model (4)		Model (5)	
Panel A: Direct effect										
$PRI_{Average}$	-0.020***	(-4.60)	-0.010**	(-2.59)						
$SEC_{Average}$	0.079***	(7.28)			0.025***	(2.69)				
$TER_{Average}$	-0.068***	(-6.35)					-0.025***	(-2.65)		
$AGG_{Average}$									0.016	(0.69)
$EDU_{Average}$	-0.004	(-0.15)	0.003	(0.11)	-0.031	(-1.15)	-0.009	(-0.35)	-0.038	(-1.45)
$TRD_{Average}$	0.034***	(5.10)	0.015**	(2.19)	0.017***	(2.62)	0.023***	(3.18)	0.015**	(2.30)
$LR_{Average}$	-0.042	(-1.31)	-0.085***	(-2.74)	-0.089***	(-2.86)	-0.071**	(-2.30)	-0.084***	(-2.73)
$KR_{Average}$	0.006	(0.52)	-0.005	(-0.39)	-0.002	(-0.19)	0.023**	(2.57)	-0.005	(-0.43)
$PGDP_{Average}$	-0.603***	(-3.38)	-0.219	(-1.37)	-0.477***	(-2.85)	-0.189	(-0.154)	-0.430***	(-2.66)
$PGDP^2{}_{Average}$	0.018**	(2.05)	-0.001	(-0.17)	0.013	(0.008)	-0.001	(-0.18)	0.012	(1.49)
Panel B: Indirect effect										
$PRI_{Average}$	-0.002	(-0.18)	-0.001	(-0.15)						
$SEC_{Average}$	-0.022	(-0.47)			-0.113	(-3.26)				
$TER_{Average}$	0.052*	(1.75)					0.001	(0.01)		
$AGG_{Average}$									-0.209**	(-2.28)
$EDU_{Average}$	0.255***	(4.73)	0.361***	(10.00)	0.456***	(10.63)	0.393***	(9.28)	0.478***	(11.61)
$TRD_{Average}$	0.206***	(5.57)	0.215***	(6.04)	0.208***	(6.75)	0.217***	(6.86)	0.221***	(7.27)
$LR_{Average}$	0.196*	(1.81)	-0.056	(-0.68)	-0.100	(-1.23)	0.059	(0.68)	-0.024	(-0.30)
$KR_{Average}$	-0.021	(-0.52)	0.004	(0.11)	-0.153	(-0.41)	0.006	(0.14)	-0.036	(-0.90)
$PGDP_{Average}$	-0.757*	(-1.80)	-2.099***	(-5.43)	-1.955***	(-5.01)	-2.188***	(-5.64)	-2.040***	(-7.57)
$PGDP^2{}_{Average}$	0.035*	(1.72)	0.103***	(5.49)	0.092***	(4.88)	0.103***	(5.53)	0.093***	(5.08)
Panel C: Total effect										
$PRI_{Average}$	–0.022*	(-1.67)	-0.012	(-1.14)						
$SEC_{Average}$	0.057	(1.23)			-0.089***	(-2.84)				
$TER_{Average}$	-0.015	(-0.64)					-0.025	(-1.13)		
$AGG_{Average}$									-0.193**	(-2.22)
$EDU_{Average}$	0.251***	(4.43)	0.364***	(10.06)	0.426***	(10.47)	0.384***	(9.63)	0.439***	(11.38)
$TRD_{Average}$	0.240***	(6.36)	0.229***	(6.42)	0.226***	(7.36)	0.240***	(7.43)	0.236***	(0.69)

$LR_{Average}$	0.154	(1.50)	-0.142**	(-2.07)	-0.189***	(-2.91)	-0.011	(-0.14)	-0.108*	(-1.65)
$KR_{Average}$	-0.015	(-0.32)	-0.001	(-0.01)	-0.018	(-0.41)	-0.001	(-0.02)	-0.041	(-0.91)
$PGDP_{Average}$	-1.360***	(-3.39)	-2.318***	(-6.59)	-2.431***	(-7.32)	-2.377***	(-6.97)	-2.471***	(-7.57)
$PGDP^2{}_{Average}$	0.053***	(2.79)	0.102***	(6.02)	0.159***	(6.67)	0.102***	(6.27)	0.064**	(2.04)

Notes: 1. All variables are measured as period averages. 2. All variables are in logarithms; 3. Significant at *10 percent, **5 percent, ***1 percent; 4. Robust z-values are in parentheses.

Table 3.9 SDM: Impact of inward FDI by ownership type on rural-urban wage inequality: averages.

Variables	Model (1)		Model (2)		Model (3)		Model (4)		Model (5)	
$CJV_{Average}$	0.005	(0.76)	0.005	(0.31)						
$EJV_{Average}$	0.048**	(2.13)			0.025***	(3.34)				
$WFE_{Average}$	-0.058**	(-2.32)					-0.023	(-1.44)		
$AGG_{Average}$									0.012	(1.36)
$EDU_{Average}$	-0.027	(-1.00)	0.012	(0.43)	0.022	(0.83)	0.008	(0.30)	0.011	(0.41)
$TRD_{Average}$	0.019***	(2.96)	0.036***	(5.34)	0.032***	(5.09)	0.036***	(5.96)	0.036***	(5.98)
$LR_{Average}$	0.022	(0.73)	-0.069**	(-2.36)	-0.076***	(-2.73)	-0.076***	(-2.71)	-0.086***	(0.25)
$KR_{Average}$	0.020	(1.43)	0.007	(0.51)	-0.002	(-0.16)	-0.009	(-0.66)	-0.009	(-0.64)
$PGDP_{Average}$	-0.402**	(-2.50)	-0.461***	(-3.06)	-0.669***	(-4.45)	-0.472***	(-2.97)	-0.643***	(-4.15)
$PGDP^2{}_{Average}$	0.107	(1.30)	0.011	(1.41)	0.023***	(2.97)	0.014*	(1.70)	0.022***	(2.82)
$W \times CJV_{Average}$	-0.042	(-1.57)	-0.078	(-1.31)						
$W \times EJV_{Average}$	-0.097	(-1.46)			-0.231***	(-3.87)				
$W \times WFE_{Average}$	-0.409**	(-2.28)					-0.369***	(-2.45)		
$W \times AGG_{Average}$									-0.321***	(-4.07)
$W \times EDU_{Average}$	1.036***	(9.47)	0.750***	(7.60)	0.943***	(9.24)	0.978***	(9.51)	0.988***	(9.53)
$W \times TRD_{Average}$	0.451***	(6.94)	0.531***	(7.88)	0.504***	(8.27)	0.492***	(8.04)	0.496***	(8.15)
$W \times LR_{Average}$	-0.288	(-1.55)	-0.425**	(-2.54)	-0.474***	(-2.88)	-0.045	(-0.27)	-0.160	(-0.99)
$W \times KR_{Average}$	-0.040	(-0.41)	0.062	(0.68)	-0.128	(-1.31)	-0.025	(-0.28)	-0.088	(-0.95)
$W \times PGDP_{Average}$	-3.589***	(-3.68)	-4.306***	(-4.99)	-5.682***	(-6.28)	-4.483***	(-5.33)	-4.935***	(-5.87)
$W \times PGDP^2{}_{Average}$	0.154***	(3.30)	0.201***	(4.95)	0.261***	(6.12)	0.195***	(4.84)	0.217***	(5.47)
Year fixed	Yes		Yes		Yes		Yes		Yes	
Regions fixed	Yes		Yes		Yes		Yes		Yes	
Observations	90		90		90		90		90	
R-squared	0.3145		0.2403		0.2666		0.2844		0.2550	

Notes: 1. All variables are measured as period averages. 2. All variables are in logarithms; 3. Significant at *10 percent, **5 percent, ***1 percent; 4. Robust z-values are in parentheses.

Table 3.10 Direct, indirect and total effect: Impact of inward FDI by ownership type on rural-urban wage inequality: averages.

Variables	Model (1)		Model (2)		Model (3)		Model (4)		Model (5)	
Panel A: Direct effect										
$CJV_{Average}$	0.009	(1.01)	0.006	(0.76)						
$EJV_{Average}$	0.057**	(2.24)			0.022	(1.07)				
$WFE_{Average}$	-0.035	(-1.56)					-0.007	(-0.36)		
$AGG_{Average}$									0.016	(0.69)
$EDU_{Average}$	-0.065	(-1.06)	-0.027	(-1.00)	-0.023	(-0.88)	-0.041	(-1.50)	-0.038	(-1.45)
$TRD_{Average}$	-0.001	(-0.22)	0.012*	(1.75)	0.011*	(1.66)	0.015**	(2.35)	0.015**	(2.30)
$LR_{Average}$	0.039	(1.10)	-0.051	(-1.53)	-0.058*	(-1.86)	-0.079**	(-2.53)	-0.084***	(-2.73)
$KR_{Average}$	0.024*	(1.83)	0.005	(0.39)	0.004	(0.31)	-0.008	(-0.74)	-0.005	(-0.43)
$PGDP_{Average}$	-0.258	(-1.57)	-0.262*	(-1.67)	-0.428***	(-2.77)	-0.271*	(-1.65)	-0.430***	(-2.66)
$PGDP^2{}_{Average}$	0.004	(0.52)	0.001	(0.08)	0.011	(1.39)	0.004	(0.54)	0.012	(1.49)
Panel B: Indirect effect										
$CJV_{Average}$	-0.026	(-0.90)	-0.043	(-1.36)						
$EJV_{Average}$	-0.089	(-1.23)			-0.156**	(-1.97)				
$WFE_{Average}$	-0.175*	(-1.73)					-0.175**	(-2.34)		
$AGG_{Average}$									-0.209**	(-2.28)
$EDU_{Average}$	0.514***	(11.59)	0.356***	(9.56)	0.458***	(11.22)	0.476***	(11.58)	0.478***	(11.61)

$TRD_{Average}$	0.204***	(7.07)	0.235***	(7.18)	0.231***	(7.45)	0.219***	(7.20)	0.221***	(7.27)
$LR_{Average}$	-0.157	(-1.62)	-0.164*	(-1.90)	-0.190**	(-2.21)	0.025	(0.31)	-0.024	(-0.30)
$KR_{Average}$	-0.032	(-0.81)	0.027	(0.72)	-0.061	(-1.40)	0.021	(0.59)	-0.036	(-0.90)
$PGDP_{Average}$	-1.457**	(-3.50)	-1.821***	(-4.79)	-2.455***	(-5.87)	-1.935***	(-5.09)	-2.040***	(-7.57)
$PGDP^2{}_{Average}$	0.066***	(3.26)	0.092***	(5.07)	0.118***	(5.86)	0.088***	(4.72)	0.093***	(5.08)
Panel C: Total effect										
$CJV_{Average}$	-0.013	(-1.17)	-0.036	(-1.25)						
$EJV_{Average}$	-0.015	(-0.55)			-0.134*	(-1.87)				
$WFE_{Average}$	-0.209**	(-1.99)					-0.182**	(-2.41)		
$AGG_{Average}$									-0.193**	(-2.22)
$EDU_{Average}$	0.433***	(9.65)	0.330***	(8.78)	0.435***	(10.75)	0.435***	(11.57)	0.439***	(11.38)
$TRD_{Average}$	0.203***	(6.98)	0.247***	(7.41)	0.242***	(7.72)	0.235***	(7.71)	0.236***	(0.69)
$LR_{Average}$	-0.117	(-1.51)	-0.215***	(-3.27)	-0.248***	(3.62)	-0.054	(-0.78)	-0.108*	(-1.65)
$KR_{Average}$	-0.009	(-0.19)	0.032	(0.74)	-0.057	(-1.19)	-0.013	(-0.30)	-0.041	(-0.91)
$PGDP_{Average}$	-1.715***	(-4.34)	-2.083**	(-6.11)	-2.883***	(-7.59)	-2.206***	(-6.79)	-2.471***	(-7.57)
$PGDP^2{}_{Average}$	0.071***	(3.72)	0.093***	(5.73)	0.129***	(7.13)	0.093***	(5.93)	0.064**	(2.04)

Notes: 1. All variables are measured as period averages. 2. All variables are in logarithms; 3. Significant at *10 percent, **5 percent, ***1 percent; 4. Robust z-values are in parentheses.

It is noteworthy that among the control variables, education increases the wage inequality between rural and urban areas through the spatial spillover effect. This probably reflects the fact that most college graduates are located in urban areas. This result also underscores the role of education as a determinant factor in regional rural-urban disparities in China. In addition, the per capita GDP has a negative spatial effect on the rural-urban wage inequality while its square term has positive spatial effect on the rural wage inequality, displaying an adverse Kuznets effect. Our understanding is that the rural-urban wage inequality first decreases as the economic development in the neighboring regions provides more job opportunities with higher wages and then increases when the job market is in saturation.

3.5 Conclusions

When investigating the relationship between inward FDI and income inequality, especially from the angle of rural-urban inequality, the literature overlooks the potential spatial spillover effects of FDI and fails to control for the heterogeneity of inward FDI. On the basis of a panel data set covering 30 provinces from 2000 to 2016 in China, this paper studies the interplay between the spatial spillover effect of inward FDI and rural-urban wage inequality. Besides explicitly allowing FDI to have a spatial spillover effect, we also consider the possibility that the effect of inward FDI on rural-urban disparity may depend on sectoral distribution and ownership types of inward FDI.

Results show that while there is no significant relationship between rural-urban wage inequality and inward FDI in secondary and tertiary sector in both short run and long run, the inward FDI in primary sector has a negative spillover effect on rural-urban wage inequality in the short run although this effect is relatively small when we account for the sectoral distribution. In another important category with respect to ownerships, we find that WFE has a negative spillover effect on rural-urban wage inequality in the short run while this effect is more pronounced in the long run. Also, the equity joint ventures reduce the rural-urban wage inequality in the long run, indicating that China has gone beyond the early stage of openness and demonstrate well-developed leaning and innovation ability. Our findings corroborate studies such as Wang (2009) and Doytch and Uctum (2011) from a macro level in the sense that the heterogeneity of different types of inward FDI accounts largely for the mixed findings in the previous literature. These findings of our study also contribute to the literature with further understanding on the heterogeneity of inward FDI at an aggregate level based on different ownership types and sectoral distribution.

Several policy implications may be obtained from our findings. Based on the suggestions from previous studies that more inward FDI should be allocated to inland provinces to address the uneven development in China (Zhang & Zhang, 2003; Wan et al., 2007), more inward FDI in traditional sector such as agricultural technology-advanced FIEs should be introduced and allocated to the central and west regions to provide more opportunities for rural workers and foster rural development. Equally importantly, the policy makers may focus on the establishment of an improved and developed rural education system so as to enable the rural labor to be well equipped and prepared for the Chinese economic transition at this turning point.

Chapter 4

Cultural Institute and Home Institution: A Comparative Study for the Impact of the Confucius Institute in Belt-Road and Non Belt-Road Countries

4.1 Introduction

Home institution is of crucial importance for one home country's globalization (Cuervo-Cazurra, 2011; Estrin, Meyer, Nielsen & Nielsen, 2016; Cuervo-Cazurra, Luo, Ramamurti, & Ang, 2018; Yan, Zhu, Fan, & Kalfadellis, 2018; Li et al., 2019). The economic impact of culture familiarity during this process of home internationalization has been widely investigated (Guiso, Sapienza and Zingales, 2006; Lee, Shenkar & Li, 2008; Lee & Peterson, 2000; Xu & Shenkar, 2002), especially for a major form of capital outflows in recent years (Morosini, Shane & Shign, 1998; Lee & Peterson, 2000; Teerikangas & Very, 2006; Lim, Makhija & Shenkar, 2016) This is followed by a small but growing number of research focusing on the role of cultural institute (Lien, Oh & Selmier, 2012; Lien and Co, 2013; Akhtaruzzaman, Berg & Lien, 2017). While both home institution and cultural compatibility are considered as two key determinants on home country's globalization, little effort has been provided to connect these two strands of the literature and even fewer attempts are found from the perspective of cultural institutes. The aim of this paper is, therefore, to probe into the role of cultural institute on the impact of home global institution by studying the interactive effect of the Belt Road Initiative and Confucius Institute (CI) on cross border mergers and acquisitions, an prevailing form of internationalization.

As the largest emerging economy, China has been one of the major outward investors in the past years. In the wake of China's economic reform initiated in 1978 and its overwhelming success, the Chinese government has successively initiated several global institutions such as "Going Out" policy and Belt Road Initiative,

encouraging investment abroad. Committing funding for massive investments in the infrastructure and the transportation network along the belt (overland) and road (maritime routes), the Belt Road Initiative launched in 2013 is argued as a new home global institution (Li et al., 2019), substantially driving the volume of Chinese outward FDI (Du & Zhang, 2018). This has helped propel the wave of Chinese cross-border mergers and acquisitions (CMA), an increasingly popular form of outward FDI. Nevertheless, Chinese enterprises' CMA activities are certainly subject to the potential influence of the home-host culture difference, a major type of informal institutional difference (Xu & Shenkar, 2002). Such national cultural difference is negative to the CMA as they can lead to raised worker turnover rate, low job satisfaction, employee resistance (Lee, Kim & Park., 2015), higher cross-border management cost (Du, Lu & Tao, 2012), shallow corporate social responsibility, weak organizational commitment and higher cross-border management cost (Ahern, Daminelli & Fracassi, 2015).

That is to say, although the Belt-Road Initiative can potentially bring sizable benefits to the world economy, its progress has so far been limited by major challenges such as misunderstanding and inefficient interplay caused by institutional distance and cultural distance (Zhai, 2018; Liu, Lu & Wang, 2018). Therefore, popularizing the Chinese culture overseas in the member countries and shortening the cultural distances vis-à-vis the targeted countries should have been attached importance (Liu, Lu & Wang, 2018). This naturally leads us to the prior research on the economic and cultural impacts of the global cultural institutes.

Cultural institute such as British Council and Goethe-Insitut can bridge the home culture and host countries' cultures by facilitating cultural exchanges (Lien & Lo, 2017). Serving similar functions, Confucius Institute, a non-profit public educational organization set up by the Ministry of Education of China has the potential to mitigate the cultural incompatibility that the Belt Road Initiative experiences. Since the establishment of the first CI branch in South Korea in 2004, the CI's influence has not only shortened cultural distance but also created significant win-win benefits in the areas of education, trade and foreign direct investments (FDI) according to the following studies. Lien, Oh and Selmier (2012) use the gravity model on over 100 countries from 1996 to 2008 and show that the CI has a positive effect on both trade

and outward FDI. The effect is especially strong for FDI because the cultural and linguistic familiarity generated by the CI enhances the trust. Trust, in turn, is an important determinant of FDI, because of their long-term-nature. In contrast, trade intensity mainly depends on transaction cost. Lien and Co (2013) find that the volume of exports from US to China is positively associated with the number of CI. They detect that approximately 5% increase of in state exports for each branch of CI set up in a given state from 2006 to 2010. In a recent study of the CI and Chinese foreign aid flows in Africa, however, it has been shown that the CI presence is not positively related to Chinese aid flows and, likewise, that Chinese aid flows do not explain the variation in the number of CI (Akhtaruzzaman, Berg & Lien, 2017). China's soft power cannot be motivated simply by resource seeking although CI is doubtlessly a potent instrument for enhancing such power as they suggest.

However, the literature has thus far left a huge gap for understanding the relationship between cultural institute and home global institutions. To bridge this gap, we conduct a comparative study on the basis of a panel data set covering 66 Belt-Road countries and 75 non Belt-Road countries from 2006 to 2017. Besides confirming the positive effect of home institutions on internalization, our results suggest that the interaction between cultural institute and home institutions can strengthen the impact of culture institute, and further promote the internalization of the home country. Two main contributions are offered in our paper. First, we contribute to the ongoing studies in broader literature on home country's institutions on its internalization (Cuervo-Cazurra, 2011; Meyer et al., 2012; Estrin et al., 2016; Cuervo-Cazurra et al, 2018; Yan et al., 2018; Li et al., 2019) from the culture perspective (Guiso et al., 2006; Lim et al., 2016; Fidrmuc & Fidrmuc; 2003; Xu & Shenkar, 2002) by investigating the role of cultural institute (Lien et al., 2012; Lien & Oh, 2013; Lien & Co, 2013; Lien et al., 2014; Lien et al., 2017). Second, we join the growing literature on the influence of the Belt Road Initiative by examining the function of CI, speaking to the recent evidence that underscores the importance of bilateral compatibility (Cheng, 2016; Huang, 2016; Du & Zhang, 2018; Lu et al., 2018; Zhai, 2018).

The rest of the paper is organized as follows. Section 4.2 provides the literature review. Section 4.3 summarizes the data and describes the methodology. Section 4.4 discusses the results. Section 4.5 concludes.

4.2 Literature Review

With the advancement of trade liberalization and globalization, the intensity of CMA activities has increased from the mid-1990s onwards and has continued at a remarkable pace among not only developed economies but also developing countries. This has helped generate considerable interest in CMA in the literature, not only in the field of economics and finance, but also in international business, marketing and strategic management. Among all the research in this field, one main stream of the literature has been focused on these questions: What drives the waves of CMA? And what are the determinants of CMA?

CMA is generally considered as a micro level decision or behavior while Harford (2005) ascribes the waves of CMA to the macro-level capital liquidity. He argues that the assemblage of industrial level liquidity finalizes the aggregate-level mergers wave by examining and comparing both neoclassical and behavioral models. Still, not only the liquidity matters, but also the structure in terms of capital does. Companies with higher leverage and poorer accounting quality are less likely to undertake acquisitions but more likely to be the targets (Rossi & Volpin, 2004; Erel, Liao & Weisbach, 2012; Hu & Yang, 2016). In the context of China, Wu and Xie (2010) show that the pre-acquisition experience and state-owned share has positive effect on the CMA performance while their results do not provide evidence that either the corporate age or the cash flow is influential in this sense.

Admittedly, there are numerous answers from the financial economics studies. Besides, a number of researchers have also reported some other CMA determinants in different perspectives. Lebedev, Peng, Xie and Stevens (2015) provide an elaborate review on the M&A literature for both developed economies and emerging economies based on more than 100 papers lately published in management, economics, finance, accounting and sociology journals. Several key factors that are perceived as the main driving forces behind the M&A are listed, namely, the mode of entry, market power, previous M&A experience, firms' real options and network characteristics, country characteristics, institutional factors and other minor yet interesting factor such as nationalistic sentiments and national implications. Xie, Reddy and Liang (2017) review over 250 articles in international business, strategic

management, finance and economics journals in the past three decades. Macroeconomic and financial market environment, institutional and regulatory environment, political environment and corruption, tax and taxation environment, accounting standards and valuation guidelines, cultural and geographical environment (in the host countries) are shown to be decisive towards the CMA activities as this systematic review suggests.

Among these factors, institutional environment in host countries is considered to be of essentially importance. For example, a large and growing body of literature has investigated how protection of investments in the target countries affects the CMA activities. An essential aspect of protection of CMA is shareholder protection. It has been argued that the countries with high-level shareholder protection polices attract more M&A activities (Rossi & Volpin, 2004). Using a sample of 49 major countries from 1990 to 2002, they find that the investments on M&A are from regions with poorer protection to ones with greater protection and argue that the CMA helps improve the cross-country corporate governance regimes. Stronger protection in host countries encourages the CMA, while policy uncertainty deters it. However, the causality between the CMA and shareholder protection is yet to be determined. Following Katelouzou and Siems (2015), Ahiabor, James, Kwabi and Siems (2018) suggest that the CMA positively affect the shareholder protection.

In line with these studies, Bonaime, Gulen and Ion (2018) demonstrate that policy uncertainty can affect the CMA activity in a negative way. Following the uncertainty policy index developed by Baker, Bloom and Davis (2016), they examine four conceivable channels through which policy uncertainty could affect CMA, including real options, interim risk, empire-building and risk management. Their findings also suggest that the influences of different types of policy uncertainty differ as the uncertainties from the monetary policy, fiscal policy and financial regulation have the worst impact on CMA.

As a watershed in forming inclusive and extractive nation's institutions, protection for property right has been considered as the fundamental factor to sustain (long-term) economic development (Acemoglu, Johnson & Robinson, 2001; 2005). Similarly, Alimov and Officer (2017) set up a sample of over 67,375 CMA in 50 countries from

1985 to 2012 and find that the host countries with higher intellectual property rights (IPR) protection experience more CMA. Interestingly still, this effect is larger for the less developed countries that tend to have poor property right protection.

The arguments above have been supported by Feito-Ruiz and Menéndez-Requejo (2011) who analyze the legal and institutional environment's impact on the shareholders' valuation of CMA. Their finding rests on 469 M&A of listed firms in 40 countries over the period of 2002 to 2006 and shows that the countries with better legal and institutional protection create higher value on CMA announcements whereas the countries with poorer protection have lower value.

Formal protection, enshrined in countries' legal systems and constitutions, is a key factor of CMA. Nevertheless, informal and "softer" protection, based on cultural differences, has also drawn sufficient attention in the literature. Among various studies, Beugelsdijk and Frijns (2010) ascribe the international investment allocation bias to cultural differences. Their evidence is based on more than 20,000 mutual funds across 26 countries in 1999 and 2000 and shows that the cultural distance affects the amount of investment but it does not affect the decision to invest overseas. In a recent study with longer panel from 1991 to 2008, Ahern et al. (2015) report a negative effect between the cross-country difference (in terms of the value of trust, hierarchy and the individualism) and the volume of CMA. In particular, the larger (or smaller) volume of CMA is caused by the smaller (or greater) cultural distance. This argument is supported by Lim, Makhija and Shenkar (2016) who study the relationship between cultural distance and the target premiums in a sample of 1690 CMA deals from 1990 to 2009 involving 45 countries as deal counterparties to the United States. They point out that the effect of cultural distance on the CMA is asymmetric with emphasis on the importance of cultural familiarity. Furthermore, Li, Li and Wang (2016) assess 367 overseas acquisitions by Chinese firms from 2000 to 2011. They find that the firms with greater absorptive capacity are better able to overcome the difficulties driven by the cultural differences and argue that cultural familiarity is the foremost issues that should be stressed to ensure the success of CMA.

From a different perspective, according to the liability of foreignness (LOF) theory, historical ties between countries that have extensive influence on economic development, trade, FDI and even on the labor market of the host countries (Acemoglu et al., 2001; Head, Mayer & Ries, 2010; Kedia & Bilgili, 2015; Wang, Fidrmuc & Tian, 2018). The potential impacts of the historical legacy are not only on the changes of legal and institutional system, but also on the individual behavior aspects such cultural familiarity, trust towards different cultures and the personal emotions or attitudes towards foreigners. The investigation on the relationship between historical ties and the CMA has been motivated as a result. For instance, Chowdhury and Maung (2018) conceive a sample of 29,496 completed CMA in 177 host countries from 2001 to 2015. As suggested by their results, CMA between countries that once were colonies and colonizers is affected by their historical relationship. Particularly, the number of CMA is either positively affected by the affable relationship or negatively affected by the hostile relationship.

Yet, the importance of cultural familiarity is derived by a major unsettled question in the literature: Is the cultural difference[15] beneficial or detrimental? (Slangen, 2006; Lee, Shenkar & Li, 2008; Stahl & Voigt, 2008; Beugelsdijk, Slangen, Masland & Onrust, 2014). This inconclusive debate thus far is basically the essence of the national cultural difference that allows the coexistence for both the positive and the negative sides. The main perception of the negative effect of the cultural difference is the culture clash that leads to certain levels of stress, anxiety, hostility and annoyance[16] in the process of CMA (Lee, Kim & Park, 2015) whereas the positive aspect of cultural differences can be primarily attributed to learning[17]. Vermeulen and Barkema (2001), for example, argue that cross-cultural differences can be

[15] There are mainly two cultural differences in the literature indeed, namely, the national cultural difference and the organizational cultural differences. However, in the context of CMA, the cultural difference mainly refers to the former one as national cultural differences more affect the CMA while the organizational cultural differences more affect the DMA (domestic mergers & acquisitions) (see Morosini et al., 1998; Larrson & Lubatkin, 2001; Lee, Kim & Park, 2015 for detail explanations).

[16] These culturally driven sentimental issues further cause negative working attitudes, internal turbulences and employment resistance. (Lee et al., 2015)

[17] Here, the learning includes at least skill learning and cultural learning, which is a prominent activator for the internationalization (Violet & Ang, 1998; Cuervo-Cazurra et al., 2018).

constructive as they trigger the inter-organizational learning, enlarge the firms' knowledge bases and keep the firms vigorous in the process of CMA. Besides, cultural learning opportunity generated in the CMA creates cultural familiarity and expands the firms' absorptive capacity, which in turn positively affects back the CMA (Li et al., 2017).

Further, the greater cultural difference between the home and host countries, the more valuable the cultural learning is. The process of learning is more important but more arduous when CMA takes place between two culturally-distant countries. However, such CMA can generate higher abnormal returns once the cultural learning succeeds (Xu, 2017). In a similar vein, Meyer & Thaijongrak (2013) propose the important signification of learning in the evolution of MNEs and the process of CMA. By using the internationalization process model to assess its usefulness, they illustrate this idea with analysis on 6 Thai MNEs case studies.

As an official cultural institute bridging the cultural gap, CI can affect the Chinese CMA activities based on following ways. First, the CMA activities are negatively associated with home-host countries' cultural difference and shortening the cultural distance helps increase CMA (Lee at al., 2008); Besides, learning is beneficial to the CMA inasmuch as it not only creates skill learning but also cultural learning (Volet & Ang, 1998; Vermeulen & Barkema, 2001). These two lessons tally with the purpose of the CI as its primary objective is to promote Chinese language and culture globally and establish better international relationships (Lien, Oh & Selmier, 2013; Akhtaruzzaman et al. 2017).

Second, as a non-profit educational institution, the CI promotes the spread and sharing of knowledge (Li, Mirmirani & Ilacqua, 2009; Lien & Co, 2013). It attracts distinguished scholars and professors from different countries. Local media's reporting on such events helps build up trust towards the Chinese and deepen the recognition of Chinese enterprises. The CI, therefore, not only provides important communicative platform and opportunities for strengthening the mutual cooperation in business, but also elevates the image of China. Accordingly, the presence of CI in a country has a positive direct effect on the Chinese firms' CMA activities by lowering the level of information asymmetry that impedes the business cooperation.

Third, as a major carrier of culture, language is important for cultural learning because different cultures can only be better understood by learning their languages (Lazear 1999). Numerous studies have shown that the language has a certain impact on various economic aspects including trade, FDI and CMA (Metliz, 2008; Lien et al., 2012; Chen, 2013; Fidrmuc & Fidrmuc, 2016). The main purpose of the CI's establishment is to provide Chinese language (*Hanyu*) courses. In recent years, *Hanyu* learning has become more and more popular since China's fast-growing development has created so many business opportunities that mastering Chinese language skills becomes necessarily important for business facilitation. The CI presence lowers the cost of *Hanyu* learning and further popularizes it. Before the process of CMA, cultural frictions in interactions may generate misunderstanding or misevaluation of the targets or the potential synergies (Joshi & Lahiri, 2014; Li, Duan, He & Chan, 2018), which could potentially cause the CMA to fail. *Hanyu* learning lowers the language barrier which in turn can reduce the cultural frictions during the negotiation of the mergers and acquirers. Besides, in the process of *Hanyu* learning, potential mergers will imperceptibly be affected by the Chinese culture and a close culture affinity will be developed. Therefore, The CI can have a positive direct effect on the Chinese firms' CMA activities by shortening the linguistic distance that hampers business communications.

In addition, as a comprehensive platform of Sino-foreign cultural exchange, the CI has been shown to have culture spillover effects to strengthen the international relationships between China and other countries (Li et al, 2009). These spillovers effects are not only limited to boosting the trade and Chinese OFDI towards the host countries where the CI locates (Lien et al., 2012), but also on other aspects. For example, Lien and Miao (2018) find a positive relationship between the CI presence and the number of foreign students studying in China. They explain this effect via the culture spillover channels such as CIs' presenting Chinese elements to local communities and accustoming them to Chinese culture, providing consultation service to the local communities and organizing regular activities which attract the local communities. These cultural spillovers also apply to the CIs' influence on the booming international tourism to China (Lien, Ghosh & Yamari, 2014; Lien, Yao & Zhang, 2017). As a corollary, we believe the CMA can benefit from this affirmative atmosphere as suggested by Chowdhury and Maung (2018).

More importantly, under a home global institution, Belt Road Initiative, the role of CI should be strengthened after the Belt Road Initiative as one of main objectives of this global institution is to promote the bilateral cultural compatibility in member countries (Huang, 2016; Liu et al., 2018; Du & Zhang, 2018). Popularizing Chinese culture to shorten the cultural gap, CI can in turn serve as a pioneer towards the success of the Belt Road Initiative. For simplicity, therefore, we transfer this discussion to three basic hypotheses. First, the influence of CI is stronger in Belt-Road countries than non Belt-Road countries. Second, the impact of CI is more pronounced in Belt Road countries and it can be also be stronger in non Belt-Road countries depending on the policy externalities after the Belt Road Initiative. Third, the interactive effect of CI and Belt Road Initiative is positive and the longer the Belt Road membership a country holds, the stronger is such an effect.

4.3 Data and Methodology

4.3.1 Data and sample

To test these hypotheses, we conduct a panel data set for the Belt-Road and non Belt-Road countries from 2006 to 2017. The data are mainly from three sources, namely, the Chinese Ministry of Foreign Affairs for the Belt-Road countries, the WIND database for the Chinese overseas CMA events, and the CI data from *Hanban* official website. According to the Chinese Ministry of Foreign Affair, there are 66 Belt-Road countries in total. Table 4.1 lists the Belt-Road countries categorized by continents. Fig. 4.1 depicts the distribution of CI under the Belt-Road network and the complementary information is placed in the appendix where Table A 4.1 shows the number of CI and the number of Chinese CMA activities in both Belt-Road countries and non Belt-Road countries.

The Chinese firms' CMA transaction data including both the announced CMA data and accomplished CMA data are sampled from the WIND. It is a database that has a collection of extensive data covering 15 macro concepts such as national accounts, foreign trade, banking, securities markets, employment and wages, mergers and acquisitions, and fixed-asset investment, etc. from both macro and firm level, which has been widely used in academia and industry In particular, we extract the sample

in accordance with the following rules: 1, the headquarters of the acquirer companies that have been selected are located solely in mainland China; 2, the companies in the financial industry have been excluded due to their higher heterogeneity compared to other industries; 3, the CMA with “rumor” transaction status have been excluded; 4, the tax haven target countries[18] have been excluded; and 5, the missing values have been excluded.

Table 4.1 The list of Belt-Road countries by continents up to 2017.

Region	Country
Asia	Afghanistan, United Arab Emirates, Azerbaijan, Pakistan, Palestine, Bhutan, East Timor, Philippines, Georgia, Kazakhstan, Korea, Kyrgyzstan, Cyprus, Cambodia, Qatar, Laos, Lebanon, Maldives, Malaysia, Burma, Mongolia, Bangladesh, Nepal, Saudi Arabia, Sri Lanka, Tajikistan, Thailand, Brunei, Uzbekistan, Singapore, Armenia, Yemen, Iraq, Iran, Israel, India, Indonesia, Vietnam
Europe	Albania, Estonia, Belarus, Turkey, Bulgaria, Poland, Bosnia and Herzegovina, Russia, Montenegro, Czech Republic, Croatia, Latvia, Lithuania, Romania, Macedonia, Moldova, Serbia, Slovakia, Slovenia, Ukraine, Greece, Hungary
Africa	Egypt, Madagascar, Morocco, South Africa
North America	Panama
Oceania	New Zealand

Source: Chinese Ministry of Foreign Affairs.

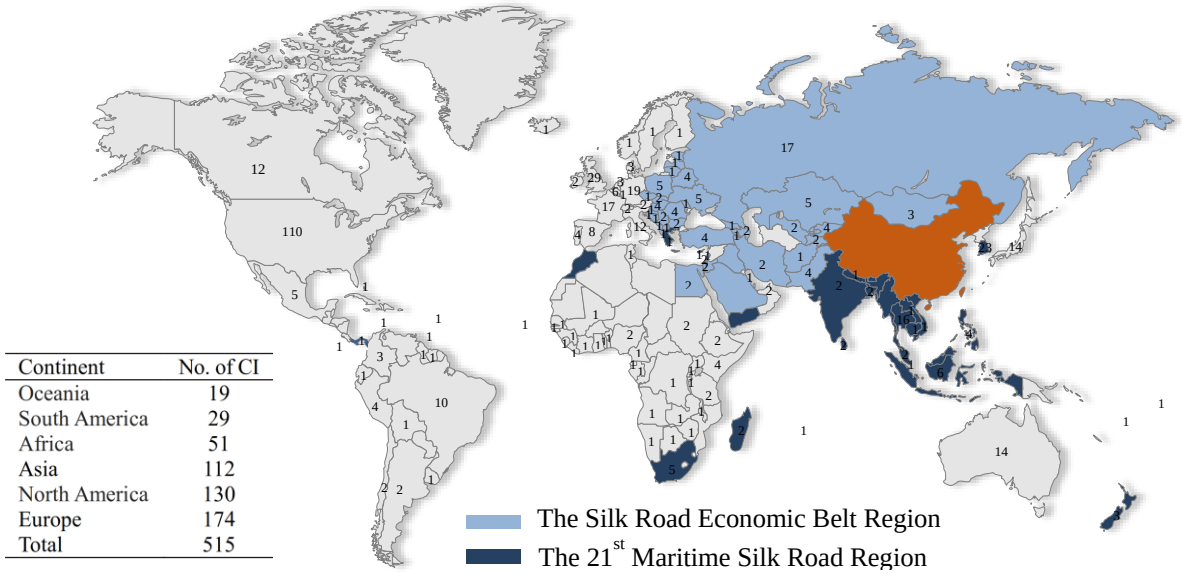

Fig. 4.1 The distribution of CI (2006-2017) under the Belt-Road network (up to 2017).

Fig. 4.2a shows the trend of Chinese CMA including the number of announced CMA and accomplished CMA in the Belt-Road countries from 2006 to 2017. Starting in

[18] They are the Cayman Islands, the British Virgin Islands, the Bermuda Islands and the Jersey Island.

2006, there were only 2 CMA that took place and the numbers have been slightly increasing and fluctuating after that. This has not changed until 2013 when the Belt-Road Initiative started. Since then, the number has been growing dramatically until 2016 with an average growth rate of 31.9%. As a comparison, the trend of Chinese CMA in non Belt-Road countries is shown in Fig. 4.2b.

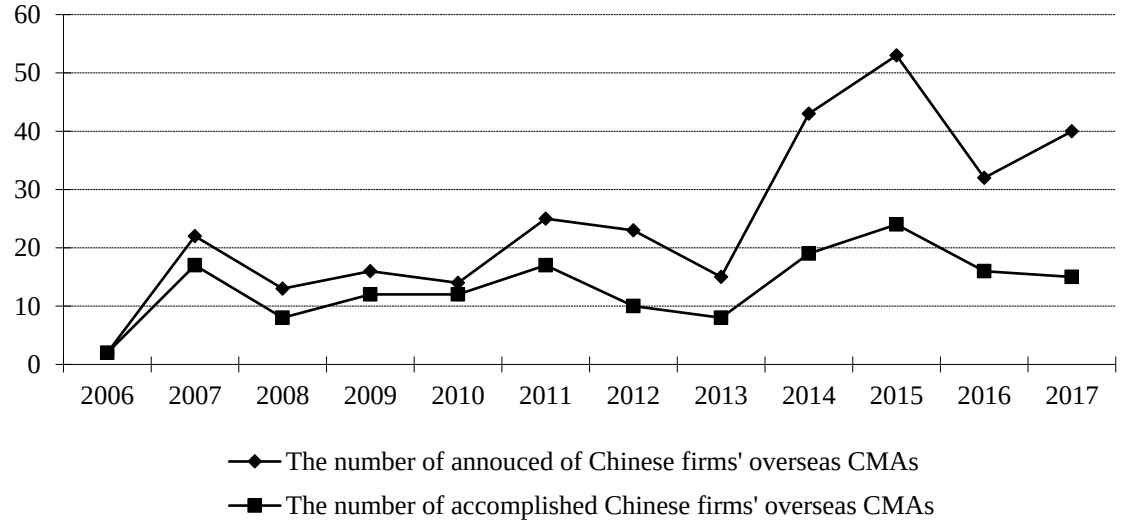

Fig. 4.2a The Chinese firms' overseas CMA events in Belt-Road countries from 2006 to 2017.
Source: The authors' calculation based on WIND.

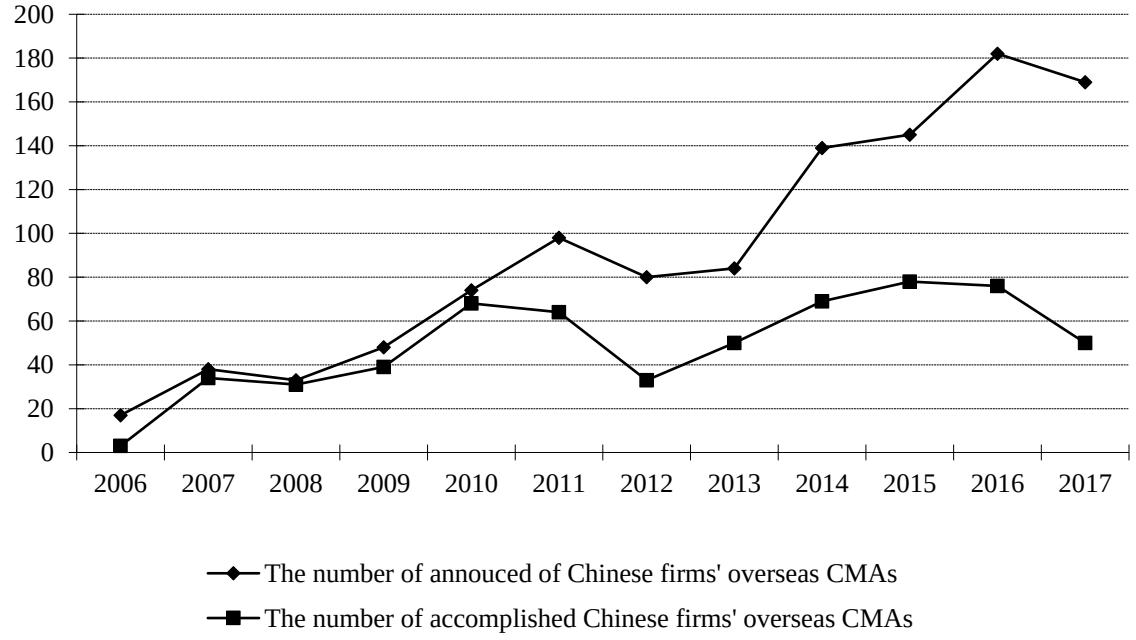

Fig. 4.2b The Chinese firms' overseas CMA events in non Belt-Road countries from 2006 to 2017.
Source: The authors' calculation based on WIND.

Table 4.2a and Fig. 4.3a summarize the Chinese firms' overseas CMA activities in different regions and list the top ten target countries in Belt-Road countries from 2006 to 2017. As shown in Fig. 4.3a, the main target countries are located in South-east Asia, East Asia, East Europe and Africa. The CMA events have mostly taken place in South-east Asia during this period, with 41.61% of the total announced CMA and 23.83% of the accomplished CMA. However, there is no CMA event in North America, which contains only one potential target country, Panama. The case in non Belt-Road countries is shown in Table 4.2b and Fig. 4.3b as a comparison. The number of announced CMA and accomplished CMA in United States has taken the largest portion, with 32.97% and 29.58% respectively.

Table 4.2a Top ten targets for Chinese firms' overseas CMA in Belt-Road countries from 2006 to 2017.

Target country	Number of announced CMA	Percentage	Number of accomplished CMA	Percentage
Singapore	65	21.81%	38	12.75%
South Korea	52	17.45%	25	8.39%
Russia	26	8.72%	13	4.36%
South Africa	19	6.38%	9	3.02%
Thailand	16	5.37%	12	4.03%
Indonesia	16	5.37%	9	3.02%
New Zealand	13	4.36%	5	1.68%
India	10	3.36%	8	2.68%
Vietnam	10	3.36%	5	1.68%
Cambodia	8	2.68%	3	1.01%

Source: The authors' calculation based on WIND.

Table 4.2b Top ten targets for Chinese firms' overseas CMA in non Belt-Road countries from 2006 to 2017.

Target country	Number of announced CMA	Percentage	Number of accomplished CMA	Percentage
United States	365	32.97%	176	29.58%
Australia	121	10.93%	70	11.76%
Germany	94	8.49%	57	9.58%
United Kingdom	89	8.04%	44	7.39%
Canada	85	7.68%	50	8.40%
Italy	69	6.23%	46	7.73%
Japan	52	4.70%	28	4.71%
France	34	3.07%	20	3.36%
Netherland	28	2.53%	13	2.18%
Brazil	27	2.44%	15	2.52%

Source: The authors' calculation based on WIND.

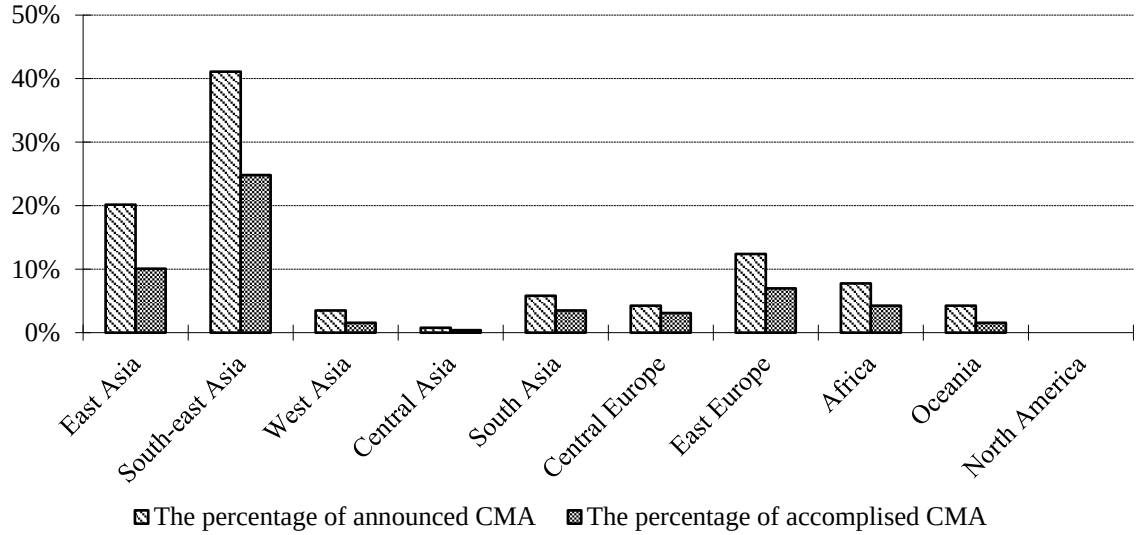

Fig. 4.3a The percentages of Chinese firms' overseas CMA events in total in Belt-Road countries from 2006 to 2017.
Source: The authors' calculation based on WIND.

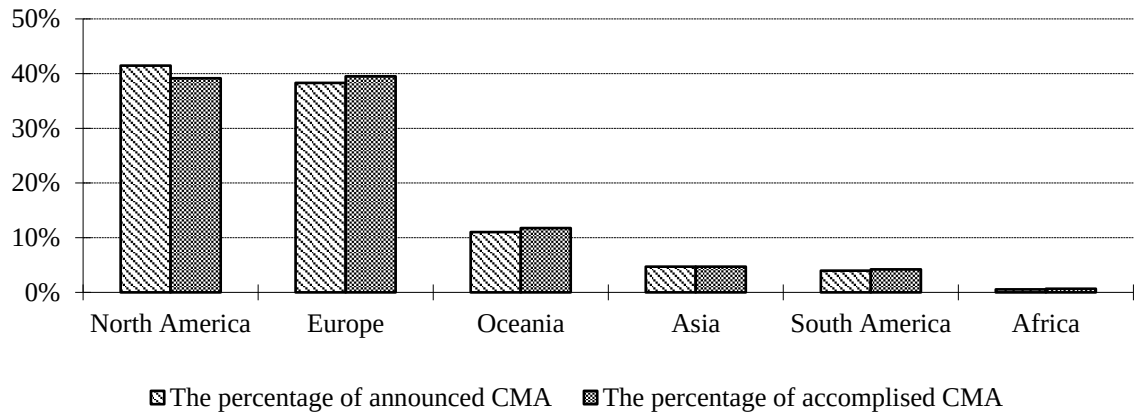

Fig. 4.3b The percentages of Chinese firms' overseas CMA events in total in non Belt-Road countries from 2006 to 2017.
Source: The authors' calculation based on WIND.

4.3.2 The model

After Anderson (1979) first employed the gravity model to international trade study, the gravity model has been used and developed in many subsequent studies, especially in international trade, overseas investment and international tourism (Cheung & Qian, 2009; Lien et al, 2012; Lien et al, 2014). The gravity model has been widely used also in the CI research (Xu, Yao & Zhang, 2015; Lien et al., 2017; Akhtaruzzaman et al., 2017; Lien & Lo, 2017).

We adopt a modified version of the gravity model. Note that we deal with the zero number issue for CMA in two ways. First, we follow studies that adopt gravity model (Lien et al., 2012; Lien & Lo, 2017; Lien et al., 2017; Lien & Miao, 2018) and take log after adding 1 to the number of CMA. The specific econometric framework is as follows:

$$\ln(CMA_{it}+1) = \beta_0 + \beta_1 CI_{it-1} + \beta_2 INS_{it} + \beta_3 ER_{it} + \beta_4 INF_{it} + \beta_5 lnPOP_{it} + \beta_6 lnPGDP_{it} + \beta_7 lnEDIS_{it} + \beta_8 lnGDIS_i + \beta_9 CC_i + \beta_{10} DEV_i + \beta_{11} NEIGH_i + \gamma_i + \delta_t + \varepsilon_{it} \quad (4.1)$$

Second, Santos Silva and Tenreyro (2006) propose a Poisson pseudo-maximum likelihood (PPML) estimator that is consistent with the presence of heteroscedasticity and also in the presence of zero values of the dependent variable. Therefore, we also adopt the PPML estimation, which estimates the following form:

$$CMA_{it} = exp[\beta_0 + \beta_1 CI_{it-1} + \beta_2 INS_{it} + \beta_3 ER_{it} + \beta_4 INF_{it} + \beta_5 lnPOP_{it} + \beta_6 lnPGDP_{it} + \beta_7 lnEDIS_{it} + \beta_8 lnGDIS_i + \beta_9 CC_i + \beta_{10} DEV_i + \beta_{11} NEIGH_i]\theta_{it} \quad (4.2)$$

where CMA_{it} is the number of CMA in target country i in year t; CI_{it-1} is the number of CI which lags one year. It takes up to 18 months on average for a CI to be officially functional. Taking one year helps lag therefore, mitigating the reverse causality and endogeneity (Lien et al., 2012; Lien et al., 2017). INS_{it} is the institutional quality index in host country i[19]; ER_{it} is the host country i – Chinese nominal currency exchange rate; INF_{it} is the inflation rate in host country i in year t; POP_{it} is the population in host country i in year t; $PGDP_{it}$ is the per capita GDP in host country i in year t; $EDIS_{it}$ is the economic distance between China and the target country i at year t measured by the difference of GDP gap; $GDIS_{it}$ is the geographic distance between China and the target country i. Also, we include dummies for whether Chinese culture is the one of the major cultures in the target country, whether the target country is a developed country and whether the China

[19] The institutional quality index is calculated by taking weighted mean of 6 indicators from the World Bank including regime stability, government efficiency, regulatory quality, corruption control ability, legal system and government accountability.

and the target country are neighbors. That is, CC_i equals 1 if the target country has Chinese culture as one of its major cultures to measure the previous Chinese cultural influence[20]. DEV_i equals 1 if the target country is a developed country. Finally, $NEIGH_i$ equals to 1 if the target country shares borders with China[21]. Table 4.3a, Table 4.3b and Table 4.3c are the descriptive statistics in the Belt-Road countries, non Belt-Road countries and full sample, respectively.

Table 4.3a Summary for the descriptive statistics in the Belt-Road countries from 2006 to 2017.

Variables	Obs.	Mean	S. D.	Min	Max
Number of announced CMA	792	0.376	1.309	0	23
Number of accomplished CMA	792	0.202	0.737	0	14
Number of CI branches	792	1.868	3.274	0	23
Institutional quality	792	-0.147	0.757	-1.895	1.861
Exchange rate	792	2.149	3.065	0.001	11.090
Inflation rate	792	5.756	6.109	0.001	59.219
Population	792	4 965 378.071	5.093	152 970.442	520 343 641.332
Per capita GDP	792	5 177.091	3.560	272.593	88 521.434
Economic distance	792	4 259.895	3.448	10.464	82 207.350
Geographic distance	792	5 426.230	1.629	809.162	14 357.101
Chinese culture majority (dummy)	792	0.167	0.373	0	1
Neighbourhood (dummy)	792	0.167	0.373	0	1
Developed country (dummy)	792	0.242	0.429	0	1

Table 4.3b Summary for the descriptive statistics in the non Belt-Road countries from 2006 to 2017.

Variables	Obs.	Mean	S. D.	Min	Max
Number of announced CMA	900	1.230	4.851	0	70
Number of accomplished CMA	900	0.661	2.384	0	25
Number of CI branches	900	3.178	10.218	0	110
Institutions quality	900	0.178	0.982	-1.660	1.889
Exchange rate	900	2.967	3.992	0.000	20.968
Inflation rate	900	5.254	5.633	0.000	55.484
Population	900	3 587 621.478	6.137	36 062.18	163 447 108.409
Per capita GDP	900	5 658.985	5.697	165.836	119 252.694
Economic distance	900	5 591.480	5.640	165.836	119 210.333
Geographic distance	900	10 467.180	1.385	2 098.540	19 302.694
Developed country (dummy)	900	0.280	0.449	0	1

[20] East Timor, Philippines, Brunei, Cambodia, Singapore, Malaysia, Laos, Thailand, Vietnam, Indonesia and Mongolia are counted as having Chinese culture as one of the major cultures.

[21] Afghanistan, Pakistan, Bhutan, Laos, Nepal, India, Vietnam, Kazakhstan, Tajikistan, Kyrgyzstan and Mongolia are counted as China's neighbors.

Table 4.3c Summary for the descriptive statistics in full sample from 2006 to 2017.

Variables	Obs.	Mean	S. D.	Min	Max
Number of announced CMA	1692	0.830	3.674	0	70
Number of accomplished CMA	1692	0.446	1.824	0	25
Number of CI branches	1692	2.564	7.807	0	110
Institutional quality	1692	0.026	0.898	-1.895	1.889
Exchange rate	1692	2.584	3.610	0.000	20.968
Inflation rate	1692	5.489	5.864	0.000	59.220
Population	1692	4 176 566.268	5.629	36 062.181	520 343 641.336
Per capita GDP	1692	5 426.230	4.655	165.836	119 252.694
Economic distance	1692	4 924.608	4.595	10.464	119 210.333
Geographic distance	1692	7 692.491	1.690	809.162	19 302.694
Developed country (dummy)	1692	0.262	0.440	0	1

4.4 Empirical Results

4.4.1 The baseline estimations

Table 4.4 shows the pooled OLS estimation results as in model (1) for the CI's effect on the Chinese firms' overseas CMA activities. Starting with the control variables, our results show that the all the coefficients of host country's institutional quality are significantly positive, which indicates that the institutional quality is key factor for CMA and this applies to China as suggested by literature. Still, the population and the per capita GDP all have positive impacts on the CMA activities in most cases. However, we do not find consistent evidence on that the host country-Chinese currency exchange rate has any effect on the number of CMA, whereas the previous studies that argue the increase of CMA activities resulted from the declining currency in the target country and appreciating currency in the acquirer countries (Erel et al., 2012; Hu & Yang, 2017). The negative sign of economic distance shows that the economic distance between China and the host countries impedes Chinese CMA activities, especially for non Belt-Road countries. Yet, there is no significant relationship between the CMA and the geographic distance as all the coefficients of the geographic distance and the dummy for whether host countries and China are neighbors are insignificant, which supports the "distance death" theory (Couclelis, 1996; Lin & Sim, 2012) as the "flaw" of the distance can be easily covered by the rapid development of the transportation and logistics. Besides, the significantly positive of Chinese cultural majority indicates that the countries where the Chinese culture has been rooted for a certain period are more attractive to the Chinese investments.

Table 4.4 OLS Estimations for the impact of CI.

Variables	Total		Belt Road		Non Belt Road	
	(1) Announced	(2) Accomplished	(3) Announced	(4) Accomplished	(5) Announced	(6) Accomplished
CI	0.033***	0.021***	0.041***	0.019***	0.031***	0.019***
	(0.002)	(0.001)	(0.008)	(0.006)	(0.003)	(0.002)
INS	0.132***	0.119***	0.110*	0.113**	0.142**	0.121**
	(0.045)	(0.038)	(0.074)	(0.047)	(0.063)	(0.054)
ER	-0.007	0.002	-0.010	-0.008	-0.011	0.006
	(0.007)	(0.006)	(0.012)	(0.008)	(0.011)	(0.009)
INF	0.001	0.001	-0.001	0.001	0.001	0.001
	(0.002)	(0.001)	(0.002)	(0.002)	(0.001)	(0.003)
lnPOP	0.074***	0.074***	0.075***	0.055***	0.061**	0.073***
	(0.017)	(0.013)	(0.022)	(0.016)	(0.023)	(0.174)
lnPGDP	0.052*	0.011	0.076**	0.018	2.158***	0.979***
	(0.029)	(0.024)	(0.037)	(0.027)	(0.041)	(0.368)
lnEDIS	-0.032*	-0.005	-0.026*	-0.005	-2.158***	-0.968***
	(0.018)	(0.015)	(0.016)	(0.013)	(0.416)	(0.365)
lnGDIS	0.104	0.059	-0.065	-0.087	-0.055	-0.018
	(0.067)	(0.054)	(0.086)	(0.067)	(0.150)	(0.125)
NEIGH	0.106	0.011	0.032	-0.067	/	/
	(0.910)	(0.096)	(0.104)	(0.076)		
CC	0.257**	0.175**	0.258***	0.165**	/	/
	(0.107)	(0.088)	(0.093)	(0.076)		
DEV	0.221**	0.135*	0.063	0.052	0.052	0.031
	(0.091)	(0.075)	(0.099)	(0.073)	(0.76)	(0.152)
Observations	1551	1551	726	726	825	825
Number of countries	141	141	66	66	75	75
R-square	0.5158	0.5913	0.3141	0.3543	0.5980	0.5070
Time Period	2006 -2017	2006 -2017	2006 -2017	2006 -2017	2006 -2017	2006 -2017
Country fixed effects	No	No	No	No	No	No
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

Notes: 1. Robust standard errors are reported in parentheses; 2. *, ** and *** represents the 10%, 5% and 1% significance level, respectively.

As expected, all the coefficients of CI are statistically significant at 1% and suggest that one additional CI leads to an increase in the number of announced CMA by approximately 3.3% (exp(0.033) = 1.033) in full sample, 4.2% (exp(0.041)=1.042) in Belt Road countries and 3.1% (exp(0.031)=1.031) for non Belt Road countries, *ceteris paribus*, respectively. This positive effect is slightly weaker in terms of accomplished CMA. One additional CI relates to 2.1% (exp(0.021)=1.021 increase in the number of accomplished CMA in full sample and 1.9% (exp(0.019)=1.019) in both Belt Road countries and non Belt-Road countries, *ceteris paribus*, respectively.

Table 4.5 summarizes the PPML estimates as in model (2). The results are broadly consistent with the OLS estimations except that the coefficient of exchange rate turns to be positive. All other coefficients of the control variables maintain expected signs and are all statistically significant. Compared with OLS estimation, the influence of CI is stronger in the sample of Belt Road while such effect declines in total sample and the sample of non Belt-Road countries on both announced and

accomplished CMA. One additional CI promotes the announced and accomplished CMA by 12.9% (exp(0.122)=1.129) and 10.3% (exp(0.098)=1.103) in Belt-Road countries while the effect shrinks to by 1.1% (exp(0.011)=1.011) regards to the announced CMA in non Belt-Road countries.

Table 4.5 PPML Estimations for the impact of CI.

Variables	Total		Belt Road		Non Belt Road	
	(1) Announced	(2) Accomplished	(3) Announced	(4) Accomplished	(5) Announced	(6) Accomplished
CI	0.011***	0.004*	0.122***	0.098***	0.011***	0.002
	(0.002)	(0.002)	(0.030)	(0.036)	(0.002)	(0.003)
INS	0.132***	0.670***	0.110*	1.339**	0.121**	0.731*
	(0.045)	(0.277)	(0.074)	(0.375)	(0.054)	(0.388)
ER	0.040**	0.048***	-0.111**	-0.053	0.051**	0.051**
	(0.016)	(0.017)	(0.044)	(0.057)	(0.021)	(0.022)
INF	-0.043	-0.016	0.008	0.033	-0.067	-0.052
	(0.026)	(0.032)	(0.020)	(0.021)	(0.046)	(0.055)
lnPOP	0.709***	0.814***	0.504***	0.657***	0.817***	0.929***
	(0.041)	(0.046)	(0.105)	(0.141)	(0.065)	(0.073)
lnPGDP	0.888***	0.912***	0.414	0.323	4.759***	4.609***
	(0.166)	(0.203)	(0.283)	(0.349)	(0.708)	(0.954)
lnEDIS	-0.027	0.039	0.164	-0.155	-3.911***	-3.482***
	(0.101)	(0.114)	(0.145)	(0.142)	(0.604)	(0.814)
lnGDIS	-0.188	-0.076	0.417**	0.307	0.012	0.194
	(0.175)	(0.178)	(0.196)	(0.067)	(0.198)	(0.218)
NEIGH	0.106	0.187	1.041**	0.459	/	/
	(0.910)	(0.380)	(0.442)	(0.472)		
CC	1.117**	1.296**	1.487***	1.535**	/	/
	(0.212)	(0.239)	(0.220)	(0.282)		
DEV	-0.862***	-0.783***	-0.257	0.044	-1.350***	-1.261***
	(0.192)	(0.253)	(0.355)	(0.048)	(0.181)	(0.236)
Observations	1551	1551	726	726	825	825
Number of countries	141	141	66	66	75	75
Pseudo log-likelihood	-1169.059	-807.6633	-431.924	-279.392	-645.968	-480.862
R-square	0.7958	0.7043	0.5013	0.4137	0.8321	0.7504
Time Period	2006 -2017	2006 -2017	2006 -2017	2006 -2017	2006 -2017	2006 -2017
Country fixed effects	No	No	No	No	No	No
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

Notes: 1. Robust standard errors are reported in parentheses; 2. *, ** and *** represents the 10%, 5% and 1% significance level, respectively.

More importantly, we observe that the positive influence of CI is more pronounced in Belt-Road countries than in non Belt-Road countries although larger number of Chinese CMA activities and CI branches are in non Belt-Road countries in both estimation methodologies. That seems to say, Belt Road Initiative in terms of regions from the estimations above indicates that such home global institution strengthens the impact of CI.

4.4.2 Before and after the Belt Road Initiative

To confirm this relationship, we compare the Belt-Road countries and non Belt-Road countries before and after this Chinese global institution commences. Note that Belt Road Initiative was launched in 2013 and our sample data covers a longer period from 2006 to 2007, which can be classified as before the Belt Road Initiative from 2006 to 2012 and after the Belt Road Initiative from 2013 to 2017. As shown in Table 4.6 and Table 4.7, the control variables remain expected signs. The coefficients of institutional quality, population, GDP per capita and Chinese culture are positive and statistically significant in general. As for the impact of CI from OLS estimation, all the coefficients are still statistically positive before and after the Belt Road Initiative. The effect is stronger after the Belt Road Initiative for the Belt Road countries. One additional CI increases the number of announced CMA and accomplished CMA by 2.1% (exp(0.021)=1.021) and 1.5% (exp(0.015)=1.015), respectively before the Belt

Variables	Belt Road				Non Belt Road			
	(1) Announced	(2) Accomplished	(3) Announced	(4) Accomplished	(5) Announced	(6) Accomplished	(7) Announced	(8) Accomplished
CI	0.021***	0.015*	0.059***	0.032***	0.032***	0.026***	0.032***	0.025***
	(0.010)	(0.008)	(0.012)	(0.06)	(0.004)	(0.007)	(0.004)	(0.003)
INS	0.173***	0.155***	0.178**	0.108**	0.156**	0.133***	0.231***	0.118*
	(0.063)	(0.050)	(0.082)	(0.058)	(0.066)	(0.057)	(0.088)	(0.072)
ER	-0.012	-0.009	-0.006	0.002	0.007	0.014	0.031*	0.014
	(0.010)	(0.008)	(0.016)	(0.011)	(0.011)	(0.028)	(0.016)	(0.013)
INF	-0.001	-0.001	0.004	0.003	0.001	0.001	-0.001	-0.001
	(0.003)	(0.002)	(0.005)	(0.004)	(0.004)	(0.001)	(0.004)	(0.004)
lnPOP	0.027*	0.049***	0.053**	0.041***	0.111**	0.096***	0.145***	0.089***
	(0.036)	(0.015)	(0.027)	(0.013)	(0.021)	(0.018)	(0.028)	(0.023)
lnPGDP	0.052*	0.001	0.019	0.001	1.930**	0.678	1.061*	0.488
	(0.029)	(0.003)	(0.051)	(0.024)	(0.771)	(0.705)	(0.585)	(0.475)
lnEDIS	-0.002	-0.012	-0.001	0.026	-1.858**	-0.952	-0.992*	-0.431
	(0.023)	(0.019)	(0.029)	(0.018)	(0.769)	(1.243)	(0.579)	(0.471)
lnGDIS	0.002	-0.012	0.067	-0.087	-0.261*	-0.018	-0.311*	-0.237
	(0.080)	(0.063)	(0.111)	(0.067)	(0.146)	(0.125)	(0.185)	(0.149)
NEIGH	0.038	-0.007	0.138	-0.028	/	/	/	/
	(0.095)	(0.075)	(0.126)	(0.057)				
CC	0.200**	0.152**	0.381***	0.216**	/	/	/	/
	(0.082)	(0.065)	(0.109)	(0.077)				
DEV	-0.009	0.015*	0.099	0.025	-0.344*	-0.223	-0.196	-0.122
	(0.095)	(0.076)	(0.126)	(0.089)	(0.185)	(0.158)	(0.234)	(0.189)
Observations	396	396	330	330	450	450	300	300
Number of countries	66	66	66	66	75	75	75	75
R-square	0.3046	0.2735	0.4297	0.3622	0.5846	0.5447	0.7496	0.8821
Time Period	2006-2012	2006 -2012	2013-2017	2013 -2017	2006-2012	2006 -2012	2013-2017	2013 -2017
Country fixed effects	No	No	No	No	No	No	No	No
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Road Initiative whereas these effects grow to 5.9% and 3.2%, respectively. Yet, we do not spot any externalities from this global policy for the non Belt-Road countries as the effect of CI remains unchanged before and after the Belt Road Initiative. The results from PPML, however, show that the impact of CI for Belt-Road countries is significant only after the initiative in the sense that one additional CI leads to increase in announced CMA and accomplished CMA by 14.7% (exp(0.138)=1.147) and 11.7% (exp(0.111)=1.117), respectively. In spite of the discrepancy, both results support that the impact of CI is strengthened in Belt Road countries after the Belt Road Initiative.

Table 4.6 OLS Estimations for the impact of CI before and after the Belt Road Initiative.

Variables	Belt Road				Non Belt Road			
	(1) Announced	(2) Accomplished	(3) Announced	(4) Accomplished	(5) Announced	(6) Accomplished	(7) Announced	(8) Accomplished
CI	0.021***	0.015*	0.059***	0.032***	0.032***	0.026***	0.032***	0.025***
	(0.010)	(0.008)	(0.012)	(0.06)	(0.004)	(0.007)	(0.004)	(0.003)
INS	0.173***	0.155***	0.178**	0.108**	0.156**	0.133***	0.231***	0.118*
	(0.063)	(0.050)	(0.082)	(0.058)	(0.066)	(0.057)	(0.088)	(0.072)
ER	-0.012	-0.009	-0.006	0.002	0.007	0.014	0.031*	0.014
	(0.010)	(0.008)	(0.016)	(0.011)	(0.011)	(0.028)	(0.016)	(0.013)
INF	-0.001	-0.001	0.004	0.003	0.001	0.001	-0.001	-0.001
	(0.003)	(0.002)	(0.005)	(0.004)	(0.004)	(0.001)	(0.004)	(0.004)
lnPOP	0.027*	0.049***	0.053**	0.041***	0.111**	0.096***	0.145***	0.089***
	(0.036)	(0.015)	(0.027)	(0.013)	(0.021)	(0.018)	(0.028)	(0.023)
lnPGDP	0.052*	0.001	0.019	0.001	1.930**	0.678	1.061*	0.488
	(0.029)	(0.003)	(0.051)	(0.024)	(0.771)	(0.705)	(0.585)	(0.475)
lnEDIS	-0.002	-0.012	-0.001	0.026	-1.858**	-0.952	-0.992*	-0.431
	(0.023)	(0.019)	(0.029)	(0.018)	(0.769)	(1.243)	(0.579)	(0.471)
lnGDIS	0.002	-0.012	0.067	-0.087	-0.261*	-0.018	-0.311*	-0.237
	(0.080)	(0.063)	(0.111)	(0.067)	(0.146)	(0.125)	(0.185)	(0.149)
NEIGH	0.038	-0.007	0.138	-0.028	/	/	/	/
	(0.095)	(0.075)	(0.126)	(0.057)				
CC	0.200**	0.152**	0.381***	0.216**	/	/	/	/
	(0.082)	(0.065)	(0.109)	(0.077)				
DEV	-0.009	0.015*	0.099	0.025	-0.344*	-0.223	-0.196	-0.122
	(0.095)	(0.076)	(0.126)	(0.089)	(0.185)	(0.158)	(0.234)	(0.189)
Observations	396	396	330	330	450	450	300	300
Number of countries	66	66	66	66	75	75	75	75
R-square	0.3046	0.2735	0.4297	0.3622	0.5846	0.5447	0.7496	0.8821
Time Period	2006 - 2012	2006 - 2012	2013 - 2017	2013 - 2017	2006 - 2012	2006 - 2012	2013 - 2017	2013 - 2017
Country fixed effects	No	No	No	No	No	No	No	No
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: 1. Robust standard errors are reported in parentheses; 2. *, ** and *** represents the 10%, 5% and 1% significance level, respectively.

Table 4.7 PPML Estimations for the impact of CI before and after the Belt Road Initiative.

Variables	Belt Road				Non Belt-Road			
	(1) Announced	(2) Accomplished	(3) Announced	(4) Accomplished	(5) Announced	(6) Accomplished	(7) Announced	(8) Accomplished
CI	0.074	0.081	0.138***	0.111***	0.008*	0.002	0.001	-0.008
	(0.058)	(0.068)	(0.032)	(0.038)	(0.005)	(0.006)	(0.003)	(0.006)
INS	1.432***	1.619***	1.273***	1.119***	1.602**	1.645**	0.571*	-0.061
	(0.046)	(0.058)	(0.026)	(0.320)	(0.347)	(0.382)	(0.308)	(0.392)

ER	-0.175**	-0.172*	-0.033	-0.008	0.038	0.031	0.061*	0.031
	(0.079)	(0.102)	(0.056)	(0.008)	(0.027)	(0.029)	(0.031)	(0.039)
INF	0.022	0.004	0.037*	0.064***	0.075	0.067	-0.029	-0.131**
	(0.016)	(0.002)	(0.020)	(0.017)	(0.046)	(0.048)	(0.040)	(0.058)
lnPOP	0.719***	0.756***	0.396***	0.055***	0.955**	1.031***	1.008***	1.103***
	(0.221)	(0.275)	(0.101)	(0.016)	(0.094)	(0.094)	(0.113)	(0.186)
lnPGDP	0.695	0.572	0.186	0.078	4.197***	2.683	3.875***	3.886***
	(0.454)	(0.605)	(0.031)	(0.361)	(1.395)	(1.946)	(0.639)	(0.942)
lnEDIS	0.055	0.115	0.171	0.172	-3.469***	-2.063	-2.525***	-1.962**
	(0.152)	(0.184)	(0.214)	(0.226)	(1.339)	(1.951)	(0.560)	(0.873)
lnGDIS	0.462*	0.535*	0.351	0.063	-0.013	-0.224	0.237	0.426
	(0.266)	(0.287)	(0.303)	(0.356)	(0.249)	(0.277)	(0.226)	(0.316)
NEIGH	0.535	0.477	1.197**	0.588	/	/	/	/
	(0.606)	(0.075)	(0.600)	(0.614)				
CC	1.357***	1.464***	1.663***	1.748**	/	/	/	/
	(0.326)	(0.397)	(0.266)	(0.364)				
DEV	-0.673	-0.549	0.301	0.691	-1.613***	-1.367***	-0.796***	-0.771**
	(0.558)	(0.076)	(0.407)	(0.647)	(0.276)	(0.336)	(0.197)	(0.297)
Observations	396	396	330	330	450	450	300	300
Number of countries	66	66	66	66	75	75	75	75
R-square	0.3760	0.3442	0.5785	0.4859	0.5980	0.5070	0.9451	0.8866
Pseudo log-likelihood	-193.6949	-143.5840	-224.7839	-129.0700	-275.9541	-247.9432	-231.8339	-166.3877
Time Period	2006-2012	2006-2012	2013-2017	2013-2017	2006-2012	2006-2012	2013-2017	2013-2017
Country fixed effects	No	No	No	No	No	No	No	No
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: 1. Robust standard errors are reported in parentheses; 2. *, ** and *** represents the 10%, 5% and 1% significance level, respectively.

4.4.3 Belt countries and road countries

The impact of CI can be different due to the difference of regional distribution of belt countries and the road countries. Therefore, we separate the samples into two different groups: the belt countries and the road countries and estimate the impact of CI before and after the Belt Road Initiative. In the OLS estimation results shown in Table 4.8, CI exerts positive effect on both the announced and accomplished CMA in belt countries and this effect is strengthened after the Belt Road Initiative, from 30% (exp(0.030)= 1.030) to 59% (exp(0.058)=1.059) on announced CMA and from 19 % to 32% on accomplished CMA, respectively. Yet, the impact of CI is statistically insignificant in road countries while it turns to be statistically significant and positive after the Belt Road Initiative. The PPML estimation results in Table 4.9, however, shows that the impact of CI is statistically significant only after the Belt Road Initiative and it remains insignificant in the road countries. Both estimations suggest that the CI's influence in belt countries is more responsive to the Belt Road Initiative, which is in line with Du and Zhang (2018). They find that the Belt-Road Initiative increases the outflow investment in land belt countries only. In general, cultural distance is

negatively associated with economic cooperation. This also applies to China in the way that culturally remote countries display higher aversion towards the foreign investments. Therefore, a possible explanation for these results is that the belt countries rather than the road countries are mostly located in East Asia and South-east Asia where the Chinese culture has been rooted for longer period. The belt countries are relatively more familiar with the Chinese culture and therefore benefit more from the CI in the short run.

Table 4.8 OLS Estimations for the impact of CI before and after the Belt Road Initiative.

Variables	Belt				Road			
	(1) Announced	(2) Accomplished	(3) Announced	(4) Accomplished	(5) Announced	(6) Accomplished	(7) Announced	(8) Accomplished
CI	0.030***	0.019***	0.058***	0.032***	0.027	0.025	0.046*	0.029*
	(0.010)	(0.007)	(0.007)	(0.007)	(0.018)	(0.015)	(0.024)	(0.017)
INS	0.059	0.018	0.011	0.035	0.280*	0.275**	0.289	0.098
	(0.063)	(0.039)	(0.050)	(0.048)	(0.143)	(0.117)	(0.205)	(0.147)
ER	-0.005	-0.003	-0.001	0.005	-0.027	-0.023	-0.047	-0.029
	(0.007)	(0.005)	(0.003)	(0.013)	(0.029)	(0.023)	(0.048)	(0.034)
INF	-0.002	-0.002	-0.001	-0.001	0.001	0.001	0.005	0.006
	(0.002)	(0.002)	(0.003)	(0.004)	(0.006)	(0.005)	(0.023)	(0.018)
lnPOP	0.038*	0.019	0.030	0.027	0.066*	0.047*	0.058	0.037
	(0.021)	(0.014)	(0.020)	(0.020)	(0.034)	(0.027)	(0.045)	(0.034)
lnPGDP	0.008	-0.002	0.011	0.005	0.026	-0.013	0.079	0.069
	(0.034)	(0.029)	(0.029)	(0.028)	(0.087)	(0.071)	(0.141)	(0.101)
lnEDIS	-0.010	0.003	-0.007	0.007	-0.029	-0.013	-0.001	0.141*
	(0.021)	(0.019)	(0.017)	(0.471)	(0.057)	(0.048)	(0.029)	(0.083)
lnGDIS	-0.094	-0.011	0.228	0.255*	0.063	0.045	0.084	-0.003
	(0.176)	(0.117)	(0.143)	(0.145)	(0.136)	(0.109)	(0.193)	(0.138)
NEIGH	-0.021	0.005	0.157	0.068	-0.011	-0.061	0.138	0.049
	(0.119)	(0.079)	(0.100)	(0.101)	(0.183)	(0.146)	(0.126)	(0.179)
CC	0.068	0.089	0.324	0.336	0.186	0.146	0.073	0.218
	(0.271)	(0.179)	(0.147)	(0.220)	(0.131)	(0.104)	(0.313)	(0.127)
DEV	0.019	0.039	0.072	-0.002	0.012	0.029	0.099	0.006
	(0.076)	(0.050)	(0.065)	(0.064)	(0.222)	(0.178)	(0.126)	(0.226)
Observations	240	240	200	200	156	156	130	130
Number of countries	40	40	40	40	26	26	26	26
R-square	0.1912	0.2735	0.3917	0.3262	0.3955	0.3971	0.5088	0.4319
Time Period	2006-2012	2006-2012	2013-2017	2013-2017	2006-2012	2006-2012	2013-2017	2013-2017
Country fixed effects	No	No	No	No	No	No	No	No
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: 1. Robust standard errors are reported in parentheses; 2. *, ** and *** represents the 10%, 5% and 1% significance level, respectively.

Table 4.9 PPML Estimations for the impact of CI before and after the Belt Road Initiative.

Variables	Belt				Road			
	(1) Announced	(2) Accomplished	(3) Announced	(4) Accomplished	(5) Announced	(6) Accomplished	(7) Announced	(8) Accomplished
CI	-0.078	-0.138	0.218***	0.404**	0.066	0.074	0.043	0.089

	(0.150)	(0.179)	(0.085)	(0.159)	(0.052)	(0.053)	(0.051)	(0.062)
INS	2.306*	0.155***	0.782	4.143	1.032	1.548	1.536**	1.177
	(1.333)	(0.050)	(1.096)	(1.084)	(1.097)	(1.194)	(0.078)	(0.839)
ER	-0.369	-0.478	-0.015	0.199	-0.467	-0.305	-0.029	-0.023
	(0.366)	(0.612)	(0.087)	(0.123)	(0.311)	(0.284)	(0.016)	(0.219)
INF	-0.067	-0.136**	0.031	0.127***	0.027	0.031	-0.048	-0.043
	(0.041)	(0.057)	(0.051)	(0.047)	(0.043)	(0.057)	(0.090)	(0.127)
lnPOP	1.465*	1.767*	0.531**	1.545***	0.753***	0.773***	0.318**	0.495***
	(0.785)	(1.0148)	(0.221)	(0.295)	(0.214)	(0.213)	(0.125)	(0.144)
lnPGDP	0.291	-0.041 （0.598 ）	0.543	0.369	1.150	0.712	0.088	-0.337
	(0.446)		(0.436)	(0.787)	(0.903)	(1.052)	(0.907)	(0.839)
lnEDIS	0.043	0.668*	-0.056	-0.086	0.018	-0.047	0.051	0.479
	(0.386)	(0.355)	(0163)	(0.277)	(0.218)	(0.195)	(0.338)	(0.501)
lnGDIS	-4.558	-0.012	7.807*	22.358***	1.211***	0.941**	0.041	-0.013
	(2.923)	(0.063)	(4.274)	(8.712)	(0.454)	(0.453)	(0.489)	(0.536)
NEIGH	-2.485	-1.973	6.404**	5.674**	0.979	0.555	0.555	0.547
	(1.945)	(2.076)	(3.245)	(2.172)	(1.061)	(0.739)	(0.739)	(0.669)
CC	-1.848	1.186	9.370**	9.469**	1.607***	1.472***	1.408***	1.832**
	(2.838)	(4.179)	(4.770)	(4.168)	(0.538)	(0.561)	(0.427)	(0.569)
DEV	-1.695	-1.345	0.099	-2.403**	0.710	0.556	1.037	1.204
	(1.542)	(1.966)	(1.067)	(1.169)	(0.615)	(0.705)	(0.664)	(0.892)
Observations	240	240	200	200	156	156	130	130
Number of countries	40	40	40	40	26	26	26	26
R-square	0.4726	0.5461	0.4436	0.4031	0.5820	0.4703	0.6341	0.5255
Pseudo log-likelihood	-84.1995	-53.5586	-73.0417	-32.5273	-92.5093	-76.2502	-136.3066	-82.4546
Time Period	2006-2012	2006-2012	2013-2017	2013-2017	2006-2012	2006-2012	2013-2017	2013-2017
Country fixed effects	No	No	No	No	No	No	No	No
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: 1. Robust standard errors are reported in parentheses; 2. *, ** and *** represents the 10%, 5% and 1% significance level respectively.

4.4.4 The interactive effect of Belt Road Initiative and CI

So far, we estimate the impact of CI based on different samples in terms of regions and time line. To further investigate the interactive effect of CI and Belt Road Initiative, we conduct two types of difference in difference (DID) analyses. In the first type of DID estimation in a standard format from column (1) to (4), the coefficients of CI in both OLS and PPML are mostly positive and significant at 1%, which again confirms the favorable effect of CI. The coefficients of Post, 2013-2017 are mostly positive, indicating that the Chinese CMA in these most recent years increases still. Yet, we observe that the BRI and the interaction term of post and BRI are negatively associated with Chinese CMA. It is not surprising that the early assessment of Belt Road Initiative can be negative due to high barriers the Initiative faces such as potential clash of religion and culture (Huang, 2016). The interaction term between CI and BRI is positive from PPML results whereas it is negative under OLS results. This discrepancy between OLS and PPML is caused by heteroscedasticity (Silva &

Tenreyro, 2006). The insignificance of the interaction term between Post and CI and the positive coefficient of the interaction term among CI, Post and BRI from OLS estimation suggest that the interactive effect of Belt Road Initiative and CI is statistically positive only in the Belt Road countries after the Initiative. This also suggests that the Belt Road Initiative has positive externalities thus far. Although the Belt Road Initiative was introduced in 2013, countries have been joining the membership in succession. Standard DID estimation may lead to bias as a result. In the second type from column (5) to (8) in Table 4.10, therefore, we account for the membership length of so as to measure the progression of Belt Road Initiative and its interactive effect with CI. Still, the impact of CI is positive in all models. While the coefficient of Membership length is insignificant, the coefficient of interaction between Membership length and CI is positive in most models except for the OLS estimation for announced CMA. Longer Belt Road membership ensures greater interactive effect between CI and Belt Road Initiative. The coefficients of main control variables such as population, institutional quality, GDP per capita and Chinese culture majority in the host country are statistically positive while others maintain insignificant or expected signs in most cases with variations due to sample differences.

Table 4.10 Estimations for the interactive effect of CI and Belt Road Initiative.

Variables	Announced		Accomplished		Announced		Accomplished	
	(1) OLS	(2) PPML	(3) OLS	(4) PPML	(5) OLS	(6) PPML	(7) OLS	(8) PPML
CI	0.030*** (0.004)	0.008** (0.003)	0.025*** (0.003)	0.003 （0.004）	0.032*** (0.002)	0.011*** (0.002)	0.020*** （0.001）	0.004* (0.002)
Post	0.087*** (0.023)	0.797*** (0.147)	0.014 (0.021)	0.390*** （0.180）	/	/	/	/
BRI	-0.158** (0.066)	0.336 (0.245)	-0.117** (0.051)	0.367 （0.300）	/	/	/	/
Post × BRI	-0.079** (0.036)	-0.589** (0.272)	-0.030 (0.031)	-0.637* （0.336）	/	/	/	/
CI× BRI	-0.022* (0.011)	0.064*** (0.019)	-0.021** (0.009)	0.061** （0.024）	/	/	/	/
Post × CI	0.001 (0.003)	-0.003 (0.003)	-0.004 (0.003)	-0.003 （0.004）	/	/	/	/
Post × BRI × CI	0.021*** (0.008)	0.013 (0.023)	0.014*** (0.007)	0.018 （0.028）	/	/	/	/
Membership length	/	/	/	/	0.003 （0.011）	0.026 （0.067）	-0.005 （0.010）	-0.064 (0.085)
Membership length × CI	/	/	/	/	0.005** （0.002）	0.013** (0.006)	0.002 （0.002）	0.015*** (0.007)
INS	0.135*** (0.044)	0.878*** (0.234)	0.110*** (0.035)	0.798*** (0.312)	0.150*** (0.043)	0.777*** (0.228)	0.128*** （0.034）	0.689** (0.287)
ER	-0.009 (0.007)	0.056*** (0.015)	-0.007 (0.007)	0.054*** (0.018)	-0.014*** (0.007)	0.039** (0.016)	0.002 (0.005)	0.046*** (0.017)
INF	0.001 (0.019)	-0.011 (0.008)	0.001 (0.008)	-0.015 (0.034)	0.001 (0.002)	-0.038 (0.027)	0.001 (0.002)	-0.016 (0.033)

lnPOP	0.100***	0.768***	0.078***	0.848***	0.096***	0.710***	0.079***	0.813***
	(0.015)	(0.047)	(0.011)	(0.059)	(0.015)	(0.040)	(0.011)	(0.046)
lnPGDP	0.077***	0.803***	0.032	0.773***	0.066**	0.862***	0.014	0.890***
	(0.028)	(0.195)	(0.023)	(0.243)	(0.028)	(0.166)	(0.023)	(0.208)
lnEDIS	-0.032*	0.085	-0.005	0.195	-0.024	-0.002	0.001	0.064
	(0.017)	(0.122)	(0.017)	(0.137)	(0.017)	(0.099)	(0.014)	(0.119)
lnGDIS	-0.081	0.107	-0.072	0.201	0.087	-0.089	0.042	-0.001
	(0.076)	(0.120)	(0.059)	（0.147）	（0.063）	（0.155）	（0.049）	(0.17)
NEIGH	0.056	0.724**	-0.024	0.414	0.105	0.546*	0.106	0.313
	(0.112)	(0.352)	(0.086)	(0.103)	（0.112）	(0.316)	（0.087）	(0.403)
CC	0.248**	1.260***	0.169**	1.385***	0.249**	1.119***	0.169**	1.351***
	(0.101)	(0.187)	(0.086)	(0.237)	（0.102）	(0.188)	（0.079）	(0.237)
DEV	0.139	-0.732***	0.054	-0.715***	0.180**	-0.829***	0.087	-0.759***
	(0.087)	(0.218)	(0.068)	(0.269)	（0.087）	(0.192)	(0.068)	(0.254)
Observations	1551	1551	1551	1551	1551	1551	1551	1551
Number of countries	141	141	141	141	141	141	141	141
R-square	0.5720	0.8234	0.5206	0.7164	0.5551	0.7972	0.5059	0.7062
Pseudo log-likelihood	/	-1089.2163	/	-789.0948	/	-1159.1394	/	-804.76806
Time Period	2006-2017	2006-2017	2006-2017	2006-2017	2006-2017	2006-2017	2006-2017	2006-2017
Country fixed effects	No	No	No	No	No	No	No	No
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: 1. Robust standard errors are reported in parentheses; 2. *, ** and *** represents the 10%, 5% and 1% significance level, respectively.

4.5 Conclusions

When investigating a home country's internalization, extant studies have explicitly recognized the importance of the cultural compatibility (Guiso et al., 2006; Xu & Shenkar, 2002; Lee et al., 2008; Lim et al., 2016; Ahern et al., 2015) and home country institutions (Cuervo-Cazurra, 2011; Estrin et al., 2016; Cuervo-Cazurra et al., 2018; Wan & Hosikisson, 2003). Rooted on these studies, our paper is one of the first to bridge these two strands of literature by assessing the role of cultural institute on home country's internalization under a home global institution from the case of the world's largest emerging economy, China. On the basis of a panel dataset containing 66 Belt-Road countries and 75 non Belt-Road countries from 2006 to 2017, we conduct a comparative analysis to study the impact of CI on the Chinese CMA activities in both Belt-Road countries and non Belt-Road countries with emphasis on the interactive effect of Belt Road Initiative and CI.

Admittedly, our empirical strategy is in dilemma and raises two main concerns from our measurement of CMA. First, CMA has been mostly considered as a firm level behavior in the literature. Second, Chinese outflow investments are largely from big companies. The big companies, mostly the SOEs, sometimes make several tiny

M&A in host countries and to ensure the major M&A to be done successfully. In this sense, firm level empirics seemingly work better to address these two issues from CMA measurements as it controls firm level characteristics. However, the availability of firm level data for most Belt-Road countries and non Belt-Road countries is unachievable and small sample estimation fails to offer a comprehensive understanding on the Belt Road Initiative and the role of CI in this context. Worse still, firm level data cannot control the country level heterogeneity and leads to bias. Therefore, we have no option but choose to negotiate with our intention and focus on a full frame of the Belt Road Initiative, thereby explaining CMA from a macro perspective, a country level estimation.

Beyond the limitations of CMA measurements, our results show that the effect of CI on Chinese CMA is positive in general and this effect is more pronounced in Belt Road countries rather than in non Belt-Road countries, especially in Belt countries after 2013, the year from when this global initiative was introduced. We also find that the influence of CI is strengthened by the positive interactive effect between Belt Road Initiative and CI. In particular, we observe that the earlier the host country joins the Initiative, the stronger is the interactive effect when we control for the intensity of Belt Road Initiative. Our understanding is straight forward. As one important objectives of the Belt Road Initiative is to shorten the cultural gap, the Initiative enhances the role of CI and intensifies the impact of CI. Or vise versa, the Initiative, at its preliminary stage, does not yet have significant impacts subject to cultural incompatibility. CI, as an irreplaceable platform, starts from the people-to-people cultural exchange and facilitate the Belt Road Initiative.

We hope that our study can serve as a first step to understand the interplay of cultural institute and home institution on the rapid developing globalization nowadays and shed lights on ongoing study and progress of the Belt Road Initiative. Future research can focus on the specific channels via which the cultural institute and home institution strengthen each other not only in terms of CMA but also of some other aspects such as export and innovation.

Our findings also lead to policy considerations. On the one hand, policy makers may want to encourage the introduction of foreign cultural institutes to China since they

are expected to promote the culture integration and develop the economic cooperation as the CI does. On the other, the established cooperation with the non Belt-Road members should not be weighed less against the Belt-Road members and China should also maintain and deepen the cooperation with these partners. Equally importantly, with the rapid growth of the Belt-Road members, the issue of cultural and institutional difference should be improved and addressed to ensure the efficiency of cooperation under the Belt Road Initiative.

4.6 Appendix

Table A4.1 The number of the CI branches and Chinese CMA events in both Belt-Road and non Belt-Road countries from 2006-2017.

Country	Belt-Road membership	Number of CI	Number of announced CMA	Number of accomplished CMA
Afghanistan	Since 2013	1	0	0
Albania	Since 2015	1	0	0
Angola	No	1	1	1
Argentina	No	2	6	4
Armenia	Since 2015	1	0	0
Australia	No	14	121	70
Austria	No	2	6	5
Azerbaijan	Since 2015	2	0	0
Bahamas	No	1	0	0
Bahrain	No	1	0	0
Bangladeshi	Since 2014	2	0	0
Barbados	No	1	0	0
Belarus	Since 2014	4	0	0
Belgium	No	6	7	4
Benin	No	1	0	0
Bhutan	Since 2014	0	0	0
Bolivia	No	1	0	0
Bosnia and Herzegovina	Since 2015	2	0	0
Botswana	No	1	0	0
Brazil	No	10	27	15
Brunei	Since 2014	0	2	2
Bulgaria	Since 2015	2	2	1
Burma	Since 2014	0	0	0
Burundi	No	1	0	0
Cambodia	Since 2014	1	8	3
Cameroon	No	1	0	0
Canada	No	12	85	50
Cape Verde	No	1	0	0
Chile	No	2	4	1
Colombia	No	3	0	0
Comoros	No	0	0	0
Costa Rica	No	1	0	0
Cote d'Ivoire	No	1	0	0
Croatia	Since 2015	1	2	1
Cyprus	Since 2015	1	2	1
Czech	Since 2015	1	3	2
Denmark	No	3	8	3
East Timor	Since 2014	0	0	0
Ecuador	No	1	1	1
Egypt	Since 2014	2	0	0
Equatorial Guinea	No	1	0	0
Estonia	Since 2015	1	0	0
Ethiopia	No	2	0	0
Fiji	No	1	0	0
Finland	No	1	11	4
France	No	17	34	20
Gabon	No	1	0	0
Gambia	No	1	0	0
Georgia	Since 2014	1	2	0
Germany	No	19	94	57

Table A4.1 The number of the CI branches and Chinese CMA events in both Belt-Road and non Belt-Road countries from 2006-2017. (Continued)

Country	Belt-Road membership	Number of CI	Number of announced CMA	Number of accomplished CMA
Ghana	No	2	2	1
Greece	Since 2015	1	1	1
Guinea	No	1	0	0
Guyana	No	1	0	0
Hungary	Since 2015	4	5	2
Iceland	No	1	0	0
India	Since 2013	2	10	8
Indonesia	Since 2013	6	16	9
Iran	Since 2014	2	0	0
Iraq	Since 2014	0	1	0
Ireland	No	2	3	1
Israel	Since 2015	2	3	1
Italy	No	12	69	46
Jamaica	No	1	1	1
Japan	No	14	52	28
Kazakhstan	Since 2013	5	1	0
Kenya	No	4	0	0
Kyrgyzstan	Since 2013	4	1	0
Laos	Since 2014	1	2	0
Latvia	Since 2015	1	1	1
Lebanon	Since 2017	1	0	0
Lesotho	No	0	0	0
Liberia	No	1	1	1
Lithuania	Since 2015	1	0	0
Luxembourg	No	1	7	4
Macedonia	Since 2015	1	0	0
Madagascar	Since 2015	2	2	2
Malawi	No	1	0	0
Malaysia	Since 2014	2	4	1
Maldives	Since 2014	0	0	0
Mali	No	1	0	0
Mauritius	No	1	0	0
Mexico	No	5	7	5
Moldova	Since 2014	1	0	0
Mongolia	Since 2014	3	4	2
Montenegro	Since 2015	1	0	0
Morocco	Since 2017	3	0	0
Mozambique	No	1	0	0
Namibia	No	1	0	0
Nepal	Since 2014	1	1	0
Netherlands	No	3	28	13
New Zealand	Since 2017	3	13	5
Nigeria	No	2	1	0
Norway	No	1	3	2
Pakistan	Since 2014	4	4	1
Palestine	Since 2014	2	0	0
Panama	Since 2014	1	0	0
Peru	No	4	4	3
Philippines	Since 2014	4	1	1
Poland	Since 2015	5	6	6
Portugal	No	4	8	4
Qatar	Since 2014	0	0	0
Republic of Congo	No	1	0	0
Romania	Since 2015	4	2	1
Russia	Since 2014	17	26	13
Rwanda	No	1	0	0

Table A4.1 The number of the CI branches and Chinese CMA events in both Belt-Road and non Belt-Road countries from 2006-2017. (Continued)

Country	Belt-Road membership	Number of CI	Number of announced CMA	Number of accomplished CMA
Samoa	No	1	1	0
Saudi Arabia	Since 2015	0	0	0
Senegal	No	1	0	0
Serbia	Since 2015	2	0	0
Sierra Leone	No	1	0	0
Singapore	Since 2014	1	65	38
Slovakia	Since 2015	2	0	0
Slovenia	Since 2015	1	2	1
South Africa	Since 2015	5	19	9
South Korea	Since 2014	23	52	25
Spain	No	8	23	10
Sri Lanka	Since 2014	2	0	0
Sudan	No	1	0	0
Suriname	No	1	0	0
Sweden	No	1	13	3
Switzerland	No	2	21	15
Tajikistan	Since 2014	2	2	1
Tanzania	No	2	0	0
Thailand	Since 2014	16	16	12
Togo	No	1	0	0
Trinidad and Tobago	No	1	1	1
Tunisia	No	1	0	0
Turkey	Since 2014	4	3	3
Uganda	No	1	0	0
Ukraine	Since 2013	5	1	1
United Arab Emirates	Since 2014	2	3	1
United Kingdom	No	29	89	44
United States	No	110	365	176
Uruguay	No	1	2	1
Uzbekistan	Since 2013	2	0	0
Vanuatu	No	0	0	0
Vietnam	Since 2014	1	10	5
Yemen	Since 2015	0	0	0
Zambia	No	1	0	0
Zimbabwe	No	1	1	1

Chapter 5

What stayers do? Capital endowments and on-farm transitions in rural China

5.1 Introduction

Traditionally, the development literature has seen the rural sector primarily as a source of cheap migrant labor facilitating incipient industrialization in urban areas (Lewis, 1954; Harris and Todaro, 1970), rather than being interesting in its own right. In this, China has been no exception (see Dekle & Vandenbroucke, 2012; Lei et al., 2013; Wang et al., 2011; Zhang & Song, 2003). Since the economic reforms started in 1978, China has undergone tremendous changes. Between 1978 and 2014, it has grown on average by just under 10% per year (Lau, 2015). This was achieved by improving the productivity of rural agriculture so as to release workers into manufacturing in urban areas. Despite industrialization during the early Maoist period (in particular during the Great Leap Forward initiative of 1958-62), 82% of the Chinese population remained in rural areas in 1978.1 Under Maoism, rural households were organized in people's communes (*RenMinGongShe* 人民公社) which shared both work responsibilities and fruits of their joint efforts. This resulted in poor incentives, low productivity and freeriding. In the early 1980s, the communes were disbanded and replaced by the Household Responsibility System (*Jiatingzerenzhi* 家庭责任制), which divided the commune's resources (including land) and its output quota among the individual households. The households thus regained responsibility for their output, and were free to keep any surplus left after delivering their share of the quota (Lin, 1992).

At the outset of reforms, in the early 1980s, the bulk of rural residents was therefore engaged in low-productivity agriculture on land controlled by their household. After

the relaxation of *Hukou* restrictions[22], a migration from rural to urban areas started in the late 1980s, with rural migrants seeking better job opportunities (and sometimes also education and/or medical services) in urban centers. As with other emerging economies, there is a large body of research on this process, referred to in the literature as *off-farm transitions* (Shi et al., 2007;; Li et al., 2016; Tian et al., 2016; Liu & Xing, 2016; Xie et al., 2017; Zhao et al., 2017; Wang et al., 2011; Dekle & Vandenbrouche, 2012; Lei et al., 2013; Wang et al., 2016). However, in contrast to the attention given to the transformation of urban areas and rural to urban migration, there has been much less work on studying the *on-farm transitions*, which can be defined as transfers of workers from low-productivity farming on farm plots held by the household to either formal agricultural employment or entrepreneurial activity in agriculture (as opposed to moving away from rural agriculture into manufacturing in the urban areas). The goal of this paper, therefore, is to explore the determinants of on-farm transitions so as to facilitate a better understanding on this rural livelihood strategy.

We contribute to the literature by investigating what drives the on-farm transitions. The ability of rural households to undertake on-farm transitions is of crucial importance based on two primary reasons. On the one hand, on-farm transitions increase agricultural productivity (Haggblade et al., 2010; Levine, 2014; Zou et al., 2018), which in turn both increases the wellbeing of those who stay in rural areas, and releases labor from agriculture which can move to urban areas and help sustain economic growth there.[23] On the other hand, on-farm transitions facilitate the promotion of rural livelihood diversity, which in turn improves the living standard of the rural residents and helps eliminate the rural poverty (Bebbeington, 1999; Ellis,

[22] '*Hukou*' is a household registration system, which designates all individuals as either rural or urban residents. In the past, individuals were expected to remain in the area stated in their Hukou, and changing either one's status (from rural to urban) or place of residence was difficult. Even at present, individuals with a rural Hukou have limited access to public goods and services in urban areas. See Chan & Zhang (1999) for a detailed explanation of the *Hukou* system.

[23] The importance of the transformation of rural areas has also been recognized by the Chinese government. In 2018, the government adopted the Rural Vitalization Strategy aimed at development of rural areas during the period 2018-20. See "China releases five-year plan on rural vitalization strategy", Xinhua, 2018-09-26, http://www.xinhuanet.com/english/2018-09/26/c_137494476.htm.

1998; Ellis, 2000; Haggblade et al., 2010). We observe rural households in 2015, some 35 years after the reforms were initiated. Although we do not observe when the transitions happen, given that the vast majority of rural households shared the same initial situation in the early 1980s, our analysis captures the outcomes of any on-farm transitions that had happened since then.

Our study is based on a large rural household survey dataset covering 9 provinces from East, Central and West China. We focus on households rather than individuals as the decision making in livelihood transitions is a profit maximizing and risk minimizing process of a household (Stark, 1984, Taylor, 1987). We focus especially on the role played by capital endowments in driving the on-farm transitions, with capital defined broadly to include not only financial but also human, natural, social and political capital. Capital endowments have been considered as key factors in determining the decisions of the household livelihood strategy (Bebbington, 1999; Bhandari, 2013; Wang et al., 2016; Tregear & Cooper, 2017; Inwood, 2017). Importantly, rural households often differ considerably in their capital endowments, reflecting different local circumstances, past effort, resources inherited from their elders, and even luck. We examine the effect of different capital endowments on the rural residents' decisions in on-farm transitions. A novel contribution of our analysis is that we consider also social and political capital. The *Guanxi* (network relationship) matters enormously in the Chinese society, especially in rural areas (Zhang, Giles & Rozelle, 2012; Jin et al., 2014). Similarly, rural cadres are responsible for key political and administrative decisions affecting rural residents' off-farm employment (Zhang, Guo & Li, 2003).

The remaining part of this paper is organized as follows. In the next section, we review the existing literature on capital endowments, namely, human, financial, social, political and natural capital; and discuss their effects on on-farm transitions of the rural stayers. Section 5.3 provides information of the data and methodology in use. Section 5.4 presents our empirical findings. Section 5.5 concludes.

5.2 Rural Transitions and Capital Endowments

5.2.1 Rural and urban development in China

The process of economic development of an emerging economy such as China is usually understood in the context of the interplay between rural and urban sectors (Lewis, 1954; Harris and Todaro, 1970). Economic transformation is set off by industrialization in the urban sector, which becomes the source of economic growth. The rural sector instead serves as a pool of abundant labor, with rural workers initially languishing in low-productivity subsistence agriculture. The plentiful supply of cheap rural labor supports the development of the urban sector: as manufacturing expands, rural workers move to the cities to take advantage of the higher wages there. This continuous influx of new workers keeps urban wage growth in check (in addition, if the urban wages are downward sticky, involuntary urban unemployment can arise as a consequence or rural to urban migration of labor). Eventually, the pool of labor in the rural sector becomes exhausted. When this happens, both rural and urban wages start growing rapidly: this phenomenon is referred to as the Lewis turning point. When the developing economy passes the turning point, the resulting wage growth restricts further expansion of manufacturing: to continue growing, productivity improvements become necessary.

The jury is still out on the question whether China has reached or even passed the Lewis turning point. On the one hand, Liu (2015) observes that both rural wages and agricultural productivity started to increase sharply around 2002-04. He therefore argues that China reached the turning point around that time. In contrast, Das and N'Diaye (2013) point out that the supply of low-wage labor in rural areas of China still remains large. They therefore anticipate China to arrive at the turning point only by 2020-2025.

The models of development are thus primarily concerned with off-farm transitions, with productivity improvements confined to the urban sector. However, Ranis (2004) argues that some countries experienced industrialization accompanied by concurrent dramatic improvements agricultural productivity. He argues this was the case of England at the cusp of 18th century, Japan in late 19th and early 20th century and

Taiwan during the 1950s and 1960s. Such productivity improvements helped release further labor from agriculture while keeping the agricultural wage at or close to the subsistence level. Therefore, successful on-farm rural transitions can restrain the wage-growth pressure and thus help facilitate further growth of urban manufacturing.

At present, 41.5% of China's population live in the rural areas. The traditional sector's share in the economy, however, is relatively low: agriculture accounts for 27.7% of total employment but only 7.92% of GDP (NBSC, 2017). The disparity between the sector's contributions to employment and output are consistent with the observation that large stock of excess labor still remains in rural areas (Das and N'Diaye, 2013). The rural residents who do not move to urban areas have three options: remaining in low-productivity subsistence farming (that is, continuing to work on the family farm), leaving the family farm by taking up formal employment in an agricultural firm, or setting up their own agricultural firm (Xia & Simmons, 2007; Wang et al., 2016). Which of these options they choose crucially depends on the resources at their disposal: savings and access to loans, skills and training, connections (both social and political), and the like. In other words, their choice depends on their endowments of various types of capital: financial, human, social, political, and natural.

5.2.2 Capital endowments and on-farm transitions

The endowments considered in this study include both tangible and intangible capital. Depending on their type, we can classify them into human capital; financial, natural, social, and political capital (Carney, 1998; Chambers, 2006; Li et al, 2012). Below, we briefly discuss these types of capital and what effects we expect them to have. We summarize our expectations on the effects of various capital endowments in Table 5.1.

(1) Human capital

Human capital corresponds to the "productive wealth embodied in labor, skills and knowledge" (Tan, 2014), with the skills and abilities being both innate and acquired (Bhandari, 2013; Inwood, 2015). As an important dimension of human capital, education plays a crucial role in decision making of rural households (Bhandari,

2013). Zhang et al. (2002) compare the effects of education in different periods and find that those who are more educated benefit from more off-farm opportunities. Similarly, Wang et al. (2016) argue that there is a strongly positive relationship between human capital investment and entrepreneurship as well as holding a managerial position. We expect human capital to have a similar impact on on-farm transitions: possessing formal education and having agricultural and/or entrepreneurial skills should help rural residents become agricultural entrepreneurs.

With respect to gender, most studies (based on experimental evidence or observing investment behavior of men and women) tend to find that women are generally more risk averse (Jianakoplos and Bernasek 1998; Fellner and Maciejovsky, 2007; Eckel and Grossman, 2008; Sarin and Wieland, 2016). Becoming an owner of an agricultural business is associated with more uncertainty and risk than formal employment (Ahn, 2010; Hvide and Panos, 2013; Skriabikova et al., 2014). Therefore, we expect that rural households with higher share of women will prefer formal on-farm employment a transition into on-farm entrepreneurship.

Rural workers who migrated to urban areas in the past benefit from experiences and acquired skills that workers who never left the rural region lack. The migrant-worker experience can be helpful both with respect to finding formal on-farm employment as well as when it comes to setting up on-farm businesses. Thus, we expect household with former rural-to-urban migrants to be more likely to undertake either type of on-farm transition.

(2) Financial capital

Financial capital includes monetary assets: current income, bank deposits, bonds and equity, and bank loans (Best, 2017). Financial capital is essential for firm growth (Fowowe, 2017). Lack of loan finance can hinder firm creation and stop firms, especially small ones, from growing (Lee and Stebunovs, 2016). Therefore, we expect rural on-farm transitions to be positively affected by the household's stock of financial capital, especially so with respect to transitions into on-farm entrepreneurship.

(3) Natural capital

Natural capital includes all natural resources, of which farmland is the most the most crucial one in rural agrarian society (Kimhi & Bollman, 1999; Goetz & Debertin, 2001; Bhandari, 2013; Li et al., 2016). By investigating the trend of farmland fragmentation, Su et al., (2014) conclude that the quality, quantity and the fragmentation of farmland have significant relations with migration decisions. We therefore expect the quantity of farmland to have positive impact on on-farm transitions into both employment and entrepreneurship. We anticipate the effects of quantity of farmland to be negative with respect to transition into employment: more land requires greater labor input from the household members. In contrast, households with more land should be in a better position to start an agricultural business (and hire labor external to the household to work on the land). Finally, the expected impact of farmland fragmentation is negative for both types of transitions: fragmented land requires more time and effort from the household members.

(4) Social capital

Social capital refers to networks created through social contacts that can be mobilized to facilitate transactions, reduce freeriding, influence goals and to expand access to better opportunities (Fidrmuc & Gërxhani, 2008; Bhandari, 2013; Moyes et al., 2015). In rural China, *Guanxi* traditionally plays an important role in cementing business ties and setting up new businesses (Zhang & Li, 2003; Moyes et al., 2015). We approximate *Guanxi* using the size of the network of relatives and acquaintances. Additionally, having a common surname can be a sign of kinship ties with other bearers of the same name.[24] We expect social capital to boost the propensity to undergo on-farm transition into both on-farm employment and entrepreneurship.

[24] Unlike most other countries, China has a relatively few unique surnames, with 100 most common surnames accounting for 84.7% of the population of the country (see 公安部统计："王"成中国第一大姓,有 9288 万人 (Public Security Bureau Statistics: 'Wang' Found China's #1 Surname, Includes 92.88m People)." Available at: http://news.eastday.com/c/20070424/u1a2791347.html (accessed 28-01-2018). The three most common surnames, Wang (王), Li (李), and Zhang (张) account for 7.3%,

(5) Political capital

Political capital is similar to *Guanxi* or can be treated as a special form of *Guanxi* in its potential to improve business ties and open doors to new opportunities. It refers to networks which are built on political rather than social connections, such as being related to or friends with a village cadre.[25] Some studies suggest that political capital is associated with higher income (Jin et al., 2014) and has a profound impact on rural residents' labor market performance (Zhang et al, 2012; Wang et al, 2016). Their explanation rests on the observations that cadres have better information about jobs and business opportunities and are therefore able to help their household members. When attempting to start an on-farm business, the access to market information is of crucial importance. The cadres can thus open door to success as entrepreneurs (Zhang et al., 2012). We therefore expect political capital to be particularly important in facilitating on-farm transition into entrepreneurship.

Table 5.1 Expected effects of capital endowments.

Capital Endowment	On-farm Employment	On-farm Entrepreneurship
Human Capital		
Education	+	+
Training	+	+
Share of females	+	–
Former rural-to-urban migrants	0	+
Financial Capital		
Income	0	+
Bank deposits	0	++
Bank loans	0	++
Natural Capital		
Quality of farmland	+	++
Quantity of farmland	–	+
Land fragmentation	––	––
Social Capital		
Friends and relatives	+	++
Popular surname	+	++
Political Capital		
Household member as cadre	+	++
Friends/relative as cadre	+	++
Household member in CPS	+	++

7.2% and 6.8%, respectively, of the Chinese population (92.9mn, 92.1mn and 87.5mn in absolute numbers). However, there are important regional differences in the popularity of surnames. For the purposes of our survey, respondents were asked only whether their name was popular in the village.

[25] "Cadres (*XiangCunGanBu*), who may be political or administrative leaders, hold most important political positions in China's rural communities" (Zhang & Li, 2003; Zhang et al., 2012).

Notes: ++ and -- stand for expected strongly positive/negative effect. + and - stands for (weakly) positive/negative effect. +/- stands for ambiguous effect, and 0 stands for no effect..

5.3 Data and Methodology

5.3.1 Data

Our data is based on the “Cultivation and Reform of Land and Relevant Factors in Rural China” survey collected in 2015.[26] The survey sampling locations have been selected as follows. The 31 provinces (including municipalities and autonomous regions) in China were first divided into 3 groups based on a cluster analysis of population, per capita GDP, agricultural acreage, proportion of agricultural acreage, proportion of agricultural population and proportion of agricultural production.[27] Geographically, China is usually divided into three broad regions: “Western”, “Central” and “astern”. Therefore, combining socio-economic and geographical dimensions yields 9 groups. The provinces included in the survey were selected randomly from each group. Those 9 selected provinces are Guangdong, Guizhou, Henan, Jiangsu, Jiangxi, Liaoning, Ningxia, Shanxi and Sichuan.

By using the same method, the counties in each province were divided according to their population; per capita GDP; agricultural acreage; proportion of agricultural acreage; proportion of agricultural population and proportion of agricultural production into 3 groups. Then, 1 county was randomly selected from each group. Within each selected county, townships and then villages were chosen following the same procedure as county selection.[28] Finally, households were selected randomly according to the roster of each village, to obtain 240 households in each sampled province. In order to enhance the comparability of provinces, the sample sizes in Guangdong and Jiangxi were increased to 600. To ensure the quality of collected data, the final questionnaire has been developed on the basis of a pilot survey.

[26] National Natural Science Foundation of China (No.71333004) led by Team Prof. Biliang Luo, South China Agriculture University

[27] For the cluster analysis basis, see the Appendix A.

[28] Chinese provinces are further subdivided, hierarchically, into prefectures, counties, townships, and villages.

Households have been surveyed by means of face-to-face interviews. As a result, a total of 2880 households have been interviewed for the survey. Eliminating invalid questionnaires (those with incomplete or inconsistent responses), the final sample contains 2704 households with valid questionnaires. Sampling locations and sample sizes are shown in Table 5.2 and Fig. 5.1.

Table 5.2 Provincial samples

Class	Eastern China	Central China	Western China
Class1	Beijing; **Guangdong**; Shandong; Tianjin; Shanghai	Heilongjiang; **Henan**; Hainan	**Ningxia**; Qinghai; Tibet
Class2	Zhejiang; **Jiangsu**; Fujian	Inner Mongolia; **Jiangxi**; Hebei; Anhui; Hubei; Hunan	Chongqing; **Sichuan**; Yunnan
Class3	**Liaoning**	**Shanxi**; Jilin; Guangxi	Shaanxi; **Guizhou**; Gansu; Xinjiang

Sample Sizes

	Guangdong	Guizhou	Henan	Jiangsu	Jiangxi	Liaoning	Ningxia	Shanxi	Sichuan
Sample	600	240	240	240	600	240	240	240	240
Valid N	547	239	230	239	587	221	226	201	214

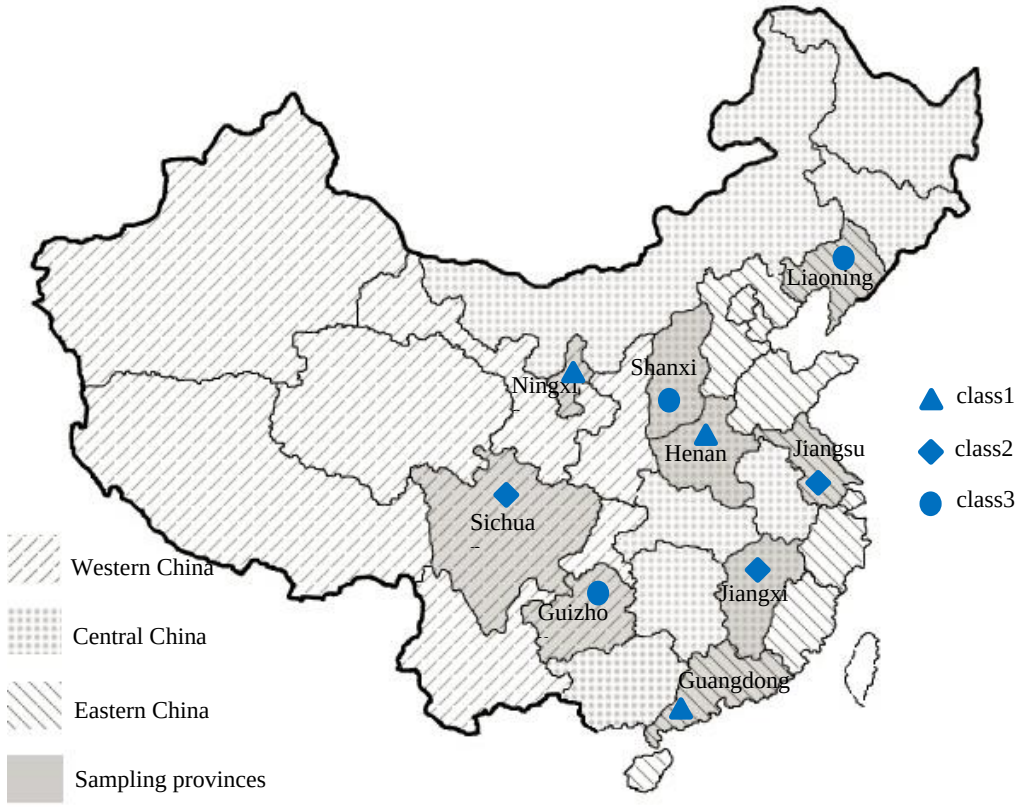

Fig. 5.1 Survey locations

5.3.2 Dependent variables

Our main aim is to explore how capital endowments effect on-farm transitions, defined as rural workers abandoning low-productivity subsistence farming on the family farm to move either into formal agricultural employment or to set up their own agricultural business. Therefore, the dependent variable, *Y*, captures the decisions of household with respect to such transitions (we observe only actions of the household, not have the behavior of individual household members). *Y* takes four values. When no household members are either in formal on-farm employment or own an agribusiness, *Y* equals 0. When one or more household members become on-farm workers (and none are business owners), *Y* equals 1. When one or more household members become entrepreneurs (and none are in formal employment), *Y* equals 2. Finally, when household has some members who move into on-farm employment and others who concurrently become agribusiness owners, *Y* equals 3. Table 5.3 summarizes the data on on-farm transitions.

Table 5.3 Dependent Variables for On-farm Transitions.

Variables	Obs.	%	Mean	S. D.	Min	Max
Dependent Variable	2704	100	0.2726	0.5960	0	3
No household member is on-farm worker or agribusiness owner	2147	79.40				
Household member is on-farm worker	409	15.13				
Household member is agribusiness owner	116	4.29				
Household members are both on-farm worker and agribusiness owner	32	1.18				

5.3.3 Independent variables

Table 5.4 shows the measures human capital, financial capital, natural capital, social capital and political capital used in our analysis, as discussed in section 5.2. Note that the survey only collects information about the household, not about individual household members (with the exception of the household head).

Human capital is measured by the number of economically active household members, their gender distribution, average educational attainment, history of training, and experience of rural-to-urban migration. Households with more workers and more educated and trained members are believed to have higher human capital endowments (Schultz, 1961; Wang et al., 2016; Muchomba, 2017). Specifically, we

set the length of compulsory education in China, nine years, as the threshold level of education, and distinguish between households whose average education level is 9 or less and those with greater values. As for training, the Chinese government has funded non-profit organizations to offer training programs, which the farmers can receive for free (Pan et al, 2017). We therefore include a measure whether members of household have received such training.

We use a relatively broad concept of financial capital which encompasses income, savings and access to bank credit. Specifically, we include the household's total income, relative comparison of present income with the past and with other households, and having savings and/or bank loans.

Natural capital is measured by household's contracted farmland, actual farmland used, land quality, and the relative size of land holdings. Farmland and land quality are indicators of the condition of the natural capital base. However, due to the limited farmland and the implementation of Household Responsibility System[29] in the late 1970s and early 1980s that followed the principle of equality (according to household size, the number of active members in a household, or both) in farmland allocation, farming operations in rural China are small and fragmented (Qing Tian et al, 2016). Therefore, we use the farmland fragmentation as an additional measure of the condition of farmland.

Social capital is measured by the amount of relatives or friends and whether the households' surname is popular in the respondent's village. In rural China, due to the small scale of villages, the fact that people share the same surname may mean that they are (clan) relatives. They may be more willing to help each other as a result. Moreover, the authorities in the village are more likely to come from the most popular surnames, so that social capital can be also closely related with political capital.

[29] Household Responsibility System (*Jia Ting Lian Chan Cheng Bao Ze Ren Zhi*) was a practice in China, first adopted in agriculture in 1979. In the traditional Maoist organization of the rural economy, farmers were given a quota by the government specifying the quantity of goods to produce. They received a reward for meeting the quota. Going beyond the quota rarely produced a further economic reward.

Political capital is measured as household members being one of the village cadres, and membership of household members in the Communist Party of China (CPC). The rural on-farm transition can take place both within the village and outside. Therefore, both in-village cadre status and outside cadre status are taken into accounts. Being a CPC member may enable people to have better access to political connections which can in turn translate into economic gains. We report descriptive statistics on capital endowments in Table 5.4.

Table 5.4 Independent variables (N=2704)

Description	Values			Mean	S. D.
	0	1	2		
Human capital					
Number of active members of household	/	/	/	3.1368	1.3019
Gender distribution of household active members	female> male	female= male	female< male	1.1845	0.6787
Household active members' average education (of years)	≤9	≥10	/	0.2892	0.4535
Training of agricultural technology	none	yes	/	0.1553	0.3623
Entrepreneurial training	none	yes	/	0.1036	0.3047
Household members was migrant worker	none	yes	/	0.6601	0.4738
Financial capital					
Household total income(yuan)	<30,000	30,000-50,000	>50,000	0.7385	0.8170
Income level compared with 2013	lower	about the same	higher	0.1712	0.6459
Income level compared with other households	lower	about the same	higher	0.9689	0.5970
Savings	no	yes	/	0.7585	0.4281
Bank loan	hard to obtain	easy to obtain	/	0.3706	0.4830
Natural capital					
Contracted farmland	<average	≥average	/	0.4545	0.4980
Actual farmland	<contracted farmland	=contracted farmland	>contracted farmland	0.7737	0.6273
Land quality	poor	average	good	1.2822	0.6673
Land fragmentation	<average	≥average	/	0.4475	0.4973
Productivity	poor	average	good	0.8277	0.5915
Social capital					
Popular surname in the village	not popular	average	popular	1.2955	0.7862
Amount of relatives or friends	few	average	many	1.4013	0.5940
Political capital					
Family members is/was village cadre	none	yes	/	0.2237	0.4168
Relatives or friends is village cadre	none	yes	/	0.2977	0.4573
Family members is cadre outside the village	none	yes	/	0.0492	0.2163
Relatives or friends is cadre outside the village	none	yes	/	0.2141	0.4103
Family members join the CPC	none	yes	/	0.1805	0.3847

Note: See the Appendix for the Table A5.2 reporting the number of samples and percentages of respondents in each category.

5.3.4 Additional control variables

The only member of household for whom individual information is available is the household head. We include four characteristics of the household head: age, gender, educational level and migrant work experience. Furthermore, we also include measures of traffic condition and distance from home to the center of township. These additional variables are used to check the robustness of our results as discussed below. The descriptive statistics of these variables are reported in Table 5.5.

Table 5.5 Additional household characteristics (N=2704)

Description	Values			Mean	S. D.
	0	1	2		
Age of the household head	/	/	/	43.4576	15.1398
Gender of the household head	male	female	/	0.3628	0.4809
Educational level of the household head	≤9	≥10	/	0.2785	0.4483
Household head's migrant work experience	no	yes	/	0.5910	0.4917
Traffic condition in the village	poor	average	good	1.2241	0.7036
Distance from home to town center (km)	/	/	/	5.6989	6.0312

5.3.5 Methodology

On-farm transition is essentially a set of decisions on occupational choice with multiple options. We follow the studies on occupational choice and adopt the Multinomial Logit Model, which has proven to be one of the most suitable methodologies to deal with the occupational choice (Greene, 2007; Schmidt & Strauss, 1975; Barkley, 1990; Wang et al., 2016; Zou et al., 2018). The utility function for household occupational choice can be expressed as:

$$U_{ij} = \alpha + \mathrm{G}X_i' + \varepsilon_{ij} \tag{5.1}$$

Where U_{ij} is the utility of household *i* associated with choice *j*. X_i' is a vector of household characteristics and G is a vector of parameters to be estimated. The probability that option j is chosen by i for a multinomial logit model for household occupational choice can be written as:

$$P_{ij} = \mathrm{Prob}(Y_{ij} = 1) = \frac{\exp(\mathrm{G}_j X_i')}{\sum_{i=1}^{M} \exp(G_i X_i')} \quad j = 0, 1, 2 \ \ldots N;\ i = 1, 2, 3 \ldots . M \tag{5.2}$$

Note that we set decision *j = 0* as denoting those household with no members as either on-farm worker or agribusiness owner as the base category; *j = 1* if at least one household member is on-farm worker (and none are agribusiness owners); *j = 2* when at least one household member is local agribusiness owner (and none are formally employed in agriculture); and *j = 3* when at least one household member is on-farm worker and at least one is agribusiness owner.[30]

The analysis proceeds in two steps. We first only include the capital endowments. Then, we also include the additional variables (household head characteristics and local infrastructure) as well as province fixed effects. Including province fixed effects is potentially important as these should capture the effects of local-level factors that also affect rural on-farm transitions and whose effects are the same for all households in the same sampling location: policies put in place by the local government (and the extent to which implementation of national policies differs across regions), local-level institutions, and access to markets.

5.4 Results and Discussion

In the tables below, we report the marginal effects of estimating the multinomial logit with the probability of the household undergoing on-farm transition. Note that we include all types of capital in the same regression. For the sake of exposition, however, we divide regression results into several tables according to the types of explanatory variables. We thus report results of two multinomial logit regressions, Model 1 and Model 2, divided into Tables 5.6 to 5.11.

5.4.1 Human capital and on-farm transitions

The results for human capital shown in Table 5.6 suggest that having more active household members increases the probability of transitioning into on-farm

[30] Only 32 households fall into this category. Therefore, we take the results for this group with a grain of salt and focus in our discussion on households for which *j* equals 1 or 2.

employment. Note that we control for the amount of land that the household can use (see below): holding the area of farmland constant, larger households are more likely to have surplus labor that can move into formal employment elsewhere. In contrast, the number of active members of household has no influence on agribusiness transition. Training plays an important role, as expected: entrepreneurial training exerts significantly positive influence on on-farm transition into both employment and entrepreneurship while agricultural training fosters only moving into on-farm entrepreneurship. Migrant work experience of a household member has positive influence on employment transition, while it has no impact on transition into entrepreneurship: former migrant workers probably have history of urban employment, and are likely to have acquired human capital that makes them more productive in rural employment as well. As expected, the number of household members employed off-farm has negative effect on transitioning to on-farm worker status: with more household members working off-farm, there are fewer members available to work on-farm. Off-farm employment does not, however, have significant influence on on-farm entrepreneurship. Household members owning off-farm business has no significant effect on either type of on-farm transition. Finally, gender balance of the household and education of household members do not significantly contribute to either type of transition, contrary to our expectations.

Table 5.6 Human Capital Effect on the Transition of Rural Residents: Marginal Effect, Multinomial Logit

	Model 1			Model 2		
	On-farm worker	Agribusiness owner	Both	On-farm worker	Agribusiness owner	Both
The number of active members of household	0.015***	-0.002	0.001	0.020***	-0.004	0.003
	(0.005)	(0.003)	(0.001)	(0.005)	(0.004)	(0.002)
Gender distribution of active members of household						
more females than males	-0.012	-0.017	-0.004	-0.009	-0.013	-0.002
	(0.019)	(0.013)	(0.006)	(0.020)	(0.013)	(0.006)
more males than females	-0.004	0.006	-0.007	-0.007	0.006	-0.009*
	(0.015)	(0.008)	(0.005)	(0.015)	(0.008)	(0.005)
Household active members' education level	-0.014	0.004	-0.004	-0.014	0.013	-0.004
	(0.015)	(0.008)	(0.005)	(0.015)	(0.009)	(0.005)
Training in agricultural technology	0.003	0.025***	0.010**	0.011	0.023***	0.010**
	(0.019)	(0.009)	(0.005)	(0.018)	(0.009)	(0.005)
Entrepreneurial training	0.043**	0.050***	0.016	0.049**	0.054	0.020
	(0.021)	(0.009)	(0.005)	(0.020)	(0.009)	(0.005)
Household members was migrant worker	0.207***	-0.016	0.003	0.201***	-0.018*	0.002
	(0.023)	(0.010)	(0.006)	(0.023)	(0.010)	(0.006)
Off-farm employment of household members	-0.280***	0.018	-0.007	-0.288***	0.019	-0.011*
	(0.022)	(0.012)	(0.006)	(0.022)	(0.012)	(0.006)
Off-farm self-employment	-0.017	-0.032	-0.148	-0.017	-0.031	-0.148

of household members	(1.533)	(0.783)	(6.713)	(3.326)	(1.499)	(12.395)
Additional control variables	NO	NO	NO	YES	YES	YES
Province Fixed effects	NO	NO	NO	YES	YES	YES

Notes: Model 1 is benchmark model and Model 2 serves as a robustness check with additional control variables shown in Table 5.11; Standard errors are in parentheses; Significant level: *p<0.1 **p<0.05 ***p<0.01.

5.4.2 Financial capital and on-farm transitions

The effects of financial capital on on-farm transition are reported in Table 5.7. The higher the income of a household, the more likely it is to transition into on-farm employment. This is likely to reflect reverse causality: being employed outside the household brings in additional earnings, resulting in an overall increase in the household's income. This interpretation is consistent also with the finding that household with employed members are less likely to report falling earnings compared with the previous year. Current income does not have a direct impact on on-farm entrepreneurship. Nevertheless, households with higher than average incomes are likely to have members who are agribusiness owners. Having savings makes formal employment less likely; contrary to our expectations, savings do not affect the transition into entrepreneurship. Bank loans have the opposite effect, being positively correlated with on-farm employment but not with being an agribusiness owner. The lack of effect of bank loans on entrepreneurship is somewhat surprising: it suggests that agricultural business owners rely little on external finance, or find it difficult to obtain it, unlike those in formal employment who can borrow from banks against future earnings from employment.

Table 5.7 Financial Capital Effect on the Transition of Rural Residents: Marginal Effect, Multinomial Logit.

	Model 1			Model 2		
	On-farm worker	Agribusiness owner	Both	On-farm worker	Agribusiness owner	Both
Household total income(yuan)						
30,000-50,000	0.033**	0.003	0.006	0.027*	0.002	0.004
	(0.016)	(0.010)	(0.006)	(0.016)	(0.01)	(0.006)
＞50,000	0.046***	0.008	0.014**	0.032*	0.002	0.013
	(0.017)	(0.010)	(0.006)	(0.017)	(0.010)	(0.006)
Income level compared with 2013						
lower	-0.048**	0.017	0.006	-0.043	0.013	0.005
	(0.023)	(0.012)	(0.006)	(0.023)	(0.012)	(0.006)
higher	0.000	-0.013	-0.003	0.002	-0.011	-0.002
	(0.015)	(0.009)	(0.005)	(0.015)	(0.009)	(0.005)
Income level compared with other households						
lower	0.003	-0.018	0.006	0.001	-0.016	0.007
	(0.018)	(0.013)	(0.006)	(0.018)	(0.013)	(0.006)
higher	-0.005	0.031***	0.000	-0.007	0.032***	-0.002

	(0.019)	(0.009)	(0.006)	(0.019)	(0.009)	(0.005)
Savings	-0.027*	0.012	-0.003	-0.032**	0.010	-0.001
	(0.016)	(0.011)	(0.005)	(0.016)	(0.011)	(0.005)
Bank loan	0.024*	0.007	-0.001	0.014	0.004	-0.004
	(0.013)	(0.008)	(0.004)	(0.013)	(0.008)	(0.004)
Additional control variables	NO	NO	NO	YES	YES	YES
Province Fixed effects	NO	NO	NO	YES	YES	YES

Notes: Model 1 is benchmark model and Model 2 serves as a robustness check with additional control variables shown in Table 5.11; Standard errors are in parentheses; Significant level: *p<0.1 **p<0.05 ***p<0.01.

5.4.3 Natural capital and on-farm transitions

In Table 5.8, we assess how natural capital contributes to on-farm transitions. Households with larger than average amount of farmland are more likely to transition into on-farm employment. Having access to more land than contracted, in turn, is associated with greater probability of entrepreneurship: this may be an effect of transitioning into entrepreneurial activity rather than a driver of it, as agribusiness owners may seek to acquire additional land. On the other hand, households with land of better-than-average quality and with better than average productivity tend to have members transitioning into formal employment (after controlling for the amount of land). Land of better quality should be easier to work on, and this should help release some household members to seek employment elsewhere. Likewise, higher productivity of land means that less labor and other inputs are required to work on given quantity of land, again helping release surplus labor into formal employment.

Table 5.8 Natural Capital Effect on the Transition of Rural Residents: Marginal Effect, Multinomial Logit.

	Model 1			Model 2		
	On-farm worker	Agribusiness owner	Both	On-farm worker	Agribusiness owner	Both
Contracted farmland more than average	0.041****	0.002	0.000	0.033**	0.007	-0.006
	(0.015)	(0.009)	(0.005)	(0.015)	(0.009)	(0.005)
Actual farmland						
less than contracted	-0.014	0.005	0.004	-0.011	0.008	0.002
	(0.015)	(0.009)	(0.005)	(0.015)	(0.009)	(0.005)
more than contracted	0.002	0.027***	0.017***	0.010	0.031	0.016
	(0.021)	(0.010)	(0.005)	(0.021)	(0.011)	(0.005)
Land quality						
poor	-0.007	-0.002	-0.001	-0.007	0.000	-0.003
	(0.023)	(0.015)	(0.009)	(0.022)	(0.015)	(0.009)
good	0.037***	0.016*	0.01**	0.030**	0.016*	0.010*
	(0.014)	(0.008)	(0.005)	(0.014)	(0.009)	(0.005)
Land fragmentation	-0.028*	-0.001	0.006	-0.023	0.011	0.008
	(0.015)	(0.009)	(0.005)	(0.018)	(0.010)	(0.006)
Productivity						
low	-0.011	0.012	-0.009	-0.013	0.010	-0.009
	(0.016)	(0.009)	(0.006)	(0.015)	(0.009)	(0.006)

high	0.041*	0.021*	0.006	0.037*	0.020	0.006
	(0.021)	(0.012)	(0.006)	(0.021)	(0.012)	(0.006)
Additional control variables	NO	NO	NO	YES	YES	YES
Province Fixed effects	NO	NO	NO	YES	YES	YES

Notes: Model 1 is benchmark model and Model 2 serves as a robustness check with additional control variables shown in Table 5.11; Standard errors are in parentheses; Significant level: *p<0.1 **p<0.05 ***p<0.01.

5.4.4 Social capital and on-farm transitions

The results in Table 5.9 indicate that there is an inverted U-shaped relationship between social capital and transitioning into formal employment. Both having a popular and unpopular surname is associated with lower probability of on-farm employment transition than having a surname of average popularity. Similarly, those with few and many friends are less likely to transition into on-farm employment than those with average number of friends. This implies that transition into formal agricultural employment is more likely for those with a surname that is neither popular nor rare, and those with an intermediate number of friends. A popular surname probably means that many residents in the village share the same surname: this may imply weaker ties among those with the same surname. In contrast, having an unpopular surname means that there are few kinsmen in the village. Interestingly, the effects of the two types of social capital on on-farm agribusiness transition are different: those with popular surnames are (weakly) more likely to move into rural entrepreneurship while having more than average number of friends has no effect on this type of transition.

Table 5.9 Social Capital Effect on the Transition of Rural Residents: Marginal Effect, Multinomial Logit.

	Model 1			Model 2		
	On-farm worker	Agribusiness owner	Both	On-farm worker	Agribusiness owner	Both
Popular surname in the village						
not popular surname	-0.05***	0.016	-0.004	-0.046**	0.016	-0.003
	(0.019)	(0.011)	(0.005)	(0.018)	(0.011)	(0.005)
popular surname	-0.041***	0.018*	-0.011**	-0.037**	0.018*	-0.010**
	(0.015)	(0.01)	(0.005)	(0.015)	(0.010)	(0.005)
Number of relatives or friends						
few	-0.054*	-0.014	0.002	-0.053*	-0.013	0.006
	(0.032)	(0.021)	(0.009)	(0.032)	(0.021)	(0.009)
many	-0.044***	-0.004	0.004	-0.040***	-0.001	0.003
	(0.014)	(0.008)	(0.005)	(0.014)	(0.008)	(0.005)
Additional control variables	NO	NO	NO	YES	YES	YES
Province Fixed effects	NO	NO	NO	YES	YES	YES

Notes: Model 1 is benchmark model and Model 2 serves as a robustness check with additional control variables shown in Table 5.11; Standard errors are in parentheses; Significant level: *p<0.1 **p<0.05 ***p<0.01.

5.4.5 Political capital and on-farm transitions

In terms of political capital, having a family member who is a village cadre has a positive effect on the probability of both types of on-farm transitions, as shown in Table 5.10. Such cadres could potentially help their family members in a variety of ways. For instance, rural cadres can use their position to help family members gain better access to higher-level bureaucrats, potential business partners and employers, credit sources, market information or technical expertise (Oi, 1999; Zhang et al, 2012, Jin et al., 2014). Indeed, this only applies when a household member is a village cadre: having (more distant) relatives or friends as village cadres, or having a family member as a cadre outside the village, have no significant influence on on-farm transition. This finding is consistent with Zhang and Li (2003) who also find that having family members as cadre has significant effect on non farm employment while the impact of having ties outside the village is insignificant. This is captured also in a Chinese proverb: “Distant water will not quench a fire nearby (*YuanShuiJiuBuLeJinHuo* *远水救不了近火*). Hence, the depth of political capital is much more important than its breadth.

Table 5.10 Political Capital Effect on the Transition of Rural Residents: Marginal Effect, Multinomial Logit.

	Model 1			Model 2		
	On-farm worker	Agribusiness owner	Both	On-farm worker	Agribusiness owner	Both
Family member is or was village cadre	0.039**	0.026***	0.001	0.042***	0.024***	0.001
	(0.016)	(0.009)	(0.005)	(0.016)	(0.009)	(0.005)
Relative or friend is village cadre	0.015	0.000	0.008*	0.017	-0.003	0.010**
	(0.015)	(0.008)	(0.005)	(0.014)	(0.008)	(0.005)
Family members is cadre outside the village	0.000	0.009	0.007	-0.004	0.002	0.008
	(0.031)	(0.015)	(0.007)	(0.030)	(0.015)	(0.007)
Relatives or friends is cadre outside the village	0.012	0.002	0.001	0.002	0.004	0.002
	(0.017)	(0.009)	(0.005)	(0.016)	(0.009)	(0.005)
Family members join the CPC	-0.034*	-0.008	0.001	-0.030	-0.006	0.002
	(0.019)	(0.01)	(0.005)	(0.019)	(0.010)	(0.005)
Additional control variables	NO	NO	NO	YES	YES	YES
Province Fixed effects	NO	NO	NO	YES	YES	YES

Notes: Model 1 is benchmark model and Model 2 serves as a robustness check with additional control variables shown in Table 5.11; Standard errors are in parentheses; Significant level: *p<0.1 **p<0.05 ***p<0.01.

It is also interesting that having household members in the Communist Party of China has a weakly negative effect on the likelihood of on-farm employment and no significant effect on on-farm entrepreneurship: this may either mean that CPC members receive few benefits, or that the Party membership helps them move out of agriculture into off-farm employment or career in the civil service.

5.4.6 Additional control variables and on-farm transitions

The effects of additional control factors are presented in Table 5.11. We find that the age of the household head has a positive effect on the decision to transition as on-farm worker. Gender or education level of the household head, somewhat surprisingly, have no effect. Finally, poor traffic conditions in the village discourage on-farm transition into employment.

Table 5.11 Effect of Additional Control Variables on the Transition of Rural Residents: Marginal Effect, Multinomial Logit.

	Model 1			Model 2		
	On-farm worker	Agribusiness owner	Both	On-farm worker	Agribusiness owner	Both
Province fixed effects	NO	NO	NO	YES	YES	YES
Age of the household head	/	/	/	0.008***	-0.001	0.002*
				(0.003)	(0.001)	(0.001)
Age square	/	/	/	0.000	0.000	0.000
				(0.000)	(0.000)	(0.000)
Gender	/	/	/	-0.016	-0.003	-0.006
				(0.014)	(0.008)	(0.005)
Educational level of the household head	/	/	/	0.009	-0.020	-0.001
				(0.018)	(0.011)	(0.006)
Migrant worker experience of the household head	/	/	/	0.034**	0.001	0.003
				(0.014)	(0.008)	(0.004)
Traffic condition in the village	/	/	/			
poor	/	/	/	-0.055**	-0.008	-0.005
				(0.021)	(0.013)	(0.008)
good	/	/	/	0.019	0.012	-0.003
				(0.014)	(0.009)	(0.005)
Distance from home to town	/	/	/	0.001	0.000	0.000
				(0.001)	(0.001)	(0.000)
Province Fixed effects	NO	NO	NO	YES	YES	YES

Notes: Model 1 is benchmark model and Model 2 serves as a robustness check; Standard errors are in parentheses; Significant level: *p<0.1 **p<0.05 ***p<0.01.

5.4.7 Summary of expectations and findings

In Table 5.12, we reproduce the expectations as listed in Table 5.1 and compare them with our findings. Our expectations have been broadly confirmed with respect

to human and natural capital, and also, though less firmly, for social and political capital. Rather surprisingly, the results of our analysis suggest that financial capital plays a limited role as a catalyst of rural on-farm transitions.

Table 5.12 Expected effects of capital endowments vs empirical results.

Capital Endowment	On-farm Employment		On-farm Entrepreneurship	
	Expectation	Finding	Expectation	Finding
Human Capital				
Education	+	0	+	0
Training	+	+	+	++
Share of females	+	0	–	0
Former rural-to-urban migrants	0	+	+	0
Financial Capital				
Income	0	+	+	+
Bank deposits	0	–	++	0
Bank loans	0	+	++	0
Natural Capital				
Quality of farmland	+	++	++	+
Quantity of farmland	–	++	+	+
Land fragmentation	––	–	––	0
Social Capital				
Friends and relatives	+	+/–	++	0
Popular surname	+	+/–	++	++
Political Capital				
Household member cadre	+	++	++	++
Friends/relative cadre	+	0	++	0
Household member in CPS	+	0	++	0

Notes: ++ and -- stand for expected strongly positive/negative effect. + and - stands for (weakly) positive/negative effect. +/- stands for non-linear effect, and 0 stands for no effect.

5.5 Conclusions

By using a recent targeted survey of rural households, our study investigates the effects of household endowments of human, financial, natural, social, and political capital on rural transitions from subsistence farming into either formal on-farm employment or on-farm entrepreneurship. Our research confirms that capital endowments are important determinants of rural households' livelihood strategies. Somewhat surprisingly, the role of financial capital, such as savings and access to bank loans, is limited. Instead, our results highlight the importance of natural, human, social and political capital. Specifically, investing in human capital, in the form of receiving training in either agricultural technology or entrepreneurial skills, increases the likelihood of transitioning into on-farm employment and entrepreneurship. Former migrant workers, who have returned to their home village, are more likely to find formal employment, suggesting that the experience of rural-to-urban migration improves the employability of rural workers even in the rural labor market. Both the

quality and quantity of farmland are important for on-farm transitions, by helping release surplus labor into formal employment. Social capital has non-linear impact on on-farm employment, with intermediate values being more supportive of on-farm employment than either high or low values. Political capital such as local rural cadre status in the village also exerts positive influence on on-farm transition. However, only local political connections seem to matter, whereas political capital outside of the village is less influential. Finally, poor road infrastructure poses a barrier to transition into on-farm employment.

Our findings add credence to the point put forward by Ranis (2004) that reaching the Lewis turning point can be postponed if the rural sector experiences productivity improvements in parallel with the growth in the urban sector. Specifically, rising productivity in the rural helps release more labor from agriculture and keep rural wages low. Therefore, successful and on-going on-farm transitions can help maintain high rate of economic growth in China in the years to come.

The results of our analysis also help identify factors that facilitate on-farm transitions: acquisition of human capital, both in the shape of formal education and further practical training, facilitating the return of rural-to-urban migrants who bring new skills (and social capital) with them back to rural areas, and improvements in the quality of road infrastructure. By focusing on these improvements, policy makers can should encourage on-farm transitions.

5.6 Appendix

Table A5.1 Index of 31 provinces in China in 2012 for the cluster analysis

Province	Population	per Capita GDP (ten thousand yuan)	Agricultural Acreage (thousand hectare)	Proportion of Agricultural Acreage (%)	Proportion of Agricultural Population (%)	Proportion of Agricultural Production (%)
Beijing	2069	8.64	231.7	13.79	13.8	0.93
Tianjin	1413	9.12	441.1	39.03	18.45	1.52
Hebei	7288	3.65	6317.3	33.66	53.2	11.65
Shanxi	3611	3.35	4055.8	25.95	48.74	7.00
Inner Mongolia	2490	6.38	7147.2	6.04	42.26	7.38
Liaoning	4389	5.66	4085.3	28.00	34.35	6.20
Jilin	2750	4.34	5534.6	29.52	46.3	9.77
Heilongjiang	3834	3.57	11830.1	26.01	43.1	16.91
Shanghai	2380	8.48	244.0	38.72	10.7	0.85
Jiangsu	7920	6.83	4763.8	46.43	37	5.49
Zhejiang	5477	6.33	1920.9	18.83	36.8	3.55
Anhui	5988	2.87	5730.2	41.02	53.5	10.85
Fujian	3748	5.26	1330.1	10.97	40.4	6.41
Jiangxi	4504	2.88	2827.1	16.93	52.49	7.75
Shandong	9685	5.16	7515.3	48.86	47.57	7.92
Henan	9406	3.15	7926.4	47.46	57.57	13.38
Hubei	5779	3.85	4664.1	25.09	46.5	11.18
Hunan	6639	3.34	3789.4	17.89	53.35	11.97
Guangdong	10594	5.39	2830.7	15.73	32.6	3.91
Guangxi	4682	2.78	4217.5	17.87	56.47	13.23
Hainan	887	3.22	727.5	21.40	48.4	16.13
Chongqing	2945	3.87	2235.9	27.17	43.02	7.38
Sichuan	8076	2.96	5947.4	12.35	56.47	11.58
Guizhou	3484	1.97	4485.3	25.48	63.59	12.62
Yunnan	4659	2.21	6072.1	15.84	60.69	13.56
Tibet	308	2.28	361.6	0.29	77.25	7.62
Shaanxi	3753	3.85	4050.3	19.70	49.98	10.56
Gansu	2578	2.19	4658.8	10.25	61.25	17.42
Qinghai	573	3.30	542.7	0.75	52.56	6.18
Ningxia	647	3.62	1107.1	16.67	49.33	10.27
Xinjiang	2233	3.36	4124.6	2.48	56.02	22.32

Data sources: China Statistical Yearbook 2013

Table A5.2 Variables description reported with number of sample sizes and proportion

Variables			Obs.	%	Variables			Obs.	%
Human capital	The number of active members of household		2704	100	Natural capital	Contracted farmland	<average	1475	54.55
	Gender distribution of household active members	female>male	419	15.50			≥average	1229	45.45
		female=male	1367	50.55		Actual Farmland	<contracted farmland	907	33.54
		female<male	918	33.95			=contracted farmland	1502	55.55
	Household active members' average education (of years)	≤9	1922	71.08			>contracted farmland	295	10.91
		≥10	782	28.92		Land quality	poor	328	12.13
	Training of agricultural technology	none	2284	84.47			average	1285	47.52
		yes	420	15.53			good	1091	40.34
	Entrepreneurial training	none	2424	89.64		Land fragmentation	<average	1494	55.25
		yes	280	10.36			≥average	1210	44.75
	Household members was migrate worker	none	2284	84.47		Productivity	poor	746	27.59
		yes	420	15.53			average	1678	62.06
	Off-farm employment of household members	none	522	19.30			good	280	10.36
		yes	2182	80.70	Political capital	Family members is or was village cadre	none	2039	75.41
	Off-farm self-employment of household members	none	2509	92.79			yes	665	24.59
		yes	195	7.21		Relatives or friends is village cadre	none	1636	60.50
Financial capital	Household total income(yuan)	<30,000	1348	49.85			yes	1068	39.50
		30,000-50,000	715	26.44		Family members is cadre outside the village	none	2571	95.08
		>50,000	641	23.71			yes	133	4.92
	Income level compared with 2013	lower	372	13.76		Relatives or friends is cadre outside the village	none	2125	78.59
		about the same	1497	55.36			yes	579	21.41
		higher	835	30.88		Family members join the CPC	none	2216	81.95
	Income level compared with other households	lower	525	19.41			yes	488	18.05
		about the same	1738	64.28	Additional control variables	Age of the household head		2704	100
		higher	441	16.31		Gender of the household head	male	1723	63.72
	Savings	no	653	24.15			female	981	36.28
		yes	2051	75.85		Educational level of the household head (of years)	≤9	1951	72.15
	Bank loan	hard to obtain	1702	62.94			≥10	753	27.85
		easy to obtain	1002	37.06		Household head's migrant work experience	no	1106	40.90
Social capital	Popular surname in the village	not popular	554	20.49			yes	1598	59.10
		average	797	29.47		Traffic condition in the village	poor	434	16.05
		popular	1353	50.04			average	1230	45.49
	Amount of relatives or friends	few	152	5.62			good	1040	38.46
		average	1315	48.63		Distance from home to town center (km)		2704	100
		many	1237	45.75					

Table A5.3 Whole table of multinomial logit regressions reporting marginal effect (N=2704)

	Model 1			Model 2			Model 3		
	Y=1	Y=2	Y=3	Y=1	Y=2	Y=3	Y=1	Y=2	Y=3
Human capital									
The number of active members of household									
Gender distribution of active members of household	0.015***	-0.002	0.001	0.020***	-0.004	0.003	0.020***	-0.004	0.003
	(0.005)	(0.003)	(0.001)	(0.005)	(0.004)	(0.002)	(0.005)	(0.003)	(0.002)
more females than males	-0.012	-0.017	-0.004	-0.009	-0.013	-0.002	-0.007	-0.016	-0.002
	(0.019)	(0.013)	(0.006)	(0.020)	(0.013)	(0.006)	(0.019)	(0.013)	(0.006)
more males than females	-0.004	0.006	-0.007	-0.007	0.006	-0.009*	-0.007	0.004	-0.009*
	(0.015)	(0.008)	(0.005)	(0.015)	(0.008)	(0.005)	(0.015)	(0.008)	(0.005)
Household active members' education level	-0.014	0.004	-0.004	-0.014	0.013	-0.004	/	/	/
	(0.015)	(0.008)	(0.005)	(0.015)	(0.009)	(0.005)			
Training in agricultural technology	0.003	0.025***	0.010**	0.011	0.023***	0.010**	0.009	0.025***	0.010**
	(0.019)	(0.009)	(0.005)	(0.018)	(0.009)	(0.005)	(0.018)	(0.009)	(0.005)
Entrepreneurial training	0.043**	0.050***	0.016	0.049**	0.054	0.020	0.049**	0.054***	0.019***
	(0.021)	(0.009)	(0.005)	(0.020)	(0.009)	(0.005)	(0.020)	(0.009)	(0.005)
Household members was migrate worker	0.207***	-0.016	0.003	0.201***	-0.018*	0.002	0.200***	-0.017**	0.002
	(0.023)	(0.010)	(0.006)	(0.023)	(0.010)	(0.006)	(0.023)	(0.010)	(0.006)
Off-farm employment of household members	-0.280***	0.018	-0.007	-0.288***	0.019	-0.011*	-0.290***	0.018	-0.010*
	(0.022)	(0.012)	(0.006)	(0.022)	(0.012)	(0.006)	(0.022)	(0.012)	(0.006)
Off-farm self-employment of household members	-0.017	-0.032	-0.148	-0.017	-0.031	-0.148	-0.021	-0.030	-0.145
	(1.533)	(0.783)	(6.713)	(3.326)	(1.499)	(12.395)	(2.952)	(1.288)	(10.918)
Financial capital									
Household total income(yuan)									
30,000-50,000	0.033**	0.003	0.006	0.027*	0.002	0.004	0.027*	0.002	0.005
	(0.016)	(0.010)	(0.006)	(0.016)	(0.01)	(0.006)	(0.016)	(0.010)	(0.006)
＞50,000	0.046***	0.008	0.014**	0.032*	0.002	0.013	0.032*	0.003	0.013**
	(0.017)	(0.010)	(0.006)	(0.017)	(0.010)	(0.006)	(0.017)	(0.010)	(0.006)
Income level compared with 2013									
lower	-0.048**	0.017	0.006	-0.043	0.013	0.005	-0.043*	0.014	0.005
	(0.023)	(0.012)	(0.006)	(0.023)	(0.012)	(0.006)	(0.023)	(0.012)	(0.006)
higher	0.000	-0.013	-0.003	0.002	-0.011	-0.002	0.002	-0.011	-0.003
	(0.015)	(0.009)	(0.005)	(0.015)	(0.009)	(0.005)	(0.015)	(0.009)	(0.005)
Income level compared with other households									
lower	0.003	-0.018	0.006	0.001	-0.016	0.007	0.001	-0.017	0.006
	(0.018)	(0.013)	(0.006)	(0.018)	(0.013)	(0.006)	(0.018)	(0.013)	(0.006)

higher	-0.005	0.031***	0.000	-0.007	0.032***	-0.002	-0.008	0.033***	-0.001
	(0.019)	(0.009)	(0.006)	(0.019)	(0.009)	(0.005)	(0.019)	(0.009)	(0.005)
Savings	-0.027*	0.012	-0.003	-0.032**	0.010	-0.001	-0.030*	0.010	-0.002
	(0.016)	(0.011)	(0.005)	(0.016)	(0.011)	(0.005)	(0.016)	(0.011)	(0.005)
Bank loan	0.024*	0.007	-0.001	0.014	0.004	-0.004	/	/	/
	(0.013)	(0.008)	(0.004)	(0.013)	(0.008)	(0.004)			
Natural capital									
Contracted farmland	0.041****	0.002	0.000	0.033**	0.007	-0.006	0.027*	0.010	-0.003
	(0.015)	(0.009)	(0.005)	(0.015)	(0.009)	(0.005)	(0.015)	(0.008)	(0.005)
Actual farmland									
less than contracted	-0.014	0.005	0.004	-0.011	0.008	0.002	-0.010	0.008	0.003
	(0.015)	(0.009)	(0.005)	(0.015)	(0.009)	(0.005)	(0.015)	(0.009)	(0.005)
more than contracted	0.002	0.027***	0.017***	0.010	0.031	0.016	0.009	0.031***	0.016***
	(0.021)	(0.010)	(0.005)	(0.021)	(0.011)	(0.005)	(0.021)	(0.011)	(0.005)
Land quality									
poor	-0.007	-0.002	-0.001	-0.007	0.000	-0.003	-0.010	0.000	-0.003
	(0.023)	(0.015)	(0.009)	(0.022)	(0.015)	(0.009)	(0.022)	(0.015)	(0.009)
good	0.037***	0.016*	0.01**	0.030**	0.016*	0.010*	0.031**	0.017*	0.010*
	(0.014)	(0.008)	(0.005)	(0.014)	(0.009)	(0.005)	(0.014)	(0.009)	(0.005)
Land fragmentation	-0.028*	-0.001	0.006	-0.023	0.011	0.008	/	/	/
	(0.015)	(0.009)	(0.005)	(0.018)	(0.010)	(0.006)			
Productivity									
low	-0.011	0.012	-0.009	-0.013	0.010	-0.009	-0.014	0.011	-0.009
	(0.016)	(0.009)	(0.006)	(0.015)	(0.009)	(0.006)	(0.015)	(0.009)	(0.005)
high	0.041*	0.021*	0.006	0.037*	0.020	0.006	0.038*	0.020	0.006
	(0.021)	(0.012)	(0.006)	(0.021)	(0.012)	(0.006)	(0.021)	(0.012)	(0.006)
Social capital									
Popular surname in the village									
not popular surname	-0.05***	0.016	-0.004	-0.046**	0.016	-0.003	-0.045**	0.017	-0.003
	(0.019)	(0.011)	(0.005)	(0.018)	(0.011)	(0.005)	(0.018)	(0.011)	(0.005)
popular surname	-0.041***	0.018*	-0.011**	-0.037**	0.018*	-0.010**	-0.037**	0.017	-0.009*
	(0.015)	(0.01)	(0.005)	(0.015)	(0.010)	(0.005)	(0.015)	(0.010)	(0.005)
Amount of relatives or friends									
few	-0.054*	-0.014	0.002	-0.053*	-0.013	0.006	-0.055*	-0.012	0.008
	(0.032)	(0.021)	(0.009)	(0.032)	(0.021)	(0.009)	(0.032)	(0.021)	(0.009)
many	-0.044***	-0.004	0.004	-0.040***	-0.001	0.003	-0.041***	0.000	0.004
	(0.014)	(0.008)	(0.005)	(0.014)	(0.008)	(0.005)	(0.014)	(0.008)	(0.005)
Political capital									
Family members is or was village cadre	0.039**	0.026***	0.001	0.042***	0.024***	0.001	0.042***	0.025***	0.001

	(0.016)	(0.009)	(0.005)	(0.016)	(0.009)	(0.005)	(0.016)	(0.009)	(0.005)
Relatives or friends is village cadre	0.015	0.000	0.008*	0.017	-0.003	0.010**	0.017	-0.001	0.011***
	(0.015)	(0.008)	(0.005)	(0.014)	(0.008)	(0.005)	(0.014)	(0.008)	(0.005)
Family members is cadre outside the village	0.000	0.009	0.007	-0.004	0.002	0.008	/	/	/
	(0.031)	(0.015)	(0.007)	(0.030)	(0.015)	(0.007)			
Relatives or friends is cadre outside the village	0.012	0.002	0.001	0.002	0.004	0.002	/	/	/
	(0.017)	(0.009)	(0.005)	(0.016)	(0.009)	(0.005)			
Family members join the CPC	-0.034*	-0.008	0.001	-0.030	-0.006	0.002	-0.030	-0.005	0.002
	(0.019)	(0.01)	(0.005)	(0.019)	(0.010)	(0.005)	(0.019)	(0.010)	(0.005)
Control variable									
Province fixed effects	NO	NO	NO	YES	YES	YES	YES	YES	YES
Age of the household head	/	/	/	0.008***	-0.001	0.002*	0.007***	-0.001	0.002**
				(0.003)	(0.001)	(0.001)	(0.003)	(0.001)	(0.001)
Age square	/	/	/	0.000	0.000	0.000	0.000***	0.000	0.000*
				(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Gender	/	/	/	-0.016	-0.003	-0.006	-0.016	-0.003	-0.006
				(0.014)	(0.008)	(0.005)	(0.014)	(0.008)	(0.005)
Educational level of the household head	/	/	/	0.009	-0.020	-0.001	0.003	-0.015	-0.001
				(0.018)	(0.011)	(0.006)	(0.017)	(0.01)	(0.005)
Migrate working experience of the household head	/	/	/	0.034	0.001	0.003	0.034**	0.002	0.002
				(0.014)	(0.008)	(0.004)	(0.014)	(0.008)	(0.004)
Traffic condition in the village	/	/	/						
poor	/	/	/	-0.055	-0.008	-0.005	-0.054**	-0.009	-0.006
				(0.021)	(0.013)	(0.008)	(0.021)	(0.013)	(0.008)
good	/	/	/	0.019	0.012	-0.003	0.019	0.011	-0.003
				(0.014)	(0.009)	(0.005)	(0.014)	(0.008)	(0.005)
Distance from home to town	/	/	/	0.001	0.000	0.000	0.001	0.000	0.000
				(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.000)

Note: Model 1 is original model and Model 2 and Model 3 serve as robustness checks with additional control variables; Dependent variable: Y=1: Household member is an on-farm worker; Y=2: Household member is an agribusiness owner; Y=3: Household members are both on-farm workers and agribusiness owners. Significant level: *p<0.1 **p<0.05 ***p<0.01

Table A5.4 Whole table of multinomial logit regressions reporting relative-risk ratio outcomes (N=2704)

	Model 1			Model 2			Model 3		
	Y=1	Y=2	Y=3	Y=1	Y=2	Y=3	Y=1	Y=2	Y=3
Human capital									
The number of active members of household	1.142***	0.960	1.110	1.209***	0.929	1.388*	1.211***	0.933	1.349
	(0.0545)	(0.0894)	(0.157)	(0.0605)	(0.0902)	(0.253)	(0.0602)	(0.0893)	(0.263)
Gender distribution of active members of household									
more females than males	0.860	0.616	0.598	0.889	0.682	0.749	0.904	0.639	0.756
	(0.151)	(0.212)	(0.336)	(0.165)	(0.240)	(0.465)	(0.166)	(0.222)	(0.465)
more males than females	0.956	1.132	0.510	0.917	1.120	0.379*	0.923	1.062	0.411*
	(0.129)	(0.256)	(0.242)	(0.128)	(0.260)	(0.204)	(0.128)	(0.244)	(0.212)
Household active members' education level	0.880	1.075	0.642	0.882	1.387	0.704	/	/	/
	(0.119)	(0.236)	(0.282)	(0.129)	(0.330)	(0.359)			
Training in agricultural technology	1.095	2.018***	2.737**	1.187	2.023***	3.302**	1.172	2.077***	3.124**
	(0.188)	(0.468)	(1.175)	(0.208)	(0.486)	(1.578)	(0.204)	(0.496)	(1.457)
Entrepreneurial training	1.664***	4.328***	6.249***	1.848***	5.169***	11.11***	1.858***	5.176***	9.973***
	(0.321)	(1.034)	(2.771)	(0.367)	(1.297)	(5.417)	(0.368)	(1.300)	(4.712)
Household members was migrate worker	6.558***	0.924	2.077	6.668***	0.862	1.959	6.637***	0.889	2.039
	(1.404)	(0.244)	(1.185)	(1.485)	(0.238)	(1.187)	(1.477)	(0.244)	(1.221)
Off-farm employment of household members	0.583**	0.246***	6.62e-07	0.0633***	0.985	0.164***	0.0629***	0.945	0.166***
	(0.156)	(0.133)	(0.000418)	(0.0142)	(0.340)	(0.0995)	(0.0141)	(0.324)	(0.100)
Off-farm self-employment of household members	0.0777***	1.017	0.290**	0.533**	0.237***	2.21e-07	0.519**	0.246**	3.29e-07
	(0.0164)	(0.336)	(0.169)	(0.150)	(0.130)	(0.000278)	(0.145)	(0.135)	(0.000361)
Financial capital									
Household total income(yuan)									
30,000-50,000	1.381**	1.168	1.886	1.319*	1.129	1.724	1.317*	1.118	1.758
	(0.200)	(0.302)	(1.006)	(0.198)	(0.300)	(0.987)	(0.197)	(0.297)	(0.994)
＞50,000	1.596***	1.394	4.188***	1.418**	1.191	4.321**	1.408**	1.205	3.939**
	(0.251)	(0.365)	(2.217)	(0.231)	(0.324)	(2.518)	(0.228)	(0.326)	(2.257)
Income level compared with 2013									
lower	0.672*	1.490	1.681	0.689*	1.353	1.498	0.691*	1.390	1.582
	(0.140)	(0.469)	(0.939)	(0.148)	(0.438)	(0.922)	(0.148)	(0.447)	(0.967)
higher	0.971	0.693	0.693	0.993	0.735	0.772	0.994	0.733	0.723
	(0.131)	(0.165)	(0.323)	(0.138)	(0.178)	(0.377)	(0.138)	(0.177)	(0.349)
Income level compared with other households									
lower	1.015	0.638	1.652	1.000	0.657	1.841	1.000	0.646	1.715
	(0.167)	(0.217)	(0.876)	(0.169)	(0.227)	(1.078)	(0.168)	(0.223)	(0.996)

higher	1.003	2.260***	1.139	0.980	2.393***	0.926	0.976	2.453***	1.005
	(0.172)	(0.558)	(0.599)	(0.173)	(0.609)	(0.504)	(0.173)	(0.620)	(0.537)
Savings	0.793	1.296	0.756	0.749*	1.257	0.817	0.757*	1.243	0.789
	(0.112)	(0.369)	(0.379)	(0.112)	(0.374)	(0.435)	(0.113)	(0.368)	(0.413)
Bank loan	1.256*	1.248	0.963	1.136	1.114	0.674	/	/	/
	(0.150)	(0.256)	(0.382)	(0.143)	(0.239)	(0.292)			
Natural capital									
Contracted farmland	1.458***	1.125	1.150	1.368**	1.253	0.631	1.310*	1.362	0.843
	(0.198)	(0.266)	(0.515)	(0.200)	(0.311)	(0.339)	(0.181)	(0.315)	(0.412)
Actual farmland									
less than contracted	0.898	1.140	1.474	0.921	1.241	1.260	0.926	1.234	1.313
	(0.122)	(0.269)	(0.732)	(0.130)	(0.302)	(0.671)	(0.130)	(0.299)	(0.691)
more than contracted	1.107	2.191***	5.327***	1.210	2.563***	5.912***	1.203	2.562***	6.123***
	(0.214)	(0.602)	(2.494)	(0.243)	(0.742)	(3.105)	(0.241)	(0.738)	(3.115)
Land quality									
poor	0.930	0.930	0.911	0.923	0.962	0.706	0.899	0.962	0.715
	(0.191)	(0.368)	(0.764)	(0.196)	(0.389)	(0.624)	(0.190)	(0.387)	(0.624)
good	1.469***	1.688**	3.031**	1.411**	1.712**	3.278**	1.421**	1.729**	3.103**
	(0.188)	(0.368)	(1.376)	(0.193)	(0.400)	(1.778)	(0.194)	(0.403)	(1.664)
Land fragmentation	0.783*	0.943	1.687	0.839	1.343	2.305	/	/	/
	(0.108)	(0.220)	(0.742)	(0.143)	(0.361)	(1.383)			
Productivity									
low	0.906	1.323	0.445	0.877	1.244	0.397*	0.872	1.281	0.418
	(0.128)	(0.302)	(0.232)	(0.128)	(0.293)	(0.221)	(0.127)	(0.299)	(0.228)
high	1.527**	1.907**	2.122	1.505**	1.896*	2.249	1.510**	1.885*	2.130
	(0.297)	(0.625)	(1.293)	(0.300)	(0.631)	(1.482)	(0.299)	(0.624)	(1.366)
Social capital									
Popular surname in the village									
not popular surname	0.646***	1.421	0.663	0.658**	1.440	0.685	0.663**	1.440	0.672
	(0.109)	(0.431)	(0.345)	(0.115)	(0.449)	(0.378)	(0.115)	(0.447)	(0.367)
popular surname	0.689***	1.480	0.353**	0.702**	1.488	0.331**	0.707**	1.449	0.374*
	(0.0960)	(0.398)	(0.170)	(0.103)	(0.413)	(0.171)	(0.104)	(0.400)	(0.189)
Amount of relatives or friends									
few	0.599*	0.633	1.038	0.598*	0.653	1.597	0.591*	0.667	1.762
	(0.174)	(0.351)	(0.895)	(0.181)	(0.368)	(1.475)	(0.178)	(0.374)	(1.619)
many	0.670***	0.857	1.269	0.684***	0.920	1.256	0.682***	0.934	1.362
	(0.0877)	(0.194)	(0.567)	(0.0916)	(0.213)	(0.600)	(0.0905)	(0.214)	(0.646)
Political capital									
Family members is or was village	1.491***	2.171***	1.355	1.555***	2.092***	1.311	1.571***	2.132***	1.414

cadre	(0.222)	(0.508)	(0.624)	(0.237)	(0.501)	(0.669)	(0.237)	(0.507)	(0.702)
Relatives or friends is village	1.168	1.051	2.249*	1.202	0.988	2.838**	1.207	1.038	3.045**
cadre	(0.156)	(0.238)	(0.941)	(0.165)	(0.230)	(1.295)	(0.161)	(0.234)	(1.338)
Family members is cadre outside	1.034	1.315	1.966	0.984	1.094	2.219	/	/	/
the village	(0.291)	(0.527)	(1.286)	(0.280)	(0.449)	(1.534)			
Relatives or friends is cadre	1.126	1.093	1.183	1.037	1.146	1.313	/	/	/
outside the village	(0.170)	(0.267)	(0.527)	(0.162)	(0.286)	(0.639)			
Family members join the CPC	0.723*	0.773	0.996	0.747*	0.819	1.070	0.745*	0.841	1.055
	(0.124)	(0.207)	(0.490)	(0.132)	(0.226)	(0.589)	(0.131)	(0.230)	(0.557)
Control variable									
Province fixed effects	NO	NO	NO	YES	YES	YES	YES	YES	YES
Age of the household head	/	/	/	1.079***	0.989	1.209**	1.073***	0.992	1.209**
				(0.0281)	(0.0383)	(0.115)	(0.0276)	(0.0384)	(0.114)
Age square	/	/	/	0.999***	1.000	0.998**	0.999***	1.000	0.998**
				(0.000296)	(0.000418)	(0.00108)	(0.000293)	(0.000419)	(0.00106)
Gender	/	/	/	0.837	0.864	0.505	0.838	0.872	0.504
				(0.113)	(0.196)	(0.247)	(0.112)	(0.197)	(0.243)
Educational level of the	/	/	/	1.053	0.578*	0.837	1.000	0.666	0.862
household head				(0.179)	(0.170)	(0.488)	(0.160)	(0.185)	(0.479)
Migrate working experience of the	/	/	/	1.393**	1.105	1.483	1.402**	1.117	1.406
household head				(0.185)	(0.241)	(0.672)	(0.185)	(0.243)	(0.623)
Traffic condition in the village									
poor	/	/	/	0.575***	0.711	0.487	0.580***	0.690	0.460
				(0.114)	(0.244)	(0.374)	(0.114)	(0.236)	(0.352)
good	/	/	/	1.210	1.411	0.832	1.217	1.400	0.821
				(0.165)	(0.328)	(0.415)	(0.165)	(0.324)	(0.405)
Distance from home to town	/	/	/	1.013	0.997	0.968	1.013	0.997	0.972
				(0.01000)	(0.0222)	(0.0463)	(0.00996)	(0.0220)	(0.0452)
Constant	0.0139***	0.000259***	9.28e-06***	0.00356***	0.000595***	3.98e-08***	0.00356***	0.00122***	1.11e-07***
	(0.00888)	(0.000261)	(1.78e-05)	(0.00346)	(0.000920)	(1.39e-07)	(0.00321)	(0.00176)	(3.77e-07)
Pseudo R2		0.1595			0.2037			0.2004	
LR chi2		566.38***			722.98***			711.26***	
Log likelihood		-1491.7946			-1413.4946			-1419.3526	

Note: Model 1 is original model and Model 2 and Model 3 serve as robustness checks with additional control variables; Dependent variable: Y=1: Household member is an on-farm worker; Y=2: Household member is an agribusiness owner; Y=3: Household members are both on-farm workers and agribusiness owners. Significant level: *p<0.1 **p<0.05 ***p<0.01

Table A5.5 Correlation matrix of all the variables in use (N=2704)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	Y	1.00															
2	The number of active members of household	0.04	1.00														
3	Gender distribution of active members of household	0.01	0.08	1.00													
4	Household active members' education level	0.02	0.09	0.01	1.00												
5	Training in agricultural technology	0.15	0.01	0.00	0.10	1.00											
6	Entrepreneurial training	0.18	0.02	-0.01	0.08	0.25	1.00										
7	Household members was migrate worker	0.03	0.34	0.07	0.07	-0.03	0.05	1.00									
8	Off-farm employment of household members	-0.11	0.25	0.06	0.06	0.02	0.06	0.52	1.00								
9	Off-farm self-employment of household members	-0.06	0.01	-0.01	0.06	-0.02	0.11	0.06	0.05	1.00							
10	Household total income(yuan)	0.11	0.12	0.02	0.07	0.06	0.05	0.12	0.07	0.05	1.00						
11	Income level compared with 2013	0.02	0.03	0.01	0.05	0.05	0.07	0.05	0.04	0.03	0.21	1.00					
12	Income level compared with other households	0.07	0.02	-0.03	0.07	0.07	0.06	0.05	0.06	0.07	0.35	0.36	1.00				
13	Savings	0.01	0.05	-0.02	0.07	0.11	0.08	0.11	0.13	0.06	0.12	0.12	0.12	1.00			
14	Bank loan	0.05	0.01	-0.03	0.01	0.01	0.01	-0.01	-0.03	-0.05	0.01	0.01	0.06	0.02	1.00		
15	Contracted farmland	0.06	0.09	0.00	-0.01	0.04	-0.02	-0.06	-0.07	-0.06	0.01	0.01	0.02	-0.03	0.01	1.00	
16	Actual farmland	0.08	0.02	-0.01	-0.02	0.07	0.02	-0.13	-0.09	-0.11	-0.02	-0.03	-0.04	-0.02	0.02	-0.01	1.00
17	Land quality	0.11	0.03	-0.04	0.03	0.15	0.06	0.06	0.04	0.03	0.08	0.11	0.07	0.18	0.04	-0.01	-0.02
18	Land fragmentation	0.02	-0.06	-0.02	0.01	0.00	-0.01	-0.09	-0.08	-0.01	-0.04	-0.01	0.03	-0.06	0.02	0.49	0.06
19	Productivity	0.01	0.02	-0.01	-0.05	-0.07	-0.07	-0.12	-0.06	-0.09	-0.09	-0.10	-0.13	-0.11	-0.01	0.00	0.15
20	Popular surname in the village	-0.03	0.07	0.03	-0.02	-0.02	0.01	0.04	0.07	0.02	-0.04	0.01	-0.03	0.04	-0.03	-0.04	-0.01
21	Amount of relatives or friends	0.01	0.05	0.03	0.04	0.03	0.03	0.04	0.03	0.05	0.05	0.04	0.03	0.04	-0.03	0.04	-0.04
22	Family members is or was village cadre	0.12	0.11	0.00	0.07	0.17	0.09	0.00	0.00	0.03	0.08	0.01	0.06	0.02	0.06	0.05	0.01
23	Relatives or friends is village cadre	0.06	0.04	0.02	0.04	0.06	0.08	0.04	0.03	0.06	0.04	0.04	0.04	0.08	0.02	0.00	-0.07
24	Family members is cadre outside the village	0.04	0.04	-0.04	0.07	0.04	0.02	0.00	0.02	0.04	0.02	0.01	0.04	0.02	0.02	-0.01	0.00
25	Relatives or friends is cadre outside the village	0.06	-0.02	-0.05	0.06	0.09	0.10	0.02	-0.01	0.09	0.00	0.01	0.05	0.00	0.03	0.06	-0.06
26	Family members join the CPC	0.03	0.10	-0.01	0.14	0.10	0.06	0.02	0.04	0.04	0.06	0.02	0.04	0.05	0.02	-0.02	-0.04
27	Age of the household head	-0.04	0.03	0.02	-0.04	-0.01	-0.07	-0.04	-0.11	0.01	-0.06	-0.06	-0.06	-0.07	-0.05	0.00	0.04
28	Age square	-0.04	0.05	0.02	-0.04	-0.02	-0.07	-0.04	-0.12	0.00	-0.06	-0.06	-0.06	-0.07	-0.03	0.00	0.03
29	Gender	-0.04	-0.05	-0.19	0.01	-0.02	0.02	0.00	-0.01	0.00	-0.05	-0.02	-0.01	0.01	-0.01	-0.06	-0.06
30	Educational level of the household head	-0.01	0.01	0.00	0.32	0.06	0.10	0.09	0.08	0.03	0.04	0.05	0.06	0.10	0.02	-0.01	-0.07
31	Migrate working experience of the household head	0.05	-0.01	0.05	0.00	-0.04	-0.01	0.07	0.08	0.02	0.05	0.02	0.02	-0.01	0.02	-0.05	-0.05
32	Traffic condition in the village	0.08	0.00	0.00	0.04	0.10	0.02	0.03	0.04	0.07	0.09	0.01	0.03	0.07	-0.03	0.00	-0.03
33	Distance from home to town	0.04	-0.06	0.02	-0.07	-0.04	-0.04	0.00	-0.11	-0.01	-0.01	0.03	0.02	-0.10	0.09	0.09	-0.02

		17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
17	Land quality	1.00															
18	Land fragmentation	0.00	1.00														
19	Productivity	-0.14	-0.05	1.00													
20	Popular surname in the village	-0.03	-0.07	0.06	1.00												
21	Amount of relatives or friends	0.06	-0.04	-0.01	0.29	1.00											
22	Family members is or was village cadre	0.06	-0.02	-0.02	0.04	0.11	1.00										
23	Relatives or friends is village cadre	0.06	-0.04	-0.03	0.09	0.19	0.15	1.00									
24	Family members is cadre outside the village	0.02	0.00	0.01	0.01	0.03	0.18	0.09	1.00								
25	Relatives or friends is cadre outside the village	0.06	0.06	-0.03	0.03	0.16	0.13	0.28	0.18	1.00							
26	Family members join the CPC	0.11	-0.05	-0.04	0.02	0.09	0.37	0.11	0.14	0.12	1.00						
27	Age of the household head	0.03	-0.02	0.04	0.03	0.02	0.08	-0.03	0.02	-0.04	0.08	1.00					
28	Age square	0.03	-0.03	0.04	0.03	0.01	0.08	-0.03	0.03	-0.04	0.08	0.98	1.00				
29	Gender	0.02	-0.03	0.01	-0.06	-0.02	-0.03	-0.03	0.00	-0.04	-0.02	-0.03	-0.04	1.00			
30	Educational level of the household head	0.03	0.02	-0.07	-0.06	0.00	0.03	0.04	0.03	0.07	0.11	-0.46	-0.40	-0.05	1.00		
31	Migrate working experience of the household head	0.03	-0.02	0.01	0.02	-0.03	-0.04	0.04	-0.01	0.04	-0.06	-0.17	-0.20	-0.11	-0.03	1.00	
32	Traffic condition in the village	0.24	0.01	-0.07	-0.01	0.05	0.08	0.02	0.04	0.05	0.07	0.09	0.09	0.00	0.00	0.00	1.00
33	Distance from home to town	-0.04	0.07	0.00	-0.08	-0.03	-0.04	-0.01	-0.01	0.05	-0.02	-0.02	-0.02	-0.02	-0.03	0.01	-0.10

Chapter 6

Grandparental caregiving, Quality of Life and Life Satisfaction: Evidence from China

6.1 Introduction

Many societies have seen grandparental caregiving as a common and important household activity in recent years. For instance, the provision of childcare by grandparents is widespread in Europe (Di Gessa et al., 2016a) with more than 50% of grandmothers providing grandchild care (Hank & Buber, 2009). In the United States, the number of grandparents playing a role in grandchild care has increased steadily from 1990s onwards (Pebley & Rudkin, 1999; Mutchler & Baker, 2004) with over 60% grandparents providing grandchild care for at least ten years and more than 70% for at least 2 years (Luo et al., 2012). In Asia, a comparative study reports that 58% of Chinese grandparents are grandchild caregivers whereas this proportion is much lower in South Korea, only 6% (Ko & Hank, 2014).

The literature has explicitly recognized the beneficial effect of grandparental caregiving on the health and well-being of the grandparents. For example, grandparenting has been shown to be positively related to both subjective and objective well-being (Di Gessa et al., 2016a; Di Gessa et al., 2016b; Xu et al., 2017), cognitive functioning (Aprino & Bordone, 2014; Ahn & Choi, 2019), lower risk of depression (Grundy et al., 2012; Tang et al., 2016), lower mortality rate (Hilbrand et al, 2017a; Hilbrand et al, 2017b; Danielsbacka et al., 2019) and higher level of life satisfaction (Liu et al., 2019; Xu 2019; Danielsbacka et al., 2019). An emerging strand of literature, however, suggests that the relationship between grandparenting and the financial condition of grandparents should not be neglected (Winefield & Air, 2010; Lee et al., 2016), especially in countries like China, where elders depend heavily on their children for financial support (Zimmer & Kwong, 2003; Gils & Mu, 2007; Cong & Silverstein, 2008; Cong & Silverstein, 2011).

Merging these two strands of the literature so as to provide a fuller understanding on the relationship between grandparenting and elders' quality of life, we study how

grandparenting affects the grandparents' quality of life and life satisfaction in China, a country in which the phenomenon of grandparenting is very common. We expand the growing research in the following ways. First, we measure the caregivers' quality of life in a broader sense, including not only their physical and mental health but also their financial condition. Second, existing studies based on Chinese grandparenting are limited in generalizability because they are based on regional samples (Cong & Silverstein, 2008; Cong & Silverstein, 2011; Liu et al., 2019). Our empirical strategy is based on the national longitudinal representative dataset of China, which provides greater generalizability and replicability. Third, unlike most previous studies that only include a binary indicator to measure grandparenting, we define grandparenting more broadly not only as whether grandparents are caregivers but also as their total caring hours spent and total number of grandchildren cared for. Fourth, this paper also highlights the importance of rural-urban difference and role of gender in understanding the grandparental caregiving in China. In particular, we distinguish the grandparental caregiving from village to non-village areas and from grandmothers' involvements in grandchild care to grandfathers'.

Furthermore, it can naturally be argued that the beneficial effect of grandparenting on quality of life in terms of health and financial condition mediates the beneficial impact of grandparenting on life satisfaction. However, previous studies have investigated grandparenting and its direct effects on health and life satisfaction without testing the mediating effect. In this article, therefore, we fill this gap by examining the direct and indirect channels between grandparenting, quality of life and life satisfaction.

The remaining part of this paper is organized as follows. Section 6.2 provides a literature review. Section 6.3 includes the data description and outlines the methodology in use. Section 6.4 presents the estimation results. Section 6.5 discusses the results and concludes.

6.2 Theoretical Framework

There is thus far a large body of research focusing on the relationship between grandparenting and grandparents' health and wellbeing. A number of studies show

that grandparenting is associated with better well-being and health of grandparents (for example, see Aprino & Bordone, 2014; Di Gessa et al., 2016a; Di Gessa et al., 2016b on Europe; Ahn & Choi, 2019 on South Korea; Tang et al., 2016 on America; Ku et al., 2013; Tsai et al., 2013on Taiwan). However, grandparenting does not always exert a positive health impact. If the obligations of the grandchild caregiver role exceed the maximum resources that the caregivers can physically and psychologically afford, which is known as the role strain theory (Goode, 1960), grandparenting can impair the health of grandparents, especially for those involved in intense and custodial grandchild caregiving (Hayslip & Shore, 2000; Ku et al, 2013; Musil et al., 2017; Yalcina et al., 2018).

Research has also emerged on the impact of grandparenting in China. Earlier studies on Chinese grandparenting start from the financial benefits as financial support from adult children has been considered to be one of the most important sources for the elders in China to maintain their livelihood in old age, especially in rural area (Cai et al., 2012). Using longitudinal data set derived from a village in Anhui Province, Cong & Silverstein (2011) study the intergenerational exchange between elders and their migrant and non-migrant sons in China. They find that the grandparenting has a positive effect on the financial support the elders receive from their sons. The financial support from migrant sons is higher as the intensity of care increases compared to non-migrant sons. In their earlier study (Cong & Silverstein, 2008) based on the same dataset, they find that financial support the elders receive as a reward of intensive grandchild care from their children has a significant effect on reducing symptoms that are associated with depression. These studies corroborate Short et al (2001) who argue that high intensity of grandchild caregiving is not a culturally scripted responsibility of grandparents in China and it requires a fair financial compensation.

In addition to financial benefits, there is some evidence on the interplay between grandparenting and grandparents' health in China. Using data from China Health and Nutrition Survey, Chen and Liu (2012) find that light intensity of grandchild care is positively associated with self-rated health while high intensity of grandchild care has a negative impact. Based on data from China Health and Retirement Longitudinal Study, Xu (2019) studies the impact of taking care of grandchildren on

mental health and physical health of grandparents. They find that grandparents who cared for both grandchildren and great-grandparents are associated with fewer depressive symptoms, reduced hypertension and greater life satisfaction compared to the non-caregivers. Both financial condition and health are equally important for elders' quality of life. Yet most work investigating grandparental caregiving has focused on either health or financial wealth of grandparents but not both.

While much research has explored the impact on grandparents' quality of life when investigating grandparental caregiving, studies have not focused on life satisfaction until recently. Using SHARE data on 11 European countries from 2004 to 2015 to investigate the within-individual effect of grandparenting, Danielsbacka et al. (2019) report a positive relationship between grandparenting and grandparents' life satisfaction. Liu et al. (2019) conduct a city-case study to explore the relationship between elders' contributory behaviours and their life satisfaction based on a survey data set of 809 older adults in Jianghan, a small town in Wuhan province. They find that frequently taking care of grandchildren is positively related to grandparent's life satisfaction, which is in accord with findings from an earlier study (Chyi and Mao, 2012). Based on the 2005 wave of Chinese General Social Survey data, Chyi and Mao (2012) investigate the association between elders' living arrangement and their level of happiness and find that the elders who live with their grandchildren report higher level of happiness than their counterparts.

The explanations of such direct effect of grandparenting on grandparents' life satisfaction are mainly rooted in two different frameworks. Evolutionary theories such as the grandmother hypothesis have been built and expanded to explain the beneficial effects of grandparenting on the elders (Hawkes et al., 1998; Hilbrand et al., 2017b). Grandparenting is a behavior of evolutionary nature that contributes to human longevity (Hawkes, 2004; Hilbrand et al., 2017a; Tanskanen & Danielsbacka, 2019; Danielsbacka et al., 2019). The positive effects of grandparenting on the caregivers' life satisfaction can be seen as an intrinsic reflection of the caregiving system (Brown et al., 2011). From the view of psychological theories such as role enhancement theory (Sieber, 1974) and its follow-up studies (Di Gessa et al., 2016b; Liu et al., 2019; Yalcin et al., 2018), the role of grandchild caregivers can strengthen the elders' relationship with the family and provide them with not only the emotional

gratification but also a sense of personality enrichment and life competence, thereby leading to greater life satisfaction. Most of the work on grandparental caregiving has investigated the grandparenting and its direct effects on health, financial wealth and life satisfaction, while the health and financial condition can potentially mediate the effect of grandparenting on life satisfaction. Building on the happiness theory of Layard (2005), a number of studies find that health and financial condition are among several other factors in determining the elders' happiness in China (Appleton & Song, 2008; Knight et al., 2009).

6.3 Data Methodology

6.3.1 Data

Our analysis is based on the 2015 wave of the China Health and Retirement Longitudinal Study (CHARLS) dataset, which is a biennial survey conducted by Peking University that aims to record and examine the main health and economic outcomes related to the rapidly ageing population in China. It was designed on the basis of a series of prior surveys on population ageing, namely the Health and Retirement Study (HRS), the English Longitudinal Study of Ageing (ELSA), and the Survey of Health, Ageing and Retirement in Europe (SHARE).[31] Table 6.1 summarizes the descriptive statistics on the variables that we use in our analysis.

The dependent variable is life satisfaction, measured as the responses to the survey questions: "Please think about your life as a whole. How satisfied are you with it? Are you completely satisfied, very satisfied, somewhat satisfied, not very satisfied, or not at all satisfied?" Answers are from 1 to 5, with 1 corresponding to "not at all satisfied", and 5 assigned to "completely satisfied".

We construct three different variables to capture the intensity of grandparental caregiving: not only a binary indicator of taking care for grandchildren, but also aggregate hours of grandchild care, and number of grandchildren cared. Note that the independent variables are temporally lagged. For example, the respondents

[31] For more details of the CHARLS survey, see charls.pku.edu.cn/.

were asked whether they have provided grandchild care last year; how many hours they have provided care to each grandchild last year and how many grandchildren they provided care for last year. The issue of reverse causality can be mitigated in this sense (Ku et al., 2013).

The mediators between grandparenting and life satisfaction, as discussed, are physical health captured by “self-rated health”, “self-rated health change” and “suffering body pains”, mental health captured by “risk of depression”, and financial support measured by the amount of money transfers the elders receive from their children. The descriptions and values of each variable are shown in Table 6.3. The assessment of depression is based on 10-item list from the Center for Epidemiologic Studies Depression Scale (CES-D), which has been widely used to measure the level of depression symptoms. Each item is rated on a 4-point Likert scale, we value them from 0 to 3, with higher values corresponding to higher risk of depression. By adding up those 10 items we obtain the depression degree, which ranges from 0 to 30. The larger the number, the higher level of depression risk. We follow Kilbourne et al. (2002) and Othieno et al. (2014) and use a cut-off point of 10. Those with scores equal to or higher than 11 in the survey are considered to suffer from risk of depression. Accordingly, we construct a binary variable, with a value of 1 assigned to those with score of 11 or higher, and 0 for the rest.

We control the grandparents’ socio-economic characteristics including gender, marriage, age, address, retirement status, self-care ability, and insurance scheme status, etc. Also, we control the household structure of grandparents such as the number of children, the number of grandchildren over 16, the number of grandchildren under 16 and the number of siblings, etc.

6.3.2 Empirical strategy

Aiming at not only studying the effect of grandparenting on quality of life but also its direct and indirect effect on life satisfaction, our empirical strategy takes two steps as presented in Fig. 6.1. In the first step, we first investigate the effect of grandparenting on the grandparents’ quality of life and life satisfaction. Hence, we estimate equations (1) to (4).

Table 6.1 Definition of variables and descriptive statistics. (N=7045).

Variables	Value	Observations	Mean	SD
Dependent variables				
Life satisfaction	Not at all satisfied=1	175 (2.48%)	3.34	0.81
	Not very satisfied=2	543 (7.71%)		
	Somewhat satisfied=3	3409 (48.39%)		
	Very satisfied=4	2343 (33.26%)		
	Completely satisfied=5	469 (6.66%)		
Mediators/Dependent variables				
Self-rated health	Bad=0	2047 (29.06%)	0.93	0.71
	Fair=1	3388 (48.09%)		
	Good=2	1610 (22.85%)		
Self-rated health change compared with last interview	Worse=0	3218 (45.68%)	0.65	0.64
	Same=1	3126 (44.37%)		
	Better=2	701 (9.95%)		
Suffering body pains	None=0	4783 (67.89%)	0.46	0.32
	Yes=1	2262 (32.11%)		
Depression	no=0	4344 (61.66%)	0.46	0.32
	yes=1	2048 (29.07%)		
Financial transfers from children (1000 yuan)	Actual value	7045 (100%)	13.51	83.42
Independent variables				
Provide grandchild care in the last year	No = 0	4901 (66.18%)	0.31	0.46
	Yes = 1	2144 (30.42%)	10.63	26.68
Caring time in the last year (1000 hours)	Actual value	7045 (100%)		
Number of grandchildren cared in the last year	Actual value	7045 (100%)	0.37	0.64
	Yes=1	4813 (68.32%)		
Age	Actual value	7045 (100%)	60.21	11.10
Living place	Village=0	4989 (71.11%)	0.43	0.73
	County/town=1	988 (14.08%)		
	City=2	1039 (14.81%)		
Retired	No=0	6328 (89.82%)	0.10	0.30
	Yes=1	717 (10.18%)		
Number of children	Actual value	7045 (100%)	2.60	1.55
Number of grandchildren over 16	Actual value	7045 (100%)	1.74	3.07
Number of grandchildren under 16	Actual value	7045 (100%)	1.74	1.95
Number of siblings	Actual value	7045 (100%)	0.30	1.05
Great grandparents can take care of themselves	No=0	6724 (95.44%)	0.04	0.20
	Yes=1	321 (4.56%)		
Enrolled in pension program	No=0	6143 (87.20%)	0.12	0.33
	Yes=1	902 (12.80%)		
Enrolled in health insurance	No=0	711 (10.09%)	0.89	0.30
	Yes=1	6334 (89.91%)		
Have social activities in the last mouth	None=0	3026 (42.95%)	0.57	0.49
	Yes=1	4019 (57.05%)		
Contact with non-coresident children ≥ monthly	No=0	2671 (37.91%)	0.62	0.48
	Yes=1	4374 (62.09%)		
See non-coresident children ≥ monthly	No=0	2738 (38.86%)	0.61	0.48
	Yes=1	4307 (61.14%)		
Saving (1000 yuan)	Actual value	7045 (100%)	13.45	10.95
Loan (1000 yuan)	Actual value	7045 (100%)	5.39	57.57
Own a house	No=0	1189 (16.88%)	0.83	0.37
	Yes=1	5856 (83.12)		
Value of the houses (1000 yuan)	Actual value	7045 (100%)	2.29	98.80
Own land	No=0	3043 (43.19%)	0.56	0.49
	Yes=1	4002 (56.81%)		

Note: Caring time are calculated as the sum of hours for taking care of each grandchild.

$$PH_i = \alpha_0 + \alpha_1 GP_i + \alpha_2 X_i + \mu_{1i} \quad (6.1)$$

$$MH_i = \beta_0 + \beta_1 GP_i + \beta_2 X_i + \mu_{2i} \quad (6.2)$$

$$FT_i = \rho_0 + \rho_1 GP_i + \rho_2 X_i + \mu_{3i} \quad (6.3)$$

$$LS_i = \tau_0 + \tau_1 GP_i + \tau_2 X_i + \mu_{4i} \quad (6.4)$$

$$LS_i = \theta_0 + \theta_1 GP_i + \theta_2 PH_i + \theta_3 MH_i + \theta_4 FC_i + \theta_5 X_i + \mu_{5i} \quad (6.5)$$

where PH_i, MH_i and FT_i is a vector of measures of physical health, mental health and financial transfers of individual i, respectively; and LS_i is the level of life satisfaction of individual i; GP_i is a vector of grandparental caregiving indicators; and X_i is a vector of control variables including the socio-economics characteristics of individual i. Equation (4) shows that the effect of grandparenting on life satisfaction is estimated directly without the quality of life as the mediators in the first step. In the second step, equation (5) takes account of the mediating effects of grandparenting on life satisfaction. In this sense, τ_1 in equation (4) represents the total effect of caring for grandchildren on grandparents' life satisfaction while the difference between the parameter τ_1 and θ_1 in equation (5), is the indirect effect after adding the mediators into the model. We also adopt a Karlson-Holm-Breen (KHB) decomposition analysis to isolate the indirect effect from total effect as a robustness test. This method has been proved to be one of the most suitable methodologies to deal with the multiple mediator variables and indirect effect based on a cross-sectional survey data set (Breen et al., 2013; Grollman, 2018; Shahriar, 2018; Bosick & Fomby, 2018).

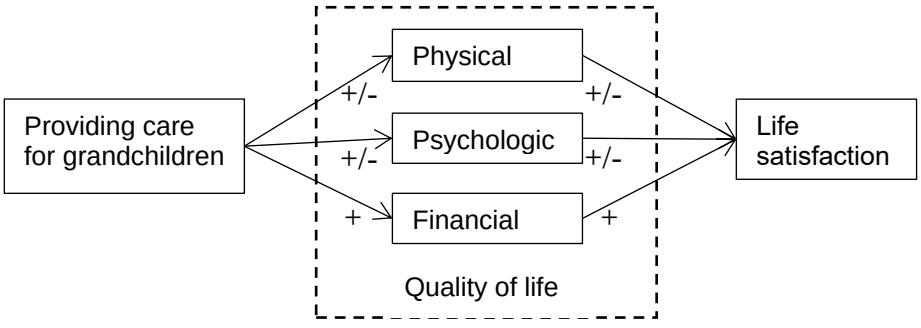

Fig. 6.1 Grandparenting, quality of life and life satisfaction.

6.4 Empirical Results

6.4.1 Grandparenting and quality of life

Table 6.2 and Table 6.3 report the results of providing care, caring time and number of grandchildren cared, respectively, on grandparents' quality of life. These tables report coefficients while the marginal effects are reported in Tables A6.1, A6.2 and A6.3. The results of control variables are only reported in Table 6.2 to save space.[32] In Table 6.2, we control for grandparental caregiving with a binary indicator. In Table 6.3, we add continuous indicators of time spent looking after grandchildren and the number of grandchildren cared for.

To start with, model 1 in Table 6.2 and Table 6.3 show that the coefficient of providing care is statistically significant and positive at 10% level, which suggests an overall positive relationship between providing grandchild care and grandparents' self-rated health.[33] The coefficient of number of grandchildren cared is positive at 5% significance level shown in Table 6.3, indicating that each additional grandchild in care is also associated with better self-rated health.[34] In model 2 and 3, the coefficients are statistically insignificant, which means that self-rated health change and suffering body pains are unrelated with grandparenting. The results of model 4 of table 6.4 shows a negative relationship between providing grandchild and depression, which indicates that grandparents' mental health is positively related to their providing care for grandchildren.[35] This effect is further shown to be proportional to the number of grandchildren in care and the time spent looking after them (see Table A6.2 and A6.3 for marginal effects). The results of model 5 shows that the effect of financial transfers from children on providing grandchild care is also positive

[32] The coefficient estimates are omitted in the further tables as they are very similar to those in Table 6.2. The full regression results are available upon request.

[33] Those caring for grandchildren are 1.8% less likely to report poor health and 1.5% more likely to be in good health (as shown in Table A6.1).

[34] Each grandchild increases the probability of good health (decreases the probability of poor health) by 1.3% (1.6%).

[35] Grandparents who look after their grandchildren are 2.9% less likely to report symptoms associated with depression (see Table A6.1 for the marginal effect).

and statistically significant at 1%[36] In a similar vein, this effect is also significantly related to the caring time and number of grandchildren in care.

Table 6.2 Estimations for provide grandchild care on quality of life: full sample.

Variables	Self-rated health Model 1	Self-rated health change Model 2	Suffer body pains Model 3	Depression Model 4	Financial transfers from children Model 5
Providing grandchild care	0.089*	-0.003	-0.004	-0.148**	0.753***
	(0.053)	(0.054)	(0.062)	(0.065)	(0.103)
Male	0.197***	0.086*	-0.682***	-0.635***	-0.655***
	(0.048)	(0.048)	(0.057)	(0.060)	(0.092)
Married	0.015	-0.042	-0.082	-0.364***	-0.167
	(0.056)	(0.057)	(0.064)	(0.068)	(0.108)
Age	-0.137***	-0.051**	0.114***	0.154***	0.459***
	(0.023)	(0.024)	(0.027)	(0.031)	(0.045)
Age ^{2}	0.001***	0.001*	-0.001***	-0.001***	-0.003***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Live in village	-0.086	-0.112	0.221***	0.326***	0.186
	(0.070)	(0.071)	(0.083)	(0.090)	(0.135)
Live in city	0.181**	-0.030	-0.212*	-0.019	-0.032
	(0.088)	(0.089)	(0.112)	(0.119)	(0.172)
Retired	-0.062	0.071	-0.069	-0.159	-0.619***
	(0.091)	(0.092)	(0.118)	(0.127)	(0.178)
Number of children	-0.023	-0.016	0.045*	-0.024	0.493***
	(0.023)	(0.024)	(0.027)	(0.029)	(0.045)
Number of grandchildren over 16	-0.023*	0.010	0.007	0.034**	0.039
	(0.013)	(0.013)	(0.014)	(0.016)	(0.025)
Number of grandchildren under 16	-0.021	-0.007	0.013	0.045**	0.098***
	(0.015)	(0.016)	(0.017)	(0.018)	(0.029)
Number of siblings	-0.023	-0.006	0.035	-0.015	0.092**
	(0.021)	(0.022)	(0.025)	(0.027)	(0.042)
Parents can take care of themselves	-0.201*	-0.436***	0.245**	0.104	-0.340
	(0.109)	(0.114)	(0.123)	(0.129)	(0.211)
Enrolled in pension program	0.298***	0.120	-0.360***	-0.436***	-0.485***
	(0.084)	(0.085)	(0.113)	(0.121)	(0.165)
Enrolled in health insurance	-0.023	-0.086	-0.026	-0.257***	0.195
	(0.077)	(0.079)	(0.088)	(0.094)	(0.148)
Have social activities in the last mouth	0.154***	0.078	-0.060	-0.133**	0.313***
	(0.047)	(0.048)	(0.054)	(0.057)	(0.091)
Contact with non-coresident children ≥ monthly	-0.025	0.004	0.001	0.078	1.300***
	(0.049)	(0.050)	(0.058)	(0.062)	(0.095)
See non-coresident children ≥ monthly	0.182***	0.091*	-0.110*	-0.161***	-0.001
	(0.050)	(0.051)	(0.059)	(0.062)	(0.097)
Saving	0.036***	0.014***	-0.034***	-0.050***	0.003
	(0.005)	(0.005)	(0.007)	(0.007)	(0.010)
Loan	-0.016*	-0.029***	0.019*	0.026**	-0.014
	(0.009)	(0.009)	(0.011)	(0.011)	(0.018)
Own a house	-0.001	-0.046	-0.134*	-0.033	-0.174
	(0.066)	(0.068)	(0.075)	(0.081)	(0.128)
Value of the houses	0.065***	0.049***	-0.057***	-0.083***	0.147***
	(0.014)	(0.014)	(0.016)	(0.017)	(0.026)
Own land	-0.048	-0.079	0.063	0.024	0.275***
	(0.053)	(0.054)	(0.061)	(0.065)	(0.103)
Observations	7,045	7,045	7,045	6,392	7,045

Notes: 1. Robust standard errors are in parentheses; 2. *p<0.1 **p<0.05 ***p<0.01; 3. Model 1 and 2 are ordered logistic regressions, Model 4 and 5 are logistic regression and Model 5 is OLS; 4. Marginal effects and results of control variables are reported in appendix.

[36] Looking after grandchildren approximately doubles the amount of support that grandparents receive from their children (with every additional grandchild increasing the amount of support by approximately 60%). Given that the financial support is in logs, the effect of providing care corresponds is exp (0.753) = 2.12.

Table 6.3 Estimations for caring time for grandchildren on quality of life: full sample.

Variables	Self-rated health	Self-rated health change	Suffer body pains	Depression	Financial transfers from children
	Model 1	Model 2	Model 3	Model 4	Model 5
Provide grandchild care	0.089*	-0.003	-0.004	-0.148**	0.753***
	(0.053)	(0.054)	(0.062)	(0.065)	(0.103)
Caring time	0.008	-0.004	0.001	-0.018**	0.103***
	(0.007)	(0.007)	(0.008)	(0.009)	(0.014)
Number of grandchildren cared	0.078**	0.020	-0.023	-0.102**	0.481***
	(0.038)	(0.039)	(0.043)	(0.046)	(0.074)
Control variables	Yes	Yes	Yes	Yes	Yes
Observations	7,045	7,045	7,045	6,392	7,045

Notes: 1. Robust standard errors are in parentheses; 2. *p<0.1 **p<0.05 ***p<0.01; 3. Model 1 and 2 are ordered logistic regressions, Model 3 and 4 are logistic regression and Model 5 is OLS; 4. Marginal effects and results of control variables are reported in appendix.

(1) Rural vs urban areas

Table 6.4 compares the effect of grandparental caregiving on the grandparents' quality of life in rural (village) and urban (town or city) areas. Model 1 to 3 shows that there is in general no significant relationship between grandparenting and physical health in either village or non-village areas. In model 4, depression is significantly and negatively associated with all the variables measuring grandparenting only in villages but not in non-village areas, which indicates that the effect of grandparenting on financial support received from children is somewhat stronger in the non-village area although this may simply reflect the greater earning power of urban residents and higher cost of living in towns and cities.

Table 6.4 Estimations for provide grandchild care on quality of life: Village vs non-village.

Variables	Self -rated health	Self -rated health change	Suffer body pains	Depression	Financial transfers from children
	Model 1	Model 2	Model 3	Model 4	Model 5
Village × Provide grandchild care	0.078	0.040	-0.025	-0.154**	0.683***
	(0.062)	(0.064)	(0.070)	(0.075)	(0.119)
Village × Caring time	0.005	-0.000	-0.002	-0.019*	0.092***
	(0.008)	(0.008)	(0.009)	(0.010)	(0.016)
Village × Number of grandchildren cared	0.073*	0.043	-0.016	-0.108**	0.459***
	(0.044)	(0.044)	(0.049)	(0.052)	(0.083)
Control variables	Yes	Yes	Yes	Yes	Yes
Observations	4,989	4,989	4,989	4,484	4,989
Non village × Provide grandchild care	0.151	-0.124	0.060	-0.174	0.899***
	(0.104)	(0.107)	(0.129)	(0.136)	(0.208)
Non village × Caring time	0.021	-0.016	0.011	-0.021	0.128***
	(0.014)	(0.014)	(0.017)	(0.018)	(0.027)
Non Village × Number of grandchildren cared	0.116	-0.056	-0.054	-0.117	0.527***
	(0.080)	(0.081)	(0.096)	(0.105)	(0.157)
Control variables	Yes	Yes	Yes	Yes	Yes
Observations	2,056	2,056	2,056	1,908	2,056

Notes: 1.Robust standard errors are in parentheses; 2. *p<0.1 **p<0.05 ***p<0.01; 3.The results of the control variables are similar with Table 6.6 and not reported for space saving; 4. Marginal effects can be reported upon request.

(2) Grandmother vs grandfather

Table 6.5 investigates how grandparenting affects grandparents' quality of life in regard to their gender. The coefficients of all the grandparenting variables are all statistically insignificant in model 1 to 3, which suggests that the effect of grandparenting does not depend on gender. In model 4, depression is significantly and negatively associated with providing care to grandchildren, time spent on grandchild care and number of grandchildren cared for grandfather whereas this relationship is insignificant for grandmothers. The results in model 5 show that the financial transfers from children are all significantly and positively related to grandparenting. Yet, this positive effect is greater for grandfathers than grandmothers, which means that grandfathers' caregiving elicits more financial transfers from children than grandmothers' care.

Table 6.5 Estimations for provide grandchild care on quality of life: grandmother vs grandfather.

Variables	Self - rated health	Self -rated health change	Suffer body pains	Depression	Financial transfers from children
	Model 1	Model 2	Model 3	Model 4	Model 5
Grandfather × Provide grandchild care	0.057	-0.010	-0.021	-0.234**	0.842***
	(0.73)	(-0.12)	(-0.22)	(-2.26)	(5.47)
Grandfather × Caring time	0.001	-0.006	-0.001	-0.029**	0.108***
	(0.011)	(0.011)	(0.013)	(0.014)	(0.021)
Grandfather × Number of grandchildren cared	0.068	0.014	-0.033	-0.154**	0.538***
	(0.059)	(0.060)	(0.072)	(0.077)	(0.114)
Control variables	Yes	Yes	Yes	Yes	Yes
Observations	3,313	3,313	3,313	3,079	3,313
Grandmother × Provide grandchild care	0.106	0.001	0.016	-0.104	0.658***
	(0.072)	(0.074)	(0.080)	(0.086)	(0.140)
Grandmother × Caring time	0.012	-0.004	0.004	-0.014	0.097***
	(0.009)	(0.010)	(0.010)	(0.011)	(0.018)
Grandmother × Number of grandchildren cared	0.080	0.024	-0.016	-0.083	0.432***
	(0.051)	(0.051)	(0.055)	(0.059)	(0.097)
Control variables	Yes	Yes	Yes	Yes	Yes
Observations	3,732	3,732	3,732	3,313	3,732

Notes: 1.Robust standard errors are in parentheses; 2. *p<0.1 **p<0.05 ***p<0.01; 3.The results of the control variables are similar with Table 6.6 and not reported for space saving; 4. Marginal effects can be reported upon request.

6.4.2 Grandparenting and life satisfaction: the direct effect and indirect effect (mediating effect)

Results in Table 6.6 show that caring for grandchildren has a positive effect on the grandparents' life satisfaction in model 1 and 2. As before, the positive effect of

grandparenting is proportional to caring time as shown in model 3 and 4. Model 5 and 6 show that life satisfaction is positively related to number of grandchildren cared but negatively related to its square term, so that the relationship displays an inverse U shape. This means that the life satisfaction initially increases with the number of grandchildren cared but decreases as the number of grandchildren grows, with the optimal number being between 2 and 3. (Life satisfaction peaks at 2.4 in model 5 and 2.6 in model 6).

Table 6.6 Ordered logistic regressions: Grandparenting, quality of life and satisfaction: full sample.

Variables	Life satisfaction					
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Provide grandchild care	0.183***	0.179***				
	(0.053)	(0.057)				
Caring time			0.023***	0.023***		
			(0.007)	(0.008)		
Number of grandchildren cared					0.215***	0.211***
					(0.062)	(0.065)
Number of grandchildren cared ^{2}					-0.044**	-0.041*
					(0.021)	(0.022)
Health (poor)		-0.217***		-0.219***		-0.215***
		(0.065)		(0.065)		(0.065)
Health (good)		0.633***		0.634***		0.633***
		(0.062)		(0.062)		(0.062)
Health change (worse)		-0.120*		-0.120*		-0.118*
		(0.062)		(0.062)		(0.062)
Health change (better)		-0.283***		-0.283***		-0.284***
		(0.057)		(0.057)		(0.057)
Body pains (yes)		0.156*		0.158*		0.155*
		(0.085)		(0.085)		(0.085)
Depression		-0.941***		-0.941***		-0.942***
		(0.062)		(0.062)		(0.062)
Financial transfers from children		0.017***		0.017***		0.017***
		(0.007)		(0.007)		(0.007)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,939	6,361	6,939	6,361	6,939	6,361

Notes: 1. Robust standard errors are in parentheses; 2. *p<0.1 **p<0.05 ***p<0.01; 3. Marginal effects and results of control variables are reported in appendix Table A6.4, Table A6.5 and Table A6.6.

As previously discussed, grandparent caregiving can not only affect grandparents' life satisfaction directly but also indirectly through quality of life as the mediating effect. Quality of life is a major channel connecting grandparenting with grandparents' life satisfaction. Yet, the results in full sample suggest that the mediating effect is negligible: the coefficient of grandparent care is essentially the same when it is included on its own in model 1 and alongside the potential mediators in model 2. Considering the marginal effects presented in Table A6.4, the full effect of grandparenting increases in the probability of being very satisfied with life by 3.2%

and 1.1% increase in the probability of being completely satisfied. When controlling for mediators, the corresponding effects are 2.7% and 1.1%, respectively. The patterns obtained with caring time and the number of grandchildren is very similar: adding the quality of life mediators has little changes on the effect of grandparenting.

(1) Village vs non village

Table 6.7 examines the direct and indirect effect of grandparenting on the grandparents' life satisfaction in village and non-village area. Results show that providing grandchild care, caring time and number of grandchildren cared all have a positive effect on the grandparents' life satisfaction for the grandparents living in the village areas but not for those living in towns and cities. The indirect effect of grandparenting on life satisfaction via quality of life is small, similar with the results from full sample.

(2) Grandmother vs grandfather

The effect of grandparenting and quality of life on the grandparents' life satisfaction with respect to genders is shown in Table 6.8. The effects of grandparent care and caring time are significant for both genders but are somewhat stronger for grandfathers. In contrast, the inverted U-shaped effect of the number of grandchildren is only significant for females; grandmothers life satisfaction peaks when caring for 2 grandchildren. As before, the effect of grandparenting changes little after we consider the mediators.

6.4.3 Robustness check for the mediating effect: The KHB analysis

We adopt the Karlson-Holm-Breen (KHB) decomposition analysis as a robustness check for the mediating effect. This method also decomposes the total effect into direct and indirect effects. It further allows for the calculation of the mediated percentage, which is interpreted as the percentage of the main association that can be explained by the mediator. The mediated percentage is only considered significant when the total and indirect effects are significant (Karlson & Holm, 2011; Santini et al., 2016). The result of KHB test is shown in Table 6.9. The total effect of all mediators is statistically significant and positive, which indicates that taking care

of grandchildren has a positive effect on life satisfaction as a whole. However, the indirect effect, only the coefficients of depression and financial supports from children are significant yet minuscule, broadly consistent with the previous results. For example, the mediating effect of providing grandchild care via depression and financial supports from children accounts for 3.68% and 1.25%, respectively; the mediating effect of caring time via depression and financial supports from children accounts for 0.45% and 0.17%, respectively and the mediating effect of number of grandchildren cared accounts for 2.53% and 0.81%, respectively.

Table 6.7 Ordered logistic regressions for Grandparenting on life satisfaction, village vs non-village.

Variables	Life satisfaction											
	Village		Non village		Village		Non village		Village		Non village	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12
Provide grandchild care	0.226*** (0.062)	0.227*** (0.067)	0.069 (0.105)	0.015 (0.111)								
Caring time					0.026*** (0.008)	0.028*** (0.009)	0.013 (0.014)	0.005 (0.015)				
Number of grandchildren cared									0.263*** (0.069)	0.265*** (0.073)	0.034 (0.152)	-0.049 (0.154)
Number of grandchildren cared ^{2}									-0.054** (0.022)	-0.054** (0.023)	0.009 (0.068)	0.039 (0.066)
Self-rated health (poor)		-0.189** (0.075)		-0.315** (0.133)		-0.193** (0.075)		-0.314** (0.133)		-0.185** (0.075)		-0.323** (0.133)
Self-rated health (good)		0.591*** (0.076)		0.733*** (0.108)		0.591*** (0.076)		0.733*** (0.108)		0.592*** (0.076)		0.739*** (0.109)
Self-rated health change (worse)		-0.102 (0.071)		-0.173 (0.126)		-0.101 (0.071)		-0.173 (0.126)		-0.099 (0.071)		-0.171 (0.126)
Self-rated health (better)		-0.315*** (0.067)		-0.199* (0.106)		-0.315*** (0.067)		-0.200* (0.106)		-0.317*** (0.067)		-0.195* (0.106)
Suffer body pains (yes)		0.087 (0.105)		0.292** (0.147)		0.089 (0.105)		0.292** (0.147)		0.085 (0.105)		0.292** (0.147)
Depression		-0.916*** (0.071)		-1.040*** (0.128)		-0.917*** (0.071)		-1.039*** (0.128)		-0.918*** (0.071)		-1.039*** (0.128)
Financial transfers from children		0.017** (0.008)		0.022* (0.012)		0.017** (0.008)		0.022* (0.012)		0.017** (0.008)		0.022* (0.012)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,911	4,461	2,028	1,900	4,911	4,461	2,028	1,900	4,911	4,461	2,028	1,900

Notes: 1. Robust standard errors are in parentheses; 2.Significant level: *p<0.1 **p<0.05 ***p<0.01; 3.The results of the control variables are similar with Table 6.6.

Table 6.8 Ordered logistic regressions for Grandparenting on life satisfaction: marginal effect, grandmothers vs grandfathers.

Variables	Life satisfaction											
	Grandfather		Grandmother		Grandfather		Grandmother		Grandfather		Grandmother	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12
Provide grandchild care	0.198**	0.170**	0.165**	0.179**								
	(0.079)	(0.083)	(0.073)	(0.079)								
Caring time					0.026**	0.023**	0.020**	0.021**				
					(0.011)	(0.011)	(0.009)	(0.010)				
Number of grandchildren cared									0.080	0.060	0.214***	0.229***
									(0.122)	(0.122)	(0.079)	(0.084)
Number of grandchildren cared ^{2}									0.046	0.046	-0.055**	-0.056**
									(0.058)	(0.055)	(0.023)	(0.024)
Self-rated health (poor)		-0.138		-0.275***		-0.140		-0.276***		-0.139		-0.269***
		(0.097)		(0.088)		(0.097)		(0.088)		(0.097)		(0.088)
Self-rated health (good)		0.696***		0.567***		0.697***		0.566***		0.693***		0.567***
		(0.088)		(0.088)		(0.088)		(0.088)		(0.088)		(0.088)
Self-rated health change (worse)		-0.253***		-0.045		-0.253***		-0.045		-0.251***		-0.041
		(0.097)		(0.080)		(0.097)		(0.080)		(0.097)		(0.080)
Self-rated health (better)		-0.315***		-0.266***		-0.315***		-0.266***		-0.318***		-0.270***
		(0.083)		(0.078)		(0.083)		(0.078)		(0.083)		(0.078)
Suffer body pains (yes)		0.151		0.173		0.152		0.175		0.146		0.170
		(0.129)		(0.114)		(0.129)		(0.114)		(0.129)		(0.114)
Depression		-0.898***		-0.976***		-0.898***		-0.976***		-0.902***		-0.980***
		(0.097)		(0.081)		(0.097)		(0.081)		(0.097)		(0.081)
Financial transfers from children		0.014		0.019**		0.014		0.019**		0.015		0.019**
		(0.009)		(0.009)		(0.009)		(0.009)		(0.009)		(0.009)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,276	3,068	3,663	3,293	3,276	3,068	3,663	3,293	3,276	3,068	3,663	3,293

Notes: 1. Robust standard errors are in parentheses; 2. *p<0.1 **p<0.05 ***p<0.01; 3.The results of the control variables are similar with Table 6.6.

Table 6.9 The KHB decomposition analysis.

Variables	Provide grandchild care			Caring time			Number of grandchildren cared		
	Total effect	Direct effect	Indirect effect	Total effect	Direct effect	Indirect effect	Total effect	Direct effect	Indirect effect
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Self-rated health	0.1959***	0.1780***	0.0179	0.0244***	0.0231***	0.0014	0.1244***	0.1079***	0.0164*
	(3.63)	(3.30)	(1.35)	(3.43)	(3.24)	(0.79)	(3.25)	(2.82)	(1.75)
Self-rated health change	0.1939***	0.1960***	-0.0020	0.0240***	0.0250***	-0.0010	0.1230***	0.1206***	0.0025
	(3.61)	(3.65)	(-0.23)	(3.39)	(3.53)	(-0.84)	(3.20)	(3.13)	(0.39)
Suffer body pains	0.1889***	0.1866***	0.0022	0.0235***	0.0235***	-0.0000	0.1192***	0.1148***	0.0044
	(3.52)	(3.48)	(0.25)	(3.32)	(3.31)	(-0.01)	(3.11)	(2.99)	(0.69)
Depression	0.2116***	0.1748***	0.0368**	0.0260***	0.0214***	0.0045**	0.1415***	0.1162***	0.0253**
	(3.78)	(3.12)	(2.32)	(3.51)	(2.90)	(2.16)	(3.52)	(2.89)	(2.23)
Financial transfers from children	0.1842***	0.1717***	0.0125**	0.0229***	0.0211***	0.0017**	0.1150***	0.1069***	0.0081**
	(3.44)	(3.20)	(2.52)	(3.24)	(2.98)	(2.53)	(3.00)	(2.78)	(2.53)
Mediators group 1	0.2250***	0.1710***	0.0540**	0.0276***	0.0218***	0.0058**	0.1508***	0.1103***	0.0405***
	(3.99)	(3.01)	(2.55)	(3.72)	(2.91)	(2.06)	(3.76)	(2.73)	(2.73)
Mediators group 2	0.2121***	0.1622***	0.0500***	0.0261***	0.0197***	0.0064***	0.1418***	0.1081***	0.0337***
	(3.79)	(2.88)	(2.97)	(3.52)	(2.65)	(2.84)	(3.53)	(2.68)	(2.84)
Observations	7045	7045	7045	7045	7045	7045	7045	7045	7045

Notes: 1. z-values are in parentheses; 2. *p<0.1 **p<0.05 ***p<0.01; 3. Mediators group 1 contains Self-rated health, Self-rated health change, Depression, Financial transfers from children and Mediators group 2 contains Depression and Financial transfers from children.

6.5 Discussion

Based on information on 7405 observations from the CHARLS data set, we study the effect of grandparental caregiving on life quality and life satisfaction of grandparents. In particular, we examine whether the quality of life mediates the effect of grandparenting on life satisfaction. There are several main findings from our analysis. First, grandparent caregiving has an overall significant and positive effect on grandparents' quality of life: it leads to improvements in mental health and financial condition. Likewise, we do not find any evidence that taking care of grandchildren makes the grandparents' physical or mental health deteriorate. Second, when we capture the intensity of grandparenting by the number of grandchildren cared for, we find that grandparents' life satisfaction depends on grandparenting in a non-linear (inverted U-shaped) manner, with looking after an intermediate number of grandchildren associated with greatest life satisfaction. Third, contrary to our expectation of both direct and indirect effects of grandparent caregiving on life satisfaction, we find that the positive relationship between grandparenting and life satisfaction is mainly driven by the direct effect. The mediating effect of quality of life on life satisfaction is, somewhat surprisingly, negligible and mostly insignificant.

Our findings contribute to the grandparenting-health literature. We find that there is no significant relationship between grandparenting and the grandparents' physical health of grandparents, which indicates that grandparenting does not accelerate physical health decline. This contrasts with the previous literature, which tends to find that grandparenting, especially if intensive, has an adverse effect on the elders' physical health (see Jendrek, 1993; Hayslip & Shore, 2000; Chen & Liu, 2012; Musil et al., 2017; Yalcin et al., 2018). One possible explanation is that the net effect of grandparenting on physical health is neutral in the short term whereas in the long run, the negative impact of grandparenting on grandparents' physical condition can be more salient (Ku et al., 2013; Liu, et al. 2019).

Our results show that the incidence of depression, as measured by the score of CES-D indicators, is negatively associated with grandparenting, which is line with previous findings of Grundy et al., (2012), Tang et al., (2016) and Tsai et al. (2013). They show that elders who are grandchild caregivers are less likely to report being

lonely and less likely to suffer from depressive symptoms. Furthermore, when differentiating rural from urban grandparents, we find that this positive grandparenting-mental health relationship is only significant for the grandparents in village (rural) areas, in line with Tsai et al. (2013) and Burnett et al. (2013). Intuitively, our understanding is straight forward: a large number of rural workers migrated to urban areas during the past few decades (Wang et al., 2018). The parents leave their children with the grandparents in the rural area wherethe grandchildren constitute an important emotional connection between the grandparents and their adult children. This effect is significant for grandfathers yet is insignificant for grandmothers. The role of grandfathers in grandparenting tends to be complementary instead of primary or custodial (Di Gessa et al., 2016a) whereas the involvements of grandmothers in grandchild care is more psychologically demanding and can lead to more mental strain (Blustein et al., 2004; Xu, 2019).

Our findings also contribute to the intergenerational exchange literature. We find that among all the life quality variables, the financial situation of grandparents is the most significantly and positively associated with grandparenting. The grandchild caregivers who live in village (rural) area receive less financial support from their children than those who live in urban area, which is in accord with the findings of Cong and Silverstein (2011). They show that financial returns to grandparents of providing grandchild care and financial assistance are greater from migrant sons than from non-migrant sons in rural China. Also, we find that grandfathers receive more financial transfers than grandmothers from their children when they provide grandchild care, as expected.

We also contribute to the literature by examining how quality of life (in terms of physical health, mental health and financial condition) mediates the impact of grandparenting on life satisfaction. The direct effect of grandparenting on grandparents' life satisfaction is statistically significant and positive, broadly consistent with the life satisfaction literature (Danielsbacka et al., 2019; Liu et al., 2019; Xu, 2019; Chyi & Mao, 2012). Building on these studies, we find that this positive association is only pronounced in village areas. Intuitively, grandparents in rural areas are more likely to take custodial role in grandchild care and achieve stronger grandparents-grandchildren relationship than grandparents in urban areas.

Also, grandparenting can be more emotionally rewarding in rural area where the traditional norms and cultural values are better presevered than in urban areas. Further, as Coall & Hertwig (2010) who report a non-linear relationship between the intensity of grandparenting and wellbeing, we detect an inverse U shaped relationship between grandparents' life satisfaction and the number of grandchildren cared for. The life satisfaction increases as the number of grandchildren cared increases but decreases when grandparents care for more than 2 to 3 grandchildren. We find, however, that the indirect effect of grandparenting via quality of life accounts for a tiny portion of the total effect on grandparents' life satisfaction. The interpretation of these results is straightforward. Although health and financial situation play significant roles in determining grandparents' level of happiness (Appleton & Song, 2008; Knight et al., 2009; Chyi & Mao, 2012), the effect of grandparenting on life satisfaction is mainly driven by the direct effect as argued by the role enhancement studies with emphasis on the role performance and family solidarity (Sieber , 1974; Chen et al., 2011; Di Gessa et al., 2016a; Yaclcin et al., 2018; Liu et al., 2019). Alternatively, this improved life satisfaction of grandchild caregivers can be seen as an intrinsic reflection of the caregiving system that encourages investments towards grandchildren from evolutionary studies (Brown et al., 2011; Hilbrand et al., 2017a; Hilbrand et al., 2017b; Danielsbacka et al., 2019).

As a social phenomenon of growing importance in a country suffering population aging, grandparenting should attract more attentions in China. Our findings have intriguing implications. On the one hand, our analysis suggests that only rural grandparents derive benefits in terms of their mental health and life satisfaction stemming from looking after their grandchildren. However, rural elders often see their children moving to urban areas for work. Grandparents looking after grandchildren in such situations would imply that the grandchildren spend considerable time separated from their parents. We do not measure the quality of life or life satisfaction of parents and grandchildren, but such separation is unlikely to be good for either of them. In contrast, if the grandparents move to the urban areas to live with their children and grandchildren, the positive effects of grandparenting vanish, possibly because they are counterbalanced by the stress of moving to a new location and/or of living in an urban area. The decision between rural and urban grandparenting thus

may involve intergenerational transfers between grandparents, their children, and grandchildren.

6.6 Appendix

Table A6.1 Estimation for providing grandchild care on quality of life: full sample.

Variables	Physical						Psychological		Financial	
	(1) Health			(2) Health change			(3) Body pains	(4) Depression	(5) *Ln* Support from children	(6) Living with children
	Bad	Fair	Good	Worse	About the same	Better				
Providing care	-0.018*	0.003*	0.015*	0.001	-0.000	-0.000	-0.001	-0.029**	0.753***	0.106***
	(0.011)	(0.002)	(0.009)	(0.013)	(0.008)	(0.005)	(0.013)	(0.013)	(0.103)	(0.012)
Male	-0.039***	0.006***	0.033***	-0.021*	0.013*	0.008*	-0.139***	-0.127***	-0.655***	-0.035***
	(0.009)	(0.002)	(0.008)	(0.012)	(0.008)	(0.004)	(0.011)	(0.012)	(0.092)	(0.011)
Married	-0.003	0.000	0.003	0.010	-0.007	-0.004	-0.017	-0.073***	-0.167	-0.051***
	(0.011)	(0.002)	(0.009)	(0.014)	(0.009)	(0.005)	(0.013)	(0.013)	(0.108)	(0.013)
Age	0.027***	-0.004***	-0.023***	0.013**	-0.008**	-0.005**	0.023***	0.031***	0.459***	-0.047***
	(0.005)	(0.001)	(0.004)	(0.006)	(0.004)	(0.002)	(0.006)	(0.006)	(0.045)	(0.005)
Age squared	-0.000***	0.000***	0.000***	-0.000*	0.000*	0.000*	-0.000***	-0.000***	-0.003***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Live in village	0.017	-0.003	-0.014	0.027	-0.017	-0.010	0.045***	0.065***	0.186	-0.029*
	(0.014)	(0.002)	(0.012)	(0.017)	(0.011)	(0.006)	(0.017)	(0.018)	(0.135)	(0.017)
Live in city	-0.036**	0.006**	0.030**	0.007	-0.005	-0.003	-0.043*	-0.004	-0.032	0.042**
	(0.018)	(0.003)	(0.015)	(0.022)	(0.014)	(0.008)	(0.023)	(0.024)	(0.172)	(0.021)
Retired	0.012	-0.002	-0.010	-0.017	0.011	0.006	-0.014	-0.032	-0.619***	-0.018
	(0.018)	(0.003)	(0.015)	(0.023)	(0.014)	(0.008)	(0.024)	(0.025)	(0.178)	(0.022)
Number of children	0.005	-0.001	-0.004	0.004	-0.002	-0.001	0.009*	-0.005	0.493***	0.064***
	(0.005)	(0.001)	(0.004)	(0.006)	(0.004)	(0.002)	(0.005)	(0.006)	(0.045)	(0.006)
Number of grandchildren over 16	0.005*	-0.001*	-0.004*	-0.003	0.002	0.001	0.001	0.007**	0.039	-0.008**
	(0.003)	(0.000)	(0.002)	(0.003)	(0.002)	(0.001)	(0.003)	(0.003)	(0.025)	(0.003)
Number of grandchildren under 16	0.004	-0.001	-0.004	0.002	-0.001	-0.001	0.003	0.009**	0.098***	0.004
	(0.003)	(0.000)	(0.003)	(0.004)	(0.002)	(0.001)	(0.004)	(0.004)	(0.029)	(0.004)
Number of sibling	0.005	-0.001	-0.004	0.001	-0.001	-0.001	0.007	-0.003	0.092**	-0.002
	(0.004)	(0.001)	(0.004)	(0.005)	(0.003)	(0.002)	(0.005)	(0.005)	(0.042)	(0.005)
Parents can take care of themselves	0.040*	-0.006*	-0.034*	0.107***	-0.068***	-0.039***	0.050**	0.021	-0.340	0.025
	(0.022)	(0.003)	(0.018)	(0.028)	(0.018)	(0.010)	(0.025)	(0.026)	(0.211)	(0.025)
Enrolled in pension program	-0.059***	0.009***	0.050***	-0.029	0.019	0.011	-0.074***	-0.087***	-0.485***	-0.009
	(0.017)	(0.003)	(0.014)	(0.021)	(0.013)	(0.008)	(0.023)	(0.024)	(0.165)	(0.020)
Enrolled in health insurance	0.005	-0.001	-0.004	0.021	-0.013	-0.008	-0.005	-0.051***	0.195	-0.006
	(0.015)	(0.002)	(0.013)	(0.019)	(0.012)	(0.007)	(0.018)	(0.019)	(0.148)	(0.018)

Have social activities in the last mouth	-0.031*** (0.009)	0.005*** (0.002)	0.026*** (0.008)	-0.019 (0.012)	0.012 (0.007)	0.007 (0.004)	-0.012 (0.011)	-0.027** (0.011)	0.313*** (0.091)	-0.005 (0.011)
Contact with non-coresident children monthly	0.005 (0.010)	-0.001 (0.002)	-0.004 (0.008)	-0.001 (0.012)	0.001 (0.008)	0.000 (0.004)	0.000 (0.012)	0.016 (0.012)	1.300*** (0.095)	-0.256*** (0.010)
See non-coresident children monthly	-0.036*** (0.010)	0.006*** (0.002)	0.031*** (0.008)	-0.022* (0.012)	0.014* (0.008)	0.008* (0.005)	-0.022* (0.012)	-0.032*** (0.012)	-0.001 (0.097)	-0.130*** (0.012)
Saving (logarithm)	-0.007*** (0.001)	0.001*** (0.000)	0.006*** (0.001)	-0.004*** (0.001)	0.002*** (0.001)	0.001*** (0.000)	-0.007*** (0.001)	-0.010*** (0.001)	0.003 (0.010)	-0.003** (0.001)
Loan (logarithm)	0.003* (0.002)	-0.000* (0.000)	-0.003* (0.002)	0.007*** (0.002)	-0.005*** (0.001)	-0.003*** (0.001)	0.004* (0.002)	0.005** (0.002)	-0.014 (0.018)	0.001 (0.002)
Own a house	0.000 (0.013)	-0.000 (0.002)	-0.000 (0.011)	0.011 (0.017)	-0.007 (0.011)	-0.004 (0.006)	-0.027* (0.015)	-0.006 (0.016)	-0.174 (0.128)	0.121*** (0.017)
Value of the houses (logarithm)	-0.013*** (0.003)	0.002*** (0.000)	0.011*** (0.002)	-0.012*** (0.003)	0.008*** (0.002)	0.004*** (0.001)	-0.012*** (0.003)	-0.017*** (0.003)	0.147*** (0.026)	0.030*** (0.003)
Own land	0.010 (0.011)	-0.001 (0.002)	-0.008 (0.009)	0.019 (0.013)	-0.012 (0.008)	-0.007 (0.005)	0.013 (0.012)	0.005 (0.013)	0.275*** (0.103)	0.020 (0.013)
Observations	7,045	7,045	7,045	7,045	7,045	7,045	7,045	6,392	7,045	7,045

Notes: 1. Robust standard errors are in parentheses; 2. *p<0.1 **p<0.05 ***p<0.01; 3. Model 1 and 2 are ordered logistic regressions reported with marginal effects, Model 3 and 4 are logistic regressions reported with marginal effects and Model 5 is OLS.

Table A6.2 Estimation for caring time on quality of life: full sample.

Variables	Physical						Psychological		Financial	
	(1) Health			(2) Health change			(3) Body pains	(4) Depression	(5) *Ln* Support from children	(6) Living with children
	Bad	Fair	Good	Worse	About the same	Better				
Caring time (logarithm)	-0.002 (0.001)	0.000 (0.000)	0.001 (0.001)	0.001 (0.002)	-0.001 (0.001)	-0.000 (0.001)	0.000 (0.002)	-0.004** (0.002)	0.103*** (0.014)	0.014*** (0.002)
Male	-0.039*** (0.009)	0.006*** (0.002)	0.033*** (0.008)	-0.020* (0.012)	0.013* (0.008)	0.007* (0.004)	-0.139*** (0.011)	-0.127*** (0.012)	-0.644*** (0.093)	-0.034*** (0.011)
Married	-0.003 (0.011)	0.000 (0.002)	0.003 (0.009)	0.010 (0.014)	-0.006 (0.009)	-0.004 (0.005)	-0.017 (0.013)	-0.072*** (0.013)	-0.176 (0.108)	-0.052*** (0.013)
Age	0.027*** (0.005)	-0.004*** (0.001)	-0.023*** (0.004)	0.012** (0.006)	-0.008** (0.004)	-0.004** (0.002)	0.023*** (0.006)	0.030*** (0.006)	0.460*** (0.045)	-0.046*** (0.005)
Age squared	-0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.003*** (0.000)	0.000*** (0.000)

Live in village	0.017	-0.003	-0.015	0.028	-0.018	-0.010	0.045***	0.065***	0.189	-0.029*
	(0.014)	(0.002)	(0.012)	(0.017)	(0.011)	(0.006)	(0.017)	(0.018)	(0.135)	(0.017)
Live in city	-0.036**	0.006**	0.030**	0.007	-0.005	-0.003	-0.043*	-0.004	-0.033	0.042**
	(0.018)	(0.003)	(0.015)	(0.022)	(0.014)	(0.008)	(0.023)	(0.024)	(0.172)	(0.021)
Retired	0.012	-0.002	-0.010	-0.018	0.011	0.006	-0.014	-0.032	-0.623***	-0.018
	(0.018)	(0.003)	(0.015)	(0.023)	(0.014)	(0.008)	(0.024)	(0.025)	(0.177)	(0.022)
Number of children	0.005	-0.001	-0.004	0.004	-0.003	-0.001	0.009*	-0.005	0.493***	0.064***
	(0.005)	(0.001)	(0.004)	(0.006)	(0.004)	(0.002)	(0.005)	(0.006)	(0.045)	(0.006)
Number of grandchildren over 16	0.005*	-0.001*	-0.004*	-0.003	0.002	0.001	0.001	0.007**	0.038	-0.008***
	(0.003)	(0.000)	(0.002)	(0.003)	(0.002)	(0.001)	(0.003)	(0.003)	(0.025)	(0.003)
Number of grandchildren under 16	0.004	-0.001	-0.003	0.001	-0.001	-0.000	0.002	0.009**	0.094***	0.004
	(0.003)	(0.000)	(0.003)	(0.004)	(0.002)	(0.001)	(0.004)	(0.004)	(0.030)	(0.004)
Number of sibling	0.005	-0.001	-0.004	0.001	-0.001	-0.001	0.007	-0.003	0.091**	-0.002
	(0.004)	(0.001)	(0.004)	(0.005)	(0.003)	(0.002)	(0.005)	(0.005)	(0.042)	(0.005)
Parents can take care of themselves	0.040*	-0.006*	-0.034*	0.107***	-0.068***	-0.039***	0.050**	0.021	-0.341	0.025
	(0.022)	(0.003)	(0.018)	(0.028)	(0.018)	(0.010)	(0.025)	(0.026)	(0.211)	(0.025)
Enrolled in pension program	-0.059***	0.009***	0.050***	-0.029	0.018	0.011	-0.073***	-0.087***	-0.485***	-0.010
	(0.017)	(0.003)	(0.014)	(0.021)	(0.013)	(0.008)	(0.023)	(0.024)	(0.165)	(0.020)
Enrolled in health insurance	0.005	-0.001	-0.004	0.021	-0.013	-0.008	-0.005	-0.051***	0.195	-0.006
	(0.015)	(0.002)	(0.013)	(0.019)	(0.012)	(0.007)	(0.018)	(0.019)	(0.148)	(0.018)
Have social activities in the last mouth	-0.031***	0.005***	0.026***	-0.019*	0.012*	0.007*	-0.012	-0.027**	0.313***	-0.005
	(0.009)	(0.002)	(0.008)	(0.012)	(0.007)	(0.004)	(0.011)	(0.011)	(0.091)	(0.011)
Contact with non-coresident children monthly	0.005	-0.001	-0.004	-0.001	0.001	0.000	0.000	0.015	1.304***	-0.256***
	(0.010)	(0.002)	(0.008)	(0.012)	(0.008)	(0.004)	(0.012)	(0.012)	(0.095)	(0.010)
See non-coresident children monthly	-0.037***	0.006***	0.031***	-0.022*	0.014*	0.008*	-0.023*	-0.033***	0.011	-0.128***
	(0.010)	(0.002)	(0.008)	(0.012)	(0.008)	(0.005)	(0.012)	(0.012)	(0.097)	(0.012)
Saving (logarithm)	-0.007***	0.001***	0.006***	-0.004***	0.002***	0.001***	-0.007***	-0.010***	0.003	-0.003**
	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.010)	(0.001)
Loan (logarithm)	0.003*	-0.000*	-0.003*	0.007***	-0.005***	-0.003***	0.004*	0.005**	-0.013	0.001
	(0.002)	(0.000)	(0.002)	(0.002)	(0.001)	(0.001)	(0.002)	(0.002)	(0.018)	(0.002)
Own a house	0.000	-0.000	-0.000	0.011	-0.007	-0.004	-0.027*	-0.006	-0.174	0.121***
	(0.013)	(0.002)	(0.011)	(0.017)	(0.011)	(0.006)	(0.015)	(0.016)	(0.128)	(0.017)
Value of the houses (logarithm)	-0.013***	0.002***	0.011***	-0.012***	0.008***	0.004***	-0.012***	-0.017***	0.147***	0.030***
	(0.003)	(0.000)	(0.002)	(0.003)	(0.002)	(0.001)	(0.003)	(0.003)	(0.026)	(0.003)
Own land	0.009	-0.001	-0.008	0.019	-0.012	-0.007	0.013	0.005	0.274***	0.020
	(0.011)	(0.002)	(0.009)	(0.013)	(0.008)	(0.005)	(0.012)	(0.013)	(0.103)	(0.013)
Observations	7,045	7,045	7,045	7,045	7,045	7,045	7,045	6,392	7,045	7,045

Notes: 1. Robust standard errors are in parentheses; 2. *p<0.1 **p<0.05 ***p<0.01; 3. Model 1 and 2 are ordered logistic regressions reported with marginal effects, Model 3 and 4 are logistic regressions reported with marginal effects and Model 5 is OLS.

Table A6.3 Estimation for the number of grandchildren cared on quality of life: full sample.

Variables	Physical						Psychological		Financial	
	(1) Health			(2) Health change			(3) Body pains	(4) Depression	(5) *Ln* Support from children	(6) Living with children
	Bad	Fair	Good	Worse	About the same	Better				
Number of grandchildren cared	-0.016**	0.002**	0.013**	-0.005	0.003	0.002	-0.005	-0.020**	0.481***	0.071***
	(0.008)	(0.001)	(0.006)	(0.009)	(0.006)	(0.003)	(0.009)	(0.009)	(0.074)	(0.009)
Male	-0.039***	0.006***	0.033***	-0.021*	0.014*	0.008*	-0.140***	-0.126***	-0.669***	-0.037***
	(0.009)	(0.002)	(0.008)	(0.012)	(0.008)	(0.004)	(0.011)	(0.011)	(0.092)	(0.011)
Married	-0.003	0.000	0.003	0.011	-0.007	-0.004	-0.016	-0.073***	-0.155	-0.050***
	(0.011)	(0.002)	(0.009)	(0.014)	(0.009)	(0.005)	(0.013)	(0.013)	(0.108)	(0.013)
Age	0.027***	-0.004***	-0.023***	0.013**	-0.008**	-0.005**	0.024***	0.030***	0.470***	-0.045***
	(0.005)	(0.001)	(0.004)	(0.006)	(0.004)	(0.002)	(0.006)	(0.006)	(0.045)	(0.005)
Age squared	-0.000***	0.000***	0.000***	-0.000*	0.000*	0.000*	-0.000***	-0.000***	-0.003***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Live in village	0.017	-0.003	-0.014	0.027	-0.017	-0.010	0.045***	0.065***	0.185	-0.029*
	(0.014)	(0.002)	(0.012)	(0.017)	(0.011)	(0.006)	(0.017)	(0.018)	(0.135)	(0.017)
Live in city	-0.036**	0.006**	0.030**	0.007	-0.005	-0.003	-0.043*	-0.003	-0.037	0.041*
	(0.018)	(0.003)	(0.015)	(0.022)	(0.014)	(0.008)	(0.023)	(0.024)	(0.172)	(0.021)
Retired	0.012	-0.002	-0.010	-0.017	0.011	0.006	-0.014	-0.032	-0.602***	-0.015
	(0.018)	(0.003)	(0.015)	(0.023)	(0.014)	(0.008)	(0.024)	(0.025)	(0.178)	(0.022)
Number of children	0.005	-0.001	-0.004	0.004	-0.002	-0.001	0.009*	-0.004	0.483***	0.063***
	(0.005)	(0.001)	(0.004)	(0.006)	(0.004)	(0.002)	(0.005)	(0.006)	(0.045)	(0.006)
Number of grandchildren over 16	0.005*	-0.001*	-0.004*	-0.003	0.002	0.001	0.001	0.007**	0.037	-0.008***
	(0.003)	(0.000)	(0.002)	(0.003)	(0.002)	(0.001)	(0.003)	(0.003)	(0.025)	(0.003)
Number of grandchildren under 16	0.005	-0.001	-0.004	0.002	-0.001	-0.001	0.003	0.009**	0.103***	0.005
	(0.003)	(0.000)	(0.003)	(0.004)	(0.002)	(0.001)	(0.004)	(0.004)	(0.030)	(0.004)
Number of sibling	0.005	-0.001	-0.004	0.001	-0.001	-0.001	0.007	-0.003	0.090**	-0.003
	(0.004)	(0.001)	(0.004)	(0.005)	(0.003)	(0.002)	(0.005)	(0.005)	(0.042)	(0.005)
Parents can take care of themselves	0.040*	-0.006*	-0.034*	0.107***	-0.068***	-0.039***	0.050**	0.020	-0.336	0.025
	(0.022)	(0.003)	(0.018)	(0.028)	(0.018)	(0.010)	(0.025)	(0.026)	(0.212)	(0.025)
Enrolled in pension program	-0.059***	0.009***	0.050***	-0.030	0.019	0.011	-0.074***	-0.087***	-0.492***	-0.010
	(0.017)	(0.003)	(0.014)	(0.021)	(0.013)	(0.008)	(0.023)	(0.024)	(0.165)	(0.020)
Enrolled in health insurance	0.005	-0.001	-0.004	0.021	-0.013	-0.008	-0.005	-0.051***	0.194	-0.006
	(0.015)	(0.002)	(0.013)	(0.019)	(0.012)	(0.007)	(0.018)	(0.019)	(0.148)	(0.018)

Have social activities in the last mouth	-0.030*** (0.009)	0.005*** (0.002)	0.026*** (0.008)	-0.019 (0.012)	0.012 (0.007)	0.007 (0.004)	-0.012 (0.011)	-0.027** (0.011)	0.315*** (0.091)	-0.005 (0.011)
Contact with non-coresident children monthly	0.005 (0.010)	-0.001 (0.002)	-0.004 (0.008)	-0.001 (0.012)	0.001 (0.008)	0.000 (0.004)	0.000 (0.012)	0.015 (0.012)	1.301*** (0.096)	-0.256*** (0.010)
See non-coresident children monthly	-0.036*** (0.010)	0.006*** (0.002)	0.031*** (0.008)	-0.022* (0.012)	0.014* (0.008)	0.008* (0.005)	-0.022* (0.012)	-0.032*** (0.012)	0.002 (0.097)	-0.129*** (0.012)
Saving (logarithm)	-0.007*** (0.001)	0.001*** (0.000)	0.006*** (0.001)	-0.004*** (0.001)	0.002*** (0.001)	0.001*** (0.000)	-0.007*** (0.001)	-0.010*** (0.001)	0.003 (0.010)	-0.003** (0.001)
Loan (logarithm)	0.003* (0.002)	-0.000* (0.000)	-0.003* (0.002)	0.007*** (0.002)	-0.005*** (0.001)	-0.003*** (0.001)	0.004* (0.002)	0.005** (0.002)	-0.013 (0.018)	0.001 (0.002)
Own a house	0.000 (0.013)	-0.000 (0.002)	-0.000 (0.011)	0.011 (0.017)	-0.007 (0.011)	-0.004 (0.006)	-0.027* (0.015)	-0.007 (0.016)	-0.166 (0.128)	0.123*** (0.017)
Value of the houses (logarithm)	-0.013*** (0.003)	0.002*** (0.000)	0.011*** (0.002)	-0.012*** (0.003)	0.008*** (0.002)	0.004*** (0.001)	-0.012*** (0.003)	-0.016*** (0.003)	0.148*** (0.026)	0.030*** (0.003)
Own land	0.010 (0.011)	-0.001 (0.002)	-0.008 (0.009)	0.020 (0.013)	-0.012 (0.008)	-0.007 (0.005)	0.013 (0.012)	0.005 (0.013)	0.278*** (0.103)	0.020 (0.013)
Observations	7,045	7,045	7,045	7,045	7,045	7,045	7,045	6,392	7,045	7,045

Notes: 1. Robust standard errors are in parentheses; 2. *p<0.1 **p<0.05 ***p<0.01; 3. Model 1 and 2 are ordered logistic regressions reported with marginal effects, Model 3 and 4 are logistic regressions reported with marginal effects and Model 5 is OLS.

Table A6.4 Providing care, quality of life and satisfaction: Ordered logistic regressions with marginal effects, full sample.

Variables	Life satisfaction									
	(1)					(2)				
	Not at all satisfied	Not very satisfied	Somewhat satisfied	Very satisfied	Completely satisfied	Not at all satisfied	Not very satisfied	Somewhat satisfied	Very satisfied	Completely satisfied
Providing care for grandchildren (yes)	-0.005*** (0.001)	-0.012*** (0.004)	-0.026*** (0.008)	0.032*** (0.009)	0.011*** (0.003)	-0.004*** (0.001)	-0.012*** (0.004)	-0.023*** (0.007)	0.027*** (0.009)	0.011*** (0.004)
Health (poor)						0.005*** (0.002)	0.014*** (0.004)	0.027*** (0.008)	-0.033*** (0.010)	-0.013*** (0.004)
Health (good)						-0.015*** (0.002)	-0.041*** (0.004)	-0.080*** (0.008)	0.097*** (0.009)	0.039*** (0.004)
Health change (worse)						0.003* (0.001)	0.008* (0.004)	0.015* (0.008)	-0.018* (0.009)	-0.007* (0.004)
Health change (better)						0.007*** (0.001)	0.018*** (0.004)	0.036*** (0.007)	-0.043*** (0.009)	-0.017*** (0.004)

Body pains (yes)						-0.004*	-0.010*	-0.020*	0.024*	0.010*
						(0.002)	(0.006)	(0.011)	(0.013)	(0.005)
Depression						0.022***	0.061***	0.119***	-0.145***	-0.058***
						(0.002)	(0.005)	(0.008)	(0.009)	(0.004)
Supports from children (logarithm)						-0.000**	-0.001***	-0.002***	0.003***	0.001***
						(0.000)	(0.000)	(0.001)	(0.001)	(0.000)
live with children (yes)						-0.001	-0.003	-0.006	0.007	0.003
						(0.001)	(0.003)	(0.007)	(0.008)	(0.003)
Male	-0.001	-0.003	-0.007	0.009	0.003	0.002**	0.007**	0.013**	-0.016**	-0.006**
	(0.001)	(0.003)	(0.007)	(0.008)	(0.003)	(0.001)	(0.003)	(0.007)	(0.008)	(0.003)
Married	-0.005***	-0.015***	-0.031***	0.038***	0.014***	-0.005***	-0.013***	-0.025***	0.031***	0.012***
	(0.001)	(0.004)	(0.008)	(0.010)	(0.004)	(0.001)	(0.004)	(0.008)	(0.009)	(0.004)
Age	0.002***	0.006***	0.013***	-0.016***	-0.006***	0.001*	0.003*	0.006*	-0.007*	-0.003*
	(0.001)	(0.002)	(0.003)	(0.004)	(0.001)	(0.001)	(0.002)	(0.003)	(0.004)	(0.002)
Age squared	-0.000***	-0.000***	-0.000***	0.000***	0.000***	-0.000**	-0.000**	-0.000**	0.000**	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Live in village	0.003	0.008	0.016	-0.020	-0.007	0.001	0.002	0.003	-0.004	-0.001
	(0.002)	(0.005)	(0.010)	(0.012)	(0.004)	(0.002)	(0.005)	(0.009)	(0.011)	(0.005)
Live in city	0.001	0.003	0.007	-0.008	-0.003	0.002	0.006	0.011	-0.013	-0.005
	(0.002)	(0.006)	(0.013)	(0.015)	(0.006)	(0.002)	(0.006)	(0.012)	(0.014)	(0.006)
Retired	0.004	0.010	0.021	-0.025	-0.009	0.003	0.008	0.016	-0.020	-0.008
	(0.002)	(0.006)	(0.013)	(0.016)	(0.006)	(0.002)	(0.006)	(0.012)	(0.015)	(0.006)
Number of children	-0.000	-0.001	-0.002	0.003	0.001	-0.000	-0.001	-0.002	0.002	0.001
	(0.001)	(0.002)	(0.003)	(0.004)	(0.001)	(0.001)	(0.002)	(0.003)	(0.004)	(0.002)
Number of grandchildren over 16	-0.000	-0.000	-0.001	0.001	0.000	-0.000	-0.000	-0.001	0.001	0.000
	(0.000)	(0.001)	(0.002)	(0.002)	(0.001)	(0.000)	(0.001)	(0.002)	(0.002)	(0.001)
Number of grandchildren under 16	0.000	0.000	0.001	-0.001	-0.000	0.000	0.000	0.000	-0.000	-0.000
	(0.000)	(0.001)	(0.002)	(0.003)	(0.001)	(0.000)	(0.001)	(0.002)	(0.003)	(0.001)
Number of sibling	0.001	0.002	0.005*	-0.006*	-0.002	0.001*	0.003*	0.005*	-0.007*	-0.003*
	(0.001)	(0.001)	(0.003)	(0.004)	(0.001)	(0.001)	(0.002)	(0.003)	(0.004)	(0.001)
Parents can take care of themselves	-0.000	-0.000	-0.001	0.001	0.000	-0.003	-0.009	-0.018	0.022	0.009
	(0.003)	(0.008)	(0.016)	(0.019)	(0.007)	(0.003)	(0.008)	(0.015)	(0.018)	(0.007)
Enrolled in pension program	0.000	0.001	0.002	-0.003	-0.001	0.003	0.007	0.014	-0.016	-0.007
	(0.002)	(0.006)	(0.012)	(0.015)	(0.005)	(0.002)	(0.006)	(0.011)	(0.014)	(0.005)
Enrolled in health insurance	-0.003*	-0.009*	-0.020*	0.024*	0.009*	-0.003	-0.008	-0.015	0.018	0.007
	(0.002)	(0.005)	(0.011)	(0.014)	(0.005)	(0.002)	(0.006)	(0.011)	(0.013)	(0.005)
Have social activities in the last mouth	0.001	0.002	0.005	-0.006	-0.002	0.002*	0.006*	0.012*	-0.014*	-0.006*
	(0.001)	(0.003)	(0.007)	(0.008)	(0.003)	(0.001)	(0.003)	(0.006)	(0.008)	(0.003)
Contact with non-coresident	-0.001	-0.003	-0.006	0.008	0.003	-0.001	-0.004	-0.007	0.008	0.003

children monthly	(0.001)	(0.003)	(0.007)	(0.009)	(0.003)	(0.001)	(0.004)	(0.007)	(0.009)	(0.003)
See non-coresident	-0.002*	-0.006*	-0.014*	0.016*	0.006*	-0.000	-0.001	-0.002	0.003	0.001
children monthly	(0.001)	(0.003)	(0.007)	(0.009)	(0.003)	(0.001)	(0.004)	(0.007)	(0.008)	(0.003)
Saving (logarithm)	-0.000	-0.000	-0.001	0.001	0.000	0.000	0.001	0.001	-0.001	-0.000
	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)
Loan (logarithm)	0.000*	0.001*	0.002*	-0.003*	-0.001*	0.000	0.001	0.001	-0.001	-0.000
	(0.000)	(0.001)	(0.001)	(0.002)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
Own a house	0.000	0.001	0.001	-0.002	-0.001	-0.000	-0.000	-0.001	0.001	0.000
	(0.002)	(0.005)	(0.010)	(0.012)	(0.004)	(0.002)	(0.005)	(0.009)	(0.011)	(0.004)
Value of the houses	-0.002***	-0.005***	-0.011***	0.013***	0.005***	-0.001***	-0.003***	-0.005***	0.006***	0.002***
(logarithm)	(0.000)	(0.001)	(0.002)	(0.002)	(0.001)	(0.000)	(0.001)	(0.002)	(0.002)	(0.001)
Own land	-0.000	-0.001	-0.002	0.002	0.001	-0.001	-0.002	-0.004	0.005	0.002
	(0.001)	(0.004)	(0.008)	(0.009)	(0.003)	(0.001)	(0.004)	(0.007)	(0.009)	(0.004)
Observations	6,939	6,939	6,939	6,939	6,939	6,361	6,361	6,361	6,361	6,361

Notes: 1. Robust standard errors are in parentheses; 2. Significant level: *p<0.1 **p<0.05 ***p<0.01.

Table A6.5 Caring time, quality of life and satisfaction: Ordered logistic regressions with marginal effects, full sample.

Variables	Life satisfaction									
	(1)					(2)				
	Not at all satisfied	Not very satisfied	Somewhat satisfied	Very satisfied	Completely satisfied	Not at all satisfied	Not very satisfied	Somewhat satisfied	Very satisfied	Completely satisfied
Caring time (logarithm)	-0.001***	-0.002***	-0.003***	0.004***	0.001***	-0.001***	-0.001***	-0.003***	0.003***	0.001***
	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)
Health (poor)						0.005***	0.014***	0.028***	-0.034***	-0.013***
						(0.002)	(0.004)	(0.008)	(0.010)	(0.004)
Health (good)						-0.015***	-0.041***	-0.080***	0.097***	0.039***
						(0.002)	(0.004)	(0.008)	(0.009)	(0.004)
Health change (worse)						0.003*	0.008*	0.015*	-0.018*	-0.007*
						(0.001)	(0.004)	(0.008)	(0.009)	(0.004)
Health change (better)						0.007***	0.018***	0.036***	-0.043***	-0.017***
						(0.001)	(0.004)	(0.007)	(0.009)	(0.004)
Body pains (yes)						-0.004*	-0.010*	-0.020*	0.024*	0.010*
						(0.002)	(0.006)	(0.011)	(0.013)	(0.005)
Depression						0.022***	0.061***	0.119***	-0.145***	-0.058***
						(0.002)	(0.005)	(0.008)	(0.009)	(0.004)

Supports from children (logarithm)						-0.000**	-0.001***	-0.002***	0.003***	0.001***
						(0.000)	(0.000)	(0.001)	(0.001)	(0.000)
live with children (yes)						-0.001	-0.003	-0.006	0.007	0.003
						(0.001)	(0.003)	(0.007)	(0.008)	(0.003)
Male	-0.001	-0.003	-0.007	0.009	0.003	0.002*	0.007**	0.013**	-0.016**	-0.006**
	(0.001)	(0.003)	(0.007)	(0.008)	(0.003)	(0.001)	(0.003)	(0.007)	(0.008)	(0.003)
Married	-0.005***	-0.015***	-0.031***	0.038***	0.014***	-0.005***	-0.013***	-0.025***	0.030***	0.012***
	(0.001)	(0.004)	(0.008)	(0.010)	(0.004)	(0.001)	(0.004)	(0.008)	(0.009)	(0.004)
Age	0.002***	0.006***	0.013***	-0.015***	-0.006***	0.001*	0.003*	0.006*	-0.007*	-0.003*
	(0.001)	(0.002)	(0.003)	(0.004)	(0.001)	(0.001)	(0.002)	(0.003)	(0.004)	(0.002)
Age squared	-0.000***	-0.000***	-0.000***	0.000***	0.000***	-0.000**	-0.000**	-0.000**	0.000**	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Live in village	0.003	0.008	0.016	-0.020	-0.007	0.001	0.002	0.003	-0.004	-0.001
	(0.002)	(0.005)	(0.010)	(0.012)	(0.004)	(0.002)	(0.005)	(0.009)	(0.011)	(0.005)
Live in city	0.001	0.003	0.007	-0.008	-0.003	0.002	0.006	0.011	-0.013	-0.005
	(0.002)	(0.006)	(0.013)	(0.015)	(0.006)	(0.002)	(0.006)	(0.012)	(0.014)	(0.006)
Retired	0.004	0.010	0.021	-0.025	-0.009	0.003	0.008	0.016	-0.020	-0.008
	(0.002)	(0.006)	(0.013)	(0.016)	(0.006)	(0.002)	(0.006)	(0.012)	(0.015)	(0.006)
Number of children	-0.000	-0.001	-0.002	0.003	0.001	-0.000	-0.001	-0.002	0.002	0.001
	(0.001)	(0.002)	(0.003)	(0.004)	(0.001)	(0.001)	(0.002)	(0.003)	(0.004)	(0.002)
Number of grandchildren over 16	-0.000	-0.000	-0.001	0.001	0.000	-0.000	-0.000	-0.001	0.001	0.000
	(0.000)	(0.001)	(0.002)	(0.002)	(0.001)	(0.000)	(0.001)	(0.002)	(0.002)	(0.001)
Number of grandchildren under 16	0.000	0.000	0.001	-0.001	-0.000	0.000	0.000	0.000	-0.000	-0.000
	(0.000)	(0.001)	(0.002)	(0.003)	(0.001)	(0.000)	(0.001)	(0.002)	(0.003)	(0.001)
Number of sibling	0.001	0.002*	0.005*	-0.006*	-0.002*	0.001*	0.003*	0.005*	-0.007*	-0.003*
	(0.001)	(0.001)	(0.003)	(0.004)	(0.001)	(0.001)	(0.002)	(0.003)	(0.004)	(0.001)
Parents can take care of themselves	-0.000	-0.000	-0.001	0.001	0.000	-0.003	-0.010	-0.018	0.022	0.009
	(0.003)	(0.008)	(0.016)	(0.019)	(0.007)	(0.003)	(0.008)	(0.015)	(0.018)	(0.007)
Enrolled in pension program	0.000	0.001	0.002	-0.003	-0.001	0.003	0.007	0.014	-0.017	-0.007
	(0.002)	(0.006)	(0.012)	(0.015)	(0.005)	(0.002)	(0.006)	(0.011)	(0.014)	(0.005)
Enrolled in health insuranc	-0.003*	-0.009*	-0.020*	0.024*	0.009*	-0.003	-0.008	-0.015	0.018	0.007
	(0.002)	(0.005)	(0.011)	(0.014)	(0.005)	(0.002)	(0.006)	(0.011)	(0.013)	(0.005)
Have social activities in the last mouth	0.001	0.002	0.005	-0.006	-0.002	0.002*	0.006*	0.012*	-0.014*	-0.006*
	(0.001)	(0.003)	(0.007)	(0.008)	(0.003)	(0.001)	(0.003)	(0.006)	(0.008)	(0.003)
Contact with non-coresident children monthly	-0.001	-0.003	-0.006	0.008	0.003	-0.001	-0.004	-0.007	0.009	0.003
	(0.001)	(0.003)	(0.007)	(0.009)	(0.003)	(0.001)	(0.004)	(0.007)	(0.009)	(0.003)
See non-coresident children monthly	-0.002*	-0.007*	-0.014*	0.017*	0.006*	-0.001	-0.001	-0.003	0.003	0.001
	(0.001)	(0.003)	(0.007)	(0.009)	(0.003)	(0.001)	(0.004)	(0.007)	(0.008)	(0.003)
Saving (logarithm)	-0.000	-0.000	-0.001	0.001	0.000	0.000	0.001	0.001	-0.001	-0.000

	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)
Loan (logarithm)	0.000*	0.001*	0.002*	-0.003*	-0.001*	0.000	0.001	0.001	-0.001	-0.000
	(0.000)	(0.001)	(0.001)	(0.002)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
Own a house	0.000	0.001	0.001	-0.002	-0.001	-0.000	-0.000	-0.001	0.001	0.000
	(0.002)	(0.005)	(0.010)	(0.012)	(0.004)	(0.002)	(0.005)	(0.009)	(0.011)	(0.004)
Value of the houses	-0.002***	-0.005***	-0.011***	0.013***	0.005***	-0.001***	-0.003***	-0.005***	0.006***	0.002***
(logarithm)	(0.000)	(0.001)	(0.002)	(0.002)	(0.001)	(0.000)	(0.001)	(0.002)	(0.002)	(0.001)
Own land	-0.000	-0.001	-0.002	0.002	0.001	-0.001	-0.002	-0.005	0.006	0.002
	(0.001)	(0.004)	(0.008)	(0.009)	(0.003)	(0.001)	(0.004)	(0.007)	(0.009)	(0.004)
Observations	6,939	6,939	6,939	6,939	6,939	6,361	6,361	6,361	6,361	6,361

Notes: 1. Robust standard errors are in parentheses; 2. Significant level: *p<0.1 **p<0.05 ***p<0.01

Table A6.6 Number of grandchildren cared, quality of life and satisfaction: Ordered logistic regressions with marginal effects, full sample.

Variables	Life satisfaction									
	(1)					(2)				
	Not at all satisfied	Not very satisfied	Somewhat satisfied	Very satisfied	Completely satisfied	Not at all satisfied	Not very satisfied	Somewhat satisfied	Very satisfied	Completely satisfied
Number of grandchildren cared	-0.005***	-0.015***	-0.031***	0.037***	0.013***	-0.005***	-0.014***	-0.027***	0.032***	0.013***
	(0.002)	(0.004)	(0.009)	(0.011)	(0.004)	(0.002)	(0.004)	(0.008)	(0.010)	(0.004)
Squared number of grandchildren cared	0.001**	0.003**	0.006**	-0.008**	-0.003**	0.001*	0.003*	0.005*	-0.006*	-0.003*
	(0.001)	(0.001)	(0.003)	(0.004)	(0.001)	(0.001)	(0.001)	(0.003)	(0.003)	(0.001)
Health (poor)						0.005***	0.014***	0.027***	-0.033***	-0.013***
						(0.002)	(0.004)	(0.008)	(0.010)	(0.004)
Health (good)						-0.015***	-0.041***	-0.080***	0.097***	0.039***
						(0.002)	(0.004)	(0.008)	(0.009)	(0.004)
Health change (worse)						0.003*	0.008*	0.015*	-0.018*	-0.007*
						(0.001)	(0.004)	(0.008)	(0.009)	(0.004)
Health change (better)						0.007***	0.019***	0.036***	-0.044***	-0.017***
						(0.001)	(0.004)	(0.007)	(0.009)	(0.004)
Body pains (yes)						-0.004*	-0.010*	-0.020*	0.024*	0.009*
						(0.002)	(0.006)	(0.011)	(0.013)	(0.005)
Depression						0.022***	0.061***	0.119***	-0.145***	-0.058***
						(0.002)	(0.005)	(0.008)	(0.009)	(0.004)
Supports from children (logarithm)						-0.000**	-0.001***	-0.002***	0.003***	0.001***
						(0.000)	(0.000)	(0.001)	(0.001)	(0.000)

live with children (yes)						-0.001	-0.003	-0.006	0.007	0.003
						(0.001)	(0.003)	(0.007)	(0.008)	(0.003)
Male	-0.001	-0.003	-0.007	0.008	0.003	0.002**	0.007**	0.013**	-0.016**	-0.006**
	(0.001)	(0.003)	(0.007)	(0.008)	(0.003)	(0.001)	(0.003)	(0.007)	(0.008)	(0.003)
Married	-0.005***	-0.015***	-0.031***	0.038***	0.014***	-0.005***	-0.013***	-0.025***	0.030***	0.012***
	(0.001)	(0.004)	(0.008)	(0.010)	(0.004)	(0.001)	(0.004)	(0.008)	(0.009)	(0.004)
Age	0.002***	0.006***	0.013***	-0.016***	-0.006***	0.001*	0.003*	0.006*	-0.007*	-0.003*
	(0.001)	(0.002)	(0.003)	(0.004)	(0.001)	(0.001)	(0.002)	(0.003)	(0.004)	(0.002)
Age squared	-0.000***	-0.000***	-0.000***	0.000***	0.000***	-0.000**	-0.000**	-0.000**	0.000**	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Live in village	0.003	0.008	0.016	-0.020	-0.007	0.001	0.002	0.003	-0.004	-0.002
	(0.002)	(0.005)	(0.010)	(0.012)	(0.004)	(0.002)	(0.005)	(0.009)	(0.011)	(0.005)
Live in city	0.001	0.003	0.007	-0.008	-0.003	0.002	0.005	0.011	-0.013	-0.005
	(0.002)	(0.006)	(0.013)	(0.015)	(0.006)	(0.002)	(0.006)	(0.012)	(0.014)	(0.006)
Retired	0.003	0.010	0.020	-0.025	-0.009	0.003	0.008	0.016	-0.020	-0.008
	(0.002)	(0.006)	(0.013)	(0.016)	(0.006)	(0.002)	(0.006)	(0.012)	(0.015)	(0.006)
Number of children	-0.000	-0.001	-0.002	0.003	0.001	-0.000	-0.001	-0.002	0.002	0.001
	(0.001)	(0.002)	(0.003)	(0.004)	(0.001)	(0.001)	(0.002)	(0.003)	(0.004)	(0.002)
Number of grandchildren over 16	-0.000	-0.000	-0.001	0.001	0.000	-0.000	-0.001	-0.001	0.001	0.001
	(0.000)	(0.001)	(0.002)	(0.002)	(0.001)	(0.000)	(0.001)	(0.002)	(0.002)	(0.001)
Number of grandchildren under 16	0.000	0.001	0.001	-0.001	-0.000	0.000	0.000	0.000	-0.000	-0.000
	(0.000)	(0.001)	(0.002)	(0.003)	(0.001)	(0.000)	(0.001)	(0.002)	(0.003)	(0.001)
Number of sibling	0.001	0.002*	0.005*	-0.006*	-0.002*	0.001*	0.003*	0.005*	-0.007*	-0.003*
	(0.001)	(0.001)	(0.003)	(0.004)	(0.001)	(0.001)	(0.002)	(0.003)	(0.004)	(0.001)
Parents can take care of themselves	-0.000	-0.000	-0.000	0.000	0.000	-0.003	-0.009	-0.018	0.022	0.009
	(0.003)	(0.008)	(0.016)	(0.019)	(0.007)	(0.003)	(0.008)	(0.015)	(0.018)	(0.007)
Enrolled in pension program	0.000	0.001	0.002	-0.002	-0.001	0.003	0.007	0.013	-0.016	-0.006
	(0.002)	(0.006)	(0.012)	(0.015)	(0.005)	(0.002)	(0.006)	(0.011)	(0.014)	(0.005)
Enrolled in health insurance	-0.003*	-0.009*	-0.020*	0.024*	0.009*	-0.003	-0.008	-0.015	0.018	0.007
	(0.002)	(0.005)	(0.011)	(0.014)	(0.005)	(0.002)	(0.006)	(0.011)	(0.013)	(0.005)
Have social activities in the last mouth	0.001	0.002	0.005	-0.006	-0.002	0.002*	0.006*	0.012*	-0.014*	-0.006*
	(0.001)	(0.003)	(0.007)	(0.008)	(0.003)	(0.001)	(0.003)	(0.006)	(0.008)	(0.003)
Contact with non-coresident children monthly	-0.001	-0.003	-0.006	0.008	0.003	-0.001	-0.004	-0.007	0.009	0.003
	(0.001)	(0.003)	(0.007)	(0.009)	(0.003)	(0.001)	(0.004)	(0.007)	(0.009)	(0.003)
See non-coresident children monthly	-0.002*	-0.006*	-0.013*	0.016*	0.006*	-0.000	-0.001	-0.002	0.003	0.001
	(0.001)	(0.003)	(0.007)	(0.009)	(0.003)	(0.001)	(0.004)	(0.007)	(0.008)	(0.003)
Saving (logarithm)	-0.000	-0.000	-0.001	0.001	0.000	0.000	0.001	0.001	-0.001	-0.000
	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)
Loan (logarithm)	0.000*	0.001*	0.002*	-0.003*	-0.001*	0.000	0.001	0.001	-0.001	-0.000

	(0.000)	(0.001)	(0.001)	(0.002)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
Own a house	0.000	0.000	0.001	-0.001	-0.000	-0.000	-0.001	-0.001	0.001	0.001
	(0.002)	(0.005)	(0.010)	(0.012)	(0.004)	(0.002)	(0.005)	(0.009)	(0.011)	(0.004)
Value of the houses	-0.002***	-0.005***	-0.011***	0.013***	0.005***	-0.001***	-0.003***	-0.005***	0.006***	0.002***
(logarithm)	(0.000)	(0.001)	(0.002)	(0.002)	(0.001)	(0.000)	(0.001)	(0.002)	(0.002)	(0.001)
Own land	-0.000	-0.001	-0.002	0.002	0.001	-0.001	-0.002	-0.005	0.006	0.002
	(0.001)	(0.004)	(0.008)	(0.009)	(0.003)	(0.001)	(0.004)	(0.007)	(0.009)	(0.004)
Observations	6,939	6,939	6,939	6,939	6,939	6,361	6,361	6,361	6,361	6,361

Notes: 1. Robust standard errors are in parentheses; 2. Significant level: *p<0.1 **p<0.05 ***p<0.01

Chapter 7
Conclusions

After the economic reform in 1978, China has achieved great success in economic development and become the 2nd largest economy in the world. Inward FDI has contributed extensively to the rapid development of economic development in China for several reasons. For example, the entry of foreign capital has caused know-how spillovers and promoted the productivity of domestic markets. Also, the multinational enterprises can offer more job opportunities to the labour market. However, the allocation of the FDI differs hugely with the largest potion in the coastal regions and the least in the western regions. As a number of regions were colonized by different countries in the Chinese modern history, the long lasting institutional effect (as suggested by Acemoglu et al., 2001; Becker et al., 2016) can lead to different attitudes and trust towards the foreign capital (Che et al, 2015), which can lead to different impact of FDI on the labour market. Also, it has long been argued that the FDI and the uneven regional distribution of FDI aggravate inequality in China. Inward FDI, therefore, has remained an important issue to study. Indeed, not only the inward FDI but also the outward FDI concerns the Chinese economy since after the going out policy, the Belt Road Initiative encourages more Chinese outward investment. Admittedly, both inward and outward FDI are two important external factors for the Chinese economy. China also faces several internal challenges such as lagging rural development and aging population. Aiming at study these issues, this thesis consists of three research articles on inward FDI and its impact on employment in labour market and rural urban inequality after several decades of economic reform and the determinant of outward FDI under the Belt Road Initiative. In further two articles, we investigate the rural labour transfer and older people's life quality and life satisfaction.

In Chapter 2 we investigate the inward FDI and the labour market in China from a historical perspective. As different colonial powers may have left behind different types of institutions, we separate two colonial legacies due to different colonial purposes, the western colonization with the intention to trade with China and the Japanese colonization with the intention of territorial expansion. Accordingly, we then construct two types of colonization indices and show that the different legacies of

colonization shape the impact of FDI on employment differently. We find that the influence of western colonization strengthens the positive relationship between inward FDI and employment while that of Japanese colonization weakens and even overturns such effect. We attempt to compare service sector and manufacturing sector in the first place yet the research suffers from severe missing data issue in manufacturing sector. As such, we turn to a comparison between the service sector and the whole economy. Based on the comparison, the development of service sector is still in a preliminary stage from our results. First, the impact of FDI on employment in service sector is less than that for the whole economy. Second, the effect of human capital is insignificant, indicating that it is not in a deep demand compared to the whole economy where the effect of human capital is statistically significant.

In Chapter 3, we then turn to investigate whether inward FDI in China has impacts on the inequality as argued in the literature from the angle of rural-urban wage inequality. Based on a provincial level panel data set from 2000 to 2016, we show that different types of inward FDI in terms of ownerships (CJV, EJV, WFOE) and sectors (primary FDI, secondary FDI and Tertiary FDI) have had different influences on the income inequality measured by the rural urban disparity in the host regions and adjacent regions by adopting the Spatial Durbin Model (SDM). From the findings we mainly argue that the inward FDI should not be blamed for the aggravation of rural urban wage inequality in China. Moreover, we detect a negative (favourable) inward FDI-inequality relationship if the inward FDI flows into primary sector. Yet, the primary sector has the least portion of the aggregate inward FDI.

In Chapter 4 we explore CI as a determinant of Chinese outward FDI under the Belt Road Initiative by comparing 75 non Belt Road countries and 66 Belt Road countries. We also compare the effect of establishment of Confucius Institutes in the Chinese outward FDI in host countries before and after the Chinese recent well-known global strategy, Belt-Road Initiative initiated. The results show that the establishment of Confucius Institute has had a positive effect on Chinese firms' cross-border mergers and acquisitions in non-Belt Road countries rather than Belt Road countries. However, the positive effect of CI has been strengthened after the Belt-Road initiative in Belt Road countries.

In Chapter 5, we use a city level survey from Professor Luo's team covering 9 cities in eastern, central and western China and show that several types of capital, namely, human capital, financial capital, natural capital, social capital and political capital, are major or minor driving forces to release the rural potential labour into the labour market. We name this as the on-farm transition so as to make it consistent with the term in the literature, off-farm transition.

In chapter 6, we study how grandparenting affects the life quality and life satisfaction of older people on the basis of CHARLS data set in 2015 covering 7045 household observations. The results show that when grandparents look after their grandchildren, they are 2.9% less likely to report symptoms of depression, the amount of support that they receive from their children approximately doubles, and are 2.7% (1.1%) more likely to report being very satisfied (completely satisfied). In short, grandparenting has a positive effect on grandparents' life quality in terms of better mental health and more financial support and life satisfaction. The favourable effect on life satisfaction on is shown to be direct rather than through a better life quality induced by grandchild caregiving.

Future research can explore extensively in the following aspects. Firstly, studies may focus on clarifing the specific channels that the different institutions and can affect both the inward FDI and outward FDI and the labour market in different sectors by using microdata sets when they are available. Second, further research should both theoretically and empirically to answer whether Chinese government should reallocate the inward FDI into less developed regions such as Central and west China to boost the economic growth or to reallocate the labour force in these regions by entirely cancelling the *Hukou* restriction so as to lower the rural urban income inequality. Third, how member countries benefit from Belt Road Initiative should have drawn more attentions by examining not only the FDI in one direction but also the bilateral FDI and trade. More importantly, through what channels the Belt Road Initiative brings sizable benefits to the world economy needs to be addressed.

References

Acemoglu, D., Johnson, S., & Robinson, J. A. (2001). The colonial origins of comparative development: an empirical investigation. *American Economic Review*, *91*(5), 1369-1401.

Acemoglu, D., Johnson, S., & Robinson, J. A. (2005). Institutions as a fundamental cause of long-run growth*. Handbook of economic growth*, *1*(05), 385-472.

Aghion, P., & P. Howitt (1998), Endogenous Growth Theory (Cambridge, MA: MIT Press).

Ahern, K. R., Daminelli, D., & Fracassi, C. (2015). Lost in translation? The effect of cultural values on mergers around the world. *Journal of Financial Economics*, *117*,165-189.

Ahiabor, F.S., James, G. A. Kwabi, F. O., & Siems, M.M. (2018). Shareholder protection, stock markets and cross-border mergers. *Economics Letters*, *171*, 54-57.

Ahn, T. (2010). Attitudes toward risk and self-employment of young workers. *Labour Economics*, *17*(2), 434-442

Ahn. T., & Choi, K. D. (2019). Grandparent caregiving and cognitive functioning among older people: evidence from Korea. *Review of Economics of Household*, *17*(2), 553-586.

Akhtaruzzaman, M., Berg, N., & Lien, D. (2017). Confucius Institutes and FDI flows from China to Africa. *China Economic Review*, *44*, 241-252.

Alimove, A., & Officer, M. S. (2017). Intellectual property rights and cross-border mergers and acquisitions. *Journal of Corporate Finance*, *45*, 360-377.

Anderson J.E. (1979). A Theoretical Foundation for the Gravity Equation. *American Economic Review*, *69*(1), 106-116.

Anselin, L., & Bera, A.K. (1998). Spatial Dependence in linear Regression Models with an Introduction to Spatial Econometrics. A. Ullah and D. E. A. Giles (eds.). Handbook of Applied Economic Statistics.

Anselin, L., Bera, A.K., Florax, R., & Yoon, M.J. (1996). Simple diagnostic tests for spatial dependence. *Regional Science and Urban Economics*, *26*(1), 77-104.

Anwar, S., & Sun, S. (2014). Heterogeneity and curvilinearity of FDI-related productivity spillovers in China's manufacturing sector. *Economic Modelling*, *41*, 23-32.

Appleton, S., & Song, L. (2008). Life Satisfaction in Urban China: Components and Determinants. *World Development*, *36*(11), 2325-2340.

Aprino, B., & Bordone, V., (2014). Does grandparenting pay off? The effect of child care on grandparents' cognitive functioning. *Journal of Marriage and Family*, *76*(2), 337–351.

Asteriou, D., Dimelis, S., & Moudatsou, A. (2014). Globalization and income inequality: A panel data econometric approach for the EU27 countries. *Economic Modelling*, *36*, 592-599.

Auer, R. A. (2015). Human capital and the dynamic effects of trade. *Journal of Development Economics, 117*, 107-118.

Baker, S. R., Bloom, N., & Davis, S. J. (2016). Measuring Economic Policy Uncertainty. *The Quarterly Journal of Economics, 131*(4), 1593–1636.

Baltagi, B.H. (2012). *Econometric analysis of panel data.* Chichester: John Wiley & Sons.

Barrell, R., & Pain, N. (1997). The growth of foreign direct investment in Europe. *National Institute Economic Review*, 160(1), 63-75.

Basu, P., & Guariglia, A. (2007). Foreign Direct Investment, inequality and growth. *Journal of Macroeconomics*, *29*(4), 824-839.

Becker, S. O., Boeckh, K., Hainz, C., & Woessmann, L. (2015). The empire is dead, long live the empire! Long-run persistence of trust and corruption in the bureaucracy. *Economic Journal*, 126(590), 40-74.

Benjamin, D. Brandt, L., & Giles, J. (2005). The evolution of income inequality in rural China. *Economic Development and Cultural Change*, *53*(4), 769-824.

Best, R. (2017). Switching towards coal or renewable energy? The effects of financial capital on energy transitions, *Energy Economics*, *63*, 75-83.

Beugelsdijk, S., & Frijns, B. (2010). A cultural explanation of the foreign bias in international asset Allocation. *Journal of Banking & Finance*, *34*, 2121-2131.

Beugelsdijk, S., Slangen, A., Masland, R., & Onrust, M. (2014). The impact of home–host cultural distance on foreign affiliate sales: The moderating role of cultural variation within host countries. *Journal of Business Research*, *67*, 1638-1646.

Bhandari, P. B. (2013). 'Rural livelihood change? Household capital, community resources and livelihood transition', *Journal of Rural Studies*, *32*, 126-136.

Blundell, R., & Bond, S. (1991). Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics*, *87*(1), 115-143.

Blustein, J., Chan, S., & Guanais, F. C., (2004). Elevated depressive symptoms among caregiving grandparents. *Health Services Research*, *39*(1), 1671–1690.

Bonaime, A., Gulen, H., & Ion, M. (2018). Does policy uncertainty affect mergers and acquisitions? *Journal of Financial Economic, 129*, 531-558.

Bosick, S. J., & Fomby, P., 2018. Family Instability in Childhood and Criminal Offending During the Transition into Adulthood. *American Behavioral Scientist*, *62*(11), 1483-1504.

Breen, R., Karlson, K. B., & Holm, A., (2013). Total, Direct, and Indirect Effects in Logit and Probit Models. *Sociological Methods and Research*, *42*(2), 164-191.

Brown, S.L., Brown, R.M., & Preston, S.D., (2011). The human caregiving system: a neuroscience model of compassionate motivation and behavior. In: Brown, S.L., Brown, R.M., Penner, L.A. (Eds.), Moving beyond Self-interest: Perspectives from Evolutionary Biology, Neuroscience, and the Social Sciences. Oxford University Press, New York, pp.75-88.

Brown, C. J., (2006). Foreign direct investment and small firm employment in northern Mexico: 1987-1996. *Entrepreneurship and Regional Development*, 14(2), 175-191.

Bryant, P. C., & Allen, D.G. (2009). Emerging organizations' characteristics as predictors of human capital employment mode: a theoretical perspective. *Human Resource Management Review*, 19(4), 347-355.

Cai, F., & Wang, M. (2010). Growth and structural changes in employment in transition China. *Journal of Comparative Economics*, 38(1), 71-81.

Cai, F., Giles, J., O'Keefe, P., Wang, D., (2012). The elderly and old age support in rural China: challenges and prospects*. Washington, DC: World Bank, Directions in Development*.

Campos, B.C., Ren, Y., & Petrick, M. (2016). The impact of education on income inequality between ethnic minorities and Han. *China Economic Review*, *41*, 253-267.

Cassidy, J.F., & Andreosso-O'Callaghan, B. (2006). Spatial determinants of Japanese FDI in China. *Japan and the World Economy*, *18*(4), 512-527.

Chamber, R. (2006). Vulnerability, Coping and Policy. *Institute of Development Studies*, *37*(4), 33-40.

Chan, K. W. and Zhang Li. (1999). 'The Hukou System and Rural-Urban Migration in China: Processes and Changes', *The China Quarterly*, *160*, 818-855.

Chan, W.K., & Buckingham, W. (2008). Is China abolishing the hukou system? *China Quarterly*, *196*, 582-606.

Chaudhuri, S., & Banerjee, D. (2010). FDI in agricultural land, welfare and unemployment in a developing economy. *Research in Economics*, *64*(4), 2010.

Che, Y., Du, J. L., Lu, Y., & Tao, Z.G. (2015). Once an enemy, forever an enemy? The long run impact of the Japanese invasion of China from 1937 to 1945 on trade and investment. *Journal of International Economics*, *96*, 182-198.

Chen, F., & Liu, G., (2012). The Health Implications of Grandparents Caring for Grandchildren in China. *Journals of Gerontology*, *Series B: Psychological Sciences and Social Sciences*, *67*(1), 99–112.

Chen, F., Liu, G., & Mair, C. A., (2011). Intergenerational Ties in Context: Grandparents Caring for Grandchildren in China. *Social Forces*, *90*(2), 571-594.

Chen, J., Chen, J., Miao, Y., Song, M., & Fan, Y. (2016). Unbalanced development of inter-provincial high-grade highway in China: Decomposing the Gini coefficient. *Transport Research Part D*, *48*, 499-510.

Chen, K. M. (2013). The effect of language on economic behavior: evidence from savings rates, health behaviors, and retirement assets. *American Economic Review*. *103*(2), 690–731.

Chen, T., Kung, J.K., & Ma, C. (2017). Long Live Keju! The Persistent Effects of China's Imperial Examination System. Chinese University of Hong Kong, mimeo.

Chen, Z., Ge, Y., & Lai, H. (2011). Foreign Direct Investment and Wage Inequality: Evidence from China. *World Development*, *39*(8), 1322-1332.

Cheng, L. K. (2016). Three questions on China's "Belt and Road Initiative". *China Economic Review*, 40, 309-313.

Cheng, L.K., & Kwan, Y.K. (2000). What are the determinants of the location of foreign direct investment? The Chinese experience. *Journal of International Economics*, *51*(2), 379-400.

Cheung, K., & Lin, P. (2004). Spillover effects of FDI on innovation in China: Evidence from the provincial data. *China Economic Review*, *15*(1), 25-44.

Cheung, Y., & Qian, X. (2009). Empirics of China's outward direct investment. *Pacific Economic Review*, 14(3), 312-341.

Choi, C. (2006). Does foreign direct investment affect domestic income inequality? *Applied Economics Letters*, *13*, 811-814.

Chowdhury, R. H., & Maung, M. (2018) Historical ties between nations: How do they matter in cross border mergers and acquisitions? *International Review of Economics & Finance*, *58*, 30-48.

Chyi, H., & Mao, S. (2012). The Determinants of Happiness of China's Elderly Population. *Journal of Happiness Studies*, *13*, 167-185.

Coall, D. A. & Hertwig, R., 2010. Grandparental investment: Past, present, and future. *Behavioral and Brain Sciences*, *33*, 1–59.

Cong, Z., Silverstein, M., 2008. Intergenerational Time-for-\money Exchanges in Rural China: Does Reciprocity Reduce Depressive Symptoms of Older Grandparents? *Research in Human Development*, *5*(1), 6-25.

Cong, Z., Silverstein, M., 2011. Intergenerational exchange between parents and migrant and nonmigrant sons in rural China. *Journal of Marriage and Family*, *73*(1), 93–104.

Conti, M., & Sulis, G. (2016). Human capital, employment protection and growth in Europe. *Journal of Comparative Economics*, *44*(2), 213-230.

Couclelis, H. (1996). The Death of Distance. *Environment and Planning B: Planning and Design*, *23*, 387-389.

Crinò, R. (2009). Offshoring, multinationals and labor market: a review of the empirical literature. *Journal of Economic Surveys*, *23*(2), 197-249.

Cuervo-Cazurra, A. (2011). Global strategy and global business environment: The direct and indirect influences of the home country on a firm's global strategy. *Global Strategy Journal*, *1*(3–4), 382–386.

Cuervo-Cazurra, A., Luo, Y., Ramamurti, R., & Ang, S. H. (2018). The Impact of the home country on internationalization. *Journal of World Business*, *53*, 593-604.

Danielsbacka, M., Tanskanen, A.O., Coall, D., Jokela, M., 2019. Grandparental childcare, health and well-being in Europe: A within-individual investigation of longitudinal data. *Social Science & Medicine*, *230*, 194–203.

Das, M., & N'Diaye, P. (2013). Chronicle of a Decline Foretold: Has China Reached the Lewis Turning Point?" IMF Working Paper WP/13/26.

de Brauw, A., & Rozelle, S. (2008). Reconciling the Returns to Education in Off-Farm Wage Employment in Rural China. *Review of Development Economics*, *12*(1), 57-71.

Dekle, R., & Vandenbroucke, G. (2012). A quantitative analysis of China's structural transformation. *Journal of Economic Dynamics & Control*, *88*, 119-135.

Di Gessa, G., Glaser, K., Tinker, A. (2016a). The health impact of intensive and nonintensive grandchild care in Europe: New evidence from SHARE. *Journals of Gerontology*, *Series B*: *Psychological Sciences and Social Sciences*, *71*(5), 867-879.

Di Gessa, G., Glaser, K., & Tinker, A. (2016b). The impact of caring for grandchildren on the health of grandparents in Europe: A life course approach. *Social Science and Medicine*, 152, 166-175.

Dillon, M. (2010). *China: A Modern History*. I.B. Tauris & Co Ltd.

Doytch, N. (2015). Sectoral FDI cycles in South and East Asia. *Journal of Asian Economics*, *36*, 24-33.

Doytch, N., & Uctum, M. (2011). Does the worldwide shift of FDI from manufacturing to services accelerate economic growth? A GMM estimation study. *Journal of International Money and Finance*, *30*(3), 410-427.

Dreher, A., & Gatson, N. (2008). Has Globalization Increased Inequality? *Review of International Economics*, *16*(3), 526-536.

Driffield, N. (1996). *Global competition and the labour market.* Reading, Harwood.

Driffield, N., & Taylor, K. (2000). FDI and the labor market: a review of the evidence and policy implications. *Oxford Review of Economic Policy*, *16*(3), 90-103.

Du, J., & Zhang, Y. (2018). Does One Belt One Road initiative promote Chinese overseas direct investment? *China Economic Review*, 47, 189-205.

Du, J., Lu, Y., & Tao, Z. (2012). Institutions and FDI location choice: The role of cultural distances. *Journal of Asian Economics, 23*, 210-230.

Du, Y., Park, A., & Wang, S. (2005). Migration and rural poverty in China. Journal of Comparative Economics, *33*(4), 688-709.

Eckel, C.C., & Grossman, P.J. (2008). Men, women and risk aversion: Experimental evidence. *Handbook of experimental economics results*, *1*, 1061-1073.

Elhorst, J.P. (2014). Spatial econometrics: From Cross-sectional data to spatial panels. *Springer Briefs in Regional Science*.

Ellis, F. (1998). ‘Survey Article: Household Strategies and Rural Livelihood Diversification’. *Journal of Development Studies*, *35*(1), 1-38.

Ellis, F. (2000). ‘The determinants of rural livelihood diversification in developing countries’. *Journal of Agricultural Economics*, *51*, 289–302.

Erel, I., Liao, R.C., & Weisbach, M.S. (2012). Determinants of Cross-Border Mergers and Acquisitions. *The Journal of Finance, 67*(3), 1045-1082.

Feenstra, R.C., & Hanson, G.H. (1997). Foreign direct investment and relative wages: evidence from Mexico’s maquiladoras. *Journal of International Economics*, *42*(3), 371-393.

Feito-Ruiz, I., & Menéndez-Requejo, S. (2011). Cross-border Mergers and Acquisitions in different legal Environments. *International Review of Law and Economics*, 31,169-187.

Fellner, G. and Maciejovsky, B. (2007). Risk attitude and market behavior: Evidence from experimental asset markets. *Journal of Economic Psychology*, *28*(3), pp.338-350.

Fenby, J. (2009). *The Penguin History of Modern China: The Fall and Rise of a Great Power, 1850-2009*. Penguin Books Ltd.

Fernandes, A. M., & Paunov, C. (2012). Foreign direct investment in services and manufacturing productivity: Evidence for Chile. *Journal of Development Economics*, *97*(2), 305-321.

Fidrmuc, J., & Gërxhani, K. (2008), ‘Mind the gap! Social capital, East and West’, *Journal of Comparative Economics*, *36*, 264-286.

Fidrmuc, J., & Fidrmuc, J. (2003). Disintegration and Trade. *Review of International Economics*, *11*(5), 811-829.

Fidrmuc, J., & Fidrmuc, J. (2016). Foreign languages and trade: evidence from a natural experiment. *Empirical Economics*, *50*(1), 31-49.

Figini, P., & Görg, H. (1999). Multinational companies and wage inequality in the host country: the case of Ireland. *Review of World Economics*, *135*(4), 594-612.

Figini, P., & Görg, H. (2011). Does Foreign Direct Investment Affect Wage Inequality? An Empirical Investigation. *The World Economy*, *34*(9), 1455-1475.

Fleisher, B., Li, H., & Zhao, M.Q. (2010). Human capital, economic growth, and regional inequality in China. *Journal of Development Economics*, *92*(2), 215-231.

Forbes, K. (2000). A reassessment of the relationship between inequality and growth. *American Economic Review*, *90*, 869-887.

Fowowe, B. (2017), 'Access to finance and firm performance: Evidence form African countries.' *Review of Development Finance*, *7*(1), 6-17.

Fu, X., & Balasubramanyam, V. N. (2005). Exports, foreign direct investment and employment: The case of China. *The World Economy*, *28*(4), 607-625.

Geary, R.C. (1954). The contiguity ratio and statistical mapping. *The Incorporated Statistician*, *5*(3), 115-146.

Girma, S., Gong, Y., Görg, H., & Lancheros, S. (2015). Investment liberalisation, technology take-off and export markets entry: Does foreign ownership structure matter? *Journal of Economic Behaviour & Organization*, *116*, 254-269.

Gao, G.Y., Wang, D.T., & Che, Y. (2018). Impact of historical conflict on FDI location and performance: Japanese investment in China. *Journal of International Business Studies*, *49*, 1060-1080.

Goetz, S.J., & Debertin, D. L. (2001), Why Farmers Quit: A Country-Level Analysis, *American Journal of Agricultural Economics*, *83*(4), 1010–1023.

Goode, W. J., (1960). A Theory of Role Strain. *American Sociological Review*, 25(4), 483-496.

Greaney, T. M., & Li, Y. (2017). Multinational enterprises and regional inequality in China. *Journal of Asian Economics*, *48*, 120-133.

Greenaway, D., Hine, R. C., & Wright, P. (1999). An empirical assessment of the impact of trade on employment in the United Kingdom. *European Journal of Political Economy*, *15*(3), 485-500.

Greene, W.H. (1997). *Econometrics Analysis*. London: Prentice-Hall International.

Greve, H.R., & Rao, H. (2014). History and the present: Institutional legacies in communities of organizations. *Research in Organizational Behavior*, *34*, 27-41.

Grollman, E. A., (2018). Sexual Orientation Differences in Whites' Racial Attitudes. *Sociological Forum*, *33*(1), 186-210.

Grundy, E.M., Albala, C., Allen, E., Dangour, A.D., & Elbourne, D., Uauy, R., (2012). Grandparenting and psychosocial health among older Chileans: A longitudinal analysis. *Aging & Mental Health*, *17*(8), 1047-1057.

Guiso, L., Sapienza, P., & Zingales, L. (2006). Does Culture Affect Economic Outcomes? *Journal of Economic Perspective, 20*, 23-48.

Ha, W., Yi, J., Yuan, Y., & Zhang, J. (2016). The dynamic effect of rural-to-urban migration on inequality *in source villages: System GMM estimates from rural China. China Economic Review*, *37*, 27-39.

Haggblade, S., Hazell, P., & Reardon, T. (2010). The rural non-farm economy: Prospects for growth and poverty reduction. *World Development*, *38*, 1429–1441.

Han, L. H., &Hare, D. (2013), 'The link between credit markets and self-employment choice among households in rural China', *Journal of Asian Economics*, *26*, 52-64.

Hank, K., & Buber, I. (2009). Grandparents Caring for Their Grandchildren Findings from the 2004 Survey of Health Ageing, and Retirement in Europe. *Journal of Family Issues*, 30(1), 53-73.

Harford, J. (2005). What drives merger waves? *Journal of Financial Economics,* 77, 529-560.

Harris, J.R., & Todaro, M.P. (1970). Migration, Unemployment and Development: A Two-Sector Analysis. *American Economic Review*, *60*, 126-142.

Hawkes, K., (2004). The grandmother effect. *Nature*, *428*, 128-129.

Hawkes, K., O'Connell, J.F., Jones, H.G.B., Alvarez, H., & Charnov, E.L., (1998). Grandmothering, menopause, and the evolution of human histories. *Proceedings of the National Academy of Sciences*, 95(3), 1336-1339.

Hayslip, B., & Shore, R.J., 2000. Custodial grandparenting and mental health services. *Journal of Mental Health and Aging*, *6*, 367–384.

Head, K., Mayer, T., & Ries, J. (2010). The erosion of colonial trade linkages after independence. *Journal of International Economics*, *81*(1), 1-14.

Herzer, D., & Nunnenkamp, P. (2013). Inward and outward FDI and income inequality: evidence from Europe. *Review of World Economics*, *149*(2), 395-422.

Hilbrand, S., Coall, D., Gerstorf, D., & Hertwig, R., (2017a). Caregiving within and beyond the family is associated with lower mortality for the caregiver: A prospective study. *Evolution and Human Behavior*, *38*, 397-403.

Hilbrand, S., Coall, D.A., Meyer, A.H., Gerstorf, D., & Hertwig, R., (2017b). A prospective study of associations among helping, health, and longevity. *Social Science & Medicine*, *187*, 109-117.

Hine, R., & Wright, P. (1998). Trade with low wage economies, employment and productivity in UK manufacturing. *Economic Journal*, *108*(450), 1500-1510.

Howell, A. (2017). Impacts of Migration and Remittances on Ethnic Income Inequality in Rural China. *World Development*, *94*, 200-211.

Hu, M., & Yang, J. (2016). The role of leverage in cross-border mergers and acquisitions. *International Review of Economics and Finance, 43*, 170-199.

Huang, J., Chen, X., Huang, B., & Yang, X. (2017). Economic and environmental impacts of foreign direct investment in China: A spatial spillover analysis. *China Economic Review*, *45*, 289-309.

Huang, Q., & Chand, S. (2015). Spatial spillovers of regional wages: Evidence from Chinese Provinces. *China Economic Review*, *32*, 97-109.

Huang, Y. (2016). Understanding China's Belt & Road Initiative: Motivation, framework and assessment. *China Economic Review, 40*, 314-321.

Hvide, H.K., & Panos, G. A. (2013). Risk tolerance and entrepreneurship. *Journal of Financial Economics*, *111*, 200-223.

Iamsiraroj, S. (2016). The foreign direct investment-economic growth nexus. *International Review of Economics & Finance*, *42*, 116-133.

Inwood, S. (2017). Agriculture, health insurance, human capital and economic development at the rural-urban-interface. *Journal of Rural Studies*, *54*, 1-14.

Jalil, A. (2012). Modeling income inequality and openness in the framework of Kuznets curve: New evidence from China. *Economic Modelling*, *29*(2), 309-315.

Jendrek, M.P. (1993). Grandparents who parent their grandchildren: effects on lifestyle. *Journal of Marriage and Family, 55*(3), 609-621.

Jenkins, R. (2006). Globalization, FDI and employment in Viet Nam. *Transnational Corporations*, *15*(1), 115-142.

Jia, R. (2014). The Legacies of Forced Freedom: China's Treaty Ports. *Review of Economics and Statistics*, *96*(4), 596-608.

Jianakoplos, N.A., & Bernasek, A. (1998). Are women more risk averse? *Economic Inquiry*, *36*(4), 620-630.

Jin, Y.H., Fan, M. Y., Cheng, M.W., & Shi, Q. H. (2014), 'The economic gains of cadre status in rural China: Investigating effects and mechanisms', *China Economic Review*, *31*, 185-200.

Jones, D., Li, C., & Owen, A.L. (2003). Growth and Regional Inequality in China During the Reform Era. William Davidson Working Paper Number 561.

Joshi, A.M., & Lahiri, N. (2014). Language friction and partner selection in cross-border R&D alliance formation. *Journal of International Business Studies*, *46*(2), 123–152.

Kanbur, R., & Zhang, X. (1999). Which Regional Inequality? The Evolution of Rural–Urban and Inland–Coastal Inequality in China from 1983 to 1995. *Journal of Comparative Economics*, 27(4), 686-701.

Karlson, K.B., & Holm, A., (2011). Comparing Coefficients of Nested Nonlinear Probability Models. *The Stata Journal*, *11*(3), 420-438.

Karlsson, S., Lundin, N., Sjöholm, F., & He, P. (2009). Foreign firms and Chinese employment. *The World Economy*, *32*(1), 178-201.

Katelouzou, D., & Siems, M., (2015). Disappearing paradigms in shareholder protection: leximetric evidence for 30 countries, 1990–2013. *Journal of Corporate Law Studies*, *15* (1), 127–160.

Kedia, B. L., & Bilgili, T. V. (2015). When history matters: The effects of historical ties on the relationship between institutional distance and shares acquired. *International Business Review*, *24*, 921–934.

Kelejian, H. H., Murrell, P., & Shepotylo, O. (2013). Spatial spillovers in the development of institutions. *Journal of Development Economics*, *101*, 297-315.

Keller, W. (2002). Geographic localizations of international technology diffusions. *American Economic Review*, *92*(1), 120-142.

Kilbourne, A., Justice, A., Rollman, B., McGinnis, K., & Weissman, S., (2002). Clinical importance of HIV and depressive symptoms among veterans with HIV infection. *Journal of General Internal Medicine*, *17*(7), 512-520.

Kimhi, A., & Bollman, R. (1999). Family farm dynamics in Canada and Israel: the case of farm exits. *Agricultural Economics*, *21*(1), 69-79.

Ko, P.-C., & Hank, K., (2014). Grandparents caring for grandchildren in China and Korea: findings from CHARLS and KLoSA. *Journals of Gerontology*, *Series B*: *Psychological Sciences and Social Sciences*, *69*(4), 646-651.

Kok, R., & Ersoy, B. A. (2009). Analyses of FDI determinants in developing countries. *International Journal of Social Economics*, *36*(1/2), 105-123.

Ku, L. E., Stearns, S. C., Van Houtven, C. H., Lee, S. D., Dilworth-Anderson, P., & Konrad, T. R., (2013). Impact of Caring for Grandchildren on the Health of Grandparents in Taiwan. *Journals of Gerontology*, *Series B*: *Psychological Sciences and Social Sciences*, *68*(6), 1009-1021.

Kuznets, S. (1955). Economic growth and income inequality. *American Economic Review*, *45*(1), 1-28.

La Porta, R., Lopez-de-Silanes, F., & Shleifer, A. (2008). The Economic Consequences of Legal Origins. *Journal of Economic Literature*, *46*(2), 285-332.

Larsson, R., & Lubatkin, M. (2001). Achieving acculturation in mergers and acquisitions: An internal case survey. *Human Relations*, *54*(12), 1573-1607.

Latorre, M.C., Yonezawa, H., & Zhou, J. (2018). A general equilibrium analysis of FDI growth in Chinese services sectors. *China Economic Review*, *47*, 172-188.

Lau, L.J. (2015). The Sources of Chinese Economic Growth Since 1978. Institute of Global Economics and Finance Working Paper No. 40, The Chinese University of Hong Kong.

Lazear, E (1999). Culture and language. *Journal of Political Economy*, *107*(6), 95-126.

Lebedev, S., Peng, M. W., Xie, E., & Stevens, C. E. (2015) Mergers and acquisitions in an out of emerging economies. *Journal of World Business, 50*, 651-662.

Lee, E., Clarkson, H, & M., Lee, Y. (2016). Parenting stress of grandparents and other kin as informal kinship caregivers: A mixed methods study. *Children and Youth Services Review*, *69*, 29-38.

Lee, J.S. & Stebunovs, V. (2016). Bank capital pressures, loan substitutability, and nonfinancial employment', *Journal of Economics and Business*, *83*, 44-69.

Lee, S.M., & Peterson, S.J. (2000). Culture, entrepreneurial orientation, and global competitiveness. *Journal of World Business*, *35*(4), 401-416.

Lee, S., Kim, J., & Park, B. (2015). Culture clashes in cross-border mergers and acquisitions: A case study of Sweden's Volvo and South Korea's Samsung. *International Business Review, 24*, 580-593.

Lee, S., Shenkar, O., & Li, J. (2008). Cultural distance, investment flow and control in cross-border cooperation. *Strategic Management Journal*, *29*, 1117-1125.

Lei, C. C., Zhang, R. G., & Wu, B. C. (2013). Labor reallocation in China: 1978–2011. *Economic Modelling*, *35*, 668-673.

Lesage, J.P. (1999). *Spatial Econometrics: Regional Research Institute*. West Virginia University.

Lessmann, C. (2013). Foreign direct investment and regional inequality: A panel data analysis. *China Economic Review*, *24*, 129-149.

Levine, S. (2014). How to study livelihoods: bringing a sustainable livelihoods framework to life. Working Paper 22. Secure Livelihoods Research Consortium, Overseas Development Institute, London.

Lewis, W.A. (1954). Economic Development with Unlimited Supplies of Labour. *The Manchester School*, *22*(2), 139-191.

Li, C., Li, S. Z., Feldman, M. W., Daily, G. C., & Li, J. (2012). Does out-Migration Reshape Rural Households' Livelihood Capitals in the Source Communities? Recent Evidence from Western China. *Asian and Pacific Migration Journal*, *21*(1), 1-30.

Li, H., & Zou, H. (1998). Income inequality is not harmful for growth: theory and evidence. *Review of Development Economics*, *2*, 318-334.

Li, J., Li, P., & Wang, B. (2016). Do cross-border acquisitions create value? Evidence from overseas acquisitions by Chinese firms. *International Business Review*, *25*, 471-483.

Li, L., Duan, Y., He, Y., & Chan, K. C. (2018). Linguistic distance and mergers and acquisitions: Evidence from China. *Pacific-Basin Finance Journal*, *49*, 81-102.

Li, Q. R., Amjath-Babu, T. S. and Zander, P. (2016), 'Role of capitals and capabilities in ensuring economic resilience of land conservation efforts: A case study of the grain for green project in China's Loess Hills', *Ecological Indicators*, *71*, 636-644.

Li, X.R., & Chan, K. C. (2016). Communist party control and stock price crash risk: Evidence from China. *Economics Letters*, *141*, 5-7.

Li, Y., Sun, Y., Zhang, Y., Yi, D., Ma, C., & Ma, S. (2016), Rural–urban disparity in health care: observations from Suzhou, China, *Public Health*, *138*, 164-167.

Lien, D., & Co, C. Y. (2013). The effect of Confucius Institutes on US Exports to China: A state level analysis. *International Review of Economics & Finance*, *27*, 566-571.

Lien, D., & Miao, L. (2018). Effects of Confucius Institutes on China's higher education exports: Evidence from Chinese Partner Universities. *International Review of Economics & Finance*, 2018, *57*, 134-143.

Lien, D., & Oh, C. H. (2014). Determinants of the Confucius Institute establishment. *The Quarterly Review of Economics and Finance*, *54*, 437-441.

Lien, D., Ghosh, S., & Yamari, S. (2014). Does the Confucius institute impact international travel to China? A panel data analysis. *Applied Economics*, *46*(17), 1985-1995.

Lien, D., Oh, C. H., & Selmier, W. T. (2012). Confucius institute effects on China's trade and FDI: Isn't it delightful when folks afar study *Hanyu*? *International Review of Economics & Finance*, *21*, 147-155.

Lien, D., Yao, F., & Zhang, F. (2017). Confucius Institute's effects on international travel to China: do cultural difference or institutional quality matter? *Applied Economics*, *49*(36), 3669-3683.

Lim, j., Makhija, A. K., & Shenkar, O. (2016). The asymmetric relationship between national cultural distance and target premiums in cross-border M&A. *Journal of Corporate Finance*, *41*, 542-571.

Lin, F. (2018). Cross-country diffusion of ideology via FDI Micro-evidence from China. *Economics of Transition*, *26*(1), 3-34.

Lin, F., & Fu, D. (2016). Trade, Institution Quality and Income Inequality. *World Development*, *77*, 129-142.

Lin, F., & Sim, N. C. S. (2012). Death of distance and the distance puzzle. *Economics Letters*, *116*(2), 225-228.

Lin, J.Y. (1992). "Rural Reforms and Agricultural Growth in China." *American Economic Review*. *82*(1), 34–51.

Lin, M., & Kwan, K. (2011). Sectoral Location of FDI in China. *The World Economy*, *34*(7), 1181-1198.

Liu, A., Lu, C., & Wang, Z. (2018). The roles of cultural and institutional distance on international trade: Evidence from China's trade with the Belt and Road countries. *China Economic Review*, in press, doi:10.1016/j.chieco.2018.10.001

Liu, D. (2015). "Has the Chinese economy passed the Lewis turning point?" *Journal of the Asia Pacific Economy*, *20*(3): 404-422.

Liu, J., & Xing, C. B. (2016). Migrate for education: An unintended effect of school district combination in rural China. *China Economic Review*, *40*, 192-206.

Liu, S., Zhang, W., Wu, L., & Wu, B., (2019). Contributory behaviors and life satisfaction among Chinese older adults: Exploring variations by gender and living arrangements. *Social Science and Medicine*, 229, 70-78.

Liu, X., Luo, Y., Qiu, Z., & Zhang, R. (2014). FDI and Economic Development: Evidence from China's Regional Growth. *Emerging Markets Finance and Trade*, *50*, 87-106.

Long, H.L., & Liu, Y. S. (2016), Rural restructuring in China. *Journal of Rural Studies*, *47*, 387-391.

Long, H.L., Liu, Y. S., Li, X.B., & Chen, Y. F. (2010). Building new countryside in China: A geographical perspective, *Land Use Policy*, *27*(2), 457-470.

Lu, Y., Tao, Z., & Zhu, L. (2017). Identifying FDI spillovers. *Journal of International Economies*, *107*, 75-90.

Luo, Y., La Pierre, T. A., Hughes, M.E., & Waite, L.J., (2012). Grandparents providing care to grandchildren: A population-based study of continuity and change. *Journal of Family Issues*, *33*(9), 1143-1167.

Madariaga, N., & Poncet, S. (2007). FDI in Chinese Cities: Spillovers and Impact on Growth. *The World Economy*, *30*(5), 837-862.

Mah, J.S. (2003). A note on globalization and income distribution-the case of Korea, 1975-1995. *Journal of Asian Economics*, *14*(1), 157-164.

Mah, J.S. (2013). Globalization, decentralization and income inequality: The case of China. *Economic Modelling*, *31*, 653-658.

Mattingly, D.C. (2017). Colonial Legacies and State Institutions in China: Evidence from a Natural Experiment. *Comparative Political Studies*, *50*(4), 434-463.

Melitz, J. (2008). Language and foreign trade. *European Economic Review*, *52*, 667–699.

Meyer, K. E., Ding, Y., Li, J., & Zhang, H. (2014). Overcoming distrust: How state owned enterprises adapt their foreign entries to institutional pressures abroad. *Journal of International Business Studies*, *45*(8): 1005–1028.

Meyer, K., & Thaijongrak, O. (2013) The dynamics of emerging economy MNEs: How the internationalization process model can guide future research. *Asia Pacific Journal of Management, 30*(4), 1125-1153.

Molero-Simarro, R. (2017). Inequality in China revisited. The effect of functional distribution of income on urban top incomes, the urban-rural gap and the Gini index, 1978–2015. *China Economic Review*, *42*, 101-117.

Molnar, M., Pain, N., & Taglioni, D. (2008). Globalisation and employment in the OECD. *OECD Journal: Economic Studies*, *2008*(1), 83-116, 5-6.

Moran, P.A. (1950). Notes on continuous stochastic phenomena. *Biometrika*, *37*(1-2), 17-23.

Moyes, D., Ferri, P., Henderson, F. and Whittam, G. (2015). The stairway to Heaven? The effective use of social capital in new venture creation for a rural business. *Journal of Rural Studies*, *39*, 11-21.

Muchomba, F. M. (2017). Women's Land Tenure Security and Household Human Capital: Evidence from Ethiopia's Land Certification. *World Development*, *98*, 310-324.

Musil, C. M., Givens, S. E., Jeanblanc, A. B., Zauszniewski, J., Warner, C. B., Toly, V. B., 2017. Grandmothers and self-management of depressive symptoms. *Archives of Psychiatric Nursing, 31*(3), 234-240.

Mutchler, J.E., & Baker, L.A., (2004). A demographic examination of grandparent caregivers in the Census 2000 Supplementary Survey. *Population Research and Policy Review*, *23*, 359-377.

Newman, C., Rand, J., Talbot, T., & Tarp, F. (2015). Technology transfers, foreign investment and productivity spillovers. *European Economic Review*, *76*, 168-187.

Nunnenkamp, P., Schweickert, R., & Wiebelt, M. (2007). Distributional effects of FDI: How the interaction of FDI and economic policy affects poor households in Bolivia. *Development Policy Review*, *25*(4), 429-450.

Oi, J. (1999). Rural China Takes Off: Institutional Foundations of Economic Reform. University of California Press.

OECD (2007). Promoting Pro-poor Growth: Policy Guidance for Donors. OECD Publishing, Paris.

Othieno, C.J., Okoth, R.O., Peltzer, K., Pengpid, S., & Malla, L.O., (2014). Depression among university students in Kenya: Prevalence and sociodemographic correlates. *Journal of Affective Disorders*, *165*, 120-125.

Ouyang, P., & Yao, S. (2017). Developing inland China: The role of coastal foreign direct investment and exports. *The World Economy*, *40*(11), 2403-2423.

Pace, J., & Pace, R.K. (2009). Introduction to Spatial Econometrics. 1st edition, Chapman and Hall/CRC.

Pan, D., Kong, F.B., Zhang, N., & Ying, R. Y. (2017). Knowledge training and the change of fertilizer use intensity: Evidence from wheat farmers in China. *Journal of Environmental Management*, *197*, 130-139.

Pebley, A.R., & Rudkin, L.L., (1999). Grandparents caring for grandchildren. What do we know? *Journal of Family Issues*, *20*, 218-242.

Pi, J.C., & Yu, Z. (2014). Foreign capital, public infrastructure, and wage inequality in developing countries. *International Review of Economics and Finance*, *29*, 195-207.

Pi, J.C., & Zhang, P. (2018). Rural–urban human capital disparity and skilled–unskilled wage inequality in China. *Review of Development Economics*, *22*, 827-843.

Pi, J.C., & Zhang, P.Q. (2016). Hukou system reforms and skilled-unskilled wage inequality in China. *International Review of Economics & Finance*, *41*, 90-103.

Ranis, G., (2004). Arthur Lewis's contribution to development thinking and policy. *The Manchester School*, *72*(6),712-723.

Rossi, S., & Volpin, P. F. (2004). Cross-country determinants of mergers and acquisitions. *Journal of Financial Economics, 74*, 277-304.

Rubin, A., & Segal, D. (2015). The effects of economic growth on income inequality in the US. *Journal of Macroeconomics*, *45*, 258-273.

Salike, N. (2016). Role of human capital on regional distribution of FDI in China: New evidences. *China Economic Review, 37*, 66-84.

Santangelo, G. D. (2018). The impact of FDI in land in agricultural in developing countries on host country for food security. *Journal of World Business*, *53*(1), 75-84.

Santini, Z.I., Fiori, K. L., Feeney, J., Tyrovolas, S., Haro, J.M., & Koyanagi, A., (2016). Social relationships, loneliness, and mental health among older men and women in Ireland: a prospective community-based study. *Journal of Affective Disorders*, 204, 59–69.

Sarin, R., & Wieland, A. (2016). Risk aversion for decisions under uncertainty: Are there gender differences? *Journal of Behavioral and Experimental Economics*, *60*, 1-8.

Schmidt, P., & Strauss, R.P. (1975). The prediction of occupations using multiple logit models. *International Economic Review* 16(2), 471-486.

Schultz, T. (1961). Investment in human capital. *American Economic Review*, *51*(1), 1-17.

Shahriar, A. Z.M. (2018). Gender differences in entrepreneurial propensity: Evidence from matrilineal and patriarchal societies. *Journal of Business Venturing*, *33*, 762-779.

Shi, X., Heerink. N., & Qu, F. (2007). Choices between different off-farm employment sub-categories: An empirical analysis for Jiangxi Province, China. *China Economic Review 18*, 438-455.

Shi, X., Lu, M., & Sato, H. (2011). Identity, Inequality, and Happiness: Evidence from Urban China. World Development, *40*(6), 1190-1200.

Sicular, T., Ximing, Y., Gustafsson, B., & Shi, L. (2007). The urban-rural income gap and inequality in China. *Review of Income and Wealth*, *53*(1), 93-126.

Sieber, S.D. (1974). Theory of Role Accumulation. *American Sociological Review*, 39(4), 567-578.

Silva, J.S., & Tenreyro, S. (2006). The log of gravity. *Review of Economics and Statistics*, 88(4), 641–658.

Skriabikova, O.J., Dohmen, T., & Kriechel, B. (2014) 'New evidence on the relationship between risk attitudes and self-employment.' *Labour Economics*, *30*, 176-184.

Slangen, A. (2006). National cultural distance and initial foreign acquisition performance: The moderating effect of integration. *Journal of World Business*, *41*, 161-170.

Slimane, M.B., Huchet-Bourdon, M., & Zitouna, H. (2016). The role of sectoral FDI in promoting agricultural production and improving food security. *International Economics*, *145*, 50-65.

Stahl., G.K, & Voigt, A. (2008). Do cultural differences matter in mergers and acquisition: A tentative model and examination. *Organizational Science*, *19*(1), 160-176.

Stark, O. (1984). Rural-to-Urban Migration in LDCs: A Relative Deprivation Approach. *Economic Development and Cultural Change*, *32*(3), 475-486.

Stopler, W.F., & Samuelson, P.A. (1941). Protection and real wages. *Review of Economic Studies*, *9*, 58-73.

Su, S.L., Hu, Y.N., Luo, F. H., Mai, G.C. & Wang, Y. P. (2014). Farmland fragmentation due to anthropogenic activity in rapidly developing region. *Agricultural System*, *131*, 87-93.

Sun, Q., Tong, W., & Yu, Q. (2002). Determinants of foreign direct investment across China. *Journal of International Money and Finance*, *21*(1), 79-113.

Sylwester, K. (2005). Foreign direct investment, growth and income inequality in less developed countries. *International Review of Applied Economics*, *19*(3), 289-300.

Tan, E. (2014). Human capital theory: a holistic criticism, *Review of Educational Research*, *84*(3), 411-445.

Tan, S.H., Heerink, N., & Qu, F.T. (2006). Land fragmentation and its driving forces in China. *Land Use Policy*, *23*(3), 272-285.

Tang, F., Xu, L., Chi, I., & Dong, X.Q., (2016). Psychological Well-being of Grandparents Caring for Grandchildren among Older Chinese Americans: Burden or Blessing? *Journal of the American Geriatrics Society, 64*(11), 2356-2361.

Tang, Y., & Zhang, K.H. (2016). Absorptive capacity and benefits from FDI: Evidence from Chinese manufactured exports. *International Review of Economics & Finance*, *42*, 423-429.

Tanskanen, A.O., & Danielsbacka, M. (2019). Intergenerational family relations. An evolutionary social science approach. New York: Routledge.

Taylor, E.J. (1987). Undocumented Mexico: US migration and the returns to households in rural Mexico. *American Journal of Agricultural Economics*, *69*(3), 626-638.

Taylor, K., & Driffiled, N. (2005). Wage inequality and the role of multinationals: evidence from UK panel data. *Labour Economics*, *12*(2), 223-249.

Tian, Q., Guo, L.Y., & Zheng, L. (2016). Urbanization and rural livelihoods: A case study from Jiangxi Province, China. *Journal of Rural Studies*, *47*, 577-587.

Tsai, F.J. Mottamed, S., & Rougemont, A., (2013). The protective effect of taking care of grandchildren on elders' mental health? Associations between changing patterns of intergenerational exchanges and the reduction of elders' loneliness and depression between 1993 and 2007 in Taiwan. BMC Public Health, *13*, 567.

Tsai, P. (1995). Foreign Direct Investment and Income Inequality: Further Evidence. *World Development*, *23*(3), 469-483.

Ucal, M., Haug, A.A., & Bilgin, M.H. (2016). Income inequality and FDI: evidence with Turkish data. *Applied Economics*, *48*(11), 1030-1045.

Vega, S.H., & Elhorst, J.P. (2015). THE SLX MODEL, *Journal of Regional Science*, *55*(3), 339-363.

Vermeulen, F. & Barkema, H. (2001). Learning through Acquisitions. *Academy of Management Journal*, *44*(3), 457-476.

Volet, S.E., & Ang, G. (1998) Culturally Mixed Groups on International Campuses: an Opportunity for Inter-cultural Learning. *Higher Education Research & Development*, *17*(1), 5-23.

Waldkirch, A., Nunnenkamp, P., & Bremont, J. E. A. (2009). Employment effect of FDI in Mexico's non-maquiladora manufacturing. *Journal of Development Studies*, *45*(7), 1165-1183.

Wan, G., Lu, M., & Chen, Z. (2007). Globalization and regional income inequality: empirical evidence from within China. *Review of Income and Wealth*, *53*, 35-59.

Wan, W. P., & Hoskisson, R. E. (2003). Home country environments, corporate diversification strategies, and firm performance. *Academy of Management Journal*, *46*, 27–45.

Wang, H., Fidrmuc, J., & Tian, Y. (2018). Growing against the Background of Colonization? Chinese Labor Market and FDI in a Historical Perspective. *International Review of Economics & Finance* (in press).

Wang, H., Fidrmuc, J., & Tian, Y. (2018). Growing Against the Background of Colonization? Chinese Labor Market and FDI in a Historical Perspective. *CESifo Working Paper* Series *No. 7093*.

Wang, H., Fidrmuc, J., Luo, Q., Luo, M., 2018. What Stayers Do? Capital Endowments and On-Farm Transitions in Rural China. *Cesifo Working Paper Series*, No. 7306.

Wang, J. (2013). The economic impact of Special Economic Zones: Evidence from Chinese municipalities. *Journal of Development Economics*, *101*, 133-147.

Wang, M. (2009). Manufacturing FDI and economic growth: evidence from Asian economies. *Applied Economics*, *41*, 991-1002.

Wang, W., Li, Q., & Lien, D. (2016). Human capital, political capital and off-farm occupational choices in rural China. *International Review of Economics and Finance*, 42, 412-422.

Wang, X. B., Huang, J. B., Zhang, L. X., & Rozelle, S. (2011), 'The rise of migration and the fall of self-employment in rural China's labor market', *China Economic Review*, *22*, 573-584.

Wang, Y. H., Chen, C. L., & Araral, E. (2016). The Effects of Migration on Collective Action in the Commons: Evidence from Rural China. *World Development*, *88*, 79-93.

Wei, K., Yao, S., & Liu, A. (2009). Foreign direct investment and regional inequality in China. *Review of Development Economics*, *13*(4), 778-791.

Wei, S. J., & Wu, Y. (2001). Globalization and inequality: Evidence from within China. Cambridge, MA: NBER Working Paper No. 8611.

Wei, Y., Liu, X., Parker, D., & Vaidya, K. (1999). The Regional Distribution of Foreign Direct Investment in China. *Regional Studies*, *33*(9), 857-867.

Whalley, J., & Xin, X. (2010). China's FDI and non-FDI economies and the sustainability of future high Chinese growth. *China Economic Review*, *21*, 123-135.

Wikipedia https://en.wikipedia.org/wiki/List_of_former_foreign_enclaves_in_China

Winefield, H., & Air, T., (2010). Grandparenting: Diversity in grandparent experiences and needs for healthcare and support. *International Journal of Evidence-based Healthcare*, *8*(4), 277-283.

Wren, C., & Jones, J. (2016). Does service FDI locate differently to manufacturing FDI? A regional analysis for Great Britain. *Regional Studies*, *50*(12), 1980-1994.

Wu, C., & Xie, N. (2010). Determinants of Cross-Border Merger & Acquisition Performance of Chinese Enterprises. *Procedia Social and Behavioral Sciences, 2*, 6896-6905.

Wu, X. (2001). Foreign direct investment, intellectual property rights, and wage inequality in China. *China Economic Review*, *11*(4), 361-384.

Xia, Q., & Simmons, C. (2007). Employment and earnings of off-farm activities in rural China (in Chinese), *China Labor Economics*, *42*(1), 57-87.

Xie, E., Reddy, K. S., & Liang, J. (2017). Country-specific determinants of cross-border mergers and acquisitions: A comprehensive review and future. *Journal of World Business*, *52*,127-183.

Xie, S. H., Wang, J. X., Chen, J., & Ritakallio, V. (2017), 'The effect of health on urban-settlement intention of rural-urban migrants in China', *Health & Place*, *47*, 1-11.

Xie, Y., & Zhou, Z. (2014). Income inequality in today's China. *PNAS*, *111*(19), 6928-6933.

Xu, D., & Shenkar, O.(2002). Institutional distance and the multinational enterprise. *Academy of management review*, *27*(4), 608-618.

Xu, E. Q. (2017). Cross-border merger waves. *Journal of Corporate Finance, 46*, 207-231.

Xu, H., (2019). Physical and mental health of Chinese grandparents caring for grandchildren and great-grandparents. *Social Science and Medicine*, *229*, 106-116.

Xu, L., Tang, F., Li, L. W., & Dong, X.Q. (2017). Grandparent Caregiving and Psychological Well-Being Among Chinese American Older Adults—The Roles of Caregiving Burden and Pressure. *Journals of Gerontology*, *Series A*: *Medical Sciences,* 72(S1), S56-S62.

Yalcina, B. M., Pirdalb, H., Karakocc, E. V., Sahind, E. M., Ozturke, O., & Unala, M., (2018). General Health Perception, Depression and quality of life in geriatric grandmothers providing care for grandchildren. *Archives of Gerontology and Geriatrics*, *79*, 108-115.

Yan, Z.J., Zhu, J C., Fan, D., & Kalfadellis, P. (2018). An institutional work view toward the internationalization of emerging market firms. *Journal of World Business*, *53*, 682-694.

Yang, D. T. (1999). Urban-Biased Policies and Rising Income Inequality in China. *American Economic Review*, *89*(2), 306-310.

Yang, D.T. (2002). What has caused regional inequality in China? *China Economic Review*, *13*, 331-334.

Yang, D.T., & Zhou, H. (1999). Rural-Urban Disparity and Sectoral Labor Allocation in China. *Journal of Development Studies*, *35*(3), 105-33.

Yang, J., & Qiu, M. (2016). The impact of education on income inequality and intergenerational mobility. *China Economic Review*, *37*, 110-125.

Yao, S. (1999). Economic growth, income inequality and poverty in china under economic reforms. *Journal of Development Studies*, *35*(6), 104-130.

Yi, H., Zhang, L., Luo, R., Shi, Y., Mo., D., Chen, X., Brinton, C., & Rozelle, S. (2012). Dropping out: Why are students leaving junior high in China's poor rural areas? *International Journal of Educational Development*, *32*(4), 555-563.

Yu, K., Xin, X., Guo, P., & Liu, X. (2011). Foreign direct investment and China's regional income inequality. *Economic Modelling*, *28*, 1348-1353.

Zhai, F. (2018). China's belt and road initiative: A preliminary quantitative assessment. *Journal of Asian Economics*, *55*, 84-92.

Zhan, S. H. (2017). Riding on self-sufficiency: Grain policy and the rise of agrarian capital in China. *Journal of Rural Studies*. *54*, 151-161.

Zhang, J., Giles, J., & Rozelle S. (2012) Does it pay to be a cadre? Estimating the returns to being a local official in rural China', *Journal of Comparative Economics*, *40*, 337-356.

Zhang, K.H. (2001). How does foreign direct investment affect economic growth in China. *Economics of Transition*, *9*(3), 679-693.

Zhang, K. H., & Song, S. (2001). Promoting exports: the role of inward FDI in China. *China Economic Review*, *11*(4), 385-396.

Zhang, K.H., & Song, S. (2003). Rural–urban migration and urbanization in China: Evidence from time-series and cross-section analyses. *China Economic Review*, *14*, 386–400.

Zhang, L., Huang, J., & Rozelle, S. (2002). Employment, emerging labor markets, and the role of education in rural China. *China Economic Review*, *13*, 313-328.

Zhang, Q., & Felmingham, B. (2002). The Role of FDI, Exports and Spillover Effects in the Regional Development of China. *Journal of Development Studies*, *38*(4), 157-178.

Zhang, X. B., & Li, G. (2003). Does *guanxi* matter to nonfarm employment? *Journal of Comparative Economics 1*, 315-331.

Zhang, X., & Zhang, X. (2003). How does globalisation affect regional inequality within a developing country? Evidence from China. *Journal of Development Studies*, *39*(4), 47-67.

Zhao, G. C., Ye, J.J., Li, Z. Y. & Xue, S. (2017). How and why do Chinese urban students outperform their rural counterparts? *China Economic Review*, *45*, 103-1.

Zhu, N., & Luo, X. (2010). The impact of migration on rural poverty and inequality: A case in China. Agricultural Economics, *41*(2), 191-204.

Zhu, S., & Fu, X. (2013). Drivers of Export Upgrading. *World Development*, *51*, 221-233.