# **Capital Freedom, FDI and Growth in China**

# Work in progress Preliminary and incomplete Do not quote

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#### Abstract:

For more than three decades, China has managed to combine rapid economic growth, increased inflow of foreign investments (FDI) with a heavily regulated financial sector. It is also well known that FDI has been beneficial for the Chinese economy, but that the impact of these investments vary across provinces. In this paper we analyze to what extent different institutional characteristics impact the growth effects of FDI. The results suggest that FDI has been most beneficial in provinces with weakly developed financial institutions suggesting that FDI not only contribute with employment and technology spillovers but also, in case of weak institutional development, FDI may to some extent fill this gap.

JEL Codes: C23; E44; G28;O11; O43 Keywords: China; FDI Economic growth; Financial institutions

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# Introduction [2-do]

This study contributes to the literature in several dimensions. First, the indices considered capture a wide variety of the institutional aspects of financial markets, yielding a rich picture of how FDI interact with different features of capital freedom and financial development in China. Second, by analysing the heterogeneous effect of FDI and financial development across the income distribution, we can analyse the extent to which improvements in a given type of institution benefits poor or rich provinces to the greatest extent.

The results of this study suggest that FDI enhance growth the most in provinces with weakly developed institutions and that the positive impact of FDI is largest in poor and medium income provinces. Thus, improving the financial system not only enhances growth in China but also decreases regional inequality. Considering the intensive debate on increasing regional inequality and Go-West policies, these results are easily translated into viable policy recommendations

#### 2. FDI, Financial institutions and Economic Development:

#### 2.1. FDI and Economic Growth (very preliminary text)

In 2013, China celebrated the 35<sup>th</sup> anniversary of its first market-oriented economic reforms. The success of the reform program can hardly be questioned. Though the growth figures has declined during the last five years, China has maintained an average annual GDP growth rate at almost ten percent during the past three decades, and during this transformation China has become a major destination for foreign direct investments (FDI).

The dominant view in the academic literature is that FDI has been highly beneficial for China, although some studies have recently argued that the spillover benefits from FDI to local firms have diminished (Liu 2008; Ljungwall and Tingvall 2008; Ma and Zhang 2008). There is a wide range of mechanisms through which the local market may benefit from foreign presence: the increase in competition encourages efficient resource use in local companies, foreign demand of goods and labor benefits local suppliers and workers, the exports from foreign MNCs make Chinese products known in world markets, the technologies and managerial skills applied in foreign enterprises provide important benchmarks for local firms, and so forth.

The presence of technology spillovers in the Chinese manufacturing sector is well documented, although there is substantial disagreement in the literature regarding how general these externalities are (see Liu 2008 for a recent review). With no ambition to cover all articles on FDI and growth in China, we here highlight a set of studies on the impact of FDI on economic growth in China. Chen (2003) and Pan (2003) both conclude that the presence of foreign MNCs has contributed to both technology spillovers and increased productivity in domestic Chinese firms. However, Ma and Zhang (2008) argue that FDI spillovers in China are insignificant, or perhaps even negative. Hence, the results are not entirely uniform across studies. One insight in this strand of research is that it is not only the volume of FDI that determines whether spillovers will materialize and how significant they will be. The presence of foreign MNCs creates a potential for learning and technology diffusion, but factors like the absorptive capacity of local firms and the size of the technology gap between foreign and local firms. Studies that have focused on identifying the role of technology gaps between foreign and local firms and local absorptive capacity include: Chen (2003), Zhou

(2005) and (Kokko et al., 2011). One conclusion drawn from these studies is that FDI tend to contribute to economic growth but that the its impact is dependent on the size of the technology gaps between foreign and local firms. In a similar vein Yonglai *et. al.*, (2005) and Lu and Zhang (2004) have argued that local learning capacity, proxied with the quality of human resources in the firm, is the key determinant of local firms' ability to absorb FDI spillovers. However, there does not seem to be any linear relation between the technology level of the industry and the presence of spillover benefits. Focusing exclusively on high-tech sectors, Jiang and Zhang (2006) were unable to find any general pattern for how foreign presence influenced local productivity.

Other studies have focused on ownership and country-of-origin effects. Differentiating between FDI from OECD countries and overseas Chinese firms, Buckley et al. (2004) found more consistent positive effects from FDI made by overseas Chinese firms. In a later study (Buckley et al. 2006), the same authors found that FDI from Western countries generated greater spillover in technology intensive industries, while FDI from overseas Chinese firms has stronger positive effects in labor intensive sectors. Buckley et al. (2006) also tried to differentiate between state owned and private Chinese firms, and found that state owned firms benefited from Western as well as overseas Chinese FDI. Private Chinese firms, on the other hand, only benefited from overseas Chinese FDI. Ma et al. (2008) addressed similar questions, but reached different results. Their results indicated that FDI from overseas Chinese firms has had negative effects on Chinese local firms, while FDI from OECD countries resulted in positive externalities on local firms. The differences between these two studies may indicate that the impact of FDI may have changed over time, differs by sectors or being non-linear. In particular, it is possible that the technologies used by overseas Chinese firms were "appropriate" from a learning or technology absorption perspective at some time in the past, but that their role may have diminished as the overall capacity of Chinese industry has improved.

Chen and Chen (2005) argue that spillovers that are related to the degree of foreign presence (spillovers from "contagion") are found in large parts of the manufacturing industry, but that the additional impact of competition is mainly seen in sectors where the technology gap is not too large. Moreover, comparing the two sub-periods 2000-2002 and 2003-2005, Chen and Di (2008) suggest that the relative importance of "contagion" (spillovers related to the volume of FDI in the industry) and "competition" (spillovers related to how foreign and local firms

interact) may be changing over time. A similar attempt to go beyond the amount of inward FDI as a determinant for spillovers is found in Li et al. (2009), who included a proxy for the technology gap in their econometric analysis. The results suggest that foreign presence had a significant positive impact on the productivity of local firms during the period 1998-2005, but that the impact of the technology gap has varied over time. To sum up, these studies suggest that FDI seems to contribute to growth but that the relation is non-linear and not yet fully understood.

#### 2.2. Financial Institutions and Growth (text - prelaminar and incomplete)

A second characteristics of the Chinese economy is that China has experienced a high level of economic growth and a weakly developed financial sector. Moreover, despite a series of financial sector reforms implemented since 1994, banks and other financial institutions are strictly regulated and the government exerts substantial control over how capital is allocated (Naughton, 2007).<sup>4</sup>

A large strand of theoretical and empirical literature has examined the relationship between the development of financial markets and economic growth. Since Goldsmith (1969), scholars have extended and deepened our understanding of the finance-growth nexus. Levine (2005) points out that well-functioning financial market improves the allocation of resources by e.g. producing information on possible investments, enhance monitoring of investments and exerting corporate governance after financing is provided, facilitating trade, diversification, risk management, mobilizing and pooling savings, and facilitating the exchange of goods and services. Following the evidence of a relationship between finance and growth, a number of studies examine the asymmetric effects of financial institutions on different country characteristics and the level of development. For instance, in two studies, Rioja and Wachtel (2004a, 2004b) found that the effect of financial institutions on growth differs between developed and developing economies and that countries at an intermediate stage of financial sophistication generally experience the largest growth effects from further financial development. Finally, the finance-growth nexus has also been analyzed from an industry perspective using industry-level data. Seminal contributions in this respect include Rajan and

<sup>&</sup>lt;sup>4</sup> Some of the largest reforms to the Chinese banking sector include the 1994 reform, in which the PBC was transformed into a formal central bank; in 1994, the four large, state-owned banks were transformed into state–owned commercial banks; in 1995, a new bank law was introduced; and in 2003, the <u>China Banking Regulatory</u> <u>Commission</u> (CBRC) was established.

Zingales (1998), who demonstrated that firms in industries that are highly dependent on external financing grow more rapidly in countries with more developed financial institutions. Other contributions include Ceterolle and Gambera (2001), who focus on the effect of the banking structure. These authors demonstrate that while the bank concentration limits the amount of credit, it also has an asymmetrically positive effect on industries that are relatively dependent on external financing and that this effect could compensate for the negative effects in other parts of the economy.

Turing to China, Liu and Li (2001) provided an early empirical contribution on the relationship between finance and growth in China their study concludes that non-state sources of funding are generally more efficient in promoting output than are state-owned sources. In contrast, Aziz and Duenwald (2002) found no relationship between financial development and growth in China. Aziz and Duenwald (2002) also conclude that non-state lending plays a minor role in increasing growth and that it is likely overshadowed by the large share of funding allocated through SOEs. Boyreay-Debray (2003) reports negative effects of extended credit by banks on growth, which is attributed to the burden of supporting inefficient SOEs rather than poor performance of the banks themselves. In contrast to Boyreay-Debray (2003), Chen et al (2006) found that expansion of bank credit has a positive effect on growth, primarily by substituting for financing via state appropriations. Cheng and Degryse (2010) dispute this finding by emphasizing the difference between formal and non-formal sources of finance and that the financial reforms implemented thus far affected these sources to different degrees. Cheng and Degryse (2010) conclude that financial reform and the development of credit markets are crucial for growth.

Based on Chinese firm-level data, Ayygara et al. (2007) emphasize the importance of bank lending as opposed to more informal sources of credit. While informal financing is more available to the private firms, when controlling for the self-selection of firms into different lending channels, they find the firms employing bank lending grow significantly more rapidly than those that do not. This finding calls in to question the efficiency of the non-regulated component of the financial sector and whether relationship building and reputation are sufficient mechanisms to substitute for the more rigorous institutional framework associated with bank credit. Chen et al. (2013) explore the asymmetric effects of financial development on provincial growth across different income segments. Their results indicate that financial development has a strong, positive relationship with growth in high-income provinces while the opposite is true for low-income provinces.

Including FDI in the analysis, Guargalia and Poncet (2008) demonstrate that indicators of state intervention are related to lower growth at the provincial level and that market-driven finance has a positive impact on economic growth. Their study also demonstrates that both of these effects have declined over time, suggesting that FDI has become an increasingly important substitute for domestic finance.

With this as a background, the combination of a weakly developed financial sector, inflow of foreign investments and sustained growth is to some extent a puzzle that raises questions regarding the causal relationship between these factors. Here we add to this literature by general, and to Guargalia and Poncet (2008) in particular by in some detail analyse how financial institutions in China impact the growth effects of FDI. Before we turn to this link we first give a short overview of China's financial system.

#### 2.3. China's financial system (text - prelaminar and incomplete)

In the transition from a planned to a market oriented economy, a series of important changes have taken place in China. Before 1978, the financial system exclusively consisted of the People's Bank of China (PBC), which served as both a central bank and a commercial bank. After 1978, the commercial side of the PBC was divided into the so-called "Big Four". The Big Four consist of the Industrial and Commercial Bank of China (ICBC), which focuses on lending and deposits in cities; the China Construction Bank (CCB), which primarily finances infrastructure projects; the Bank of China (BOC), which is responsible for foreign trade and exchange; and the Agricultural Bank of China (ABC), which has a similar task to that of the ICBC but in rural areas. Thus, the PBC has exclusively served as the central bank since this reform (Naughton, 2007).

While all of the Big Four banks have been publicly traded since 2010, the Chinese government remains the largest shareholder. A concern regarding the Big Four is their bias towards stateowned enterprises when channeling credit. Although China has undergone significant reforms to liberalize its financial sector, the Big Four continue to discriminate against private companies because of their shorter credit histories, lower likelihood of being bailed out by the government (Guariglia and Poncet, 2008) and lack of political clout (Borst, 2011). Apart from being an impediment to the growth of the private sector, the excessive financing provided to SOEs causes non-performing loans to accumulate.

As a result of the 1994 reforms, three policy banks were separated from the commercial banks (Naughton, 2007) and assumed responsibility for financing government projects. The China Development Bank finances large-scale infrastructure projects, the Export-Import Bank of China promotes exports and the Agricultural Development Bank of China operates in rural areas. Another group of banks in China are the joint-stock commercial banks and city banks. Between 1986 and 2001, a number of joint-stock commercial banks were established that according to Naughton (2007) brought competition into the banking system. Until 2013, these banks were transformed into private joint stock companies with shares owned by local government, investment companies and individuals. The joint-stock commercial banks and city banks also rely less on regular bank lending and more on other forms of finance (Martin, 2012).

The last category consists of rural credit cooperatives (RCCs). These cooperatives were created in the 1950s and were not integrated into the People's Bank of China. Their primary purpose was to stimulate the development and productivity of farmers in the rural areas by financing township and village enterprises (TVEs). While the TVEs proved highly successful in the 1980s, many of these firms experienced difficulties during the 1990s, which caused the RCC to accumulate large amounts of non-performing loans. This resulted in a bailout from the central government in the early 2000s, which was followed by a vast restructuring of these banks (Naughton, 2007).

Due to China's strictly regulated banking system, which is dominated by few large institutions, a large fraction of private firms are unable to secure financing and, as a result, are searching for other sources of funds which have contributed to the growth of a parallel, shadow banking sector (Borst, 2011). As pointed out above, with lacking financial instituions, investors seek for alternative sources of funding, advice, and information and as pointed out by Guargalia and Poncet (2008), FDI and foreign actors may play a role in this puzzle.

## 2.4. Financial Institutions – The Missing Link in the FDI-Growth Nexus? (text - prelaminar and incomplete)

As stated in the introduction, results from studies of the relationship between FDI and economic growth are somewhat inconclusive. At the core of this literature lies the idea that potential benefits from FDI for not only will be channeled through an increase in the capital accumulation but also through spillovers. Kokko and Blomström (2003) made the observation that spillover effects are dependent upon local conditions, since these conditions play a large role in inducing firms to adopt new technologies and skills. The question then arises, what local conditions matters, is there more to this than absorptive capacity and technology distance and to what extent does financial institutions matter?

One can think of different ways through which well functioning financial markets and institutions can influence the effect of FDI on economic development. By increasing savings and thereby increasing the available volume of capital for investment and also through monitoring allow for an efficient distribution of capital, it is thought that well functioning financial markets can increase economic growth (Aghion & Howitt, 2009).

Well-developed financial markets also enables individuals in the host country to reap further benefits from technology transfer by undertaking additional investments. The idea is that is that deprived local financial markets and institutions undermine an economy's ability to benefit from FDI through spillover effects and raise productivity (Alfaro et al. 2004).

However, the extent to which financial institutions - but also institutions in a more broad sense - shape the relationship between FDI and economic development is not well understood though there is a few studies touching on this question. Present studies on the FDI-institutions and growth nexus have, up until today, used cross-country data to study this relationship and existing studies have in general found positive interaction effects between FDI and institutional quality, suggesting that more developed financial markets increases the growth effects of FDI. Using private sector bank loans to GDP ratio to proxy financial development, Hermes and Lensink (2003) find a positive interaction effect between financial market development and FDI on per capita growth rates when running cross-country regressions. The same pattern is found by Durham (2004) when using OECD-data (which only include FDI flows from OECD countries to lower income countries) and stock market capitalization relative to GDP as a proxy

for financial market development. Alfaro et al. (2009) employ cross-country regressions between 1975-1995 where they use both private sector credit extended by deposit banks (as a share of GDP) and share of private sector credit by the whole financial system (as a share of GDP) as proxies for financial market development. They find positive interaction effects between FDI and institutions when using both average growth rate of real GDP and total factor productivity growth rate as dependent variables. Hence, developed financial institutions boost the growth effects of FDI. Other studies have used broader measures of institutions, such as the Economic Freedom of the World and International Country Risk Guide (ICRG) in order to look at cross-country data and analyse whether the effectiveness of FDI is dependent on general institutional quality in a country (Alfaro et al., 2009; Alguacil et al, 2011). These studies haven't found any convincing evidence for the claim that insitutional quality increases the effect of FDI on economic growth.

Turning to China, Guariglia & Poncet (2008) concluded that distorted financial institutions might have smaller detrimental effects on economic growth if the province has a high FDI stock to GDP ratio. Guariglia & Poncet (2008) suggested that an important mechanism to explain this result could be revealed in the work of Harisson et al. (2004), in which the authors found that financial constraints was less of a threat to the growth of firms in countries with higher FDI inflows since FDI also represents another source of external capital.

Altoghether, the overall impression is that well-developed finacial instituions boost the growth effects of FDI but that the relation may be the other way around in China. The mixed empirical results obtained thus far and the design of the Chinese financial system indicate that simple measures of financial development might conceal the underlying structures of financial mechanisms that are important for economic growth. Using detailed data capturing different aspects of capital freedom and financial institutions development in China we perform a multifaceted analysis of the association between FDI, financial market development and growth in China.

#### 3. Data and descriptive statistics

#### 3.1 Data on Development of Financial Institutions

To measure capital freedom and the regional quality of financial institutions in China we use the Provincial Capital Freedom Index (PCF), developed by the China Institute of Public Affairs (CIPA) (Feng & Shoulong, 2011). The design of the index was inspired by the Economic Freedom of the World index, created by the Fraser Institute. The index designed by CIPA consists of four sub-indices: (i) Government and legal institutional factors, (ii) Economic factors, (iii) Money supply and financial development, and (iv) The level of marketization in the financial market. Each sub-index is constructed from a set of lower level indices. In total, we have access to 21 indices that are aggregated to form these four sub-indices and one aggregate index. By construction, the PCF-index make it easy to use, both as an aggregated total index and in the form of different area indices enabling us to evaluate different aspects of institutional development in China and its relation to the growth effects of FDI. The four area indices are constructed in the following manner:<sup>5</sup>

- (1) Government and Institutional Factors (GIF). This area index consists of subcomponents that measure the scope of government involvement in the economy. More concretely the components measure the share of market allocation of resources, percentage of government subsidies to GDP, local protectionism and the efficiency of the judicial system.
- (2) Economic Factors (EF). EF consists of three components that more broadly reflect the size of non state- and entrepreneurial activity in each province. It consists of measures of enterprises per capita and the size of non-state sector, both in industry and in total capital construction investment.
- (3) Money Supply and Financial Development (MSFD). Provides a broad measure of macroeconomic stability and monetary liquidity among private households, MSFD contains measures of total deposits in relation to GDP, inflation, standard deviation in inflation rate, return from assets, amount of cash as a share of income and number of bankcards per capita.
- (4) Marketization Level of Financial Market (MLFM). The last area index represents an assessment of the development and importance of non-state financial institutions within

<sup>&</sup>lt;sup>5</sup> A description of all 21 subcomponents is provided in Table A1 in the appendix.

the banking and financial system as well as how the weight of non-state controlled companies within the stock market has evolved over time.

The PCF-index is constructed by using 2001 as a baseline year where the province with the highest score is given the maximum index value of 10 while the province with the lowest score receives the value of 0. For further details on the construction of the index, see Feng & Shoulong (2011) and Hepeng et al. (2012). The over-time evolution of the indices is captured by comparing the score on the i<sup>th</sup> indicator to minimum and maximum scores during the base year. The method needs further adjustments if the indicator is negative. For further details, see Feng & Shoulong (2011) and Hepeng et al. (2012). Data covers the period 2001-2009.<sup>6</sup>

Index value<sub>i,t</sub> = 
$$\frac{V_{i,t} - V_{min,2001}}{V_{max,2001} - V_{min,2001}} \times 10$$

Each area index and all sub-components can be found in Table A1 in the appendix. As pointed out above, each area index is supposed to grasp different aspects of capital freedom and a simple correlation analysis (see Table A2) indicates that the correlation between the four area indices vary between 2-70 percent, suggesting that they seem to capture different processes of institutional development in China.

#### 3.2 Additional data

The Chinese National Bureau of Statistics and China Statistics Yearbook provides us with data on per capita income, population, capital intensity, share of urban employment and foreign direct investments. We also have information on the share of the population with a tertiary education or higher. All nominal variables are deflated to the constant 2001 prices. Summary statistics of indicators of institutional development as well as economic variables are shown in Table 1.

<sup>&</sup>lt;sup>6</sup> The PCF-index display some similarities with the Economic Freedom of the World-index (EFW) created by the Fraser Institute and the authors acknowledge both methodological and financial support from the Fraser Institute when constructing the index (Hepeng et al. 2012).

Variable	Mean	Std. Dev.	Min	Max
Total Index	5.80	1.28	2.83	9.33
Government Factors and Institutions	7.66	1.49	2.00	10.0
Economic Factors	6.22	2.71	0.48	12.9
Money Supply and Financial Development	4.63	1.65	0.18	10.9
Marketization Level of Financial Markets	5.58	1.83	-1.31	10.6
ln(Per capita income)	9.47	0.63	7.97	11.1
ln(Population)	8.13	0.77	6.26	9.18
ln(Capital per capita)	-0.60	0.68	-1.96	1.01
ln(Human capital)	49.8	34.9	1.79	165
Urban Employment/Total Employment	0.31	0.15	0.11	0.85
ln(FDI)	11.5	1.73	7.34	14.6

 Table 1. Descriptive statistics

A detailed, province by province ranking institutional development, per capita income and FDI as of 2001 is provided in Table A3. Eyeballing Table A3 suggest that provinces with high inflows of foreign direct investment also tend to have both a high per capita income and a high score on the total aggregated PCF-index. For example, the provinces of Guangdong, Shanghai, Jiangsu and Fujian are all examples of provinces with a top ten ranking in all three categories. However, there are some exemptions to this pattern, for instance the province of Sichuan is ranked as number seven based on the total institutional index while it's ranked 23<sup>rd</sup> based on per capita income. Examining the index score across provinces, the 2001 score vary from the highest index score of 6.93 to the lowest score at 2.83.

#### 3. Empirical approach (To be extended)

The analysis consists of a set of three models, highlighting the relationship between finance and growth from different perspectives. Here we build on Liu and Yoon (2000), Griliches and Mairesse, (1997) and Frankel and Romer (1999) and estimate a production function based model, analyzing the relationship between per capita income and financial institutions. The estimated model is formulated as follows:

 $ln(y)_{it} = B_{1}ln(pop)_{it} + B_{2}ln(K/L)_{it} + B_{3}ln(H)_{it} + B_{5}(Urban)_{it} + B_{4}ln(FDI)_{it} + B_{5}(CF)_{it} + B_{6}(FDI \ x \ CF)_{it} + \nu_{i} + \gamma_{t} + \varepsilon_{it}$ 

Where  $y_{it}$  is per capita income in province *i* at time *t*, *pop* is population, *K/L* is fixed capital per capita, *H* is the share of population with higher education, *CF* is a set of proxies for capital freedom and the quality of financial institutions, *FDI* is the share of FDI to regional GDP, following Alguacil et al. (2001) we add control for the level of urbanization using the share of urban population to the model,  $v_i$  represents province fixed effects,  $\gamma_t$  is a period dummy and  $\varepsilon_{it}$  is the error term.<sup>7</sup>

#### 5. Results

With the descriptive results as a backdrop, Table 2 looks at the impact of FDI, a set of regional indices of capital freedom and financial institutions, and their interaction-effect on income. The table presents regressions using fixed effect estimations. Looking briefly at the control variables first, it can be noted that the standard control variables, capital and educational attainment of the labor force have the expected positive signs and are statistically significant. The positive coefficients for population might be less expected but can mirror the presence of scale, and agglomeration effects. The non-significance of urban employment share may be due to its correlation with educational attainment (Barro and Xala-I Martin, 1995).

#### 5.1. Fixed effects regressions

As pointed out above, table 2 display the results from estimations of a fixed effect estimations of equation 1 using a series of indices capturing provincial financial freedom and financial institutional development. Column 1 analyzes the effect of the aggregate index while columns 2-5 displays each of its four sub-area indices. All area indices capture different features of institutional development, enabling us to perform a multifaceted analysis that should be less prone to data compatibility problems compared to analyses based on cross-country data, and/or analysis using one index only (Guariglia & Poncet, 2008).

Starting with the direct effect of institutional development on income, column 1 indicate that the direct effects of institutional development is positive and significant. Notably, column 1 display that a one-unit increase in the aggregate total index increases per capita income by

<sup>&</sup>lt;sup>7</sup> One challenges is to cope with endogeneity surrounding income, FDI and financial institutions. Bellemare et al. (2015) argue that the route of using lagged covariates doesn't solve the underlying problem of causal identification; instead it typically entails a replacement of the "no selection on unobservables"-assumption with a "no dynamics among unobservables"-assumption.

roughly 10%, indicating that an overall improvement of financial institutions can have growthenhancing effects.

Moving from the total index to its sub-indices, column two reveals that government and institutional factors have a positive effect on per capita income, similar in magnitude as the aggregate index. Moving on to economic factors (column 3) and money supply and institutional development (column 4), the results are less clear cut, suggesting no statistical support for an effect of institutional development on per capita income.

Column 5 display the results of the index of main interest, the marketization level of financial institutions. Results in Table 2 suggest that a higher level of financial market institutions enhance growth. To be precise, a one unit increase in the marketization index is associated with increases income in the neighborhood of seven percent. Results in column 5 emphasize the importance of non-state financial institutions within the financial system as suggested by the positive and significant direct effect of the MLFM area index. This result is in line with the findings in Söderlund & Tingvall (2016) where the authors scrutinized the finance-growth nexus in China and found a positive link between the MLFM area index and per capita income using the system GMM estimator.

Throughout these estimations we note that inflow of foreign investments is associated with increased income; a one percent increase in FDI increases income with approximately 1.5-6 percent. However, our main question of interest is whether the effect of FDI on per capita income is dependent on the development of financial institutions. That is, is there an interaction effect of institutional quality affecting the growth effects of FDI? Results in Table 2 suggest that the interaction term is consistently negative in all specifications except in column 4, suggesting that higher levels of institutional development might reduce the effect of FDI on per capita income. That is, FDI seems to enhance growth relatively much in provinces with less developed institutions. We may though note that in columns 3 and 4, there's no significant interaction effect. More interestingly, the results from the interaction between FDI and MLFM area index further indicate that higher levels of FDI reduces the importance of the financial and banking sector development in China. As put forward by Hermes and Lensink (2003), FDI might affect economic activity by increasing economic efficiency, which in this context would suggest that the efficiency enhancing effect of FDI might be smaller at higher levels of institutional development. According to this reasoning, one might expect that the importance of FDI to be diminishing, as institutional reform is further continued in China but also that poorer provinces with slow institutional development are benefitting the most from FDI inflows, partly reflecting a broader process of convergence in China. Our findings is also in line with Guariglia & Poncet (2009) who using aggregated measures of institutional quality got similar results. We also note that Harisson et al. (2004) who highlighted that financial constraints represent a smaller growth-obstacle for firms in countries with higher FDI inflows, reflecting the contribution of FDI as an additional source of capital in developing countries. These findings may provide an important mechanism for why the interaction effect between FDI and our main area index of interest, MLFM, is negative and significant.

	Kegressions, 2	2001-2007, Depen		is i ci Capita ilic	onic
	(1)	(2)	(3)	(4)	(5)
Applied PFC-Index	Total Index	Governmental	Economic	Money Supply	Marketization
		Factors	Factors	& Financial	Level of
				Development	Financial
					Market
	0.00101.	0.001.01.00	0.00105	0.000.000	0.00100#
Human Capital	0.00121*	0.00161**	0.00107	0.000498	0.00122*
	(0.000693)	(0.000710)	(0.000866)	(0.000692)	(0.000655)
ln(capital intensity)	0.272***	0.300***	0.279***	0.271***	0.273***
	(0.0727)	(0.0732)	(0.0780)	(0.0759)	(0.0701)
ln(population)	0.401**	0.461***	0.421**	0.348**	0.317*
	(0.160)	(0.164)	(0.160)	(0.154)	(0.156)
Urban Employment share	0.195	0.176	0.146	0.165	0.260
	(0.230)	(0.221)	(0.225)	(0.214)	(0.248)
ln(FDI)	0.0601**	0.0631***	0.0321*	0.0165	0.0460**
	(0.0254)	(0.0210)	(0.0189)	(0.0159)	(0.0211)
Applied Index	0.108**	0.0959***	0.0452	-0.0112	0.0748**
	(0.0493)	(0.0242)	(0.0341)	(0.0249)	(0.0329)
ln(FDI)*Applied Index	-0.00879**	-0.00764***	-0.00328	0.000501	-0.00623**
	(0.00419)	(0.00248)	(0.00273)	(0.00238)	(0.00276)
Observations	240	240	240	240	240
Provinces	30	30	30	30	30

Table 2. Fixed effects Regressions, 2001-2009, Dependent Variable is Per Capita Income

Notes: Standard errors clustered by province. \*\*\*, \*\*, \* indicates significance at the 1, 5 and 10 percent level respectively.

To sum up, Results in Table 2 suggests that FDI and institutional development has had a positive direct effect on per capita income in China during the period of 2001 -2009 and that the egrowth enhancing effect of FDI has been the largest in provinces with poor institutional quality.

In Table 3 we make a first robustness test of the initial findings in Table 2. To be precise, in Table 5.3 we replace the log of FDI for its share of regional GDP. Again, results in columns 1,

2 and 5 indicate positive and significant direct effects of FDI/GDP on per capita income. When looking at the direct effect of the Capital Freedom-index, the effect no longer seem to be significant for the total aggregate index but the initial positive results for GIF and MLFM again have statistical support. Across all specifications, the estimated effect of institutional quality is smaller, suggesting that a one-unit increase in the index will increase income by roughly 1.5-3 percent. Table 3 also indicates a positive and significant direct effect of MSFD on per capita income, which wasn't found in Table 2. EF now seems negatively related to per capita income, which can be seen in column 3.

Interacting FDI/GDP with the aggregate index and each of the area indices again generates negative estimates across specifications. Due to the new construction of our FDI-variable the estimated effects aren't directly comparable but results in all columns except in column 3 are significant which provides some support to the initial findings in Table 2. Thus, when performing alterations to the model initially proposed, the overall results remains valid.

Applied PFC-Index	(1)	(2)	(3)	(4)	(5)
	Total Index	Governmental	Economic	Money Supply	Marketization
		Factors	Factors	& Financial Development	Level of Financial Market
Human Capital	0.000640	0.000757	0.000376	0.000623 ( $0.000664$ )	0.000684 (0.000656)
ln(capital intensity)	0.268***	0.296***	0.279***	0.277***	0.265***
ln(population)	(0.0795)	(0.0805)	(0.0835)	(0.0868)	(0.0780)
	0.347**	0.415**	0.347**	0.419**	0.311*
Urban Employment share	(0.168)	(0.179)	(0.169)	(0.173)	(0.164)
	0.139	0.180	0.162	0.147	0.208
FDI/GDP	(0.236)	(0.231)	(0.222)	(0.224)	(0.249)
	0.00280*	0.00278**	0.000183	0.00193*	0.00210*
Applied Index	(0.00158)	(0.00136)	(0.00105)	(0.00110)	(0.00119)
	0.0274	0.0319***	-0.00584	0.0190*	0.0182*
In (EDI)* A pulled Index	(0.0178)	(0.0114)	(0.00585)	(0.0107)	(0.00953)
	-0.000459*	-0.000368**	-1.18e-05	-0.000269*	-0.000348*
III(I'DI)' Applied IIIdex	(0.000249)	(0.000165)	(0.000156)	(0.000149)	(0.000186)
Observations	240	240	240	240	240
Provinces	30	30	30	30	30

Table 3. Fixed effects Regressions, 2001-2009, Dependent Variable is Per Capita Income

Notes: Standard errors clustered by province. \*\*\*, \*\*, \* indicates significance at the 1, 5 and 10 percent level respectively.

#### 5.1.1. Marginal effects

Through the initial analysis in Table 2-3, we have presented results where the impact of FDI has been assessed at the mean of the distribution. However, as suggested by the interaction effects, the impact of FDI seems to vary with institutional quality, therefore, presenting mean based values only can to some extent be misleading. <sup>8</sup> Using results from Table 2, Figure 1 therefore presents the marginal effect of FDI on per capita income across different levels of the area indices. As suggested by the negative interaction effect, the marginal effect of FDI decreases with higher levels of institutional development. To be precise, results mf Gigure 1 suggest that the impact of FDI generally goes from positive to negative as the level of institutional quality increases, though a closer inspection suggest that the marginal effect of FDI only is significant in provinces with the least developed institutions.

A unique feature of our data is that they allow us to analyze the impact of different proxies of institutional development. Results from Table 2 and Figure 1 suggest that the growth enhancing effect of FDI has a closer tie to governmental factors, and the marketization level of financial institutions than the macro-economic based indices, money supply and economic factors. To be precise in Figure 1; for money supply, and economic factors, the marginal effect of FDI is consistently insignificant at every level of institutional quality.

<sup>&</sup>lt;sup>8</sup> Implied by the mathematical expression  $\frac{\partial Y}{\partial FDI} = B_4 + B_6(Finance)_{it}$ 





Note: Figure based on fixed effects regressions from Table 2, 95% confidence interval.

#### 5.2. Quantile Regressions

To further scrutinize the robustness of the result we proceed and analyse whether the varying impact of FDI is influenced by a varying slope along the dependent variables' conditional probability distribution. We therefore proceed by analysing whether impact of FDI, for a given level of institutional quality vary with respect to income. To be precise, if the impact of FDI not only vary due to the provincial level of capital freedom and financial institutions, but also with respect to per capita income, an analysis based on the mean of income will provide an incomplete picture of the relationship between FDI, financial institutions and income. To analyze potential asymmetric effects of capital freedom and financial development across wealthy and poor provinces we in in Table 4 estimate a set of quantile regressions that enables us to cope with a varying slope along the dependent variables' conditional probability distribution.

In Table 4, each area index is examined within the quantile regressions-framework. For each area-index we estimate equation 1 at the 25<sup>th</sup>, 50<sup>th</sup>, 75<sup>th</sup> income percentile.

In line with results in Table 2, we find the strongest and most significant direct effects for the indices, governmental factors, and financial institutions development while money supply does not show any significant results. We also note that that economic factors, as in Table 2 end up in an intermediate position with a significant effect for relatively rich and poor provinces but with no significance for average income provinces.

Comparing these direct effects across quintiles, we note that the impact of governmental factors, and financial institutions development is fairly stable across income percentiles while the impact of economic factors roughly doubles 0.029 to 0.056 as we move from the 25<sup>th</sup> to the 75<sup>th</sup> income percentile.

Similar to the results in Table 2, the direct effect of FDI is generally positive and significant with an estimated elasticity in the range of 0.00-0.05 suggesting that a doubled inflow of FDI is associated with an income increase in the range of 5-10 percent. Comparing the direct effect of FDI across quintiles we note that, if anything, is the growth enhancing effect of FDI largest in relatively poor and medium income provinces.

Turning to the interaction effect between FDI and institutional quality results in Table 4 to a large extent mirror those of Table 2. That is, the interaction term is negative and significant in all quantiles for governmental factors and financial institutions development but insignificant for the money supply index. Again the index of economic factors takes an intermediate position with no significant effects for poor and medium income provinces and a (negative) significant estimate for the richest provinces.

Comparing the interaction effects across quantiles, we find no uniform pattern across indices but all of our significant indices suggest that the negative interaction effect is largest in upper-, and medium income provinces. That is, since the marginal effect of FDI on income consist of a positive direct effect from which we deduct a negative interaction effect, the most positive effect of FDI is likely to be found in poor or medium income provinces with relatively weak institutions.

<b>Table 4.</b> Quant	he Regressions	(2001-2009) -	Dependent vari	able is Per Cap	ita income	
	(1)	(2)	(3)	(4)	(5)	(6)
Applied PFC-Index	Government	Government	Government	Economic	Economic	Economic
	Factors and	Factors and	Factors and	Factors	Factors	Factors
	Institutions	Institutions	Institutions			
Quantiles	Q25	Q50	Q75	Q25	Q50	Q75
ln(FDI)	0.0503***	0.0349*	0.0489***	0.0192**	0.0187	0.0151*
	(0.0122)	(0.0183)	(0.0111)	(0.00825)	(0.0151)	(0.00871)
Applied Index	$0.0788^{***}$	0.0707***	0.0872***	0.0288**	0.0307	0.0546***
	(0.0165)	(0.0247)	(0.0150)	(0.0133)	(0.0243)	(0.0140)
ln(FDI)*Applied Index	-0.00640***	-0.00487**	-0.00729***	-0.00139	-0.00188	-0.00427***
	(0.00153)	(0.00229)	(0.00139)	(0.00109)	(0.00200)	(0.00115)
	(7)	(8)	(9)	(10)	(11)	(12)
Applied PFC-Index	Money	Money	Money	Marketization	Marketization	Marketization
	Supply and	Supply and	Supply and	Level of	Level of	Level of
	Financial	Financial	Financial	Financial	Financial	Financial
	Development	Development	Development	Market	Market	Market
Quantiles	Q25	Q50	Q75	Q25	Q50	Q75
ln(FDI)	0.0145	0.000578	-0.00585	0.0321***	0.0398**	0.0105
	(0.0111)	(0.0158)	(0.0102)	(0.0101)	(0.0156)	(0.00962)
Applied Index	-0.00593	-0.0363	-0.0207	0.0531***	0.0571**	0.0460***
	(0.0189)	(0.0269)	(0.0173)	(0.0169)	(0.0261)	(0.0161)
ln(FDI)*Applied Index	0.000326	0.00255	0.00111	-0.00396***	-0.00482**	-0.00349**
	(0.00171)	(0.00242)	(0.00156)	(0.00148)	(0.00229)	(0.00141)
Observations	240	240	240	240	240	240

Notes: Standard errors clustered by province. \*\*\*, \*\*, \* indicates significance at the 1, 5 and 10 percent level respectively. Control variables include: Human Capital, ln(capital intensity), ln(population) and Urban Employment share and period dummies.

To shed some light on the complex relation on how the impact of FDI on income vary with respect to institutional quality and income we in Figure 2 in a 3D-graph display the estimated marginal effects for the total index [insert regression in appendix]. That is to visualize the these relation the x- and y-axis represents variation in income and institutional quality and the z-axis, the marginal effect of FDI on income. That is, in addition to Figure 1 where we allow the impact of FDI to vary with respect to institutional quality we inFigure 2 also allows for the average marginal effect of FDI to vary with respect to per capita income according to the quantiles specified in the quantile regressions.

Figure 2 indicates that the average marginal effect of FDI generally is positive. The average marginal effect of FDI is positive at low-income levels and reaches its peak when assessing its impact in median income provinces with a low levels of institutional quality. From this peakregion, the effect decreases and eventually turns negative as we evaluate it for high- and low

income provinces with strong institutions. Across the board we also note that the marginal impact of FDI vary more as we change institutional quality rather than income level. That is, in line with Guariglia & Poncet (2009), our results suggest that FDI to some extent, when well functional institutions are lacking, can enter the role of an institutional substitute. That is, FDI inflows may prove particularly beneficial to the economic development in low- and medium income provinces with weak institutions.

Figure 2: Average marginal effects of FDI for different levels of institutional development.



Note: Figure based on the quantile regressions-framework in Table 4 and total index of intuitional quality.

#### 6. Summary and conclusions

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# Appendix

#### Table A1.

Area Indices and Sub-Components

1. Government and Institutional Factors
1.a. Share of Market Allocation of Resources (% of Government Expenditure to GDP)
1.b. % of Government Subsidies to Enterprises to GDP
1.c. Non-tax Burden of Enterprises
1.d. Local Protectionism
1.e. Legal Protection (Efficiency of Judicial System)
2. Economic Factors
2.a. Ratio of Number of Enterprises to Population
2.b. Size of Non-state Sector
2.b1. Share of the Non-state Industry in Total Production Value of the Total industry
2.b.2. Share of the Non-state Sector in Total Capital Construction Investment
3. Money Supply and Financial Development
3.a. Percentage of Total Deposits to GDP
3.b. Inflation Rate
3.c. Standard Deviation in Inflation Rate
3.d. Share of Return from Asset of Urban Households in Their Total Disposable Income
3.e. Share of Cash Held by Urban Households in Their Total Disposable Income
3.f. Number of Bank Cards per Capita
Marketization Level of Financial Markets
4.a. Competition Among Banks and Other Financial Institutions
4.a.1. Percentage of Deposit with Non-state Financial Institutions to Total Deposit
<i>4.a.2. Percentage of Loans for Non-state Enterprises to Total Loans Granted by Financial Institutions</i>
4.b. Stock Market
4.b.1. Share of Number of Non-state Controlled Listed Companies in Total Number of Listed Companies
4.b.2. Share of Number of Tradable Stocks in Total Number of Stocks
<i>4.b.3. Share of Non-state Controlled Listed Companies in Total Assets of All Listed Companies</i>
4.b.4. Share of Non-state Controlled Listed Companies in Total Funds Raised in Stock Market by All Listed Companies

# Table A2. Correlation, Indices of Capital Freedom and Financial Institutions

	1. Total Index	2. GIF	3. EF	4. MSFD	5. MLFM
1. Total Index	1.0000				
2. GIF	0.7559	1.0000			
3. EF	0.8586	0.7039	1.0000		
4. MSFD	0.5132	0.0233	0.3259	1.0000	
5. MLFM	0.7547	0.6002	0.5624	0.0122	1.0000

### Table A3.

FDI inflow, Capital Freedom and per capita income in Chinese provinces in 2001FDI (2001)Total Index (2001)Per capita income (2001)

	TDI (2001)		10iui maes	<i>Total Index</i> (2001)			
Rank	Province	ln(FDI)	Province	Index Score	Province	ln(per capita income)	
1	Guangdong	13.99	Zhejiang	6.93	Shanghai	10.53	
2	Jiangsu	13.45	Guangdong	6.90	Beijing	10.15	
3	Shanghai	12.97	Shandong	5.64	Tianjin	9.91	
4	Fujian	12.88	Jiangsu	5.60	Zhejiang	9.59	
5	Shandong	12.77	Fujian	5.53	Guangdong	9.53	
6	Liaoning	12.44	Hainan	5.53	Jiangsu	9.47	
7	Zhejiang	12.31	Sichuan	5.10	Fujian	9.42	
8	Tianjin	12.27	Shanghai	4.99	Liaoning	9.40	
9	Beijing	12.08	Liaoning	4.88	Shandong	9.26	
10	Hubei	11.69	Guangxi	4.78	Heilongjiang	9.14	
11	Hunan	11.30	Xinjiang	4.72	Hebei	9.03	
12	Hebei	11.11	Chongqing	4.71	Xinjiang	8.98	
13	Sichuan	10.97	Hebei	4.64	Hubei	8.96	
14	Hainan	10.75	Tianjin	4.61	Jilin	8.94	
15	Henan	10.73	Hunan	4.55	Hainan	8.87	
16	Jiangxi	10.59	Beijing	4.52	Inner Mongolia	8.77	
17	Guangxi	10.56	Shaanxi	4.30	Hunan	8.71	
18	Shaanxi	10.47	Anhui	4.21	Henan	8.69	
19	Heilongjiang	10.44	Heilongjiang	4.11	Qinghai	8.65	
20	Jilin	10.43	Henan	3.96	Chongqing	8.64	
21	Anhui	10.42	Jilin	3.75	Shanxi	8.61	
22	Chongqing	10.15	Hubei	3.73	Ningxia	8.58	
23	Shanxi	10.06	Inner Mongolia	3.62	Sichuan	8.57	
24	Inner Mongolia	9.28	Yunnan	3.55	Jiangxi	8.56	
25	Gansu	8.91	Jiangxi	3.53	Anhui	8.56	
26	Yunnan	8.77	Gansu	3.48	Shaanxi	8.52	
27	Qinghai	8.20	Ningxia	3.40	Yunnan	8.50	
28	Guizhou	7.95	Qinghai	3.33	Guangxi	8.45	
29	Xinjiang	7.62	Guizhou	2.90	Gansu	8.33	
30	Ningxia	7.43	Shanxi	2.83	Guizhou	7.97	

Quantile Regressions (2001-2009) - Dependent Variable is Per Capita Income							
	(1)	(2)	(3)	(4)	(5)	(6)	
Applied Index	Government	Government	Government	Economic	Economic	Economic	
	Factors and	Factors and	Factors and	Factors	Factors	Factors	
	Institutions	Institutions	Institutions				
Quantiles	Q25	Q50	Q75	Q25	Q50	Q75	
ln(FDI)	0.0503	0.0349*	0.0489***	0.0192	0.0187*	0.0151	
	(0.0313)	(0.0197)	(0.0171)	(0.0141)	(0.0110)	(0.0110)	
Applied Index	0.0788*	0.0707***	0.0872***	0.0288	0.0307	0.0546***	
	(0.0403)	(0.0259)	(0.0159)	(0.0287)	(0.0303)	(0.0199)	
ln(FDI)*Applied Index	-0.00640**	-0.00487**	-0.00729***	-0.00139	-0.00188	-0.00427***	
	(0.00312)	(0.00239)	(0.00181)	(0.00223)	(0.00226)	(0.00162)	
	(7)	(8)	(9)	(10)	(11)	(12)	
Applied Index	Money Supply	Money Supply	Money Supply	Marketizatio	Marketization	Marketization	
	and Financial	and Financial	and Financial	n Level of	Level of	Level of	
	Development	Development	Development	Financial	Financial	Financial	
				Market	Market	Market	
Quantiles	Q25	Q50	Q75	Q25	Q50	Q75	
ln(FDI)	0.0145	0.000578	-0.00585	0.0321**	0.0398*	0.0105	
	(0.0196)	(0.0155)	(0.0102)	(0.0156)	(0.0223)	(0.0171)	
Applied Index	-0.00593	-0.0363*	-0.0207	0.0531**	0.0571	0.0460*	
	(0.0387)	(0.0187)	(0.0173)	(0.0258)	(0.0538)	(0.0259)	
ln(FDI)*Applied Index	0.000326	0.00255	0.00111	-0.00396	-0.00482	-0.00349	
	(0.00398)	(0.00163)	(0.00156)	(0.00259)	(0.00431)	(0.00245)	
Observations	240	240	240	240	240	240	

Table A4

*Notes:* Standard errors clustered by province. \*\*\*, \*\*, \* indicates significance at the 1, 5 and 10 percent level respectively. Control variables include: Human Capital, ln(capital intensity), ln(population) and Urban Employment share and period dummies.