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Vulnerability, Public Service Delivery and Fiscal Decentralization: The experience of China as a Developing and a Transition Country

Richard Schiere

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Ecole Doctorale de Centre d'études et de recherches
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Vulnerability, Public Service Delivery and Fiscal Decentralization

THE EXPERIENCE OF CHINA AS A DEVELOPING AND A TRANSITION COUNTRY

PhD. Thesis of Richard Schiere

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February 2008

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Foreword and acknowledgement

The recent development of China is truly fascinating. Historically speaking, there has never been such a massive poverty reduction and economic growth in such a short period. Through its accomplishments, China has transformed from a poor state planned oriented economy to a modern market based allocation system with membership of the World Trade Organization. These successes are even more remarkable when placed in perspective with many other developing and transition countries which did not manage to grow and reduce poverty significantly over the last fifty years.

Sharing the reform experience of China with other developing and transition countries is therefore an important issue. Many countries might not only be able to benefit from China's development models, but also might want to put in perspective the economic policy advices provided by international organizations, multilateral banks and bilateral donors. These organizations often followed narrowly defined policies based on general models not adapted to local circumstances. As such, these policies failed to gain the genuine support from national governments as well as the society at large and therefore were doomed to fail.

Another key aspect of the development and transition processes in China is that its success was unexpected. In the sixty and seventies, nobody could have predicted that China, in the middle of the disastrous "great leap forward" and "cultural revolution" would become such a successful development story. This was similar to other Asian countries (e.g. the first Asian tigers: South Korea, Taiwan and Japan) that over the course of four decades also transformed themselves from war ravaged countries to OECD status countries.

Despite its successes, China has still major challenges to overcome before its development is sustainable on the long-term. These challenges include the nexus on vulnerability and public sector reform, in particular fiscal decentralization and service delivery. Understanding the importance and complexity of these subjects is a pre-requisite for solution.

During the past three years China's development in general and above topics in particular were subject of my study. It has been a fascinating experience of which I want to share the results with many through this thesis. It is my greatest wish to contribute this way a little to a better understanding of some of the most important and pressing problems of the current world e.g. economic development, poverty and vulnerability and public sector reform.

The research of this thesis would however have not been possible without the assistance and support of many people. Foremost is my PhD advisor Professor Mary-Francoise Renard. She inspired and motivated me to undertake my PhD, initially alongside my work at the United Nations in New York and later full time at the CERDI-institute. Her genuine interest and support were invaluable. With her support, I presented my research at academic conferences and summer schools including at the China Economic Association in Nottingham (UK), the UNU-WIDER in Helsinki (Finland), University of Florence (Italy) and China Center for Economic Studies at Fudan University (China) and at CERDI. Through these conferences and summer schools, I was exposed to fresh ideas and innovative thinking needed for this thesis.

I also want to thank Yiu Por Chen, Professor at the University of DePaul in Chicago who I had the privilege to meet at the summer school in CERDI. Thanks to his direct hand-on guidance and knowledge sharing, I gained valuable experience on how to undertaken methodologically, sound and high quality research.

I also appreciate greatly the assistance of my professors and students at the CERDI library who continuously, and without hesitation, time and again, listened to me and helped to answer numerous questions. In this respect I want to single out, Jules-Armand Tapsoba and Thierry Kangoye, who not only supported my PhD in this manner, but were always willing to explain the newest methodological approaches with a friendly smile.

This acknowledgement would not be complete without mentioning my family, mother, father and dear brother whom not only patiently listened to my endless “vulnerability”, “poverty” “public sector reform” and “China” stories but also never failed to encourage me to continue on the chosen path. Finally and foremost I have to thank Yukiko, my wife who provided comfort in times of uncertainty and was more convinced than anybody, not only that I could complete this study but also that the study needed to be completed.

Abstract

The research of this thesis focuses on the nexus of vulnerability (or the risk to become poor), fiscal decentralization and public service delivery in the perspective of the development of China during the last 50 years. This development has been remarkable: a consistent high level of economic growth, a massive reduction of poverty and at the same time wide and fundamental reform of the public sector. The subject is a contemporary issue in particular as vulnerability is considered a key for addressing the poverty challenges in the world and is strongly related to public services and decentralisation.

The thesis presents a methodology to estimate the evolution of vulnerability by region through analysis of household assets consisting of liquid resources, human capital and health care. This is done on the basis of provincial level panel data in China from 1985 to 2001. Asset composition is estimated through an one-stage Theil decomposition index which is introduced into a logistic regression. The conclusion is threefold: Firstly, liquid assets and human capital contribute to the reduction of vulnerability, while health care does not reduce vulnerability. Secondly, Interior and Western regions have higher degree of vulnerability, while the Eastern region has lower vulnerability. Thirdly, inequalities *within* regions contribute about 20-30% to vulnerability, while inequality *between* regions contributes about 70-80% to vulnerability.

The research provides also empirical evidence on the extend that public service delivery is a determinant of fiscal decentralization by using OLS regression, OLS regression with Fixed Effect, Two-Stage Least Square (TSLS) and TSLS with FE to analyze the effects of various education and health variables on fiscal decentralization. This is undertaken on the revenue and the expenditure side, as well as on the growth of extra-budget revenues and extra-budget expenditures. The conclusion is that the quality of secondary and higher education has overall a negative impact on the fiscal decentralization, probably due to lack of internationalization of spill-over effect caused by huge migration in China.

Also part of the research is an analysis of the impact on vulnerability, as measured by the dependent variable food consumption, by the quality of public services delivery in the education and health sector. This is undertaken through an OLS, OLS with Fixed effect, Two Stage Least Square (TSLS) and TSLS with Fixed Effect regressions as well as robustness tests through lags of respective one and two years. The conclusion is fourfold: (i) the quality of primary education has a negative impact on vulnerability, probable due to high inequality and to the selection bias of children from poor families being taken out of school (Connelly and Zheng, 2003); (ii) the quality of the secondary education service has a negative impact on vulnerability in all time lags with TSLS with Fixed Effect. Therefore, these results are strongly robust; (iii) the quality of higher education service has a negative impact on vulnerability. However, these results are less robust than the one with secondary education; and (iv) the health care has also a partially positive impact under the fixed effect.

The research in this thesis is based on datasets from five sources: (i) China Datacenter of Michigan University; (ii) China Statistical yearbook; (iii) Prof. Belton M. Fleisher and Prof. Min Qiang of Ohio University on human capital; (iv) Prof. Jing Jin of John Hopkins University and Prof. Heng-fu Zou of the World Bank on fiscal

decentralization; and (v) Prof. Yiu Por Chen of DePaul University in Chicago on political decentralization.

The policy implication of the thesis is that vulnerability can be reduced substantially through social service delivery. However, fiscal decentralization in China has led to the introduction of userfees which form a barrier for the poor, particularly in the rural areas. The fiscal decentralization policies therefore need be accompanied by a fiscal envelope for poor regions to ensure that basic services are available and accessible to all citizens.

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Abbreviations

AIDS - Acquired Immune-Deficiency Syndrome

CMS - Cooperative Medical System

CCP - Chinese Communist Party

CERDI – Centre d'études et de recherches sur le développement international

CPR - Common Property Resources

DF – Damaging Fluctuations

EPA - Environmental Protection Agencies

EPZ - Export Processing Zones

EVI - Economic Vulnerability Index

FDI - Foreign Direct Investment

FE - Fixed Effect

FFS - Fee For Service

LDC - Least Developed Countries

GDP - Gross Domestic Product

GEM - Gender Empowerment Measure

GNP - Gross National Product

HDI - Human Development Indicators

HIV - Human Immunodeficiency Virus

HPI - Human Poverty Index

IDREC - Institut de Recherches sur l'Économie de la Chine

ITG - Inter-Generational Transmission

LICUS - Low Income Countries Under Stress

NGO - Non-Governmental Organization

OECD - Organization For Economic Co-operation and Development

OLS - Ordinary Least Square

PC - Private Consumption

PPA - Participatory Poverty Assessment

SOE - State-Owned Enterprises

SPC - State Provided Commodities

TOLS - Two-Stage Least Square

TVE - Township Village Enterprise

UN - United Nations

UNCTAD - United Nations Conference on Trade and Development

UNHS - Uganda National Household Survey

UPPAP - Uganda Participatory Poverty Assessment Process

UNDP - United Nations Development Programme

VPL - Vulnerability to Poverty Line

WHO - World Health Organization

WTO - World Trade Organization

Introduction: China's reforms in transition and development perspective

Introduction

China is often viewed with admiration for its remarkable developmental successes, with massive reduction of poverty and high level of economic growth. These results translated in a huge improvement in living conditions for the majority of the population beyond the simple measurement of income. Examples of this are, an increase in consumption per person of four times for eggs and eight times for poultry, a doubling of the per person living space in urban areas and a tripling in rural areas, and household bank deposits which, measured against GDP, increased from less than 6 percent in 1978 to more than 60 percent by 2000.

Although the reform process in China was successful, it was by no means clear cut and predictable. At the beginning of the reform in 1978, China was still in the aftermath of the Cultural Revolution which severely distorted society and economic structures. What sets China reform apart from many other transition and developing countries, was the cautious and slow pace of reform as well as the approach to decentralized policy experimentation. This meant that policies were first tried out at provincial level. If successful, they were subsequently adopted at national level. Examples of these were the abolishment of the commune system as well as the introduction of Export Processing Zones (EPZ). Moreover, the slow pace of reform created a political economy within the vested interest groups such as the State-Owned Enterprises (SOE), the communist party elite, the bureaucracy as well as the society at large that could support transition. The final step in transition was the accession into the World Trade Organization (WTO), as this required both deepening of the market based allocation system as well as internationalization of the economy. Moreover, this international treaty effectively "locked" China "in" a market based economic system. The success of China is more striking when considered in the perspective of its overall transitional (i.e. domination of state sector, political economy of state owned enterprises, lack of institution for "pricing", etc.) and developmental challenges (i.e. largely an agricultural based production sector, lack of physical infrastructure, overpopulation, high rate of migration and urbanization, low education level, etc.). After all, there are many poor transition and development countries in the world that did not manage to grow economically or reduce poverty substantially. Therefore, the introduction focuses on comparing China's development with other transition as well as Asian developing countries.

This thesis focuses on the nexus of vulnerability, public services delivery and fiscal decentralization in China. It contributes to the academic and policy debates in several ways. Firstly vulnerability, or in other words, the risk of becoming poor, is a relative new field of poverty research that can be applied to many transition and developing countries. In the case of China, vulnerability is important from social cohesion perspective as a negative economic shock could create social tensions and therefore threaten the development of a harmonious society. Secondly, vulnerability plays an important role in the decision-making of the poor because their resilience to negative shock is low (Wood 2003). Therefore, vulnerability does not just result from poverty, it can also reinforce poverty. Furthermore, a relative small number of households in China have an average consumption below the poverty line, but a much larger number of households are just above the poverty line (Mc Culloch and Calandrino, 2003).

Finally, vulnerability is important as it provides for a more dynamic poverty perspective, instead of using absolute poverty measurements which often focus on income and expenditure variables (Lipton and Maxwell, 1992), which is essential for fast growing economies such as in China.

Secondly, the quality of delivery of public services, such as health care and education, is critical to increase livelihood opportunities as well as to reduce both poverty and vulnerability. The health sector is vital to reduce vulnerability as descending households often have income shocks arising from ill health (Jalan Ravallion 1999, Sen 2003). This creates additional health care expenditures as well as reduces the capacity of individuals to earn a living. Therefore, an adequate health care system increases the likeliness that households can recover from a negative shock caused by illness. In addition, adequate education services are important as they are critical to build-up human capital, which in turn, increases the productive capacity of individuals and reduces vulnerability. This is particular important in a rapidly developing economy as China as sufficient human capital can contribute to broad based wealth creation benefiting all segments of society, especially the poor.

This brings us to the third element of the thesis, decentralization, in particular fiscal decentralization. This is critical as over the past few decades many developing and transitional countries have launched these kinds of exercises with the objective of improving public service delivery. This is especially relevant as the majority of developing countries inherited centralized administration systems that were set-up under colonialism, while transition countries had centralized administration structures, which were part of the communist based allocation system of economic resources within an overarching state plan. China is an interesting case study as the country had a decentralized M-structure (Maskin *et al.*, 2000) which permitted domestic policy experimentation that resulted in economic development and poverty reduction. Examples of these were the de-collectivization of communal system in the country side and the establishment of Economic Processing Zones (EPZ) in Eastern part of the country. Both were characterized by experimentation at the local level, and if successful, where implemented at the national level. Another element which made fiscal decentralization in China a critical topic is that it was combined with privatization and “marketization” of public goods. In practices this means that previous free and accessible health and education services, became commodities for which citizens had to pay through the introduction of userfees. This reduced accessibility, in particular for the poorer segments of society, and thus negatively affected vulnerability.

For these reasons, the nexus of vulnerability, public service delivery and fiscal decentralization is a contemporary and relevant issue. Studying it requires a broad set of variables. The research in this thesis is based on five data sources: (i) China Datacenter of Michigan University; (ii) China Statistical yearbook; (iii) Prof. Belton M. Fleisher and Prof. Min Qiang of Ohio University on human capital; (iv) Prof. Jing Jin of John Hopkins University and Prof. Heng-fu Zou of the World Bank on fiscal decentralization; and (v) Prof. Yiu Por Chen of DePaul University in Chicago on political decentralization. These five datasets are compiled into one panel dataset covering 28 provinces by year from 1978 to 2001.

The remaining of this introduction is organized as follows: The first section “Initial situation prior to reforms in China” highlights the difficulties as well as the political economy effects of the disastrous great leap forward and the Cultural Revolution. The

second section “Overview of social-economic developments during transition” provides an overview of transition and development challenges of China. The third section “China’s WTO accession as the end of transition” emphasizes that the transition from planned economy toward market driving allocation system will likely come to an end as this accession “locked-in” the market based allocation system and private ownership. The fourth section “China as a transition country” highlights the different reform paths in comparison with Eastern Europe and the former Soviet Union. The fifth section “China as an Eastern Asian developing country” compares China’s developmental process with other countries in the region, notably Japan, South-Korea and Taiwan. The sixth section “Synthesis of the China’s reform in transition and development perspective” considers various political economy arguments underpinning Chinese reform process. Finally, the section “Outline of thesis” provides an overview of the whole thesis.

Initial situation prior to reforms in China

Although China reforms are considered a success in terms of poverty reduction and economic growth, its outcome could not have been predicted. The reform and opening up period was officially launched in December of 1978 at the Third Plenum of 11 Central Committee. At this event, Deng Xiaoping officially launched “Four Modernizations” in the areas of agriculture, industry, national defense and science and technology. The goal of the “Four Modernizations” was to accelerate development by stepping up the volume of foreign trade and opening up its markets, especially for the purchase of machinery from advanced developed countries like Japan, United States and Europe. Later this was complemented with a variety of reforms aimed at decentralizing the economy and opening the country to international trade.

The “Four Modernizations” was operationalized by a 10 year plan, which was severely hampered by shortage of capital, as is the case in many transition and developing countries. International trade and Foreign Direct Investment (FDI) were meant to alleviate the shortage of capital by attracting foreign currency to finance capital imports. These were the first signs that indicated that China’s leaders were taking a pragmatic approach in the transition. At the same time, these initial reforms were a departure from the original political approach which shunned both capitalist motivation and foreign economic intervention in domestic affairs of the country. Moreover, it was a fundamental change from a strict command economy whereby the state controlled almost all of the output from the service sector, 94.4 percent of agricultural production and 97.5 percent of industrial production was sold at state-fixed prices (UNDP, 1999). There was no notion of an independent financial sector as there was a monobank system in place, which meant that the bank sector was simply the state’s cashier that channeled financial resources to state directed development projects.

The radical policy shift from a planned autocracy to a system that permitted foreign economic influence was made more politically acceptable by the social and economic disaster caused by the Cultural Revolution and the great leap forward. This was referred to as the “decades of chaos” as there was social turmoil that had severe effect on the economy as well as society at large. An example of this was that during the Cultural Revolution, all primary schools in urban areas in China were closed for 2 to 3 years, and secondary and tertiary level institutions were closed for much of the period. Universities were closed from 1966 to 1970–71, although those who had entered university before the Cultural Revolution, and had not completed their

degrees were allowed to stay there without formal teaching until 1970–71 (Zhang, Liu and Yung, 2007). With these kinds of social turmoil still fresh in the memory of everybody, from the party leadership to the people on the streets, Deng Xiaoping could gain political support for his reform program as it meant a departure from the policies that underpinned the Cultural Revolution.

Besides the political support for the modernization programme of Deng Xiaoping, China also saw the rising economic power of South Korea, Taiwan and especially of their long term rival, Japan as a geo-political threat. For China to keep its dominant position in Asia would require additional economic development, which was held back by lack of industrialization as 71% of the labor was allocated to agriculture, with a low marginal productivity. This was not only linked to fact that China was mainly an agricultural society, but also because in the late 1950s nearly all Chinese agriculture had been gathered into people's communes and people's production teams of some fifty people. Therefore industrialization of China was low and the limited industrial production of the State Owned Enterprises (SOE) generally speaking was inefficient. This was one of the reasons why future Township Village Enterprises (TVE) could fill the gap as there was a lack of any consumer good production, which SOE were not able to fill (Kai-sing Kung and Lin 2007).

The role of government and public administration was also important in establishing domestic owned policies relevant for China. This was because China had traditionally been a country with a decentralized structure, in which a local government could undertake policy experimentation. If successful, this policy was implemented nationally. This policy formulation and development process is linked to the traditional decentralized system of government in China that had a M-form organization, in which regional governments (be it province, county, township or village) had considerable responsibility for coordination within their jurisdiction (Maskin et al., 2000). In particular, a large number of state-owned enterprises, including many in heavy industries were subordinated to the regional governments even before the economic reforms. Hence, each region was relatively self-sufficient, while the scale of enterprises was small and industries were less concentrated. In this environment, regional policy experiments can be carried out in a less costly way because the disruptive effect to the rest of the economy is minimal (Barrell, Holland and Pain, 2000).

Although the introduction of a market system was undertaken incrementally, the overall objective of reform and opening up was clear. It was to improve the economic welfare of the people at large. Against this yardstick, the reform measures that worked have been kept and improved; those that did not were discarded. Overall policies were not imported from foreign countries. Rather, policies were geared toward the development of a system that can best deliver the economic welfare outcomes and is most adaptable to the changing social, political, and cultural conditions. As such, transition from a planned economy to a market based system was seen from a pragmatic point of view as a means to improve welfare and not an end in itself, nor ideologically driven.

Overview of social-economic developments during transition

The socio-economic changes in China have been dramatic over the last twenty-five years. While growth rates of GDP have averaged close on 10 per cent per year for nearly two decades, average materialistic standards of living have been transformed,

pulling about 500 million people out of poverty more than at any other time in human history. However, the benefits have not been equally divided with the elites and middle class enjoying an affluent lifestyle, while there remained an estimated 100 million poor people in China (World Bank, 2001). Moreover, 30 million children of school age are not going to school (World Bank, 1999). These poor are mostly located in rural areas of the middle and western regions in China.

The reforms process first started in the rural areas and then spread to the urban regions. Among the first rural reform was the abolishment of the commune system in the countryside – where 90 per cent of the population used to live - and its replacement with small-scale, *de facto* privatized family farming. This happened at the begin of the 80s and is also referred to as the introduction of the household responsibility system. It was combined with a reduction of top-down autocratic planning and direct control of economy, while market mechanism were slowly introduced along with fixed supply quota. Moreover, local political leaders were encouraged to engage in economic enterprises, which were later referred to as the Township Village Enterprises (TVE).

At the same time, China started abandoning its isolationist position in the world and China embarked upon the development of international trading relations with other countries. As such, China created four Special Economic Zones (and subsequently ‘open cities’) to allow foreign enterprises, in new joint venture with Chinese counter parts, special privileges including a relaxed regulatory and bureaucratic environment as well as tax holidays, to encourage Foreign Direct Investment (FDI). As these areas were located in Eastern part of the country, these cities became China’s “engine of growth” and had the official policy of becoming rich first. Deng Xiaoping promised that the benefits of this strategy would eventually trickle down to the rest of the country. This policy resulted in an increase of regional inequality as well as inequality between social classes (Kanbur and Zhang, 1999). As such, the objective of attracting hard currency necessary to finance capital imports for economic development was deemed more important than having an egalitarian society. This was a major departure from the traditionally central credo of the Chinese Communist Party (CCP) which focused on creating an equitable society for everybody, in particular for the peasants upon which the revolution was originally built.

The urban reform process started a decade later than the rural reform, in the beginning of the 90s with the privatization of State Owned Enterprise (SOE). The smaller SOE were first privatized and at a later stage, new forms of enterprises were created, including stockholding as well as foreign-owned (partial) participation in companies. The objective of privatization and changing the ownership structure of companies was to “harden the budget constraints”, by strengthening corporate management. The process of privatization of Chinese State-Owned Enterprises had a major impact on the urban areas, as social provisions disappeared, which were traditionally provided by these companies.. Laid-off employers of SOE were often not only hit by a sudden loss of income, but also by the loss of secondary benefits such as housing, schooling, health care, pension, etc. To some extent, local and central governments tried to limit the impact of these policies by providing minimal safety-net provisions. However, in general it can be stated that privatization process led to increased vulnerability as primary benefits, such as income, as well as secondary benefits, such as housing, schooling and pensions, were not automatically provided anymore by the State, as used to be the case before reforms.

China's WTO accession as the end of transition

China's became the 144th member of the World Trade Organization (WTO) in December 2000. With this engagement, and obligations of full market liberalization stemming from the treaty, China's transition from a planned economy to a fully functioning market-based system can be considered as coming to an end. Moreover, with WTO engagement, China became committed to deepening its economic integration with the rest of world as well as accepting a broad set of domestic reforms which would transform the role of State, in terms of industrial policy (including severely limiting preferential policies and lending practices), to regulator of the market economy.¹

The welfare and distributional effects of China's WTO accession have been extensively studied on regional level (Wang, 1999; Martin et al., 1999; Hertel and Walmsley, 2001; and Fan and Zheng, 2000). These studies note that although the aggregate effect at the national level is positive, all regions in China may not benefit equally. Some regions may be hurt due to the existing differences in economic development and openness. Furthermore, the WTO accession requirements such as opening-up of domestic market may cause farm incomes to fall, exacerbating the rise in inequality since the mid-1980s between farm–nonfarm and inland–coastal aggregate income (Kanbur & Zhang, 2001).

Moreover, and judging from the past results, the gains of addition economic growth are not likely to be distributed equally among regions. Less-developed areas, such as the Northwest and Southwest, have gained very little from the prosperity of the Eastern regions as they lack infrastructure and human capital to participate in economic growth. This is despite the “Western Development Strategy” which was part of the “Overall Plan of Western Regional Development during the Tenth Five-Year Plan Period” (2001-2005), which included, among others financial support, infrastructure development, education, cooperative measures and industrial policies (Golley, 2007).

A possible explanation for the continuous drive by the Chinese leadership to accede into WTO and “lock in” China's development into a market based system could be found in the political economy. From this perspective, WTO accession could enhance the interest of the Chinese bureaucrats and business elite as deeper global integration and more trade might create more wealth for this class (Zweig, 2002). This is rooted in the wealth creation opportunities of rent seeking and doing business. Through granting preferential treatment to foreign investors and lowering transaction costs, bureaucratic units could gain from liberalizing their economic activities and integrating themselves with the world economy. This argument is similar to the role of Township Village Enterprises (TVE), which “bought in” local political leaders through wealth accumulation due to the liberalization of the markets.

At the same time, the political economy argument, in combination with the M-structure of the country (Maskin et al, 2000), in which decentralized agents have local

¹ This stems from requirement of the WTO which include: (i) non-discrimination; (ii) market opening; (iii) transparency and predictability; and (iv) undistorted trade, and preferential treatment for developing countries (World Bank, 2004a).

power, could reduce the enforcement capacity of the Chinese central government. This could be a major impediment as WTO requires a standardization of domestic regulatory framework across the country on the basis to ensure uniform enforcement of foreign trade and investment policies (WTO, 2001). This commitment should in theory oblige local governments to relinquish parts of their economic autonomy to central government and increases local governments' accountability to central government. However, out of the desire to protect regional development, their political careers and rent-seeking opportunities, local leaders are likely to compromise the interests of foreign businesses and its WTO obligations (Diao, Fan and Zhang, 2003).

From a transition point of view, WTO accession could be seen as a continuation on the path to transform from a planned towards a market based system of economic coordination. In addition, WTO accession will also deepen the linkages between the domestic economy and international markets, which could exacerbate regional inequality in China.

China as a transition country

The People's Republic of China, created in 1949, has its foundation in the planned economic allocation system. As a communist country, China has similarities with other transition countries in Eastern Europe and the Soviet Union such as lack of property rights and lack of transparent markets. Besides similarities in terms of transitional challenges, China had several characteristics that made its transition process different from former communist countries in the Eastern Europe and the Soviet Union. In the 1970s, compared to other communist countries, China was considered over-populated, lacked human capital and was dominated by a poor agricultural sector. Also, China's reform had a specific trajectory compared to other transition countries, which can be characterized as followed:

a) Pace of transition and dual track approach

The debate on the pace of transition is linked to the time when the first market oriented reforms were launched as well as the different stages of the reform process. In Eastern Europe, the first elements of reforms started as early as 1968 in Hungary, 1980 in Poland, and 1985 in the Soviet Union. In many of these transition countries, the reform process was divided into two stages. The first stage in transition covered policy measures and reforms that were relatively easy to introduce and could be implemented in a fairly short time span, such as: (i) attracting Foreign Direct Investment (FDI) through the creation of Export Processing Zones (EPZ) and (limited) import liberalization; (ii) rural reforms as de-collectivization of farming, introduction of the household responsibility system including granting of individual land-use licenses and lifting of urban-rural migration restrictions; and (iii) privatizing small and medium size enterprises and liberalization of prices in non-strategic sectors, which included labor market reform and the abolishment of life-time employment (Wei, 2006).

The second stage of reforms in transition countries were more difficult as they had a higher degree of uncertainty and required a longer period of implementation. This stage included reforms such as: (i) enhancement of the competitiveness of large-scale state owned enterprises. This encompassed the change of ownership structures and improvement of enterprise governance; (ii) shifting the banking system, from a monobank in which one-bank dominated lending and borrowing, to private banks of

which the activities were overseen by a central bank; and (iii) recreating social safety nets, which were originally on the level of companies, at the national level. The second stage of reforms were more difficult to implement, had less predictable outcomes and were politically more risky (Wei, 2006).

These two stages of reform were similar in many transition countries, in which first micro-level reforms were introduced before the macro-market system was reformed. However, the big difference is that in Eastern Europe, piecemeal reform in the first stage failed in the 60s and 70s, and the second stage was jump-started during the “shock-therapy” at the end of 80s and beginning of the 90s (Qian, 1999). This was also linked to the political upheaval due to the overthrow of communist regimes in Eastern Europe as well as the dismantling of the Soviet Union. Moreover, privatization was considered a means to create private property and disperse wealth so as to minimize the chance of a non-democratic counter-revolution. In contrast, in China the first stage was more radical, while the second stage was less radical, as there was no need to disperse assets quickly to avoid a counter-revolution or coup d'état. The success of the first stage allowed it to build political momentum for further reform without revolution and political dismantling of the communist system.

The key issue in China was the “dual-track” approach which meant that the development of the private sector was created alongside the old state drive sector. This dual-track transition strategy consisted of the private sector that slowly but surely and steady grew and eventually replaced the public sector. The private sector growth was mainly attributed to the development of Township Village Enterprise (TVE), while the larger State Owned Enterprises were only privatized in the end of the 90s.

The dual-track approach provided the opportunity for economic agents, participating in the market economy, to be better off, whereas the maintenance of the planned economy implicitly compensated potential losers from market liberalization by protecting the status quo. This had a considerable positive effect in terms of political economy. Another desirable feature of the dual-track approach were its minimal additional informational and institutional requirements. For example, commune households had the possibility of selling directly to the market after they fulfilled their quota. However, commune and households could purchase grain (or other) outputs from the market for resale to the state to fulfill its responsibility. The result of the dual-track approach was that the state procurement of domestically produced grains remained essentially fixed between 1978 and 1988, while during the same period the grain output increased almost one-third.

b) Policy experimentation and decentralization

One of the main characteristics of China's reform is its approach in terms of policy experimentation, which is closely linked to the M-structure of regional decentralization (Qian and Xu, 1993; Qian, Gérald, and Xu, 1999). Experimentalization has its advantages, in particular from a “the evolutionary-institutional perspective” as reform and change are always risky. The risk stems from lack of knowledge in terms of outcome as well as from uncertainty in implementation. In this perspective, reforms cannot have a blue print. To minimize the costs of policy failure, regional experimentation was encouraged. This regional experimentalization was linked to the M-structure of public administration, which made regions relatively “self-contained”. By contrast, in Eastern Europe and the former Soviet Union there

was an U form organization, which meant that every reform had national implications, which increased the cost of policy failures and limited opportunities for policy experimentation (Roland & Xu, 2000).

One example of policy experimentation was de-collectivization in which the household responsibility system was established in rural areas. In 1978, rural areas in China were operating under the collective farming system. In that year, Fengyang county in Anhui Province began to experiment with contract with local government for delivering a fixed quota of grain in exchange for farming on a household basis. This practice was subsequently imitated by other counties in the province and promoted by the provincial government before it was promoted by the central government. By 1984, almost all farm households across China had adopted this method.

Like the agricultural de-collectivization, the strategy of the Economic Processing Zones (EPZ) was not a policy objective that was implemented top-down, but rather the result of policy experimentation. In the 80s China first established four zones in Shenzhen, Zhuhai, Shantou, and Xiamen to allow foreign investments, while the rest of China was still under central planning. At a later stage, successful employment and accounting practices, that were part of the EPZ policies, were adopted elsewhere in China (Qian, 1999). The policy experimentation approach was supported by a decentralized administrative M-structure with a centralized political system (Maskin et al., 2000). In such a system, local governments on a regional level were responsible for coordinating policies within their region. At the same time, the central political structure provided central government the possibility to create policy yardstick competition among local officials by rewarding or punishing them on the basis of economic performance (Zhang 2006). This was supported institutionally through standardized statistical data and accounting systems.

c) The role of Township Village Enterprises (TVE)

A key element of the Township Village Enterprises (TVE) is that the community or local government (i.e. town or village) was engaged in a private company. Like with the de-collectivization of agriculture sector, the TVE were allowed to sell their products at market prices and operated in competitive markets. The TVE were a major source of growth and employment, in particular in rural areas. This was the opposite in Soviet Union and Eastern Europe where most labor was in SOE which collapsed with transition. This had major consequences as privatization often meant not only a loss of income, but also a reduction in housing benefits, schools and pension. It made the transition process in Soviet Union and Eastern Europe, politically speaking much more difficult.

In China, the TVE are a typical transitional phenomenon as the community government played an important role in protecting TVE in an environment lacking secure property rights (Chang and Wang, 1994; Li, 1996). Without the rule of law and with a still prevailing anti-private property ideology, private enterprises in China were subjected to insecurities as was the case just after the Tiananmen incident of 1989. In addition, the community governments were more likely to invest revenue in local public goods than private entrepreneurs, which in turn ensured higher future levels of government revenues. TVE after-tax profits were mostly used for two purposes: reinvestment and provision of local public goods (Che and Qian, 1998). Therefore, the government entities behavior was overall not rent-seeking oriented and the TVE

were less worried about revenue confiscation. Moreover, local governments had regulator authority over the local economy through issuing business licenses, coordinating local business development and resolved disputes.

Local government could also use political connections with state banks to channel loans to TVE. This is important as in transitional and developing economies, capital is one of the most scarce resources and new entry firms have great difficulty obtaining it. In addition, TVE, with community government control provided collateral and therefore could attract capital from State banks. Hence, local government control over firms did not only benefit local officials, but also improved efficiency on the grounds that they provided more secure property rights and more local public investment. Moreover, the Township Village enterprises “bought-in” local actors and made them agents for economic development (Oi, 1992), which in a political economy perspective ensured sustainability of market transition.

d) Political economy, rent-seeking and building win-win coalitions

In many transition economies in Eastern Europe and the former Soviet Union, that went through a swift reform period, situations were created in which “the winner takes all”. This presented a serious political economy problem and was the result of a rapid reform strategy that created vested and entrenched interest groups. However, this was not the case in China which demonstrated that the winners of early reforms were not necessarily the losers at a later stage nor did these winners manage to “take all” (Hellman 1998). The first and foremost reason for this was the slow pace of reform while the economy grew rapidly. This allowed old vested interest groups to adapt without losing out. Therefore, it can be argued that the bigger the gains from growth of the private sector, the bigger the compensation for the loss of rent-seeking opportunities in the state sector. Moreover, the dual-track liberalization provided opportunities for old groups (i.e. CCP members, bureaucrats, etc.) as well as new groups to benefit (i.e. the peasantry, TVE employers, etc). As such, China's reforms benefits were relatively evenly distributed and there were not many losers, nor were there concentrated winners with huge gains. This created the political momentum for continuously reform aiming at further market systems introduction.

From an institutional perspective, it can be added that the decentralized structure of China which diversified rent distribution away from the central government and encouraged inter-regional competition among local governments, limited the amount of rent local governments could extract. Moreover, as noted earlier, the local government became an actors of development through their activities in the TVE which resulted in “buying into” the reform process. This can be classified as “the helping hand”, which was especially useful in the beginning of the transition phase when networks were important to gain access to key financial resources and markets.

However, a decentralized structure could also become a “grabbing hand” when local government focused on rent-seeking, which inhibited private sector development and economic growth (Chen, 2004). In China local government is considered a “helping hand”, while in Russia local government was considered a “grabbing hand”. These difference is often linked to the political economy of reform by which China had a prospect of long-term economic growth while Russia was characterized by high uncertainty as well as social political term-oil (Shleifer, 1997).

China as an Eastern Asian developing country

China is well known to have adapted its policies and reform processes to fit its specific set of country circumstances. Besides the characteristics of a transition economy which were similar to Eastern Europe and to the former Soviet Union countries, China's policies have also been influenced by development strategies in Asia in particular of the first generation of Asian Tigers, e.g. Japan, South Korea and Taiwan. Comparison is useful as it provides an opportunity to examine growth paths of different Asian developing countries. One of the more interesting aspects of such comparison is the extraordinary growth and poverty reduction process. Just as in the case of China, nobody predicted the success of the first Asian Tigers at the beginning of their reforms. For example, in the 1950s South Korea was just recovering from the war with North Korea. Nobody predicted that this country would achieve OECD status in one of the world's fastest-growing economies.²

Although, discussions and debates on the Eastern Asia model are widespread and numerous, this section only highlights some of the similarities between the development and reform process in China and that of the first generation of East Asian Tigers. These three countries had to overcome economic problems related to relatively large and densely populations as well as resource-shortage.³ The development process of Japan, Korea and Taiwan can be characterized by the move from cheap, labor-intensive manufacturing to more heavy industries and subsequently to advanced electronics. This was undertaken through rapid export growth as well as the increased importance of exports in each country's output structure.⁴ The advantage of this strategy, in particular in comparison with the import substitution approach followed by other developing countries (i.e. India and Brazil), was that exports fostered competition and encouraged the introduction of new technologies. Both cannot be achieved through import substitution as the internal markets of developing countries were often too small for economy of scale (Bruton, p.22, 1998). These characteristics made them different from India and Brazil which had sizable internal markets.

The elements of the East Asian development model are based on several common characteristics including high investment ratios, small public sectors, competitive labor markets, export expansion, and government intervention in the economy. Furthermore, investments in human capital and capacities to absorb new technology are two other economic features shared by the first generation of Asian Tigers (Kuznets, 1988). Although, China was still considered a planned economy at the start

² At that time, this country was devastated by a bitter war that had seen its capital and major industrial center, Seoul, change hands four times. Its savings rate was low. Its exports were low. More than half of imports in the late 1950s were paid for by U.S. assistance, either foreign aid or the expenditures to support the U.S. military presence in South Korea. With the takeover of the government by Chung Hee Park in 1961, everything changed. Chung Hee Park was a somewhat brutal (although quite ordinarily so by the standards of the twentieth century) but remarkable leader who shifted Korea's development strategy to one of export-led industrialization, rather than import-substitution. The consequences were astounding. The growth rate of income per capita averaged more than 7 percent of GDP for the three decades after 1960. Exports grew from three percent of GDP to forty percent of GDP.

³ Two other candidates for inclusion in any East Asian model, Hong Kong and Singapore, have been excluded as they faced problems of city-states without agricultural sectors.

⁴ As such, various forms of export promotion were adopted, including forms of export promotion, quotas were used to provide protection from import competition, and local firms were encouraged to buy or license foreign technology, marketing support absorption of risk exchange, etc.

of the reform in 1978, the Chinese leadership was open to pragmatic introduction of market system and several elements could have been inspired by the East Asian development experience.

The first element was the emphasis on exports promotion which could become a tool for economic development and growth. Although, this was first implemented through the four Economic Processing Zones (and subsequently a tranche of 'open cities'), it was later adopted in other coastal regions and is currently an element of the "Western Development Strategy" (Golley, 2007). In China the policy of creating Special Economic zones (SEZs) to attract foreign investment, by exempting investors from regulations applicable elsewhere in China (particularly relating to hiring and firing of workers and foreign ownership) and also providing excellent infrastructure, was highly successful. In addition, China's FDI was export oriented and also directed in part to investment in infrastructure to support the EPZs (Srinivasan, 2006). An underlying reason for the success of export orient industries in China as well as in East Asia Development was the low labor cost, due to the abundance of labor. This was the case as well with the first group of Asian Tigers, which also had an abundance of cheap labor, at least during the first phases of development, in combination with weak labour laws and unions.

The second element, in which China's development was similar to that of the East Asia model, is the role of the State in facilitating development. For example, in Korea the state was considered a "learning state" (Bruton, 1998), while in China policy, experimentation was a key element for the success of development. Although Korea, Taiwan and Japan had different policies, their governments were considered flexible and responsive to new information and implementation processes. Thus when mistakes were made, the governments of the Korea, Taiwan and Japan learned from them (Bruton, p.23, 24 1998). This was similar to the learning state which was linked to the decentralized M-structure of the State.

The third element is human capital accumulation. Investment in human capital in Taiwan, Korea and South Korea, has been above average, compared to other developing countries. Their greater effort is reflected in enrollment data that indicate, for example, that secondary school and higher education enrollment as proportion of the people in relevant age groups has been considerably higher in Taiwan and Korea than in comparable countries outside Asia and has been about the same as in Japan. In China the emphasis on education and human capital accumulation is illustrated by the introduction of a compulsory Education Law in March 1986, which required free education for all for the first 9 years of schooling. Furthermore, empirical evidence indicates that education in China helped improve the total factor productivity in China. For example, Chen and Fleisher (Chen and Fleisher, 1997) studied the relationship between education and total factor productivity in China during the period 1979-1993. Using the number of newly graduating college students as a measure of investment in education, they found that the investment in education contributes significantly to both the level and the growth rate of total factor productivity in China.

Finally, the fourth element is the high savings rate which characterizes both China and other Asian countries development experience. Distributions of domestic saving by source for Japan (1978-84) and Taiwan and Korea (1974-83) show that corporate saving is minor in all countries, though somewhat higher in Korea (10% of the total) than in the other two (4%-5%) (Guariglia and Poncet, 2007). In China the saving rate was around 47.7 percent during the period 1990-2005, which is higher than Korea

(40.1 percent) and Japan (33.8 percent) for the same period (Zhang, 2007). More importantly, in these Asian countries the saving rate was substantially higher than in the US (19.4 percent) and France (26.9 percent). However, given that the Chinese state banks' primary function was to channel savings, which consisted up to 80 percent, to SOE, it is by no means sure that this is actually translated into productive growth (Boyreau-Debray, 2003).

Synthesis of China's reforms from a transition and development perspective

After twenty-five years of experience, China's reform can contribute several lessons in regard to the process of transition and development. From a transitional perspective, China has moved from a State planned economic coordination system to a decentralized market driven economic system. This latter is "locked-in" by WTO accession of China. From a development perspective, China has achieved high levels of growth and poverty reduction, which have spread to large segments of society. The downside of the rapid enrichment process in China is that wealth has been highly inequilaterally distributed, which in itself can cause political instability and threaten social cohesion.

The most important lesson is that growth is possible with non-perfect institutions, both in a development and transition context. For example, Township Village Enterprises (TVE) can be considered an institutional arrangement in transitional environment. At the beginning of the 80s this public-private structure of ownership grew because: (i) private businesses were discriminated in resource mobilization and regulatory treatment; (ii) fiscal decentralization provided local government the possibility to engage in private sector activities, both in terms of revenue generation as well as career tracts of local officials; and (iii) access to credits from the banking system that were still controlled by the State banks. However, as transition process advanced, the TVE were often privatized or changed ownership structures (Kai-sing Kung and Lin 2007). The success of China, both as a transition and development country, can therefore indicate that some "transitional institutions" are more effective than the "best practice institutions" for a period of time because of the second-best principle. In other words, it is better to work *within* a less distorted economic system and adapt to it than to create a whole new economic system, which is not adapted to the local context of a specific country. This has been the mistake of many poor developing countries which followed the policy advice of Bretton Woods Institutions.

Secondly, China had a large agriculture sector at the beginning of reform, and therefore lacked the extensive social services that were provided normally by State Owned Enterprises. The consequence of this was that the "losers" of transition were relatively small compared to other transitional countries in the Soviet Union and Eastern Europe. Moreover, the industrial urban workers, were left out in the first stages of transition in the beginning of the 80s, as reforms focused on the rural areas through the de-collectivization of agriculture and the introduction of TVE. The positive aspect was that the "winners" of transition were created in the rural areas, before "losers" emerged in the urban sector through the restructuring of the State Owned Enterprises (SOE). This created bottom-up momentum for additional reforms which gradually spread to the entire economy and, from the start, involved opening the economy to foreign investment and trade.

Thirdly, in the context of transition, the emphasis was placed on changing enterprise behavior and improving managerial skills that are more suitable to new business environments, instead of changing ownership structure alone. The incremental process in the introduction of market system, is underpinned in the “the evolutionary-institutionalist perspective”, in which the role of government in transition economies will be confined to such areas as enforcing laws and contracts, securing private property rights, and maintaining macroeconomic stability. In the case of China, the role of the government has been redefined, and the governing mechanism redesigned, but not minimized, while many transition country in Eastern Europe and former Soviet Union had the role of government reduced through the “big-bang” and “shock therapy” approach which had the objective of kick-starting the private sector. In this context, the transition in China may best be characterized as a progress of controlled decentralization, which has been accompanied by the induced behavioral changes in both private and public institutions.

Fourthly, China has the advantage and disadvantages related to size of country compared to other countries that went through the Eastern Asia Developmental Experience such as Taiwan and South Korea. The advantage is that China domestic market would be able to attract Foreign Direct Investment (FDI), in particular as it is located close to the Japanese market. Furthermore, and due to its size, China could also engage in more favorable trade treaties as this country has a large market which other countries could benefit from. However, the disadvantage is that the amount of production it could export would influence the terms of trade and depressed its own prices on the world market. Another disadvantage, in terms of development policies and WTO accession, is that China has limited “policy space” for government to engage in industrial policy. For example “picking winning industries” is severely limited by WTO requirements. This is because WTO regulations and practices prevent the kind of development and industrialization strategies that was practiced by the first Asian Tigers from the 1960s onwards. It is clear that international pressure will force the Chinese government to undertake a more market-based strategy (Saich, 2001).

Finally, it could be noted that the overall developmental success and poverty reduction were not anticipated, both in China as well as the first wave of Asian Tigers. However, it is evident that the next 25 years would be more difficult in terms of achieving sustainable economic growth as current economic problems are linked to multi-faceted challenges, like urbanization, environmental regulation, water-management, inequality, etc.

Outline of thesis

This thesis has two parts. The first part “Vulnerability, poverty and assets” starts with the chapter “The classical poverty debate”, which provides an overview of various elements of poverty analysis. It distinguishes between poverty perspectives, including transitional and chronic poverty and the dynamic livelihood approach. It also focuses on Sen capacity as a means for generating income and the importance of human capital accumulation and health care provision. Finally, the relation between poverty growth and inequality is discussed, which is a relevant issue in China as multi-dimensional inequality has grown rapidly with economic development. The second chapter “Various approaches to vulnerability” highlights the vulnerability in terms of Sen capacity, including the capacity to generate wealth through human capital and public social services provision. It further conceptualizes the measurement of

vulnerability. Finally, it emphasizes the value added in terms of poverty analysis and livelihood approach. The third chapter “Poverty and Inequality in China” emphasizes that the Chinese transition, has massively increased wealth, but that this wealth is highly unequally divided between on the one hand, rich urban coastal regions, and on the other hand, poor rural inland regions. It also emphasizes the strong relation between poverty in China, public health care and education provision.

The last chapter of the first part of the thesis “Empirical analysis of regional income vulnerability and inequality in China using an asset based framework”, provides a methodology to estimate the evolution of vulnerability by region as well as to analyze the change in asset composition (liquid assets, human capital and health care), using provincial level panel data from 1985 to 2001. Asset composition is estimated through an one stage Theil decomposition index, which is subsequently introduced into an logistic regression. By presenting a methodology to estimate the evolution of vulnerability, this chapter provides a new perspective on poverty and contributes to the development of a harmonious society in China. In addition, the methodology on estimating vulnerability using an asset based approach could also be applied to different countries around the world. The conclusion is threefold: Firstly, liquid assets and human capital contribute to the reduction of vulnerability, while health care does not reduce vulnerability. Secondly, the Interior and Western regions have a higher degree of vulnerability, while the Eastern region has a lower vulnerability, which “peaks” around 1995. Thirdly, the inequalities *within* regions contribute about 20-30% to vulnerability, while inequality *between* regions contributes about 70-80% to vulnerability. Therefore any policy that focuses on reduction of vulnerability in China should aim at supporting the accumulation of human capital and liquid assets as well as increasing accessibility of health care. Furthermore, a regional development strategy should be developed to address inequality in the Interior and Western region.

The second part “Fiscal decentralization and public service delivery” starts with the chapter “Fundamentals of fiscal decentralization and public service delivery analysis” which describes the Oates Decentralization Theorem and the principle agent problem which is the basis of the decentralization theory. It then links fiscal decentralization to economic growth and income distributional effects. In particular the effects of user-fees and social services are highlighted. The second chapter “Fiscal decentralization and public services delivery in China” emphasizes the effect of various forms of reforms, which started in the rural areas, and, then spread to the urban areas. As such, the health and education sector in rural and urban regions were influenced respectively by the de-collectivization of communal system and by the privatization State-Owned Enterprises (SOE) in which “hard budget constraints” resulted in drastic reduction, or in the worst case total elimination, of social services.

The third chapter of the second part of this thesis “The empirical evidence on the extend that public service delivery is a determinant of fiscal decentralization” uses OLS regression, OLS regression with Fixed Effect and Two-Stage Least Square (TSLS) and TSLS with Fixed Effect to determinate of fiscal decentralization through three Education variables (amount of students per teacher in primary education, amount of students per teacher in secondary education and amount of students per teacher in higher education) and three health variables (amount of doctors per bed, amount of beds per health institute and amount of medical personal per doctor). This will be undertaken respectively on the revenue and expenditure side, as well as on the growth of extra-budget revenue and extra-budget expenditures. As such, we undertake four separate families of regressions with four different dependent variables of fiscal

decentralization, which are respectively: (i) provincial budgetary expenditure as share of total budgetary expenditure at national level; (ii) provincial budgetary revenue as share of total budgetary revenue at national level; (iii) provincial extra-budgetary expenditure as share of the total budgetary expenditure at national level; and (iv) provincial extra-budgetary revenue as share of total budgetary revenue. The conclusion is that the quality of secondary and higher education has overall a negative impact on the fiscal decentralization, probably due to lack of international of spill-over effect caused by huge migration in China.

The final chapter of this thesis “Empirical analysis of vulnerability and public service delivery in China” focuses on the relation between vulnerability, as measured by the dependent variable food consumption, and the quality of public services delivery in the education sector (amount of students per teacher in primary education, amount of students per teacher in secondary education and amount of student per teacher in higher education) and in the health sector (amount of doctors per bed and the amount of beds per hospital). The section on “Methodology and robustness” presents the underpinnings of the OLS, OLS with Fixed effect, Two Stage Least Square (TSLS) and TSLS with Fixed Effect regressions as well as the robustness tests through lags of respectively one and two years. The conclusion is fourfold: (i) the quality of primary education has a negative impact on vulnerability, probable due to high inequality and to the selection bias of children from poor families being taken out of school (Connelly and Zheng, 2003); (ii) the quality of the secondary education service has a negative impact on vulnerability in all time lags with TSLS with Fixed Effect. Therefore, these results are strongly robust; (iii) the quality of higher education service has a negative impact on vulnerability. However, these results are less robust than the one with secondary education; and (iv) the health care has also a partially positive impact under the fixed effect.

Part 1: Vulnerability, Poverty and Assets

Introduction

The concept of poverty as well as how to combat it is continuously changing and is closely linked to overall development thinking of the time. From addressing poverty through industrialization, to participatory approaches and Sen capacity nowadays, the concept of poverty is evolving. The most recent trend in poverty thinking is to focus on vulnerability. As with previous concepts of poverty, vulnerability is in itself a reflection of a changing world. In rapid growing economies, especially in Asia, inequality and social disparities are rising. In these circumstances, it is important to estimate vulnerability as it not only provides a more realistic picture of the poor, but also offers a more dynamic poverty perspective, instead of using absolute poverty measurements which often focus on income and expenditure variables.

The issue of vulnerability is of particular importance in China since the reform and opening-up period that started in 1978. These reforms led to high levels of economic growth and to massive reduction of poverty, at least measured in absolute income terms. However, this coincided with growth in regional disparities as well as urban-rural inequality, particularly after the 1990s. At the end of this part of the thesis, vulnerability is defined as the risk to events in which a bad outcome could move the household into poverty on a regional level.⁵ This approach enables the identification of regions that are more vulnerable than others. The operationalization of this definition is to focus on the asset composition (liquid assets, human capital and health care) so as to measure resilience. By focusing on vulnerability, this part of the thesis will provide a new perspective on poverty in China as well as contribute to the vulnerability debate around the world.

There are several reasons for the growing interest in vulnerability in China. Firstly, although China is rapidly evolving economically, inequalities on a regional and social level are also on the rise.⁶ In these kinds of circumstances, it is important to estimate vulnerability as this provides a more dynamic poverty perspective, instead of using absolute poverty measurements which often focus on income and expenditure variables (Lipton and Maxwell, 1992). Secondly, vulnerability plays (Lipton and Maxwell, 1992) an important role in decision making of the poor because of their resilience to negative shock is low (Wood 2003). Therefore, vulnerability does not just result from poverty, it can also reinforce poverty. Thirdly, a relative small number of households in China have an average consumption below the poverty line, but a much larger number of households are just above the poverty line (Mc Culloch and Calandrino, 2003). Finally, vulnerability is important from social cohesion perspective as a negative economic shock could create social tensions and therefore threaten the development of a harmonious society in China.

The remainder of this part of the thesis is organized as followed. The first chapter, “The classical poverty debate” provides an overview of the evolvement of the poverty

⁵ This definition combines two elements: (i) the risk to an event in which a bad outcome could move the household into poverty (Alwang, Siegel and Jørgensen, 2001); and (ii) the identification of geographical area which is more vulnerable than other areas (Downing, 1991 and Guillaumont 2006)

⁶ Some coastal provinces in China have development indicators that perform more like a middle income country (such as in the area of literacy and infant mortality), while in western China these variables are comparable to low income countries (Kanbur & Zhang, 2005b).

concept as well as its desegregation (e.g. transitional and chronic poverty, Sen capacity, etc.). In addition, the three way relation between inequality, distribution and poverty is discussed. The second chapter “Various approaches to vulnerability” highlights the integration of the issue of vulnerability, which originated in the food insecurity and disaster management literature, in the domain of economics. The third chapter “Poverty and inequality in China” describes the impact of the “opening up” reforms on urban and rural poor as well as on the growth of inequality in health and education sectors. Finally, the fourth chapter “Empirical analysis of regional income, vulnerability and inequality in China using an asset based framework” presents an analysis of vulnerability using an asset based approach. This is achieved by estimating assets through a Theil inequality index, which is subsequently introduced into a logistic regression.

Chapter 1.1: The classical poverty debate

Introduction

The concept of poverty is not new and the vision how to combat it is linked to overall development strategy and political economy of the time. After decolonization, the prevailing view was that rural poverty and under-development would disappear by itself as result of industrialization. In mid-1970, this changed and poverty was conceptualized mainly in terms of income and calorie intake. These two pillars formed the basis of government intervention to reduce poverty. The former was addressed through wage and self employment, while the latter was tackled by mid-day meals for school children. In the 1990s, there was another shift in the conceptualization of poverty. The focus shifted away from income and employment towards human development, a broader concept that also includes education, health, housing rural roads, etc. It also emphasized the importance of empowerment and of participation in decision making of local government.

This chapter summarizes the poverty debate. The first section “Basic poverty approaches and its measurements” provides an overview of poverty and emphasizes ways to measure poverty through income or expenditure variables, relative poverty variables and what Amartya Sen called “capacity and endowment”. This latter would have to be measured through a participatory approach and individual interviews. The second section “Transitional and chronic poverty” emphasizes that the poor are not one homogenous group but can be divided in people that are sometimes poor and people that are permanent poor. The third section “Livelihoods and the dynamics of poverty” provides a framework to analyze “why” and “how” people move into and out of poverty. As such, it describes how households ascent from, and decent into, poverty. This framework therefore mainly focuses on transitional poverty. The fourth section “Health and poverty” underlines the importance of health care in avoiding households falling into poverty. The fifth section “Human capital and poverty” emphasized that education is a fundamental element in increasing the productive assets of individuals as well as in breaking the Inter-Generational Transmission (ITG) of poverty. The sixth section “Inequality-poverty-growth triangle” focuses on the inter-relationship between these three elements. In particular, it highlights that initial distribution of assets and income is important in determining the “poverty-growth path” of countries. Finally, “Synthesis on the evolution of poverty analysis” highlights the most important issues of this chapter.

1.1.1 Basic poverty approaches and its measurements

Traditionally, poverty has been measured through aggregated variables, such as GDP per capita, household income and expenditures, etc. Over time, poverty analysis has become more sophisticated and is measured through, among others, the following four ratios/indexes: Head-count Ratio, Poverty-gap Index, Foster-Greer-Thorbeche Index and Sen Index (Srinivasan, 2000):

1. The Head Count ratio, H , equals the proportion of the poor in the population;
2. Poverty-gap index, G , is the average over all the poor of the gap between the threshold. An alternative definition of poverty gap is GH ;

3. Foster-Greer-Thorbecke index $F(\alpha)$ is HJ where J is the average over all the poor, the α th ($\alpha \geq 0$) power of the poverty, instead of the gap itself as in the Sen index below; and
4. Sen index, $S=H[G+1-G]g$, where g is the Gini coefficient of the distribution of consumption or income among the poor.

The drawback of the ‘headcount’ definition is that the recipient unit cannot show the depth of poverty. This makes comparing poverty rates in two countries or comparing poverty in two different points in time difficult as it only conveys information on average income levels or shortfalls below poverty lines. Furthermore, from a policy perspective the head count poverty rate could be miss-used to measure effectiveness of anti-poverty policy as policymakers may be tempted to ‘cream-skimming’. This refers to the most cost effective way to reduce poverty which is to give a small transfer to the richest of the poor, in order to lift his or her income just above the poverty line and gain political prestige. However, for the households “far below” the poverty line, would not receive assistance as this would not reduce poverty in a statistical sense. The advantage of the Sen index is its sensitivity to redistribution of income among the poor which is not the case with the first poverty measure (i.e. the Head Count ratio) and the second measurement (i.e. poverty gap index) and remains unaltered if the position of the poor worsens (Bourguignon and Chakravarty, 2003).

As the poverty debate shifted from analyzing absolute poverty to inequality, the concept of relative poverty gained more attention. This measurement of poverty focuses on the relative poor, which considers people poor if they lack a certain amount of income in relation to the overall distribution in society. Historically, these kind of measures are more applicable to rich countries, but become more relevant in developing countries as inequality increases (Wong, 1995). Another advantage is more related to policy formulation, for example in allocation of funds. As such, inequality could be used to locate the severest rural poverty area’s. For these reasons the median income is used as the poverty threshold in developing and low-income countries, for example in Mexico (Salas, 2003) and Nepal (Wagle 2006). In the case of China, the use of relative poverty variables can be justified by the fact that some areas of this country perform more like middle income countries (such as in literacy and infant mortality). In rich areas, such as Shanghai, health indicators are on par with many western countries, while in western China, such as in Guizhou, these indicators are comparable to those of African countries (Kanbur & Zhang, 2005b). Therefore some researchers suggest that China should move from absolute to relative poverty analysis (Osberg and Xu, 2006).

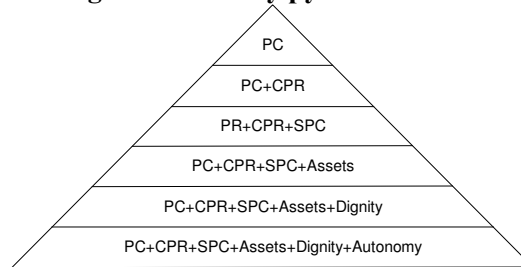
In the beginning of the 80s, the poverty debate perspectives changed again by the focus on what Amartya Sen called, ‘capabilities’ or the ‘choice set’ which an individual faces.⁷ To identify “capabilities” and “choice setting” of households, it is

⁷ Amartya Sen argues in *Development as Freedom* (Sen, 1999) that poverty must be seen as the deprivation of basic capacity rather than merely as lowness of incomes, which is standard criterion of identification of poverty. The perspective of capacity-poverty does not involve any denial of the view that low income is clearly one of the major causes of poverty, since lack of income can be a principal reason for a person’s capacity deprivation. However, the capacity-poverty approach does have the following advantage⁷: (i) poverty can be identified in terms of capacity deprivation. In this case, the approach concentrates on deprivations that are intrinsically important such as education and health status (unlike low income, which is only instrumentally significant); (ii) there are influences on capacity deprivation-and thus on real poverty-other than lowness of income (income is not the only instrument in generating capacities); and (iii) the instrumental relation between low income and low

important for communities to define their problems and local constraints (Linderberg 2002). This can only be done through interviews, townhall meetings, or other Participatory Poverty Assessment (PPA) approaches. Using this approach in several countries, the World Bank (World Bank, 2000b) identified the following issues that characterizes “being poor”: (i) lack of income and assets to attain basic necessities—food, shelter, clothing, and acceptable levels of health and education; (ii) sense of voice-less and powerless in institutions of state and society; and (iii) vulnerability to adverse shocks, linked to an inability to cope with them. The report further notes that to understand determinants of poverty in all its dimensions, it helps to think in terms of people’s assets, the returns on (or productivity of) these assets, and the volatility of returns. These assets are of several kinds: (a) *Human* assets, such as the capacity for basic labor, skills, and good health; (b) *Natural* assets, such as land; (c) *Physical* assets, such as access to infrastructure; (d) *Financial* assets, such as savings and access to credit; and (e) *Social* assets, such as networks of contacts and reciprocal obligations that can be called on in time of need, and political influence over resources.

The two schools of thought (i.e. the income/consumption concept and the participatory approach), are well conceptualized by schematized six-level pyramids, with private consumption at top of the pyramid and private consumption, common property resources, state provided commodities, assets, dignity and autonomy at the pyramids bottom of the pyramid (Baulch, 1996):

Figure 1: Poverty pyramid



PC = Private Consumption
 CPR = Common Property Resources
 SPC = State Provided Commodities

The traditional income or consumption approach’s concept of poverty prefers to focus on line 3 of the pyramid (private consumption, common property resources and state provided commodities), but often settles for line 1 private income due to difficulty of measuring consumption of state provided commodities and access to common resources. The participatory approach focuses on line 6 as it emphasizes “choice setting capacity” of these households. Therefore, it is important for households and community to define their problems and local constraints (Baulch, 1996). The challenge, or complementarities of these two approaches, comes when survey data is analyzed alongside the outcome of a participatory approach exercise as the results could be different (Bourguignon and Chakravarty 2003).

capacity is variable between different communities and even between different families and different individuals (the impact of income on capabilities is contingent and conditional).

The emphasis should therefore be on the difference between paradigms of poverty. One is on consumption or expenditure variables, while the other on a broader set of “no capacities or opportunities” through unequal access to education & health facilities, financial capital and political influence. A good example is the experience in Uganda. The incidence of poverty in this country declined from 56% in 1992 to 35% by 2000. Nevertheless, there was widespread discontent and the “feeling” of poverty increased.⁸ This was the basis for numerous studies in Uganda (Lawson, McKay, Okidi 2003) which analyzed the difference between the Uganda National Household Survey (UNHS) and a complementary Uganda Participatory Poverty Assessment Process (UPPAP). Although methodologically different,⁹ the findings illustrate the difference between poverty income analysis based on consumption and poverty measured through multi-dimension perspective by a participatory approach.¹⁰ While the household income indeed rose, this was not translated into “wellbeing” due to: (i) abuse of alcohol; (ii) increase in food insecurity; and (iii) gender discrimination.

The discussion on the link between poverty reduction and overall wellbeing highlights the importance of an all round understanding of “wellbeing”. The Human Development Indicators (HDI) attempt to broaden the scope of poverty analysis beyond the classical definition of household expenditures. This requires not only to analyze welfare gains, or loss, with macro-economic indicators (GDP, GNP) but also

⁸ The difference of perception could also be linked to two distinct constituencies (Kanbur, 2001). Group A could be labelled “Finance Ministry” and includes, employees of the Minister of Finance, International Financial Institutions and Regional Banks. Group B, could be labelled “Civil Society” and includes analysts and advocacy and operational NGOs and some of the UN specialized agencies, aid Ministries in the North and social sector ministries in the South. The basic difference in perspective and framework of these two groups are the following three characteristics: Aggregation, Time Horizon and Market Structure. First, Group A tends to view the consequences of economic policy in much more aggregative terms than does Group B. Second, Group B’s major concerns are with consequences over a time horizon which is both much shorter and much longer than the “medium term” horizon which Group A typically adopts. Third, Group A instinctively approaches the distributional consequences of economic policy through a competitive market structure, while Group B instinctively thinks of a world in which market structure is characterized by pockets of market power, and economic policy feeds through this non-competitive structure to the consequences for the poor.

⁹ Methodologically, there is also a difference in sample size, referral period and different interval. The approaches of these exercises were not the same in terms of: (i) Different dimension of poverty, the UNHS confining itself to household consumption shortfall and UPPAP ranging through material and non material dimension as experiences at various levels of society – individual, household, community and nation; and (ii) Different assumptions about the relationship between household consumption and the well-being of household members. Where the UNHS takes a rise in household consumption to indicate an increase in household well-being, implicate equally beneficial to all members, UPPAP makes no such assumption. Instead it facilitates people to arrive at their own definitions of increased or decreased well-being and to trace the changes in component parts of this which have an impact on their overall well-being. However, the findings between the two exercises clearly indicate the limits of income poverty and value added of a multi-dimensional approach through a participatory exercise.

¹⁰ The differences were: (i) PPA participants registered some increase in their consumption over the years, which is consistent with the survey data. However, it did not enhance well-being, as it sometimes led to consumption of alcohol which led to domestic violence, reduced household earnings due to labor lost through drunkenness and the heighten risk of sexual transmitted diseases like HIV/Aids; (ii) the overall impression of decrease in food insecurity. Participants noted two main dynamics: environmental changes producing climatic shocks and progressively worsening yield; and (iii) gender was also noted in the PPA exercise and found that poor women – especially but not only widows and co-wives – face social, economic, legal and cultural constraints, discrimination and barriers that men do not. There was evidence that as awareness has spread in Uganda about women’s rights, there is greater dissatisfaction among women, and some resentment among men towards changing gender roles.

to take into consideration the Human Development Index (HDI), the Human Poverty Index (HPI) the Gender Development Index (GDI) and the Gender Empowerment Measure (GEM). This would help to determine “who” gains or loses. From a human development perspective, this is important as all increases in income are not equal. Among the poor, income increases are likely to have a greater impact on advancing overall human development. The reason is simple: diminishing marginal returns in income with respect to human development (Mckinley, 2001). In other words, one dollar earned by the poor carries more weight than one dollar earned by the rich.

Human Development can also be viewed from an inter-temporary time perspective and would be similar to the definition of sustainable development. Although this term was mainly preserved to the domain of environmentalists, public health workers and other domains of social sciences, it is currently also being used widely in the domain of economics. A widely accepted definition of sustainable development is “development that meets the needs of the present without compromising the ability of future generations to meet their needs.” While the first part of this definition relates to conventional economic and social objectives of development, the second part incorporates a long-term view (Veron, 2001).

To sum up this section, when analyzing poverty it is important not only to focus on income and expenditure variables, but also on non-monetary measurements such as water, shelter and food and assets such as health and education. The importance of non-monetary poverty is also reinforced by the limitation of the usual income and consumption measures. This is because traditional variables for chronic deprivation may not be enough to address multidimensional deprivation as this is likely to underpin long-term poverty (Hulme and Shepherd, 2003). Unfortunately, the literature on the relation between non-monetary poverty and monetary poverty is limited. A study in Vietnam analyzed monetary and non-monetary variables of poverty (Baulch and Masset, 2003). This study noted that monetary poverty is less persistent than child stunting and malnutrition among adults. Monetary poverty is also less persistent than primary and lower secondary school enrollments. Such immobility reflects well-known irreversibility in education and nutrition. The study therefore found a modest association between monetary and non-monetary poverty variables, both in the static and dynamic context.

1.1.2 Transitional and chronic poverty

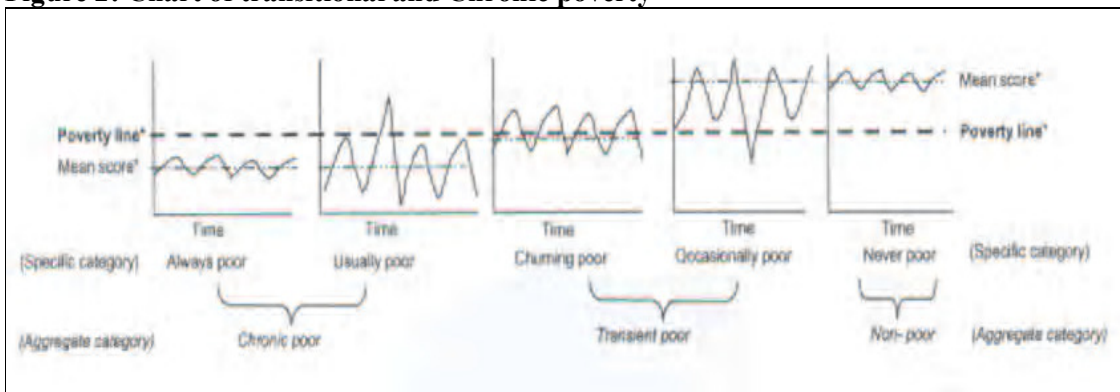
The debate on poverty has been further refined by the desegregation of the poor in groups of people with different characteristics. Some people are permanently poor, while other people are poor only during a certain moment of the year (due to seasonal employment) or a certain moment of their life (life-cycle poverty). For example, the poverty of a farmer who becomes poor in a certain year because his harvest fails due to adverse weather shocks (even though with a normal harvest he would not be poor) is not the same as the poverty of a person whose land holding is too small to provide an adequate harvest even with ideal weather (Srinivasan, 2000). The former is referred to as transitional poor, while the latter is referred to as chronic poor.

Chronic poverty is usually distinguished from transitory poverty by its duration. This means that chronically poor are identified not so much by income in a year as by low variation in income over a period of several years that is continuously below the poverty line. It is also useful to separate people that move in and out of poverty, often as a result of seasonal or random shocks (including armed conflict), from people that are permanently poor and tend to live on the margins. In addition, chronic poverty is

often conceptualized as poverty that is transmitted from one generation to the next. As such, children from poor households are likely to become poor adults. This is similarly with ultra-poor, defined as individuals living below half of the poverty line (Aliber, 2003).¹¹

Some researchers separate the transitional from the chronic poor by the criteria of living under the poverty line for a period of five years. There are three arguments that can be used to support this criteria (Hulme and Shepherd 2003). The first argument is that a five year period is perceived in most cultures as a significant period of time in an individual's life. The second argument is that there is often a five-year gap between data collection points when panel data are created so that in practical terms the study of poverty duration will often be based on a five-year period. The third and strongest argument is that if a person is poor for a significant period of time, e.g. for five years, he or she is like to remain in poverty on a long-term basis.

Figure 2: Chart of transitional and Chronic poverty



Source: Hulme and Shepherd, *Conceptualizing Chronic Poverty*, World Development, 2003

Using the poverty-line as entry point, chronically and transitional poor can further be sub-divided as followed:

The chronically poor, include:

- The always poor, whose poverty score in each period is below a defined poverty line; and
- The usually poor, whose mean poverty score over all periods is less than the poverty line, but who are not poor in every period.

The transitional poor, include:

- The fluctuating poor, who are poor in some periods but not in others, and have a mean poverty score around the poverty line; and
- The occasionally poor, who have experienced at least one period in poverty although their mean poverty score is above the poverty line.

Two main methods have been adopted to identify and measure chronic poverty (in practice chiefly income or consumption poverty)¹² based on suitable panel data: the “spells” and “components” approaches. In the spells approach, the chronic poor are

¹¹ The definition of the poverty-line is the following: a monetary sum necessary to obtain 2,100 calories per person per day, which can be referred to as “food poor”. This can be supplemented with a modest allowance for essential non-food expenditures such as fuel and housing, which is referred to as overall poverty.

¹² This is because poverty data is traditional collected with consumption and expenditure indicators.

identified based on the number or length of spells of poverty they experience so that all poor households are classified as either chronic or transitional poor (see Figure 2). The “components” approach distinguishes the permanent component of a household's income or consumption from its transitory variations, and identifies the chronic poor as those whose permanent component is below the poverty line. A common approach in identifying the permanent component is based on the intertemporal average income for the households. An alternative procedure for identifying the permanent component is based on the predictions of a statistical (regression) model capturing the relationship between a household income or consumption level and its characteristics. This kind of models aims at purging the effect of transitory shocks (Mckay and Lawson, 2003). Classifying households through assets rather than expenditure reveals a bigger gap between rich and poor and gives a more stable picture over time (Chronic Poverty Report, 2004).

A paper on rural China noted that the determining factor between chronic and transitional poor was the average wealth holding. However, household demographics, education levels and health status of household members –while important for chronic poverty – are no significant determinants of transient poverty (Jalan and Ravallion, 1998). At global level, the groups of people that have been identified to be particularly likely in chronic poverty are: (i) those experiencing deprivation because of their stage in the life cycle (for example, older people, widows, families with young children, children); (ii) those discriminated against because of their social or ethnical position at a local, regional or national level; (iii) household members who experience discrimination within the household; (iv) those with health problems; and (v) people living in remote rural areas and poor urban (Hulme, Moore and Shepherd, 2001). In addition, the issue of chronic poverty is also linked to the direct impact of violent conflicts as this is likely to increase chronic poverty due to high dependency ratios caused by an increase proportion of the old, women and disabled in the population.¹³ This will amplify the intergenerational transmission of poverty. This latter is reinforced by gender based violence and spread of HIV/AIDS (Goodhand, 2003).

1.1.3 Livelihoods and the dynamics of poverty

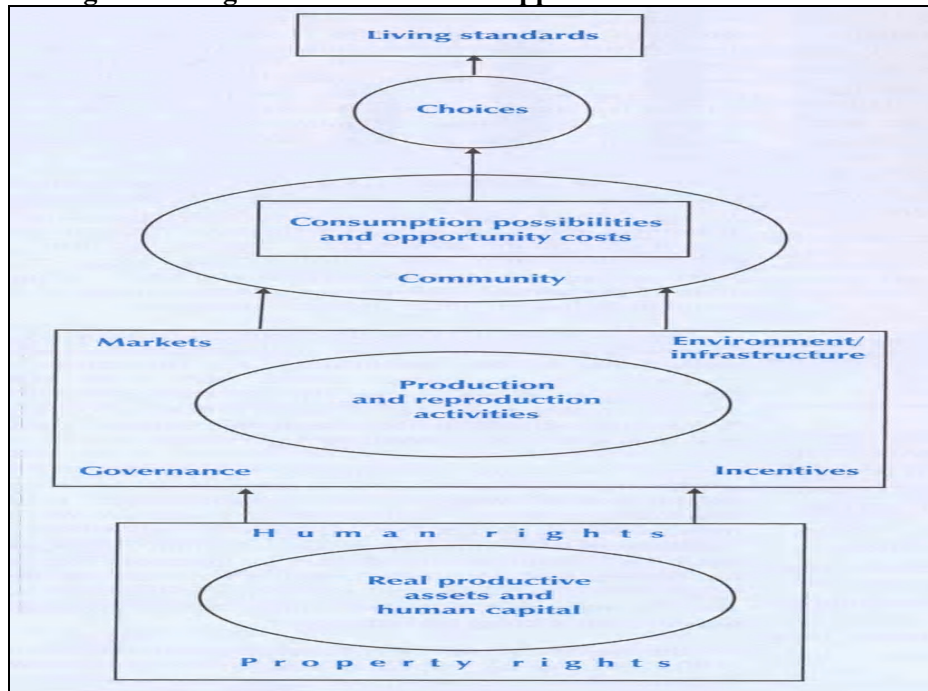
The origins of the livelihood approach can be found in food security literature, in particular the endowments and entitlement approach of Amartya Sen. As with the Human Development Index (HDI), the livelihood approach seeks to broaden the scope of poverty beyond income and expenditure variables, which are based on return on assets (Ellis and Bahiifwa, 2003). According to the livelihood framework, the level of well-being depends on the assets it has access to (classically financial, human, natural, physical and social capital); the factors that mediate their access (for instance, gender relations or how markets operate) and contextual factors such as macro policies to mitigate shocks. This is reflected in figure 3. At the center of the livelihood approach is an economic relationship between livelihood assets, and the outcomes that result from these activities in terms of improving or worsening the welfare and

¹³ This is important as eighty per cent of the world's twenty poorest countries have suffered a major civil war in the past 15 years. The issue has been analyzed by Paul Collier and he has identified three high-risk economic characteristics (low income, low growth and dependence upon natural resources) that make countries *prone* to conflict (Paul Collier speech to the second committee of the United Nations, 5 October 2004). Furthermore, The World Bank's classification 'Low Income Countries Under Stress' (LICUS) identifies 27 countries; UNDP's 'fragile states' cover 46 countries.

wellbeing of the individual or family (Freeman, Ellis and Allison, 2004). The livelihood approach can be applied at family level (Linderberg 2002) and community level (Sen, 2003) and country level (UNCTAD, 2002).

The livelihood approach can be expanded to include political and social exclusions, which comes close to Sen's deprivation of basic capacity (Sen, 1999). Rather than merely focusing on lowness of income, which is a standard criterion for poverty identification, it focuses on the "capacity" of individuals to climb out of poverty. The perspective of capacity-poverty does not deny that low income is one of the major causes of poverty, since lack of income can be a principal reason for a person's capacity deprivation.

Figure 3: Diagram of the livelihood approach



UNCTAD, Least Developed Countries Report, 2002

As such, the livelihoods approach places emphasis on achieving an "all-round" understanding of making a living, comprising not just the conventional categories of employment and incomes, but also that of the asset basis of people's livelihoods and the vulnerability factors they confront. The definition of vulnerability, as applied to the livelihood framework, refers to the capability of households to cope with, and recover from, shocks and trends of varied nature (e.g. environmental, economic, political etc.) as well as seasonality (Brugere and Lingard 2003). The risk of falling into poverty is important as it figures as a central element in the peasant mentality of the poor as they focus more upon reproduction than production as central motivation for managing their risk whether annual or during a life cycle (Wood, 2003).

The livelihood framework provides a framework for analyzing a diversity of activities and also the risk of falling into poverty. Therefore diversifying income opportunities could reduce vulnerability. Diversification is captured by the Herfindahl index which calculates the wealth shares held as farm, non-farm, and livestock assets. The

Herfindahl index of concentration, H , is calculated as $H = \sum_i (s_i)^2$, where i = livestock, farm and non-farm assets, and s indicates the shares of the various assets (Block and Webb, 2001).¹⁴

Diversification has a “push” and “pull” factor. The first set of motivations comprises the traditionally termed “push factors” and include risk reduction, response to diminishing factor returns in any given use, such as family labor supply in the presence of land constraints driven by population pressure and fragmented landholdings, reaction to crises or liquidity constraints, high transactions costs that induce households to self-production in several goods and services, etc. The second set of motivations comprises of “pull factors”: realization of strategic complementarities between activities, such as crop-livestock integration (Barret, Reardon and Webb, 2001).

The dynamics of ascending and descending can also be used in a livelihood framework. A study in Bangladesh noted (Sen, 2003) that ascending households generally accumulate different assets, especially human and physical assets, diversify assets into higher income-yielding nonagricultural assets as well as re-orientate from agricultural activities to non-agricultural activities. Descending households often experience income shocks arising principally from ill health or natural disaster. Therefore, the initial asset base is an important factor that distinguishes ascending poor from chronic poor. A study in Uganda (Ellis and Bahigwa, 2003) also noted the importance of the role of initial assets in ascending poverty. The emerging picture in this study was that poorer groups in rural Uganda depend principally on food crop agriculture, seasonal wage income, and remittances for their livelihoods, while the better-off combine food crop agriculture with rising livestock holdings and widespread engagement in non-farm self-employment activities. They also point out that raising farm output would help the less-poor, but the poorest of the poor have the least access to land, and thus policies aiming to raise food crop yields would principally benefit the already well off.

Diversification might be hampered by remoteness of areas, due to the distance of markets. For example, research in Zimbabwe (Bird and Shepherd, 2003) demonstrated that there was a strong link between remoteness and chronic poverty. Relative urban proximity supports income diversification and poverty reduction. However, remote areas had difficulty diversifying because high transport costs and low economy of scale, combined with low provision of government services and infrastructure. Lack of market access and remoteness are key determinates of poverty for indigenous forest dwellers (Poole, 2004).

A study in Latin America (De Janvry and Sadoulet 2000) identified four potential paths out of poverty for the rural and agricultural poor which are: (i) rural-urban migration; (ii) agricultural growth for households with sufficient access to land, and low and public institutions and low transaction costs; (iii) off-farming income combined with income from small plots for poor rural households and (iv) assistance to the chronic poor, who have insufficient minimum resources, and transitional poor suffering from shock, illness or bad weather. This study also notes that de-diversification was evident in descending households, i.e. becoming more dependent on one particular source of income. In another study, de-diversification was a coping

¹⁴ Herfindahl index focuses on asset concentration (dependence in terms of income and wealth derived from capital stocks) and can therefore be used as a measurement of diversification.

strategy, (Niehof, 2004) in which narrowing diversification leads to one-sided income sources as well as increasing dependency on a smaller resource-base.

The narrowing down of diversification of income as coping strategy was contradicted by a study of nine villages in Laos (Bouahom, Douangsavanh and Rigg, 2004) which found that diversification and non-farm activities of household may not only be a “progressive”, but also a “distress” strategy. This is reinforced as land scarcity increases and market extension lead to migration and remittance.¹⁵ Another coping strategy, reduce vulnerability of households, is reliance on natural resources in times of stress. In difficult times, rural communities may turn to forest resources, like bush meat or other wild animals, to provide foods. However, again the extreme poor do not have the equipment to hunt (Merode, Homewood and Cowlshaw, 2004) or, in the case of Nepal, are excluded from this resource because of membership of an inferior caste (Adhikari, Di Falco and Lovett, 2004).

The advantage of the livelihood approach is that it provides a framework to analyze poverty in dynamic manner, in particular with regard to diversification strategies of the poor. However, the drawback of the livelihood approach is that it only provides a framework for analyzing transitional poverty and not for chronic poverty (De Janvry and Sadoulet 2000, Wood, 2003). Often the poorest of the poor have many barriers to diversification of income, especially if they are already resource constrained.

1.1.4 Health and poverty

Health and poverty are closely related as illness can cause impoverishment through a downward spiral of income loss, treatment costs and asset depletion. This constitutes the single largest factor associated with descending households (Jalan Ravallion 1998, Sen 2003). This is particularly the case as many developing countries lack universal health care insurance and therefore expenditures are paid “out of pocket” (Doorslaer and O'Donnell, 2006). This becomes a bigger problem as people become poorer and eventually are excluded from critical health care. This is because out of pocket expenditures add to other barriers that poor people face when seeking health care, and contribute to social exclusion. Even relatively small health care payments might push vulnerable households into absolute poverty or deepen their poverty (Gilson & McIntyre, 2005). Therefore the issue of minimizing risk is a key element in the debates on health care systems and poverty (Kawabata, Xu, & Carrin, 2002; World Bank, 2004b; Xu et al., 2003).

The manner in which health expenditures affect poverty in the context of the livelihood framework, is through the exposure of households to large and unpredictable health payments. This brings substantial financial risk and in the most extreme case, can result in impoverishment. This is also related to the triangle of poverty, health-service access and use, and the failure of social mechanisms to pool financial risks accounts for most of the variation across countries (Xu K, al 2003). The “severity” of financial stress is linked to depth and duration of illness. In addition, capacity to cope depends on household asset portfolios (physical and financial capital, human capital, social networks) and policy-related resources included health services as well as other public policy measures (e.g. education services) or community-based initiatives (e.g. micro-credit institutions) that contribute to resilience. Therefore, public health care for households reduces vulnerability to illness costs.

¹⁵ Unfortunately, the research did not desegregate in terms of human capacities and education levels, which could have indicated if this was “progressive” or “distressed” diversification strategies.

Besides the interconnected health and poverty in regard to transitory poverty, health hazards can also cause chronic poverty if illness impacts the capacity of households to escape poverty (Wagstaff 2002). This is especially true for chronic illness such as HIV/AIDS, which deplete assets by increasing health care costs as well as reduce income opportunities, all of which make breaking out of the cycle of poverty even more difficult.

1.1.5 Human capital and poverty

Human capital, roughly speaking, refers to the quality of labor, including knowledge and skills obtained through education and training, but also of the wellness of labor which depends on the health condition. Human capital and poverty are linked through educational investments that influence productive capacities of individuals (Adamu, 2003). Therefore acquiring productive skills enhances the capacity of individuals to earn a livelihood. Human capital therefore has a two-fold objective of building skills and providing productive employment.

This fits into the livelihood framework as an increase in human capital improves productive capacity. With an increase in human capital, households have a stronger resilience from becoming poor after a negative shock. This has also been demonstrated by research on human capital. For example, Adam and Jane (Adam and Jane, 1995) in Pakistan and Campa and Webb (Campa and Webb, 1999) in Peru, found that increased levels of education reduced the probability of chronic poverty. Evidence from other studies suggests that increased education in general reduces the probability of poverty (Mc Culloch and Baulch, 1999). In addition, Olaniyan (Olaniyan, 2002) found that the most important determinant of household poverty in Nigeria is the educational attainment of the household head. Therefore, the education system is the first entry point to increase human capital and reduce the probability of falling, and remaining, in poverty by enhancing income opportunity.

The strong relation between human capital and poverty could be explained by the important role of labor, which constitutes the main productive asset of the poor (World Bank, 2000b). As human capital increases the productivity of labor, it enhances income opportunities as research indicates a positive relationship between education and labour market outcomes. In addition, Olaniyan (Olaniyan, 2002) found that the most important determinant of household poverty in Nigeria is the educational attainment of the household head.

Besides the effects of human capital on transitional poverty, human capital also affects chronic poverty, most notably through the Inter-Generation Transmission (IGT) of poverty. Investment by parents in their children's education is seen as a vital human capital investment. Unfortunately, the persisting discrimination (for example, around gender, caste and ethnicity) can create inequality between who is educated and for how long. In addition, maternal education is identified as particularly significant, especially in terms of nutrition information for the well-being of children. As such, early enrolment in schools and sustained education have been shown to influence adult income-earning potential.

In sum, one could state that human capital has a direct impact on productivity, employment, income generation and standard of living. This implies that human capital development leads to improved capability and ultimately a reduction in poverty. Moreover, public education is demonstrated to be a significant pathway for

breaking the Inter-Generational Transmission (ITG) of the poverty cycles as well as for the “catching-up” after a bad start in life due to poverty.

1.1.6 The Poverty-Growth-Inequality Triangle

The relation between growth and inequality has traditionally been observed through the Kuznet-curve, which demonstrates the relationship between inequality and growth. The hypothesis is the existence of an inverted-U hypothesis, i.e. if a country has a low development level, but at the same time has a growing economy, then inequality will first grow and subsequently, at a certain level of economic wealth, inequality will be reduced. The research on the Kuznet hypothesis is based on cross-country data. In the 1970s there was particular strong evidence for this thesis (Ahluwalia, Carter and Chenery 1979). However, as datasets became better and more accurate, the Kuznet curve has been undermined (Bourguignon, 2004).

Recent theories on inequality and growth emphasize the importance to understand why in one setting the same rate of economic growth might be less effective in reducing poverty than in another setting. In an economy where inequality is persistently low, the poor obtain a higher share of the gains from growth than in an economy in which inequality is high (Timmer, 1997). Therefore, higher initial income inequality entails a lower (absolute) elasticity of poverty to average incomes. Research has indicated that this is also the case in some of the poor states in India (Ravallion and Datt, 2002) where growth reflects the differences of initial economic structure, namely the access of different groups to productive assets (Birdsall and Londono, 1997).

There are three channels through which inequality makes poor less sensitive to growth. The first channel are the assets needed for collateral. From a capital market perspective, physical assets are likely to affect the extent to which poor people participate in economic growth. This credit-market failure argument explains that the initial distribution matters to the rate of growth by suggesting that the asset poor people are mostly locked out of growth prospects. This leads to underutilization of their productive and growth potential compared to a more equitable society. In this manner, greater initial asset poverty will mean that occurring growth is less (income) poverty reducing (World Bank, 2006).

The second channel through which inequality makes poor people less sensitive to economic growth is accessibility of public services such as education and health care. In this perspective inequality in education is important as this affects the degree to which the poor are equipped to participate in revenue generating opportunities. This issue has been confirmed in research in India (Drèze and Sen 1995), and in Indonesia (Thorbecke and Hong-Sang 1996). In addition, inequality in health care leads to less accessible health institutions which make the poor more dependable on “out of pocket expenditures” (O'Donnell *et al*, 2007). This becomes more significant when the proportion of social insurance, taxation, or private insurance becomes smaller.

Finally, the third channel is that high inequality leads to more ineffective social programmes because of increased corruption. This is because in highly unequal societies, elite tends to capture the state at different levels depending on traditions of political participation, voter awareness and literacy, allocation of social and economic power within communities, lobbying and campaign contributions by wealthier groups,

fairness and regularity of elections, transparency in local decision-making processes and government accounts and media attention (Bardhan & Mookherjee, 2000).

An initial unequal asset base could result in a “twin peak” in which two peaks exist in the distribution of wealth. Twin peaks imply a country polarized between rich and poor (Quah, 1993). This is the case in Brazil where inequality did not change between 1976 and 1996, whereas the mean income per capita overall increased (Ferreira and Paes de Barros 1998). To avoid such a “twin peak” growth path, inequality needs to be addressed through better distribution of assets. This discussion is also referred to as the poverty-growth-inequality triangle by Bourguignon (Bourguignon, 2004) in which redistribution of *wealth*, not income, is underlined. The important point is that the former may favorably affect economic efficiency and growth, while the latter does the opposite.

Synthesis on the evolution of poverty analysis

This chapter provided a literature overview of various poverty dimensions as well as determinates of poverty. The first observation is that the poverty conception is moving beyond the standard income or expenditure analysis and is becoming more multidimensional. In itself this is linked to the current overall development challenges, including environmental degradation, urbanization, and higher inequality which could lead to social unrest or civil strife. In this context, multidimensional poverty better captures the dynamics of poverty, i.e. why households move into and out-off poverty. The second observation is that livelihood approach is suited to analyze the dynamics of poverty. However it does not measure chronic poverty. The third observation is that ascending households often rely on a wide range of assets (Human capital, liquid assets, etc.), while descending households are caused by income shock often due to ill health. This is also linked to the vulnerability as well as the resilience of households. The fourth observation is that China’s current policy favors physical capital investment over investment in education and health. In 2004, the governmental expenditure on schooling and medical services accounted for only 2.79% and 0.37% of the nation’s GDP in China. At the same time, roughly 44% of the nation’s GDP was devoted to physical capital investment. In the United States, those figures were 5.4 % and 17% in 1995 respectively (Heckman, 2005). Finally, the inter-linkages between poverty, distribution and growth were discussed. This issue is particularly relevant to China as this country is suffering from high inequalities in initial asset distribution. This could lead to a “twin-peak” situation, whereby growth will lead to high-inequality on a permanent basis. This in turn could leads to additional social tension.

Chapter 1.2: Various approaches to vulnerability

Introduction

While the poverty debate has been dominated by the traditional school (focused on income or expenditure variables) and the capacity school (focused on human capital, public health care, social networks, assets, etc.), a new field in the poverty literature has emerged that emphasizes vulnerability to poverty. The growing interest in this field is linked to the changing poverty profile, in particular in Asia. In the past, a relative simple measurement of poverty, based on income or expenditure variables, was used to determine poverty. However, as economies have grown and absolute poverty has declined, newer forms of risks and poverty have been observed, including the risk of becoming poor. This is referred to as vulnerability and is important for two reasons. Firstly, many developing countries, especially in Asia, are economically rapidly evolving and inequalities on a regional and social level are also on the rise.¹⁶ In this kind of circumstances, it is important to estimate vulnerability as this provides a more dynamic poverty perspective, instead of using absolute poverty measurements which often focus on income and expenditure variables (Lipton and Maxwell, 1992). Secondly, vulnerability plays an important role in the decision making of the poor because their resilience to negative shock is low (Wood, 2003). Finally, from a political perspective, vulnerability is important as addressing this issue reduces social tension and civil strife during a macro-economic downturn.

This chapter presents the vulnerability perspective in the poverty literature. The first section “Origins of vulnerability approach and Sen’s capacity” highlights that vulnerability originates from the food insecurity literature as well as the importance of “resilience”. This latter is closely linked to capacity approach of Amartya Sen. The second section, “Conceptionalization of vulnerability” presents several models in which vulnerability is disaggregated. The third section “Criteria of vulnerability” emphasizes the risk of becoming poor and the role of asset accumulation (human capital, health care and physical assets). The fourth section “Livelihood and vulnerability” focuses on analysis of the dynamics of poverty on the basis of the livelihood framework. The fifth section “Vulnerability and poverty” highlights the difference between poverty and vulnerability, in particular that vulnerability focuses on transitional poverty and less on absolute poverty. The six section “Measurements of vulnerability” emphasizes the various methods to measure vulnerability. Finally, “Synthesis on the various approaches to vulnerability” highlights the most important issues of this chapter.

1.2.1 Origins of the vulnerability approach and Sen’s capacity

Although vulnerability in economic research has not often been used in standard poverty analysis, which focuses on aggregated income and expenditure variables, it is common in the food security and disaster management literature. A well accepted definition of vulnerability in the field of food security/famine is “an aggregated measure, for a given population or region, of the risk of exposure to food insecurity” (Downing, 1991). As such, vulnerability is a function of exposure to shock and

¹⁶ Some coastal provinces in China have development indicators that perform more like a middle income country (such as in the area of literacy and infant mortality), while in western China these variables are comparable to low income countries (Kanbur & Zhang, 2005b).

resilience of households and correlates positively with the probability and impact of a shock and negatively with the resilience and its determining factors. Vulnerable people are extremely sensitive to shocks because seasonal events or unforeseen circumstances cause them to fall below the threshold of poverty as their ability to manage a shock is weak (Misselhorn, 2005). Variables used to estimate vulnerability in this literature are child malnutrition, child mortality, consumption, or standard measures of poverty.

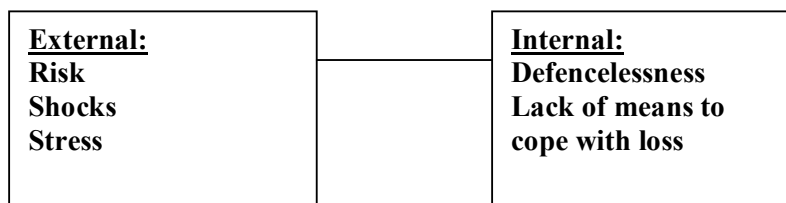
Vulnerability is also closely linked to the resilience of households, which, in turn is strongly associated with entitlements and capacity. The strength of resilience is important as this could protect households from adverse shocks. In this framework, “resilience,” or the capacity of recovering from the negative effects is also influenced by the amount of assets and entitlements that individuals, households, or communities can mobilize in the face of hardship. Vulnerability refers to the capability of households to cope with, and recover from, shocks and trends of varied nature (e.g. environmental, economic, political, etc.) as well as seasonality (Brugere and Lingard, 2003). Factors that could reducing vulnerability are liquid assets, including disposable items (classically, jewelry and livestock), social networks and public interventions (Hulme and Shepherd, 2003). In addition, safety-nets can reduce vulnerability through *protective effects* which are measures to prevent the non-poor from slipping into poverty (Ravallion, van de Walle and Gautam, 1995). Vulnerability is therefore closely linked to the lack of asset ownership. The more assets people have, the less vulnerable they are, while a reduction of people’s assets leads to greater insecurity.

In this sense, it should be noted that absolute poor are also the ones that lack any resilience against poverty as they do not have formal or informal safety networks. For example, some research argued that in the case of Guyana (Pelling 1999), the support networks in terms of disaster mitigation have been appropriated by the local elites, while vulnerable groups are excluded from decision making. This lack of political participations reinforces their vulnerability.

1.2.2 Conceptualization of vulnerability

As the origins of vulnerability can be found in the food insecurity and disaster management literature, the conceptualization of vulnerability also originated from this academic field. In the beginning of the 1980s, vulnerability was disaggregates between external “threats” and “internal” resilience (Figure 4). In later years this became more complex.

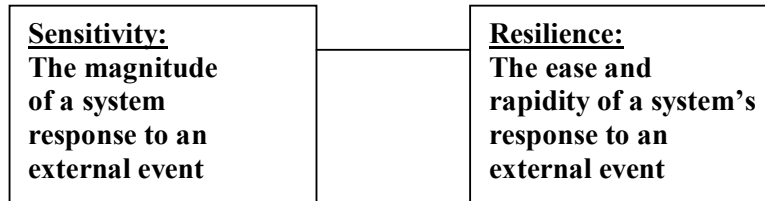
Figure 4: Chambers' external and internal side of vulnerability



The starting point of disaggregation of vulnerability is the internal/external distinction proposed by Chambers (Chambers 1989). As such, there are two sides: an external side of risks, shock and stress to which an individual is subject to, and an

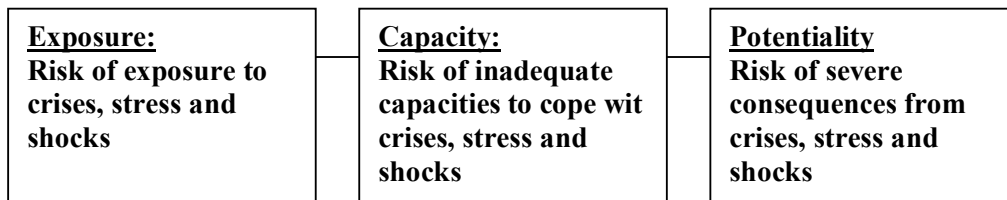
internal side which is defencelessness, meaning lack of means to cope without financial and material losses (Chamber, 1989). The two-step model of Chamber forms the basis of understanding vulnerability. The internal/external distinction at micro-level (at individual or households level) replicates the key distinction in “disasters” literature at macro-level about hazard and populations (i.e. at country level).

Figure 5: Moser’s two dimensions to vulnerability



The emphasis in the sensitivity or resilience model of vulnerability is twofold. The model emphasizes (Moser, 1998) the extent and severity of the interaction between the external “hazard” and the internal “capacity” (sensitivity), and the strength of the “system” to recover from an external hazard (resilience). The model stresses the importance of “capacity” of individual and households to respond to stress. This is reflected in the importance which Moser places on assets. Resilience is inverse to vulnerability, which means that vulnerability could be reduced with an increase in the capacity of the public sector to provide public services (health and education facilities). As such it provides a safety-net to groups of people and reduces vulnerability towards illness and demographic family factors.¹⁷ Furthermore, the capacity provided by private households (accumulation of disposable income, liquid assets and fixed assets) is key in mitigating negative shocks of households.

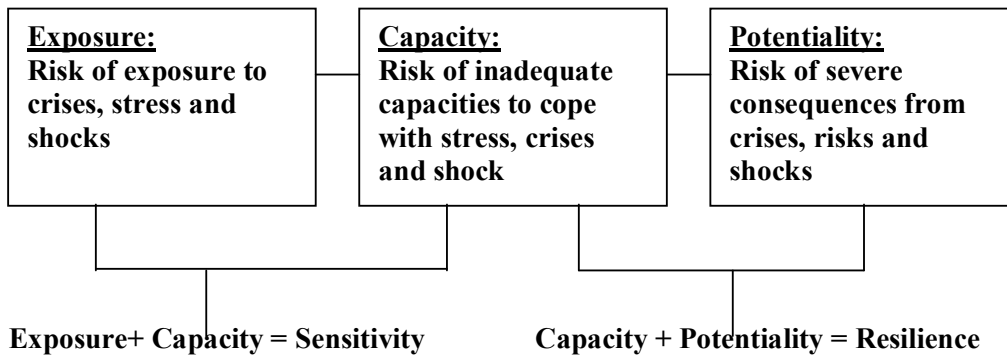
Figure 6: Watt and Bohle’s “space of vulnerability”



The three-step model (Watt and Bohle, 1993) adds a further dimension to vulnerability which is concerned with the downstream consequences of being exposed to a shock or stress, and not mobilizing the resources to cope with the negative situation. The model in figure 6 suggests why Moser’s sensitivity/resiliency conception places such an emphasis on assets and capacities. It could be argued that *sensitivity* in Moser’s model brings together both the exposure and capacity aspects of the “space of vulnerability” while the resilience aspect of vulnerability brings together both the capacity and potentiality aspects of the “space of vulnerability”.

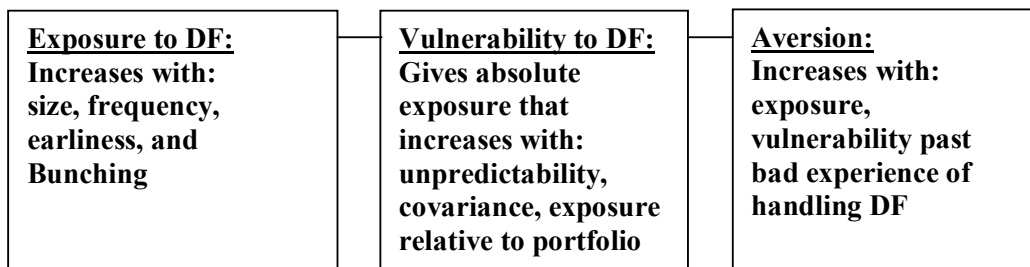
¹⁷ Although, China has a only child policy, demographic factors also included female headed households and health situation of parents, etc.

Figure 7: Combining Moser’s approach with Watts and Bohle’s three co-ordinates of vulnerability



The combination of Moser’s approach with Watts and Bohle’s three co-ordinates of vulnerability produces figure 7. This figure suggests that Moser places primary significance on assets and capacities as a determinant of vulnerability because the *sensitivity* as well as and the *resilience* dimensions of the conception of vulnerability include capacity. For the “transient poor”, the potentiality of suffering a shock, and not having the right capabilities could result in an increase in poverty which may take the individual/households below a defined poverty line. The effect of this, however, is not necessary permanent as “transiently poor” households are more resilient and may manage to escape poverty. This process is different for those who are chronically poor or become chronically poor. The potentiality of suffering a shock and not having the right resources to cope means for chronically poor households the risk of an increase in depth and duration of poverty, possibly leading to premature death. Therefore, the extent of the potentiality of vulnerability, as influenced by exposure and capacity, differentiates the transiently poor from the chronically poor (Prowse, 2003).

Figure 8: Sinha and Lipton’s model of exposure, vulnerability and aversion



Sinha and Lipton (1999), emphasizing the “damaging fluctuations” (DF) and risk, draw upon a schema remarkably similar to the “space of vulnerability” outlined by Watts and Hohle (Watts and Hohle 1993). Sinha and Lipton describe exposure to DF (this increases with size, frequency, earliness and bunching and correlates to what Watts and Bohle also describe as “exposure”), vulnerability to exposure (this increases with unpredictability, co-variance with other DFs and exposure relatively to the portfolio of assets and activities, this correlates roughly to “capacity”), and aversion (this increases with exposure, vulnerability and experience, and correlates to potentiality).

With the growth of conceptualizations of vulnerability, this field of literature became closer to traditional economic literature, which often dealt with poverty on

aggregated level. As the economic poverty literature progressed into disaggregated analysis of poverty, the issue of vulnerability and capacity become more important.

1.2.3 Criteria of vulnerability

Vulnerability is often treated from a probability perspective. One such definition is “having a high probability of being poor in the next period” and is determined by the ability of households and individuals to manage their risks (Dercon, 2001, Mansuri and Healy, 2000). This introduces a dynamic concept that it is concerned with the potential future welfare status of individuals and households. In addition, it also provides useful insights in accounting for reasons that individuals or households are predominantly poor or not poor at a particular point in time. The insight that the vulnerability aspect brings is important as it figures as a central element in the mentality of the poor who focus more upon reproduction rather than production as the central motivation for managing the domestic cycle whether annual or intergenerational (Wood, 2003). Therefore, vulnerability does not just result from poverty, it can also reinforce the processes leading to poverty.

The vulnerability concept has also been integrated in environmental research, which has developed different definitions of vulnerability including social vulnerability. This is the exposure of groups or individuals to stress resulting from social and environmental change. In this context stress refers to unexpected changes and disruption to livelihoods. The definition emphasizes the social dimensions of vulnerability following the tradition of analysis of vulnerability in terms of hazards, food insecurity and lack of entitlements (Adger, 1999).

Estimating vulnerability can be done by accessing the resilience of households. This resilience can be measured through the assets base of households, including liquid assets (gold, jewelry, etc.), fixed assets (housing, land, etc.), human capital (education level), formal safety networks (government subsidy programmes) and informal safety networks (family and friends), also referred to as social capital.

This methodological approach to estimate vulnerability therefore could use an asset based approach as a means to measure resilience. This could be referred to as an “asset vulnerability framework”, which includes elements of tangible assets such as labour and human capital, and less familiar productive assets, such as housing as well as intangible assets, such as household relations and social capital (Moser, 1998). Another asset based framework that focuses on rural livelihood uses the following variables: (a) the type of people’s access to capital asset; (b) the ways in which they combine and transform those assets in the building of livelihoods; (c) the ways in which people are able to expand their asset bases through engagement with other actors through relationships governed by the logics of the state, market and civil society; and (d) the ways in which they are able to deploy and enhance their capabilities both to make living more meaningful and to change the dominant rules and relationships governing the ways in which resources are controlled, distributed and transformed in society (Bebbington, 1999).

1.2.4 Livelihood and vulnerability

The use of an asset based approach to estimate vulnerability, brought this field of research close to the livelihood security literature, which emphasized an all round

understanding of making a living. This comprises not just the conventional categories of employment and incomes, but also the asset bases of people's livelihoods and the vulnerability they confront. At the centre is an economic relation between livelihood assets (human capital, social capital, physical capital, public intervention, etc.) and the outcomes that result from these activities in terms of improving or worsening the welfare and wellbeing of the individual or family (Freeman, Ellis and Allison, 2004).

Over the years, the definition of "livelihood security" has expanded to include elements of vulnerability, like exposure to risk, hazards, shocks and stress, difficulty in coping with contingencies, and links to net assets (Longhurst, 1994). In this literature, vulnerability is commonly referred to the probability that stress will occur - with more stress or a higher probability implying increased vulnerability. Thus, their vulnerability might be denoted "livelihood vulnerability". The sustainable livelihoods literature focuses on the concepts of *risks* and *responses*. The *outcome* is loss of livelihood as well as continued "vulnerability" to future shocks (Alwang, Siegel, Jørgensen, 2001). This "livelihood vulnerability" is therefore forward looking and dynamic.

The livelihood literature also emphasizes that diversification of resources could lead to diversification of risks. In this perspective, off-farm employment activities are considered a means to diversify risk so as to protect households against natural and policy shocks. This would lead to a reduction of vulnerability and/or improved levels of consumption for most households involved, but the poorest households in risky environments cannot diversify and therefore lack the opportunity to become richer. As such, their portfolio could reflect constraint linked to mitigation or risks, rather than choice to acquire more wealth. Therefore, the asset composition could also reflect the risk factors in becoming poor.

The livelihood approach provides a useful framework to examine the dynamics of poverty as it focuses on "what" households have and their capacity to cope with stress as well as their capacity to recovery from crises. Recent attempts to use a vulnerability framework to estimate negative effects have been undertaken in Peru on macro-economic shocks, (Glewwe and Hall's, 1998), on poverty and seasonal fluctuations in Ethiopia (Dercon and Krishnan's, 2000) and on the impact of currency devaluation on farm level production in Cote d'Ivoire and Kenya (Barrett et al., 2001).

Mitigating factors in regard to reducing vulnerability are assets, include disposable items (classically, jewellery and livestock) and social networks or public interventions (Hulme and Shepherd, 2003). Descending households often have income shocks arising from ill health or natural disaster that emerged predominately among the lead self-reported causes of declining household fortunes (Sen, 2003). Vulnerability is also directly related to health, lack of education, income poverty and the capacity to sell assets (Misselhorn, 2005).

1.2.5 Vulnerability and poverty

Although the concept of vulnerability is often used in parallel with poverty, it is not the same. Poverty, as measured through traditional variables such as household income and expenditure, is a static concept, as the baseline does not vary over time. From a methodological point of view, this would make inter-temporary analysis possible. However, vulnerability is a broader concept and focuses on the risks households face as well as the resilience to cope with this risk. Therefore,

vulnerability is more dynamic and better captures change processes as “people move in and out of poverty” (Lipton and Maxwell, 1992). This also means that vulnerable people are not necessary poor. This is especially the case as many households live just above the poverty line, as is the case in many developing countries with rapidly growing economies.

Compared to transitional poor, the chronic poor are more likely to have a higher vulnerability for four reasons. The first reason for this was already recognized in disaster management literature which noted that poor people often live in areas more exposed to risky events, such as natural disasters or floods. The second reason is that the poor have less assets to manage risk as their response capacity is less (Devereux, 1999). The third reason is that the poor are less likely to have informal networks as their social capital is limited (Serra, 1999). The fourth reason is linked to the disenfranchised position of the poor in political and participation terms. This means that because they are not well organized as one constituency, they often are overlooked in public policy which could lead to not receiving general social services as well as disaster management assistance after a crisis. For these reasons, minor shock among the poor can have significant impact on them.

The poor are therefore often more vulnerable than the non-poor and lack the capacity to manage shocks. Moreover, once a shock occurs, poor households may be pushed deeper into poverty and ultimately lose their capacity to recover. This could be a “poverty trap” in which affected households have difficulty recovering and regain basic economic security. This is why vulnerability is a central element in the mentality of the poor as they focus more upon reproduction than production as the central motive for managing the risk cycle whether annual or intergenerational (Wood, 2003).

This analysis of how negative shocks affect households can be extended to poverty through life-cycle effects or household demographic characteristics (Srinivasan, 2000). Households that are characterized with certain variables (such as headship, age, households with old and infirm members - similar to concepts of structural poverty) are defined as structural vulnerable, while those vulnerabilities that are dependent of the productive capacity of their entitlements in a given season or year are defined as “proximate vulnerability” (Davies, 1996).

Therefore, vulnerability captures multidimensional aspects of changing socio-economic. As such vulnerability refers to the capability of households to cope with, and recover from negative income shocks (Brugere and Lingard 2003). The relationship between vulnerability and poverty is therefore two-ways, i.e. vulnerability is an outcome of poverty as well as the other way around. At the same time, and although poor people are usually among the most vulnerable, not all vulnerable people are poor, a distinction that facilitates differentiation among lower-income populations (Okido and Mugambe, 2002).

1.2.6 Measurements of vulnerability

As the concept of vulnerability originated from food insecurity and disaster management literature, the first measurements of vulnerability also came from this literature. This included among others, variables such as child malnutrition, child mortality, consumption, and standard measures of poverty and would identify a region, or a sub-group of people, over a certain time, in a given region. However, as the

vulnerability concept became integrated into various academic disciplines, the different meanings and concepts of vulnerability also changed. For example environmentalists refer to vulnerability as the resilience of ecological systems to cope with environmental change (EPA, 2001), while public health used the term to describe human's sensitivity to diseases (WHO, 2003).

The economic literature uses, both micro and macro approaches to determine vulnerability. The micro approach often used household data to estimate vulnerability, while the macro-approach focuses on aggregated data. The first micro approach attempts to quantify vulnerability by constructing a Vulnerability to Poverty Line (VPL) as a level of expenditure which a household has a greater than fifty percent probability of falling into poverty within a certain time period. The VPL for a household is a function of the time period, the variability of expenditure and the vulnerability threshold. Therefore the VPL increases with the variability of household expenditure, with the increase in the chance of encountering one episode of poverty, and with the length of the time period in question.

The second micro approach defines vulnerability as the risk of a household to fall into poverty at least once in the next few years (Cafiero and Vakis 2006). Vulnerability is thus measured as probability of households having greater or lesser degrees of vulnerability. The poverty line is then integrated into the "inability to insure against risks". It therefore amounts to redefining the typical poverty line to account for the cost of insurance. In this perspective "a poverty line includes a minimum amount of consumption required to achieve basic needs plus the cost needed for acquiring enough insurance". An alternative, suggested by Ravallion (Ravallion, 1998) is to decompose chronic and transient poverty to account for time spent below the poverty line. The vulnerability described by Ravallion (Ravallion, 1998), however, does not explicitly account for the stochastic nature of poverty. The logical consequence is the need to measure the *probability* associated with future states to compute *current* vulnerability.

The first macro approach was the development of an Economic Vulnerability Index (EVI), which focuses on a risk analysis of a country to have its development durably hampered by unforeseen exogenous factors. It is based on three components which are the size of the shock (natural or external), exposure to shock, and resilience to shock. This vulnerability is important to enhance growth to reduce poverty and increase security. Furthermore, the EVI is used by the United Nations as an graduation variable of Least Developed Countries (LDC) (Guillaumont, 2006).

Another macro approach to measure vulnerability was undertaken in Peru in which two types of vulnerability were distinguished (Glewwe, 1998). The first group of people were concerned with specific changes in government programs and another, more general vulnerability to changes in socio-economic conditions, including inability to adapt to such changes. The first group is called *policy-induced* and the second *market-induced* vulnerability. This could also be a function of life-cycle income as for example, older individuals tend to have more obsolete skills, and fewer (life-cycle) incentives to learn new ones; their incomes may decline more than average after a macroeconomic shock.

Synthesis on the various approaches to vulnerability

This chapter presents the various perspectives on vulnerability. There are three observations that could be made. Firstly, vulnerability is interpreted differently by various academic disciplines. For example environmentalists refer to vulnerability as the resilience of ecological systems to cope with environmental change, while public health uses the term to describe human sensitivity to diseases. From an economic perspective, vulnerability is used both at macro level (i.e. EVI) as well as a micro-level (i.e. consumption smoothing analysis). Secondly, measuring vulnerability focuses on the dynamic elements of poverty. Therefore, it analysis the transitional poor while excluding the chronic poor. Thirdly, the livelihood approach, in terms of its asset based approach can estimate the resilience of households, and be used to measure vulnerability. In the context of China it is important to estimate vulnerability, as this country is highly dynamic as well as highly unequal. As such, the literature on vulnerability is rich and could provide a value-added perspective on poverty in rapidly growing economies like that of China.

Chapter 1.3 Poverty and inequality in China

Introduction

The evolution of poverty is closely linked to the overall reform process in China. This reform process started in the rural areas in the beginning of the 80s, with the de-collectivization of the commune system, and then spread to the urban areas in the beginning of the 90s with the privatization of State Owned Enterprises. The effects of these reforms have been a reduction in absolute poverty in the country side, while inequality increased massively. Also regional inequality increased substantially due to the official policy of creating wealth in the Eastern regions through the “coastal development” strategy. For these reasons poverty has declined drastically (Fan et al., 2002 and World Bank, 2000b), and disparities are evident through different dimensions such as the rural–urban cleavage as well as the inland–coastal regional cleavage (Aaberge & Li, 1997, Chen & Martin, 1996, Hussain et al., 1994, Kanbur & Zhang, 1999, Kanbur & Zhang, 2005b, Khan et al., 1993, Lyons, 1991, Tsui, 1991 and Yang, 1999). These inequalities could reinforce the “twin-peak” poverty-growth path, in which inequality remains high, despite high economic growth. This would be detrimental to the objective of the creation a harmonious society.

This section presents an overview of poverty and inequality in China. The first section, “Poverty and regional equality and the start of reforms”, highlights the policy of poverty reduction as well as regional disparities before the opening-up period. The second section, “Reduction of rural poverty” focuses on how rural poverty was drastically reduced through de-collectivization of agriculture as well as through employment generated through Township Village Enterprises (TVE). The third section, “Urban poverty and privatization” emphasizes that urban poverty has been growing in China due to privatization of State-Owned Enterprises (SOE) as well as due to rural-urban migration. The fourth section, “Health sector and poverty in China” focuses on the transitional effects of China’s health care system and its consequences on vulnerability. The fifth section, “Education sector and poverty in China” highlights the role of human capital in the reduction of vulnerability. Finally, the “Synthesis on poverty and inequality in China during transition” highlights the most important issues of this chapter.

1.3.1 Poverty and regional equality and the start of reforms

Before the communist regime took power in 1949, poverty in China was extensive and the population suffered from common diseases like: (i) enteric infections, such as typhoid fever, bacillary dysentery and cholera; (ii) hookworm disease; (iii) childhood measles (often fatal), smallpox epidemics, diphtheria and tuberculosis, malaria, kala-azar, schistosomiasis, tetanus of the umbilical cord and venereal diseases. High death rates were also caused by impact of floods and drought (Worth, 1973). This was reinforced by many years of war, both with Japan as well as with the Guomindang (i.e. the national party).

Despite these initial difficulties, the Chinese communist government managed to improve health and educational indicators across the country. This was important as such social improvements strengthened the legitimacy of the communist regime as well as provided “visible” improvement to the peasantry, which formed the back-bone of the revolution. An example of such social improvements was the Cooperative

Medical System (CMS), in which the rural population, which was where 90% of the population lived, was organized. It was an integrated part of the overall system of collective agriculture production and social services. CMS organized rural health care into a three-tier structure. The first tier was comprised of “barefoot doctors” who provided both preventive and primary-care services, including prescription drugs. For more serious illnesses, barefoot doctors referred patients to the second tier that were township health centers. Finally, the most seriously sick patients were referred to county hospitals which formed the third tier.

Under CMS, the financing of health care relied on a pre-payment plan, which included farmers' premium contributions (0.5–2% of a peasant family's annual income), village Collective Welfare Fund, and subsidies from higher level governments. By the late 1970s, 90% of the rural population were covered by CMS schemes (Liu et al., 1995) and China's health situation had improved to such a level that life expectancy had doubled to 70 year and infant mortality, a key variable of a nation's development, declined from 300 per 1000 births in 1950 to 31 per 1000 births in 1999 (Murray and Cook 2002, Liu Y.L. et al 1999). Another social achievement of the Maoist decades in China was the expansion of access to basic primary education for children, and the provision of adults literacy classes to overcome illiteracy. As schools were built and teachers trained, China shifted from an illiterate, uneducated country to one that provided basic education to a large majority of the population (Banister and Zhang 2005). However, this basic education was often limited to primary school and not necessary focused on increasing enrolment in secondary and higher education. For this reason China was, compared to other communist countries that encouraged higher education to support industrialization, considered to have low human capital.

Due to advancement socio-economic areas, China had become a more equitable country (Jian, Sachs and Warner, 1996). However, Chinese policymakers shifted radically in 1978. Instead of pursuing equitable development policies across China, they instituted an uneven regional development policy by adopting a “coastal development” strategy. This led to the creation of various “coastal open regions”, including the five special economic zones of Shenzhen, Zhuhai, Shantou, Xiamen, and Hainan province, 14 coastal open cities, seven free-trade zones in coastal cities and three open economic zones of the Pearl River, Yangtze River and Minnan Delta. As a result, the coastal provinces, the group known as the “five dragons” – Guangdong, Fujian, Jiangsu, Shandong and Zhejiang – has grown at a rate of more than 10% each year since 1978, while Heilongjiang, a soviet-style heavy industrial base, lagged behind.

The objective of the open cities was to attract foreign investment so as to create regional economic “growth points” in eastern China. To support these initiatives, the state introduced preferential treatment for special coastal zones (Fan, 1995b). These regions received more investments and projects from the state and had more authority to approve investment proposals. They also enjoyed greater financial autonomy such as for obtaining credits and loans (Naughton, 1987, Ferdinand, 1989). Favorable policies attracted as well as qualified personnel, technology and physical capital especially foreign investment (Yang, 1990), which increased regional disparities even more.

From a policy perspective, regional inequalities resulting from promoting coastal regions, were considered inevitable for the advancement of the country, and

consequently were not considered as a problem but rather as an inconvenience (Tu, 1995). This is especially true as it was assumed that a fast pace of development in the coastal areas would spur development of the lagging regions through a “spread effect”, which was essentially a trickle-down on a spatial basis. The central government believed at the beginning of the reform that some people and regions can get rich first but eventually the whole country would become rich. Therefore regional disparities and inequality were not considered a problem by the CCP-leadership and the bureaucratic establishment of the central government. However, this perspective changed and a “Western Development Strategy” was included in the “Overall Plan of Western Regional Development during the Tenth Five-Year Plan Period (2001-2005)”. This strategy included, among others, financial support, infrastructure development, education, cooperative measures and industrial policies (Golley, 2007).

1.3.2 Reduction of rural poverty

Poverty is a rural phenomenon in China, where 90% percent of the people lived in 1978. This is because Chinese peasants have traditionally been disadvantaged by urban-biased policies through severely restricted urban–rural migration and subsidies for the urban population at the expense of their rural counterparts. This was despite the critical role the peasantry played in the revolution and the establishment of the communist state. However, China has massively reduced absolute poverty over the last twenty-five years due to three, policy induced, reasons.

The first reason was the dismantling of the commune system, so that peasant households were once again able to farm on their own plot of land. The de-collectivization and privatization of land-use rights were also referred to as the “household responsibility system”. In this system, households were still responsible for delivering a fixed quota of crops to the government but were also able to sell any surplus above that quota on the free market. The household plot was up to 15 years leased from the government. Agricultural procurement prices were also raised to promote agricultural production. Peasants were allowed to choose crops and to pursue activities other than traditional agriculture. The de-collectivizing of agriculture and the shifting of responsibility for farming to households brought gains to the country's rural community that happened to be the poorest. As Ravallion and Chen (Ravallion and Chen 2007) pointed out, this seems to have attributed to halving the national poverty rate during the first few years of the 1980s and can be considered “low-lying fruits” of agricultural reform. It contributed to an increase in the annual growth rate of agriculture from an average of 2.5 percent in 1952–1977 to 7.4 percent in 1978–1984.

The second reason was the growth of Township Village Enterprises (TVE), which created employment at the country side. Under this institutional structure, rural villages and townships were given the right to establish small-scale industrial, construction, and commercial enterprises outside the central plan. These township and village enterprises (TVE) absorbed excess labor from agriculture. The TVE were thus designed in part to absorb labor that otherwise would move to urban areas in search of work. The growth of TVE is all the more striking as it became the number-one producer of China's industrial production in 1995, thus over taking the position of state-owned enterprises (SOE).

A large body of research analyzes why and how the local government-owned TVE, instead of the more conventional private firms, have contributed most to China's

impressive economic growth during the first two decades of the reform (Che, 2002 and Li, 1996). The suggestion is that local government ownership can be considered a second-best arrangement in transition countries in particular when there are few constraints on the government's predatory behavior. This is because local government ownership can act as a commitment mechanism that limits rent-seeking activities thereby constraining the predatory behavior of the local government during the beginning of reforms.

The third reason for the reduction of poverty in the country side is the increased rural-urban migration. The push factor of this migration was the poverty in the country side, while the pull fact was rapid economic development in the coastal urban areas. This had a strong poverty reduction effect on the country side (e.g. Knight and Song, 1999, Rozelle et al., 1999 and Zhao, 1999). Remittances from migrants also rose with the outflow of labor from villages, reaching 9% of rural income in 2001 (Deininger, Jin, & Rozelle, 2003). The flow of remittance created by migration catalyzed development in rural areas (Zhao, 2002). However, a more recent phenomenon is a return of migration. This stems not only from the denial of permanent urban residency status, but also from under-rewarding of migrants' human capital in cities, probably due to migrant's lack of access to skilled jobs as well as from family separation and the expected likelihood of obtaining decent nonfarm jobs by the more educated in their home villages. Because of the effects of growing agricultural production, the employment generated by Township Village Enterprises (TVE) and migration, the total number of rural poor declined from 250 million in 1978 to 32 million by 2000.

1.3.3 Urban poverty and privatization

Although poverty was traditionally mostly a rural phenomenon in China, urban poverty has emerged in recent years due to significant reforms in the labor market in urban areas. During privatization in the beginning of the 90s, urban poverty was exacerbated by the close integration between industrial and residential uses (Wu, 2005). This was part of the wider industrialization policies that started in the 1950 in which the integration of social services (health, education, housing, pension benefits, etc.) were closely tied to State-Owned Enterprises (SOE). In combination with the urban *hukou* (household registration) system, urban poverty was virtually non-existent in China (World Bank, 1997). The exception was the "three Nos" poor group, with no ability to work, no savings or other income source, and no relatives to depend on.

Once the privatization process was launched in the beginning of the 90s, growth of urban poverty and inequality started as industrial restructuring ensured that SOE had their "budget constraints hardened" while at the same time market rules were introduced. These SOE were characterized by a strong dependency on party/central government, redundant workforces and poor performance in terms of share of total industrial output between 1978 and the late 1990s (Mi & Wang, 2000). This share dropped from 77.6 % in 1978 to 28.4 % in 1996. In addition, there were also geographical inequalities as FDI and imported technologies were mainly located in major cities in the eastern region. Therefore, in the eastern part of China, SOE could take advantage in industrial upgrading toward capital and technological intensive industries. Traditional industries in sectors like textiles and metal processing, became redundant. This created the new urban poor which composed of laid-off or unemployed workers from SOE, low-paid workers in informal or low-rank service sectors, and pensioners. This development was highlighted in a study (Meng, 2001) which demonstrated that 17.5 million state-owned enterprise (SOE) workers were

made redundant by the end of 1998 as restructuring and mass lay-offs hit workers in the heavy industries, textiles and machinery. By that year, the total number of employees in the SOE had been reduced from 75.0 to 50.0 million. The State Council reported 26.0 million people registered as laid-offs and 9.0 million unemployed in the urban areas. Many of these unemployed workers were trapped in poverty due to lack of income as well as the collapse of social services provided by SOE.

The restructuring of SOE and introduction of market reforms resulted in urban poverty as socialistic welfare systems were unable to provide social services for the urban poor. The most important change in the welfare system during the economic reform is the retreat from providing workplace-based social provision to individual (or if possible, local government) based social care (Wong, 1998). Before 1978, employment was the only direct source of security and insurance for urban residents, since the insurance and security system was exclusively financed by work-units, mostly state or collectively owned enterprises (Chow & Xu, 2001). The obligations to provide welfare services such as medical care and housing were transferred from SOE to public social insurance agencies and individuals when the “hard budget constraints” were introduced.

Since 1998, the Chinese cities have established a three-tier safety network based upon three programs - the Labor Security Program to ensure the basic living expenses of laid-off workers, the Unemployment Insurance Program and the Minimum Standard of Living Program for urban residents. The Unemployment Insurance Program covers 101 million people and the Minimum Standard of Living Program supports 19.6 million people. However, the system did not cover all the disadvantaged groups and mainly focuses on supporting workers that are lay-off because of restructuring. As such, it is estimated that only about 5% of the current urban poor residents are qualified for traditional government assistance (Yan, 2003).

Another source of urban poverty is migration, which as stated in the previous section, had a strong impact on rural livelihoods due to the flow of remittance it created. This group of urban poor comprises of rural migrants who have low-paid or unstable jobs. Millions of rural residents working in the cities may also live in poverty as they either engage in low-pay jobs or face unemployment. In addition, enormous number of rural labourers have immigrated to urban areas with the relaxation of controls on population movement, most live in poor conditions under the restriction of the household registration system and related policies of inequality. However, without residency, a vast majority of migrants are not eligible for any entitlement to social welfare benefits in urban areas. Even some migrants with de-facto urban residency, such as those who migrate to the city through marriage with urban residents, lack urban *hukou* (household registration) status.

Overall the contemporary urban poor can be categorized as mainly employed in manufacturing industries or low-rank service sectors and thus have received most of the negative side effects of economic restructuring. Low-paid jobs, unemployment, migrants that pushed wages down and lay-offs of household members lead to low household income. As such, new urban poverty groups as well as the traditional urban poverty group are situated at the lowest stratum of income distribution. This could be the reason why the emergence of new urban poverty in China is strongly associated with increasing intra-urban income inequality (Bian & Logan, 1996; Gu, 1999 and Gu & Liu, 2002).

1.3.4 Health sector and poverty in China

Before decollectivisation, China had a model for community financing and health care organization covering the provision of preventive and primary care services to the majority of the Chinese population. This model contributed significantly to China's 'first health care revolution' and reduced the infant mortality rate from about 200 per 1000 life births (in 1949) to 47 per 1000 life births (in 1974). During the same period the life expectancy increased from 35 to approximately 65 years (Gu, 1993).

After decollectivisation and the introduction of market reform in rural areas at the end to the 70s, the Cooperation Medical System (CMS) was phased-out. With the individual household responsibility system, the communal administrative structure, which employed barefoot doctors as health 'workers', and the collective welfare fund (the main source of financing for drugs and other services) disappeared. This had two fundamental reasons. Firstly, the ideology of private responsibility was over-valued compared to equal access. Hence, economic efficiency was emphasized while equality was ignored. This resulted in a drop of CMS coverage to just 40-45% of China's villages in 1983 (Zhou, 1991). Secondly, the CMS suffered from patronage and corruption as well as poor management. Although the CMS was based on local communities, it was controlled and managed by local officials who were not held accountable. As a result, people lost confidence in the government-run CMS program and refused to make financial contributions once the system became voluntary in the early 1980s. In response many communities voluntarily designed their own funding mechanisms, and many villages fell back to a Fee-For-Service (FFS) payment systems.

The phasing out of the Cooperative Medical System (CMS) led to medical expenses becoming a significant burden on rural households as 90% of this group paid out-of-pocket for their health services (Liu et al., 1996). Many of the households that recently fell below the poverty line were actually health-stricken rather than poverty-stricken (Gustafsson and Li 2004, and Banister and Zhang 2005). The results of the abolishment of the CMS as well as the privatization of the SOE led to an increase in out-of-pocket health expenditures by which most of China's people pay for basic level care at clinics or outpatient departments of hospitals (Henderson *et al.*, 1994). For catastrophic or chronic medical needs whose costs are high, poorer people often cannot afford the pharmaceuticals or the hospital fees. In practical terms, this means that if an individual gets very sick, his or her family may not be able to pay for needed medications or hospital costs. High user fees are charged even for emergency services in public hospitals and clinics.

The introduction of userfees and lack of health coverage led to the start of the insurance industry in China, which has developed rapidly, especially since the 1990s. However, the large gap between urban and rural incomes remains a problem as rural residents lack the means to pay for insurance. Low coverage exposes rural Chinese residents to health and related financial risks which may have negative effects on economic development when uninsured individuals cannot receive medical care because of the cost. This leads to a growing gap in terms of quality and accessibility of services between rural and urban areas (World Bank, 2005). The result of these disparities is a rural health service deficit can be summarized as follows (Dummer and Cook, 2007): (i) wide disparities in mortality rates, including infant and maternal mortality, between rural and urban areas; (ii) resurgence in infectious diseases, such as schistosomiasis and tuberculosis; (iii) growing threats of HIV/AIDS and Avian Flu; (iv) increased environmental vulnerability with a knock-on effect on health; (v)

increase of mental health problems, including propensity to suicide amongst rural females; (vi) decline in immunization take-up; and (vii) declining levels of state investment for health care in rural areas

From a poverty perspective, health care is important as medical services can help patients recover from ill health as well as mitigate the burden of medical expenditure. This latter has a strong crowd-out effect on other goods and services, such as human capital investment¹⁸, physical capital investment¹⁹ and Investment in development of human well-being²⁰ (Wang H. Zhang L. Hsiao, 2006).

1.3.5 Education sector and poverty in China

Although high literacy was one of the main achievements of Mao, it is mainly limited to primary education. Secondary and higher education were not as vigorously promoted. In addition, and as schools were funded at local level, inequality in education attainment and enrolment remained a serious issue. An example of this was the introduction of the “Law of Compulsory Education” in 1986 which officially made nine years of schooling compulsory throughout China (six years of primary school, three years of middle school). By 1990, all provinces were expected to have primary education available for all students. However, according to official Chinese government statistics, only 76% of the counties had realized universal primary education though the population of those counties was 91% of the national total (He, 1996).

The inequality in education is related to the local funding of schools. Therefore, rich provinces tend to produce more human capital per capita than poor provinces. Resource constraints also differentially affect access to schooling of individuals in different parts of China, especially in rural areas and in the West (Heckman, 2005). However, economic reform also increased opportunity cost. A rural family’s income is now more closely linked to its own work effort. When there is a real gain to the family from their children’s labor, rural families may be more likely to pull their children out of school before graduation. In the short-term, this could provide a gain in income of the household, but in the long-term, this could encourage the Inter-Generational Transmission (IGT) of poverty.

¹⁸ Human capital investment. Expenditures on education for children or adults are considered human capital investments that tend to increase productivity in the long run. The results from this study indicate that medical expenditures, especially due to hospitalization, significantly affect households’ investment on education expenditure. Households with ill health members have less investment on education than households without ill health members.

¹⁹ (2) *Physical capital investment in farm production*. The results of this study also suggest that households with ill health members spend less on physical capital investment for farm production, such as farming tools and seeds, than households without ill health members. The increase of each 100 Yuan in medical expenditure leads to 0.22 percentage point decline (4.5 Yuan decline) in farming investment. Thus, excessive medical expenditure reduces physical capital investment in farm production, and therefore reduces farming productivity.

²⁰ *Investment in development of human well-being*. In addition to economic development, many households’ consumptions are critical for the human survival and well-being, such as food, clothes, and social activity. Households with ill health members and high medical expenditures must sacrifice their consumptions in those categories, which could have both short- and long-term negative impacts on human development.

Besides the issue of the quality of education, poverty significantly affects both educational investments and learning. Children from households that are both poor and credit constrained are three times as likely to drop out of school. Thus, for some of the poor, the lack of available funds is a major obstacle to financing educational investments. Therefore, even with high enrollments, poverty still may be an important issue in educational attainment (Connelly and Zheng, 2003). In addition, there is also a clear gender bias in educational investments which may be due to lower returns to education for girls, the perception that girls will marry into other families and from parental preferences that favor sons (Song, Appleton and Knight, 2006).

Education and human capital formation is especially difficult for children of migrated families because of the *hukou* system which requires students (1) to reside within the local school district in the city; and (2) to be registered in the school district as well. The reasoning behind these regulations is that since the education budget (elementary school and high school) is allocated through local government, temporary migrant children are not allowed to attend local schools, as it increases the financial burden (Liu, 2003). However, instead of entirely denying access to education for temporary migrant children, many schools in cities allow migrant children to attend but then their parents must pay “education endorsement fees” (*jiaoyu zanzhu fei*) which is a significant, and sometimes prohibitively heavy, burden for parents. Given the large concentration of migrants in low-paying occupations and difficulties of enrolling in local schools there is an emerging phenomenon in many large cities: schools that cater particularly to migrant children (Zai and Por., 2007).

Synthesis on poverty and inequality in China during transition

This chapter focuses on the poverty situation in China and how this evolved during the transition. In rural areas the de-collectivization in the 80s had a positive impact on the livelihood opportunities of poor farmers. However, in terms of public health care and education services, there was a remarkable downside with the introduction of userfees. In urban areas, it was the privatization of State Owned Enterprises (SOE) in the 90s which led to growth of poverty as well as a reduction of health and education services.

In both urban and rural areas, the reduction in public services deliveries led to higher inequality because health care and educational facilities were not provided for all. This increased vulnerability as education is essential in building human capital, while health care is critical to avoid households falling into poverty. The introduction of fees further raised the barrier to access and excluded a large part of poorer segments of society. This not only reinforced the “twin-peak” growth path, in which inequality remains high despite high economic growth. Two additional inhibitions to income convergence are the household registration system, which makes the movement of the rural poor to prosperous areas illegal, and the monopoly state bank system that, because of its bureaucratic nature, disburses most of its funds to its large traditional customers (Demurger, Sachs, Woo, Bao, Chang, Mellinger, 2000). This could threaten the development of a harmonious society.

Chapter 1.4 Empirical analysis of regional income vulnerability and inequality in China using an asset based framework

Introduction

The study of vulnerability is a prominent issue for poverty researchers (Dercon, 2001, Mansuri and Healy 2000, Wood 2003), in particular in developing and transition countries like China. In this chapter, regional income vulnerability is defined as the risk to events in which a bad outcome could move the household into poverty on a regional level.²¹ This approach enables the identification of regions which are more vulnerable than other regions. The operationalization of this definition is to estimate vulnerability with average household expenditure on provincial level, while the explanatory factors are the Theil inequality index of the various asset (liquid assets, human capital and health care). The objective of this research is to analyze the composition of assets in China as well to present the evolution of vulnerability by region. This is done by using provincial level data from 1985 to 2001. By presenting a methodology to estimate the evolution of vulnerability, this chapter provides a new perspective on poverty and contributes to the development of a harmonious society in China. In addition, the methodology on estimating vulnerability using an asset based approach could also be applied to different countries around the world.

China reform and opening-up period started in the beginning of the 80s and led to dramatic economic growth as well as massive reduction in poverty. This coincides with the growth of regional disparities as well as urban rural inequality, particularly after the 1990s (Fan 1995a, Gustafsson & Shi, 1998; Ravallion and Chen 1998, Yang, 1999 and Yao, 1999, Fan 1995b, Fan, Zhang L. and Zhang X., 2002, Kanbur & Zhang, 2005b, Wan 2007). The issue of vulnerability has only been studied on a limited basis in China (Jalan and Ravallion, 1999, Jalan and Ravallion 2001, Mc Culloch and Calandrino 2003). In general, these studies use household level and do not focus on provincial level evolution of vulnerability as well as its asset composition. More specifically, the research in this chapter complements the debate on poverty in China by presenting a methodology to estimate vulnerability by region.

There are several reasons for the growing interest in vulnerability in China. Firstly, although China is rapidly evolving economically, inequalities on a regional and social level are also on the rise.²² In these circumstances, vulnerability provides a more dynamic poverty perspective, instead of absolute poverty measurements which often use income and expenditure variables (Lipton and Maxwell, 1992). Secondly, a relative small number of households in China have an average consumption below the poverty line, but a much larger number of households are just above the poverty line (Mc Culloch and Calandrino, 2003). This means that with a relative minor negative shock, households could fall back into poverty. Thirdly, the aspect of vulnerability plays an important role in the decisionmaking of the poor because their resilience to negative shock is low (Wood, 2003). Therefore, vulnerability does not just result from

²¹ This definition combines two elements: (i) the risk to an event in which a bad outcome could move the household into poverty (Alwang, Siegel, Jørgensen, 2001); and (ii) the identification of geographical area which is more vulnerable than other areas (Downing, 1991 and Guillaumont 2006)

²² Since the reform period, some coastal provinces in China have development indicators that perform more like a middle income country (such as in the area of literacy and infant mortality), while in western China these variables are comparable to low income countries (Kanbur & Zhang, 2005b).

poverty, it can also reinforce poverty. Finally, from a social cohesion perspective, vulnerability is important as a negative economic shock could create civil strife and therefore threaten the development of a harmonious society in China.

This chapter takes a two step approach to estimate vulnerability in China. Firstly, asset composition is estimated by a one stage Theil decomposition index with one liquid assets variable (savings deposit in banks per capita), two human capital variables (people with at least secondary education and people with at least colleague education) and two health care variables (amount of beds in hospitals and the amount of medical personnel in hospitals). The one-stage Theil method provides the opportunity to distinguish inequality between the three main regions (Eastern, Western and Interior) as well as between regions and individual provinces. Asset inequality is related to vulnerability as higher inequality leads to: (i) lower access to public services for the poor, as they are more depended on the state than richer people. Moreover, high inequality lead to ineffective social programmes which are more susceptible to corruption (Bardhan & Mookherjee, 2000); and (ii) an increasing gap in social development which will reduce the trickle-down effect of economic growth on poverty reduction and increase the risk of staying in poverty. For example, it is hard for an illiterate person to benefit from rapid economic development; (iii) lack of physical assets which could be used as collateral. From a capital market perspective, it is physical assets based which is likely to influence the extent to which poor people participate in economic growth. This credit-market failure argument explains why initial distribution matters in regard to the economic growth as it will be the asset poor who are mostly locked out of growth prospects (World Bank, 2006).

Secondly, the one stage Theil decomposition index is introduced into a logistic regression whereby a geographical area is identified as being poor or non-poor, based on 80% of the median disposable household income. To ensure the validity of results three control variables are introduced (mortality rate, rural food expenditure and urban food expenditure). Furthermore the *average marginal effect* of the coefficient of the logistic regression are calculated, which are used to estimate the evolution of vulnerability in China by region (Eastern, Interior and Western) as well as its decomposition between regions (i.e. between the three regions) and within regions (i.e. between province and regions).

The remainder of this chapter is organized as followed. The first section “Measuring vulnerability through asset ownership” underlines the role of physical assets, human assets and the importance of health care as a mitigation factor in regard to vulnerability. The second section “Data description” describes the data as well as the sources. The third section “Methodology” presents the one-stage Theil inequality and introduces this into a logistic regression with poverty as dependable variable. Furthermore, the *average marginal effect* of the coefficients are calculated so as to illustrate the evolution of vulnerability in China from 1985 to 2001. The fourth section “Results” emphasizes that the reducing inequality in liquid assets and human capital reduces vulnerability, while health care does not contribute to the reduction of vulnerability. In addition, the evolution of vulnerability by region as well as its decomposition is presented. Finally, the section “Synthesis and policy implications on vulnerability in China” highlights the limitations of this research as well as suggests policy recommendations that might reduce vulnerability in China.

1.4.1 Measuring vulnerability through asset ownership

Although the issue of vulnerability in the economic literature is gaining attention, it is often analyzed using household level data. However, in the traditional vulnerability literature, vulnerability is also used to identify social groups, or regions that are more vulnerable than other regions. For example, a well accepted definition of vulnerability in the field of food security/famine is “an aggregated measure, for a given population or region, of the risk of exposure to food insecurity” (Downing, 1991). As such, vulnerability in a geographical area is a function of exposure to shock and of resilience of households, and correlates positively with the probability and impact of a shock and negatively with the resilience and its determining factors. Vulnerable regions are extremely sensitive to shocks because households in this area are not able to manage a shock (Misselhorn, 2005). Another example on how vulnerability could apply to a geographical area is the Economic Vulnerability Index (EVI), which is a country analysis on a risk faced to its sustainable development by unforeseen exogenous factors. The EVI is important as a lower vulnerability enhances growth, reduce poverty and increase economic security simultaneously, and is used by the United Nations as an indicator to define a Least Developed Countries (Guillaumont, 2006).

The conceptionalization of vulnerability has led to a closer examination of the role of assets as a means to mitigate negative shocks. In this regard, assets are often associated with ‘wealth’ and ‘money income’. Sometimes it is interpreted in broad terms and is defined as the value of wealth of all household resources, both human and non-human. In terms of vulnerability, financial assets are essential to reduce vulnerability as they are the first “buffer” to cope with stressful situations as well as provide the opportunity to benefit and participate in economic growth. The initial distribution of assets is also important from a capital market perspective, as it is the physical assets based which is likely to influence the extent to which poor people take part in economic growth. If this is not the case, this leads to underutilization of productive and growth potential as a lot of (poor) people are excluded. Therefore, greater initial inequality in asset distribution will mean that the growth that does occur is less (income) poverty reducing (World Bank, 2006). Unfortunately the distribution of financial assets in China is highly unequal compared to India and Africa countries as well as Europe (see table 1).

Table 1: Comparison of Assets wealth distribution within countries by PPP value in percentage (year: 2000)

Proportion of the population	China	India	Africa	Europe	America
Decile1	2.99%	13.60%	29.53%	6.12%	2.30%
Decile2	6.28%	14.18%	18.42%	6.19%	4.27%
Decile3	6.50%	16.32%	14.40%	6.80%	5.75%
Decile4	14.71%	11.72%	9.36%	6.12%	5.42%
Decile5	16.47%	10.56%	7.51%	6.25%	5.75%
Decile6	15.02%	10.23%	6.79%	8.07%	6.57%
Decile7	14.23%	9.20%	6.28%	9.48%	8.54%
Decile8	12.91%	7.51%	5.45%	12.17%	10.18%
Decile9	9.09%	5.18%	..	15.27%	15.76%
Decile10	1.80%	1.49%	2.26%	23.54%	35.47%
Total	100%	100%	100%	100%	100%

Source: UNU-WIDER

The results of this table indicate that asset wealth distribution is highly unequal compared to other parts of the world, with the poorest 10 percent only having 2.99 percent of the wealth. The initial distribution is important as this determines the poverty levels as well as the poverty changes in rural China (Wan, 2006). This latter was reinforced by urban housing reform, in which public apartments, which can be considered fixed assets, were sold to urban households at extremely low prices. The effect of this was an increase in inequality in wealth between urban and rural households (Li and Zhao, 2007). This would have negative effect on inequality in redistribution of assets. The outcome is that the poor would have less possibility to participate in economic growth as well as have fewer assets to mitigate negative shocks.

The capacity to cope is not only linked to monetary wealth, but also related to non-tangible assets.²³ Research on vulnerability emphasizes that mitigating factors in regard to reducing vulnerability are not only assets such as disposable items (classically, jewellery and livestock), but also social networks or public interventions (Hulme and Shepherd, 2003) as well as the composition of assets (Bebbington, 1999). Vulnerability is also directly related to health, lack of education, income poverty and the capacity to sell assets (Misselhorn, 2005). For example descending households often have income shocks arising from ill health (Jalan Ravallion 1999, Sen, 2003) or natural disasters, which results in the decline of household fortunes (Sen, 2003). Therefore the advantage of an asset base analysis is that it can focus on how household assets can be used to manage risk. This could be an “asset vulnerability framework”, which includes elements of tangible assets such as labour and human capital, and productive assets, such as housing, as well as intangible assets like household relations and social capital (Moser, 1998).

The asset framework presented in this chapter is applied on a provincial level, which would identify which regions are more vulnerable than other regions. This should have a negatively impact in regard to liquid assets, human capital and health care, i.e. more assets would make people less vulnerability. This could also be considered an analysis of “proximate” vulnerability and not “structural” vulnerability as this research focuses mainly on productive assets (liquid assets and human capital) in a given year for an individual province and not on structural vulnerability variables such as headship, age, households with old and infirm members—similar to concepts of structural poverty (Davies, 1996). As such, it builds upon similar approaches in Latin-America (Bebbington, 1999) as well as a study using an asset framework in various urban areas in Zambia, Ecuador, Philippines and Hungary (Moser, 1998).

1.4.2 Data description

To estimate the evolution of asset base of households in China the dataset covers the period 1985 till 2001. This dataset is based on China Statistical Data Compilation of Michigan University, which has data on provincial levels,²⁴ as well as the on Belton

²³ An example of the multidimensional approach is the poverty pyramid which indicates traditional income poverty measurements at the top of the pyramid, while at the bottom are a broad set of poverty variables including dignity, assets, common resources, state provide commodities, autonomy, etc. (Baulch, 1996).

²⁴ This dataset is officially certified by the Statistical Bureau of China.

M. Fleisher and Min Qiang from Ohio University on human capital in China.²⁵ The following five variables are used to measure assets (A_i) on a provincial level which are:

1. Liquid assets (L): Per capita savings deposits by individuals in banks that have interest. The savings deposit is calculated by summing-up demand deposits, times deposits, savings deposits, other deposits and foreign currency deposits. This is deflated by CPI. Liquid assets are key component in reducing vulnerability as it could be used as a buffer for short-term negative income shocks, in particular as liquid assets are easily accessible;
2. Human capital (H_1 and H_2): Amount of people with at least secondary education (H_1) and amount of people with at least college education (H_2). These human capital variables are important as it estimates the capacity to seek employment or engage in productive activities as well as to recovery from crises. The role of human capital in the reduction of poverty is well documented in the literature (Adam and Jane 1995; Campa and Webb 1999); and
3. Health care (HC_1 and HC_2): Number of beds per 10000 persons per province in Hospitals (HC_1) and the number of medical personnel per province (HC_2). The definition of hospitals include: hospitals, health centers, sanatoriums, maternity, child care centers and other health institutions. Health care is important as illness, especially chronic illnesses, is a mayor factor in making people poor (Jalan and Ravallion 1999, Sen 2003). Future research would also include health care insurances.

To identify poor and non-poor provinces, we adopted a relative measurement of disposable income on a provincial level:

4. Poverty (P): Disposable income on a provincial level. This measurement is weighed by urban disposable income with the non-agricultural population and by rural income with the agricultural population (see equation 1). Disposable income in China is the total income of household minus taxes.²⁶ This is deflated by CPI. The poverty rate is set at 80% of the median, which means that provinces that fall below 80% of the median are considered poor (value 1) and if the province is higher than 80% of the median the region is considered non-poor (value 0).

$$(1) \quad I = \gamma_{rt} * (I_{urb} - I_{urb\text{livexp}})_{rt} + (1 - \gamma_{rt}) * (I_{rural} - I_{rural\text{livexp}})_{rt}$$

With the following annotations: I disposable income, γ_{rt} urbanisation rate, I_{urb} is urban household income, $I_{urb\text{livexp}}$ is living expenditure in urban areas, I_{rural} is rural household income, $I_{rural\text{livexp}}$ is living expenditure in rural areas, γ is the non-agricultural-agricultural population coefficient, r is region f China and t is year.

Ideally, the use of the poverty measure would be to compare income or expenditure variables with the official poverty rate. However, the official poverty rate in China is

²⁵ This dataset was provided by Belton M. Fleisher and Min Qiang, but originated from Sylvie Demurger. College education was based on 1982, 1990 and 2000 census, as well as annual Population Change Survey (1996, 1998, 1999, 2002 and 2003). Secondary education was based on Sylvie Demurger and was extended by Belton M. Fleisher and Min Qiang.

²⁶ Disposable income is based on “spot checks”.

set rather low and therefore, only a few provinces were poor, which was insufficient for a statistical analysis. Therefore, we chose to use a relative measurement of poverty, which is traditionally more widely used in rich countries than in developing countries (Wong, 1995). However, there are several reasons for using relative poverty measurements. Firstly, China is rapidly developing and some development variables are more like middle income countries while others are like low income countries.²⁷ Therefore absolute measurements would fail to capture the inequality between these regions (Osberg and Xu, 2006). Secondly, in terms of policy formulation, relative poverty provides a tool to target certain regions.²⁸ For these reasons relative poverty measurements such as the median income variables, have been used in other developing countries and low-income countries, for example in Mexico (Salas, 2003) and Nepal (Wagle 2006).

To ensure that the results of this research are valid, three control variables are introduced, which are:

5. Deathrate (D): The amount of people that die per 10000 people²⁹. As the risk of poverty increase, it is highly likely that death rate would also increase. The control of death rate is strongly linked to the probability of becoming poor as the ultimate result of vulnerability could be death. In addition, the death rate could not be directly linked to the liquid assets, human capital and health care (such as doctors and beds per 10000 persons).
6. Rural food expenditures (RF): Expenditure of food in rural areas by province by year, which is deflated by CPI. A person is counted as rural if he/she was born in rural areas or should have at least live in rural areas for one year. This could be a control variable as a reduction of food consumption is clearly linked to the vulnerability of becoming poor as this is the last expenditure item which would be influenced. In addition, food intake is often used as a variable for vulnerability in the original food insecurity literature (Downing, 1991).
7. Urban food expenditures (UF): Expenditure of food in urban areas by province by year, which is deflated by CPI. Urban areas in China refers to the following areas: big city, medium cities, small cities and city at region level. This later includes cities at country level districts such as Beijing city. As with rural food expenditure, urban food expenditure could be a control variable as a reduction of food consumption is clearly linked to the vulnerability of becoming poor as this is the last expenditure item which would be influenced. In addition, food intake is also used as an indicator for vulnerability in the original food insecurity literature (Downing, 1991).

Overall there are therefore one variable to measure poverty at 80% of the median (P), five assets based variable (L, H₁, H₂, HC₁ and HC₂) and three control variables (D, UF and RF). All variables are the average on the provincial level by year.

²⁷ Some areas in some coastal provinces in China some development indicators which perform more like a middle income country (such as in the area of literacy and infant mortality), while in western China these variables are more like low income countries (Kanbur & Zhang, 2005b).

²⁸ For example in allocation of funds, it is important to identify which areas need to be targeted.

²⁹ The national total death rate excludes the population of Hong Kong, Macao and Taiwan. The sample of the % of the total population in China.

1.4.3 Methodology

This research takes a two step approach to estimate vulnerability through an asset based framework. The first step is to construct a one-step Theil decomposition index for the various asset variables so as to estimate vulnerability. The one-step Theil decomposition index provides the opportunity to distinguish the contribution of inequality between regional component (i.e. between regions) and within a region (i.e. between region and provinces). For this research, the provinces of China are divided as followed: Eastern and north eastern (Beijing, Tianjin, Hebei, Shanghai, Jiangsu, Zhejiang, Fujian, Shandong, and Guangdong-Hainan, Liaoning, Jilin and Heilongjiang), Interior (Shanxi, Inner-Mongolia, Anhui, Jiangxi, Hubei, Hunan, Henan, Guangxi, Sichuan-Chongqing, Guizhou, Yunnan, and Shaanxi) and Western (Gansu, Qinghai, Ningxia, and Xinjiang). Tibet is excluded for lack of data. The provinces of Guangdong-Hainan and Sichuan-Chingqing have been merged to make compatible the datasets on Human capital provided by Belton M. Fleisher and Min Qiang from Ohio University. The observations years are from 1985-2001 for every individual year and for every individual province.

The measurement of inequality in hierarchical structure of a country (i.e. between region and province) can be done by using province as a basic regional unit. The overall regional income inequality can be measured by the following Theil equation:

$$(2) \quad \text{Theil inequality index} = \sum_i \sum_j (Y_{ij}/Y) \log (Y_{ij}/Y/N_{ij}/N)$$

An inequality index can be decomposable if total inequality is the sum of between-group and within-group inequalities. In addition, the mean independence implies that the index remains unchanged if every province income is changed by the same proportion, while population-size independence means that the index remains unchanged if the number of people in each region is changed by the same proportion (i.e. the index depends only on the relative population of each region, not the absolute population).

To obtain a decomposition of the Theil index into a Between Regional component (TBR) and a Within Regional (TWR) component would require the following (see Akita, 2000):

$$\text{Decomposed Theil (Th)} = T_{BR} + T_{WR}$$

$$(3) \quad T_{BR} = \sum_r (A_{ir}/A_{ic}) \log (A_{ir}/A_{ic}/N_r/N_c)$$

$$(4) \quad T_{WR} = \sum_r (A_{ir}/A_{ic}) T_{PI}$$

$$(5) \quad T_{PI} = \sum_p (A_{ipr}/A_{ir}) \log (A_{ipr}/A_{ir}/N_{pr}/N_r)$$

With the following annotations: T_{BR} is the between regional component of the Theil index of vulnerability variable, T_{WR} is the within regional component of the Theil index of vulnerability variable, T_{PI} is the between province income inequality, A_i are the individual Asset variables (L, H_1, H_2, HC_1 and HC_2), A_{ipr} is the individual Asset i , in province p of region r , A_{ir} is the sum of the asset i , in region r , A_{ic} is the sum of the individual asset variables i , in the country, N is the population, N_{pr} is the population in province p of region r , N_r is the sum of the population in region r , N_c is the sum of the population in the country of China. The Theil index of the five variables as well as its decomposition by a between regional component and within regional component can be view in the annex (Graphic 3 to 14).

The second step is to introduce the one stage Theil index into a logistic regression whereby a region is measured on binary based (poor and non-poor) with disposable income as dependent variable (see equation 1), five independent vulnerability variables (as estimated with the Theil index) and three control variables, which means that the:

Dependent variable is: Poverty (P), which is calculated by disposable income on the provincial level by 80% of the median. This means that a province becomes poor if the disposable income becomes less than 80% of the median income. This 80 % threshold of median income was chosen for two reasons. Firstly, the average income of household on a provincial level are relatively close to each other, which means that at 60% or lower there are hardly any provinces poor. Secondly, the 80% threshold is used in other countries as this could include out of pocket medical expenditures, which is also a relevant issue in China.³⁰

Independent variables are: The asset based Theil index of the following variables: Liquid assets (L), Human capital 1 (H₁), Human capital 2 (H₂), Health care 1 (HC₁), and Health care 2 (HC₂).

Control variables are: Death rate (D), Rural food expenditure (RF) and Urban food expenditure (UF).

The core logistic regression is as followed:

$$(6) \quad \text{Logit}(p) = \log(p / 1-p) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_k X_k$$

This logistic regression is adapted in this research to include the following variables:

$$(7) \quad \text{Logit}(p) = \log(p / 1-p) = \beta_0 + \beta_1 T_L + \beta_2 T_{H1} + \beta_3 T_{H2} + \beta_4 T_{HC1} + \beta_5 T_{HC2} + \beta_6 D + \beta_7 RF + \beta_8 UF$$

With p is the percentage of the odd ratio: $\begin{cases} 1 = \text{province} - \text{poor} \\ 0 = \text{province} - \text{nonpoor} \end{cases}$

The equation has the following annotation: T_L is Theil of Liquid assets, T_{H1} is Theil of Human capital 1, T_{H2} is Theil of Human capital 2, T_{HC1} is Theil of Health care 1 and T_{HC2} is Theil of Health care 2, D is Death rate, RF is Rural food expenditure, and UF is Urban food expenditure. β_X are the coefficients of the respective variables. The results of this logistic regression are demonstrated in table 2, 3 and 4.

Finally we estimate the *average marginal effect* of the coefficient of the vulnerability variables so as to estimate the evolution of vulnerability in China by over the years. This could be done by introducing the averages into the nonlinear function (Wooldridge, 2002). With the marginal effect of coefficients (dF/dx) it is possible to estimate the evolution of assets in China on a regional level from 1985 to 2001. The results of *average marginal effect* of the assets coefficient are presented in table 5. These averages can be weighed by summing up all the coefficient ($\beta_L, \beta_{H1}, \beta_{H2}, \beta_{HC1}$ and β_{HC2}), see equation 8:

$$(8) \quad \beta_{TOT} = |\beta_L| + |\beta_{H1}| + |\beta_{H2}| + |\beta_{HC1}| + |\beta_{HC2}|$$

³⁰ The 80 percent median income as poverty rate measurement has been proposed by the US Census Bureau (Bavier, 2005) as a means to incorporate out-of-pocket medical expenditures, which is a one of main source of poverty in the United States of America and is, in the sense, similar to other developing countries. In addition, the some states, like the state of Oregon, use the 80 percent median income to define low-income (Housing and Income data, 2005).

With the following annotations: β_{TOT} , total sum of coefficient, β_L average coefficient of liquid assets, β_{H1} average coefficient Human capital 1, β_{H2} average coefficient Human capital 2, β_{HC1} average coefficient Health care 1 and β_{HC2} average coefficient Health care 2. The weighed coefficient can be introduced into a function to estimate the evolution of vulnerability (V). The control variables have been excluded as the average impact is negligible (>0.01).

$$(9) \quad V = (\beta_L/\beta_{TOT}) T_L + (\beta_{H1}/\beta_{TOT}) T_{H1} + (\beta_{H2}/\beta_{TOT})T_{H2} + (\beta_{HC1}/\beta_{TOT})T_{HC1} + (\beta_{HC2}/\beta_{TOT})T_{HC2}$$

$$(10) \quad V = (-0.09) T_L + (-0.29) T_{H1} + (-0.35)T_{H2} + (0.09)T_{HC1} + (0.18)T_{HC2}$$

With the following annotation: V is the level of vulnerability, T_L is Theil of Liquid assets by year, T_{H1} is Theil of Human capital 1, T_{H2} is Theil of Human capital 2, T_{HC1} is Theil of Health care 1 and T_{HC2} is Theil of Health care 2. Finally, the Theil index can be decomposed into a between regional component and a within regional component. (Decomposed Theil (Th) = $T_{BR} + T_{WR}$). The weighed coefficient of the average marginal effect can also use to estimate vulnerability by a between and within regional component through assets:

$$(11) \quad \text{Theil (T)} = T_{BR} + T_{WR} = V_{BR} + V_{WR}$$

$$(12) \quad V_{BR} = (-0.09)TBR_L + (-0.29) TBR_{H1} + (-0.35)TBR_{H2} + (0.09)TBR_{HC1} + (0.18)TBR_{HC2}$$

$$(13) \quad V_{WR} = (-0.09) TWR_L + (-0.29) TWR_{H1} + (-0.35)TWR_{H2} + (0.09)TWR_{HC1} + (0.18)TWR_{HC2}$$

$$(14) \quad V_{TPI} = (-0.09) TPI_L + (-0.29) TPI_{H1} + (-0.35)TPI_{H2} + (0.09)TPI_{HC1} + (0.18)TPI_{HC2}$$

With the following annotation: T_{BR} , is the between regional component of the Theiler index, T_{WR} , is the within regional component of the Theil index, V_{BR} , is the between regional component of vulnerability, V_{WR} , is the within regional component of vulnerability, V_{TPI} , is the Theil between provinces, TBR_L is the between regional component of Theil of Liquid assets, TWR_L is the within regional component of Theil of Liquid assets, TBR_{H1} is between regional component of Theil of Human capital 1, TWR_{H1} is within regional component of Theil of Human capital 1, TBR_{H2} is between regional component of Theil of Human capital 2, TWR_{H2} is within regional component of Theil of Human capital 2, TBR_{HC1} is the between regional component of the Theil of Health care 1, TWR_{HC1} is the within regional component of the Theil of Health care 1, TBR_{HC2} is the between regional component of the Theil of Health care 2 and TWR_{HC2} is the within regional component of the Theil of Health care 2. The results are reflected in figure 9, 10 and 11.

1.4.4 Results

This section presents results of inequality measurements from the logistic regression in which the 80 percent median of income poverty is the dependent variable, with five variables that estimate assets (L, H₁, H₂, HC₁ and HC₂), as well as three control variables (D, RF and UF). The statistical summary of the regression are indicated in table 2, while the predictability of the logistic regression analysis can be viewed in table 3.

Table 2: Statistical summary of results

Observations		N
Selected Observations	Observations in Analysis	423 (88.7%)
	Missing Observations	54 (11.3%)
Total		477 (100.0%)
Unselected Observations		0 (0.0)
Total		477 (100.0%)

Table 3: Predictability of logistic regression of poverty at 80% of median level income

Observed		Predicted		
		Poverty		Percentage Correct
		Non-poor (.00)	Poor (1.00)	
Poverty	Non-poor (.00)	302	26	92.1
	Poor (1.00)	35	60	63.2
Overall Percentage				85.6

In table 2 on the statistical summary, it is noted that that there 423 (88.7 percent) observation are included in the analysis, while 54 are excluded (11.3 percent). In table 3, it is noted that of the 423 observation were divided by 328 non poor (77.5 percent) and 95 poor (22.5 percent). The predictability of logistic regression with the median dependent variable of 80%, is corrected predicted in 85.6 percent of the cases. This is the average prediction of both non-poor (63.2 percent) and poor (92.1 percent). This means that the percentage of times that the predicted y_i matches the actual y_i is the percent correctly predicted in 85.6 of the time. However, this can be misleading as a goodness-of-fit statistic test as it is simply an average of the outcome of the non-poor and poor. Therefore, a Pseudo R2 measurement is introduced which is based on the log likelihood and is 0.4549. The 85.6 percent correctly predicted in combination with a Pseudo R2 of 0.4549 leads to a robust result.

Table 4: Results of logistical regression analysis with poverty at 80% of median level income as dependable variable

Asset variables	B	S.E.	Wald	Sig.
Theil Liquid assets	-13.14	7.29	3.29	.072**
Theil Human capital 1	-42.55	14.20	8.99	.003*
Theil Human capital 2	-51.31	12.97	15.65	.000*
Theil health care 1	13.16	4.29	9.61	.002*
Theil health care 2	26.46	10.03	6.96	.008*
Death rate	0.85	0.22	14.65	.000*
Rural food expenditure	-0.05	0.00	34.22	.000*
Urban food expenditure	0.04	0.00	2.87	.090**
Constant	2.49	1.58	2.47	0.116

** Correlation is significant at the 0.1 level (2-tailed).

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

Table 4 indicates that the asset variables are significant at the 0.01 (In the case of the Human capital 1, Human capital 2, Health care 1, Health care 2 as well as the control variables Death rate and Rural food expenditure) and at 0.1 level (In case of liquid assets and Urban food expenditure). In addition, Liquid assets, Human capital 1 and Human capital 2 have a negative impact, which means that a higher Theil index leads to lower odd ratio probability of becoming non-poor (i.e. more risk of poverty). However, Health care 1 and 2 has a positive impact, which means that a higher Theil index leads to a higher odd-ratio probability of becoming non-poor (i.e. less risk of poverty), which is contrary to our intuition.

There are also three control variables so as to ensure that the results of the logistic regression are valid. The first control variable, Death rate, has a positive impact, which indicates that higher inequality in death rates leads to higher probability in the risk of becoming poor. The second control variable, Rural food expenditure, has a negative impact, which indicates that a lower inequality in Rural food expenditure leads to an increase in the odd-ratio of becoming non-poor (i.e. more risk of poverty). The third control variable, Urban food expenditure, has a slightly positive impact (0.004), which indicates that a higher inequality in Urban food expenditure leads to lower probability of poverty. This is contrary to intuition, which would indicate that higher inequality in food expenditure would lead to higher probability of poverty as is the case with rural food expenditure. This could be explained by the fact that Urban food expenditures are already sufficient to meet the basic needs of households. Therefore, higher inequality in food expenditure does not necessary lead to lower probability of poverty. After discussing the different impacts, we will now focus on average marginal effects, which are indicated in Table 5.

Table 5: Results of logistic regression analysis (dF/dx) with poverty at 80% of median level as dependable variable to measure the *marginal effect* of the coefficient

Asset variables	dF/dx	S.E.	z	P> z	Sig.
Theil Liquid assets (T_L)	-.14 (β_L)	.0991	-1.74		.081**
Theil Human capital 1 (T_{H1})	-.45 (β_{HC1})	.404	-3.06		.002*
Theil Human capital 2 (T_{H2})	-.53 (β_{H2})	.401	-3.94		.000*
Theil health care 1 (T_{HC1})	.14 (β_{HC1})	.133	3.14		.002*
Theil health care 2 (T_{HC2})	.27 (β_{HC2})	.238	2.59		.001*
Death rate	0.01	.0081	3.99		.000*
Rural food expenditure	-.00	.0004	-6.28		.000*
Urban food expenditure	.00	.0000	1.78		.090**
Constant	2.49	1.582	2.473		0.116

** Correlation is significant at the 0.1 level (2-tailed).

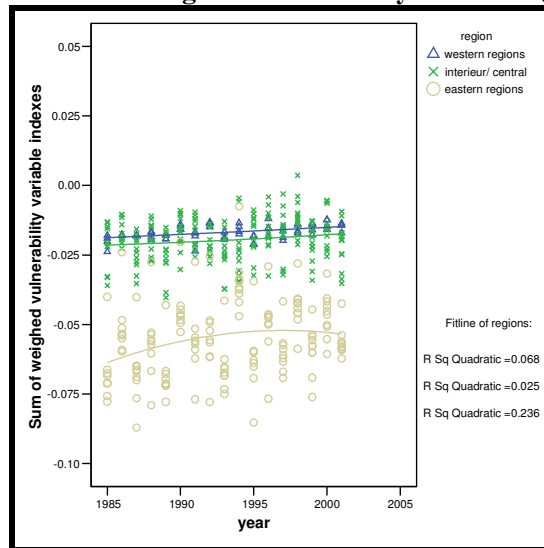
* Correlation is significant at the 0.01 level (2-tailed).

Table 5 presents the results of logistic regression (dF/dx), which indicate the *average marginal effect* of the coefficient of the various assets variables. It should be noted that the impact of the Human capital 1 (-0.45) and Human capital 2 (-0.53) are strong. This indicates that Human capital is strongly linked to the reduction of probability of becoming poor. This could be related to human capital accumulation as China introduced a compulsory Education Law in March 1986, which requires free education for all for the first 9 years of schooling. In addition, the importance of human capital accumulation is confirmed by other researchers which demonstrate the

strong relationship between education and poverty reduction (Adam and Jane, 1995, Campa and Webb 1999).

Liquid assets also contribute the reduction of poverty, although this has a much less impact than human capital. However, Health care 1 and Health care 2 have a positive impact. This indicates that this variable would increase the risk of poverty as inequality in medical personnel and beds in hospitals increases. This could be linked to decentralization as more health care staff would mean a high wage bill, which would be transferred to the users by services fees. As user fees would make it difficult for the poor to get access to health care, the probability of poverty might increase as inequality in Health care 1 and 2 is reduced. In practical terms, this would mean that the quality of health care could increase, which would only benefit a small portion of the population, while the poor are excluded due to introduction of services fees. The results of health care are contrary to the Education sector, which introduced a law to increase access to schooling for all, and might explain the difference in results between the two health care variables and the education variables.

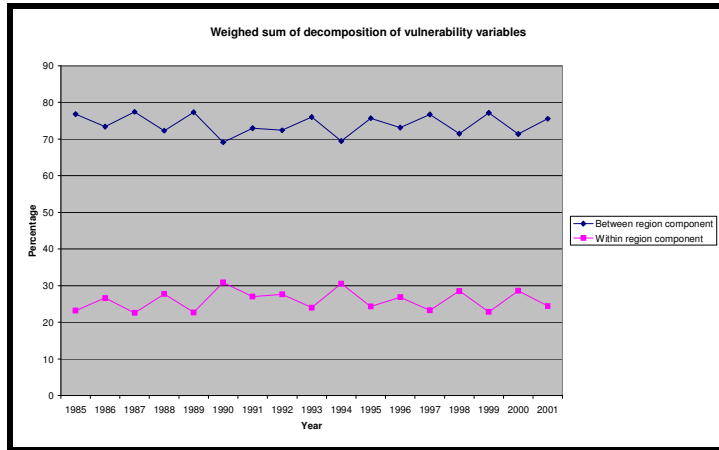
Figure 9: result of the weighed vulnerability variables (equation 10)



Source: Data provided by Belton M. Fleisher and Min Qiang, Ohio University and China Data Centre of the University of Michigan

Figure 9 demonstrates that Eastern region is less vulnerable compared to the Western and Interior regions. However, the Eastern region does seem to have an increase in vulnerability until 1995 after which it stabilises. The unequal evolution in vulnerability could be linked to different patterns of growth in China. In particular, the Eastern region benefited from economic growth while the Western and Interior region did not have high economic growth rates. This could explain both “why” vulnerability is lower compared to the other two regions, as well as the evolution of the Eastern region between 1985 to 2001.

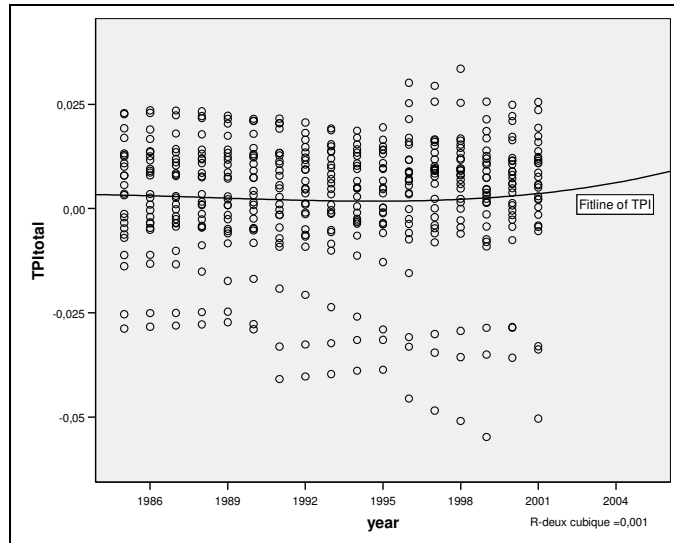
Figure 10: Decomposition of asset vulnerability index with a between region component and a within region component (equation 12 and 13)



Source: Data provided by Belton M. Fleisher and Min Qiang, Ohio University and China Data Centre of the University of Michigan

Figure 10, the decomposition of inequality, indicates that the between regional component contributes roughly 70%-80% to the inequality in vulnerability variables, while within regional component contributes roughly 20%-30% to the inequality in the vulnerability variables. Again, this indicates that inequalities between regions are large and is linked to the growth process in China that focussed on the Eastern region while the Interior region and Western region have been left out.

Figure 11: TPI of asset vulnerability index (equator 14)



Source: Data provided by Belton M. Fleisher and Min Qiang, Ohio University and China Data Centre of the University of Michigan

Figure 11 indicates that overall vulnerability in China has lightly increased in China as a whole as the TPI measure inequality between all provinces, irrespective of the various regions. Although most of the provinces are between -0.025 and 0.025, Xinjiang is the bottom of the graph with a score of 0.05. This indicates that the Western, or at least one province in the Western region, has a higher vulnerability than the rest of the provinces.

Synthesis and policy implications on vulnerability in China

The objective is to present the evolution of vulnerability in China as well as an analyze of the asset composition, with vulnerability, as dependent variable, and asset composition, as independent variable, using provincial level data from 1985 to 2001. The key assumption is that assets could mitigate negative income shocks. The conclusion is threefold: Firstly, liquid assets and human capital contribute to the reduction of vulnerability, while health care does not contribute to the reduction of vulnerability. Secondly, Interior and Western region have higher degree of vulnerability as they have a higher probability to become poor, while the Eastern region has a lower degree of vulnerability, which “peaks” around 1995. Thirdly, the inequalities *within* regions (i.e. between individual regions and its provinces) contribute about 20-30% to vulnerability, while inequality *between* regions contributes about 70-80% to vulnerability (i.e. between the three regions). Therefore any policy that focuses on reduction of vulnerability in China should aim at supporting the accumulation of human capital and liquid assets as well as at addressing inequalities at regional level.

However, we have to interpret our results with caution in regard to its impact on vulnerability. Firstly, this research focuses on “proximate” vulnerability and not “structural” vulnerability as this research mainly emphasizes productive assets (liquid assets, human capital and health care) of entitlements in a given year and not on structural vulnerability variables such as headship, age, informal networks as well as family networks (i.e. *guanxi*), households with old and infirm members—similar to concepts of structural poverty (Davies, 1996). Secondly, the assets variables focus on “resilience” of households and not on the external risks. For example, some regions might be more prone to natural disasters, floods or economics down turn than other regions. These external threats have not been taken into account in this research. Thirdly, the issue of vulnerability should ideally be divided by urban-rural areas. Unfortunately, the dataset does not allow it to be disaggregated in this manner. Fourthly, the variables that measure assets of households may not reflect the reality as the variables do not necessary measures effectiveness and accessibility. This is particularly the case in regard to the health care variables, but could also be the case for education sector, which would have negative implications for Human capital. Finally, there is a problem of the direction of causalities between vulnerability and poverty. For example, one could assume that having a low level of exposure to vulnerability is the *source* of assets build-up as households have the possibility of creating wealth through risk-taking.

Despite these limitations, this research does present an asset based framework which is used to estimate the evolution of vulnerability in China from 1985 to 2001 as well as its asset composition. The policy implication of this research is that to reduce vulnerability would ensure that the population of a province or region in China if there is a negative economic shock. This would decrease social tension and contribute to the development of a harmonious society in China. The Government of China could take the following policy measures into consideration:

1. To encourage human capital accumulation in an equitable manner as this research indicates that human capital formation is closely linked to the reduction in the probability of becoming poor. Therefore, stimulation the accumulation of human capital, both at secondary as well as university level, would increase resilience of a region as it increases the capacity to cope with

stress as well as to recover from crises situations. An entry point could be to introduce an amendment into the compulsory education law and extending the current 9 year period of free education by several years.

2. To increase accessibility of health care as the current system does not reduce vulnerability. This could be done by introducing a law which would compel health care institutions to provide free basic medical care for everybody. Such an intervention would increase accessibility and would have two advantages. The first would provide a safety net for households which fall ill or have work or road related accidents. The second advantage is that the health care would encourage human capital accumulation that, as previously described, would increase resilience. Providing such a safety nets is particular important as there is a strong employment inflow and outflow are not symmetrical (Wu and Yao, 2006), which could results in people being poor for a long-period of time.
3. To develop regional strategy to address under development in the Interior and Western regions. This would reduce inter-regional disparities which contribute 70-80 percent to the reduction of vulnerability. Such development strategies could be modelled on the Eastern regions (such as provide tax incentives, establish export processing zones, encourage industrial development, etc.), as vulnerability in this region is lower than the Interior and Western region. However, this should be accompanied by major investments in infrastructure to ensure linkage between on the one hand, the coastal areas and on the other hand, Western and Interior region.

With these measures, vulnerability in China would be reduced by increasing the resilience of the population on provincial level. This would contribute to the development of a harmonious society, to the strengthening of social cohesion as well as to the wellbeing of households in China. In addition the methodology used in this research might be considered in other countries as a means to present the evolution of vulnerability by taking into account the regional variations of asset ownership.

Part 2: Fiscal decentralization and public service delivery

Introduction

Over the past few decades many developing and transition countries have launched decentralization exercises, in particular fiscal decentralization. This is especially relevant as the majority of developing countries inherited centralized administration systems that were set-up under colonialism, while transition countries had centralized administration structures, which were part of the communist based allocation system of economic resources within an overall state plan. The definition of fiscal decentralization consists of devolving revenue collection and expenditure functions to lower tiers of government. However, research on the impact of decentralization in terms of equity, corruption and social service delivery is still unclear (Bardhan, 2002) and much of it is focused on the federal system in developed countries, due to data constraints on sub-national level in developing countries as a whole.

The concept of decentralization is based on the division of responsibilities between central and local government. On the one hand, macroeconomic stabilization functions as well as income redistribution are the natural roles of central government. This is because of the high degree of externalities. For example, if one region decides to create an effective poverty programme, it could attract poor people from around the country. In addition to these functions, the central government must provide certain “national” public good (like national defense, foreign affairs, etc.) that provide services to the entire population of the country. On the other hand, decentralized entities of government provide goods and services whose consumption is limited to their own jurisdiction, with limited externalities. As these decisions are made closer to the people, it is assumed that particular preferences and circumstances of their constituencies will result in an increase of economic welfare.

The issue of fiscal decentralization and public service delivery is particularly relevant in China as this country went through vertical decentralization processes (i.e. between the central government and local government) and horizontal decentralization process (i.e. between government and State Owned Enterprises). This later is linked to overall privatization process as well as a reduction in public services provided by the State. In general, fiscal decentralization assisted the developmental process, from providing a “help hand”, such as the “buying in” of local bureaucracy that had a stake in the successful development of Township Village Enterprises (TVEs), to market sector experimentation with policies which resulted in the de-collectivization of rural commune system as well as the in the introduction of Special Processing Zones (SPZ). However, the negative aspect of fiscal decentralization, in which sub-national entities became financial responsible, was the introduction of userfees that were often introduced as a means for off-budget growth.

The remainder of this part of the thesis is organized as followed. The first chapter “Fundamentals of fiscal decentralization and public service delivery analysis” starts with Oates Decentralization Theorem and principle agent problem which is the basis of the decentralization studies. The links between fiscal decentralization, economic growth and income distributional are also discussed. In particular, the effects of userfees and social service delivery are considered. The second chapter “Fiscal decentralization and public service delivery in China” emphasizes the effect of the

various forms of reforms, which started in the rural areas in 80s and then spread to the urban areas in the 90s. As such, the health and education sector in rural and urban regions were greatly influenced respectively by the de-collectivization of communal system and by the privatization in which “hard budget constraints” resulted in the elimination or drastic reduction of social services that State-Owned Enterprises (SOE) provided. The third chapter, “Empirical Evidence on the extend that Public Service delivery is a determinant of Fiscal Decentralization” undertakes OLS regressions, OLS regression with Fixed Effect, Two-Stage Least Square (TSLS), and TSLS with FE to analyze the effects of Education and health variables. This will be analyzed using respectively four families of regression, which are respectively core revenues, core expenditures, extra-budgetary revenues and extra-budget expenditures. These latter two are important these are considered growth is user-fees.

The fourth chapter, “Empirical analysis of vulnerability and public service delivery in China” focuses on the impact on vulnerability, as measured by the dependent variable food consumption expenditure, by the quality of public services delivery in the education and health sector. This is undertaken through an OLS, OLS with Fixed effect, and Two Stage Least Square (TSLS) and TSLS with Fixed Effect regressions as well as robustness tests through lags of respective one and two years. The conclusion is fourfold: (i) the quality of primary education has a negative impact on vulnerability, probable due to high inequality and to the selection bias of children from poor families being taken out of school (Connelly and Zheng, 2003); (ii) the quality of the secondary education service has a negative impact on vulnerability in all time lags with TSLS with Fixed Effect. Therefore, these results are strongly robust; (iii) the quality of higher education service has a negative impact on vulnerability. However, these results are less robust than the one with secondary education; and (iv) the health care has also a partially positive impact under the fixed effect.

Chapter 2.1: Fundamentals of fiscal decentralization and public service delivery analysis

Introduction

The issue of fiscal decentralization and its relationship to public services are important as the majority of developing countries inherited centralized administration systems set-up under colonialism. In addition, transition countries had a communist based allocation system in which resources were planned from the center. This also required a high degree of centralization. Therefore, the issue of how fiscal decentralization impacts public service delivery are critical for many countries. Much of this research and datasets are based on developed countries as there is a lack of data on sub-national level in developing countries (Bardhan, 2002). As such, the affect of fiscal decentralization are still unclear as the institutional context in terms of capacity and resources are unclear.

The remainder of this chapter is organized as followed. The first section “Oates decentralization theorem” provides the foundation for why decentralization would lead to higher efficiency in decision-making processes. The second section “Decentralization and the principal-agent problem” emphasizes how economic incentives change through decentralization. The third section “Decentralization and Economic Growth” highlights the interlinkages between these elements. The fourth section “Decentralization, privatization and userfees” underscores that corruption can increase with decentralization, if there is a lack of accountability towards local constituency as well as of central government audit. The fifth section “Decentralization, effective public services and corruption” emphasizes the impact that decentralization could have on the health and the education sector. The fifth section, “Decentralization and social services delivery” discusses how anti-poverty programmes could be more effective. Finally, “Synthesis of Fiscal decentralization and public services” highlights the most important issue of this chapter.

2.1.1 Oates Decentralization Theorem

One of the principles of fiscal federalism and decentralization is the comparative efficiency of sub-national entities to delivery local goods and services in comparison to centralized agencies. This is the basic Oates decentralization Theorem which states that a decentralized system is always more efficient than a centralized system for supplying local public goods as local government knows the “preference” of their constituency. The reason for this comparative efficiency is the informational advantage of local government through it’s physical and institutional proximity to local residence which leads to higher efficiency as well as enhanced accountability (Oates 1972).

The Oates Decentralization Theorem assumes that local residents can chose between different jurisdictions to live. This assumption builds on another advantage expressed by Tiebout (Tiebout, 1956), which states that decentralization leads to greater variety in the provision of public goods, which are tailored to the preference of local populations. Local government will have an incentive to respond to resident demands for public services packaging as people will “vote with their feet”. Various jurisdictions would therefore respond to diverse tastes of public good and an income

tax rate can be chosen according to the income inequality and preference of the local district under decentralization (Bolton and Roland, 1997). Another important element in the discussion regarding fiscal decentralization is that this can serve as a disciplinary device to preserve market incentives. These theories highlight the positive effects of fiscal decentralization and interjurisdictional competition in the efficiency of public goods provision (Qian and Roland 1998). In other words, fiscal decentralization can prompt more efficient provisions of local public goods if individuals can freely move across localities.

The assumption of the Oates decentralization theorem as well as Tiebout's citizens "voting with their feet", is that there is mobility of people to live where their preference matches the tax rate in relationship to quality of public goods. This could be linked to preliminary research in the field of fiscal decentralization which was often based on the United States of America (Bardhan, 2002) where mobility is high. However, the Oates decentralization theorem is weakened by its focus on the unrealistic assumption that residents can freely, and without cost and emotional feelings, move from one municipality to another. Therefore residents may, at least in the short term, not be willing to move and may be able to continue not responding to the preferences of local citizens (Xie et al., 1999).

The second factor that weakens the Oates Decentralization theorem is the advantage of "internalization of spillover" which is associated with central provided goods and services. For example, decentralized subnational entities, might not invest in education as children could move to another district. To address this issue, several models have been developed, which include spillover from local public goods. This is evident from the internalization of spillovers under centralization in small districts which follow their own preference (Ellingsen, 1998) as well as the internalization of spillovers under centralization against adaptation to heterogeneous tastes for public goods by decentralization (Besley and Coate, 2003).

The third factor undermining the Oates Decentralization theorem is the benefits of the economy of scale when producing local services and goods. This could counter-balance the positive effects of district level tailored public goods because it lacks economy of scale that can be provided under centralized public services (Alesina and Spalore, 1997). In this case, the "diverge" of policies necessary to meet the specific preference of local constituency would also have a cost because of a lack of "standardization".

Finally, decentralization may bring decision processes closer to its citizens, but it also creates additional coordination problems *within* the government entities, i.e. between the central and local government. This is because the "informational distance" increases between the center and the decentralized agencies or subnational governments to which fiscal responsibilities are devolved or delegated. The loss of control of the center over decentralized agencies renders the acquisition and processing of information within the government more costly and creates inefficiencies (Gilbert and Picard, 1996).

The issue on how the Oates decentralization theorem relates to developing countries is highly debated as much of the research focused on developed countries. In addition, crosscountry analysis is made more difficult as many developing countries inherited centralized administration from colonial times. In these centralized administration capacity was often at the center and not at the local level (Pru'homme, 1995). Therefore, the positive effects of decentralization will not necessary have a positive

affects as local entities lack technical and administrative capacities, which often take decades to develop within a civil service.

2.1.2 Decentralization and the principal-agent problem

Decentralization changes the incentive structure of public administration and can result in an principal-agency problem because of asymmetrical information on the costs and benefits of government between the center and subnational governments. Although, the delegation of power to subnational government reduces the distance between society and the local government, it also creates inter-coordination problems with the state. In a theoretical centralized State, information flows *within* government entities would be less. This is because decentralized structures could create difficult incentives and different information flows between local officers (agents) and the central authority (principal).

The different incentive structure leads to local decision makers, in which agents maximize the probability of re-election, to downplay the interest of the central state. A good example of this is local expenditures and macro-economic stability. A small single local state entity in a decentralized State, could have an incentive to spend more on health and education, as they would not necessary feel the negative ramifications macro-economic shocks. As such, the negative externalities of an expansionary budget policy would increase the chance of re-election, while not necessary affecting the local economy. However, if all local government would entities follow this policy, then this could result in macro-economic instability, which would have a negative ramification on the whole country.

This could be classified as a free-rider problem in public policy, in which individual decentralized entities have an incentive to spend more in an effort to maximize the probability of re-election. Thus, under decentralization, more direct accountability could improve politicians' performance, while the lack of "internal coordination" of the State could have negative effects for the country as a whole. The optimal solution would be to provide a mix of advantages of central government and local government responsibility. For example, it can be that a school is administrative run by a local government entity, while the curriculum is set at a country level. This would have within one sector the advantages of local as well as central level responsibilities.

The principle-agent problem is particularly a problem in non-democratic political systems as fiscal decentralization could be used to exploit local constituents and the national treasury (Bahl and Johannes, 1994). This is because local bureaucrats can exploit additional rent-seeking opportunities "upwards" (i.e. charge additional expenditure to the center), or "downwards" (i.e. charging fees to its citizens). The literature of fiscal federalism and decentralization does provide an answer to the principal agent problem. The core element in this theorem is that local government activities should be internalized by matching revenue and spending requirements. In a theoretical sense, this should lead to a situation whereby local government should (1) stimulate revenue mobilization from local sources, and improving a country's overall fiscal position; (2) improve accountability of sub-national governments; and (3) reduce the distorting effects of intergovernmental transfers (Shah, 1994).

2.1.3 Decentralization and Economic Growth

The link between fiscal decentralization and economic growth has been extensively researched (Oates, 1991 and Oates, 1999, Prud, 1995, Rondinelli and Nellis, 1986, Rubinfeld, 1987, Shah, 1994, and Ter-Minasian, 1997). The Oates Decentralization Theorem plays a central role in the discussion on the relationship between growth and decentralization as it assumes that devolution of political and administrative power to lower levels of government will lead to higher efficiency in local public service delivery. In turn, it is assumed again that this would lead to an increase in growth rate at national and regional levels.

Various research has been undertaken which focused on the relationship between decentralization and growth. Research on 51 developed and developing countries covering the period 1997-2001 found a significant and positive impact of expenditure decentralization on per capita GDP growth (Imi, 2005). Another cross country study, made a distinction between unitary and federal states in a panel study of 46 developed and developing countries between 1971 and 1990, and found that fiscal decentralization had a positive and statistically significant impact on growth in unitary states (Yilmaz, 1999). Additional research on the United States indicates that decentralization contributes to growth (Akai and Sakata, 2002). The positive relation between decentralization and growth is found when decentralization is increasing from low levels. However, as decentralization increased, the relation eventually turned negative in a cross section of high-income OECD economies using annual data for 1973–1998 (Thießen, 2003). This suggests that the relationship between decentralization and growth has an inverted U shape, in which “the amount” of decentralization first contributes to additional growth and then reduces the potential for growth.

Unfortunately, much of the research on the impact of fiscal decentralization does not distinguished appropriately between administrative and substantive decentralization in that it failed to recognize that high sub-national government revenue and expenditure shares do not necessarily indicate high local autonomy. In particular, many studies on the relation between fiscal decentralization and economic growth fail to take into account the independent taxing powers of sub-national governments to measure revenue decentralization. The result is substantially underestimated revenues at the decentralized level. Empirical results suggest that when decentralization is limited to the revenues over which sub-national governments have full autonomy, its impact on economic growth in OECD economies has not been statistically significant (Thornton, 2007).

The application of research on fiscal federalism and decentralization should be undertaken with caution, as many developing countries do not necessary have the assumed underpinnings, both institutional and economic, for a successful decentralization exercises. For example, one of the complicated factors in many developing countries is that they inherited centralized systems at the time of their independence. In these centralized systems, the capacity of the public sector is at central level and not at the local level, which leads to the likelihood that central government’s bureaucracy is operating closer to the technical production frontier than local bureaucracy (Pru’homme 1995). The issue of local capacity is also important as decentralization requires the setting-up of new institutions arrangements, such as tax sharing mechanisms, cross-regional subsidiary rules, and intergovernmental transfer administration (Shah and Thompson, 2004, World Bank, 2003).

The contradiction in the empirical work in regard to the relationship between fiscal decentralization and economic growth may be linked to lack of understanding on what effects fiscal decentralization have directly and indirectly on economic growth (Martinez-Vazquez and McNab, 2003). Theoretically, the contribution of decentralization to growth is limited. This is because of the lack of internationalization of spillover under centralization (Besley and Coate, 2003) and lack of economies of scale provided by a centralization compared to tailored supply of public good under decentralization (Alesina and Spolore, 1997). Furthermore, long-term growth is also linked to many other variables such as economic freedom, basic legal structure, savings rates, investment behavior and general capital accumulation, human capital, technological development and change. These elements make it difficult to isolate the effect of fiscal decentralization on economic growth.

2.1.4 Decentralization, privatization and userfees

Besides the issue of devolving central power to the lower tier of government, which is referred to as vertical decentralization, another element in the decentralization debate is the transfer of ownership of productive assets from the public to the private sector, which is referred to as horizontal decentralization, or privatization. This is particularly relevant to transition countries, which are moving from a centrally planned to a market based allocation system. Moreover, privatization in transition countries had a strong impact on distribution as the initial situation has high economy-wide inefficiency, while income and wealth inequality were comparatively low (Nixon and Walters 2006, Birdsall and Nellis 2003). The impact of privatization in transition countries had a direct impact on the population as many SOE provided social services, including housing, health care, education, pensions, etc.. After privatization these services were not considered anymore their responsibilities. At the same time, the public sector did not necessarily have the capacity and financial resources to assume these social responsibilities or create a social safety-net for the newly unemployed.

The rationality behind privatization is the principal-agent problem which indicates that if the incentives are different, public enterprises will not function at the production frontier, in the context of no externalities and perfect markets. At central level of government, as the deficit of public companies are financed by the treasury, privatization could lead to “freeing” up resources, which could be directed to the public health or education sector. This is all the more important as many transition countries have central budgets that are overstretched and deficit. Another effect of the privatization process was that in many cases, governments have used revenues from privatization to increase recurrent financial expenditures. For example, in Brazil and Argentina fiscal benefits were used to support fiscal expenditure for in the late 1990s (Macedo, 2000, Mussa, 2002).

The fiscal element has been an important determinant in the general privatization process and there was a lack of analysis of, or even consideration for, the likely short- or long-term impact on poverty and income distribution. From a political economy point of view, privatization was accompanied with new vested interest based on the new (or potential) distribution of productive assets. However the privatization process was not always considered in the interests of the users, in particular the poor (Nixon and Walters, 2006). This is especially true for the negative effect on low-income workers which might be more likely to be laid off than high-income workers. Once laid-off, these dismissed low-income workers might have a more difficult time finding

alternative employment. In addition, especially in transition countries, SOE were often not only a place of employment, but also ensured health and educational benefits for the employees as secondary benefits, which were also lost if somebody was laid-off.

Privatization could also have negative ramifications on access, through the introduction of userfees. The concept behind the introduction of userfees was an increase in efficiency, through on the one side, the internationalization of costs by government entities and on the other side, the increase in the quality services standards which would be claimed by end-users if they would pay for services. However, studies in Latin America have concluded that the poorer segments of the population have been hit, disproportionately, from these introduction or increases in userfees (Delfino & Casarin 2001). As such, societies might reasonably choose an initially less efficiency-oriented approach, in order to ensure long-run accessibility for the whole population of vital public services. As such, income distribution could be chosen over economic efficiency at company level.

2.1.5 Decentralization, effective public services and corruption

It is assumed that decentralization would enhance accountability and encourage, broadly speaking, “good governance” in a country. However, literature on empirical links between decentralization and corruption is limited. Overall, it can be stated that on the one hand decentralization reduces corruption opportunities through increased accountability which is done by enhanced local participation in decision making as well as inter-jurisdictional competition. On the other hand, the corruption opportunities could increase as local bureaucrats have additional rent-seeking opportunities through new found discretionary authority, which could lead to the introduction of userfees, especially if there is a lack of a central audits systems.

In many countries, decentralization tried to bring decision making process closer to its citizens. It is assumed that these citizens would more effectively monitor activities of local government than distant civil servants and auditors at the center level (Bardhan & Mookherjee, 2000 and Azfar, Kähkönen & Meagher, 2001). This is referred to “horizontal accountability” as there is a relationship between local officials and civil society. This is contrary to “vertical accountability” which underlines the relation between the local government entity and central government entity. However, decentralization has provided additional opportunities for corruption due to a lack of oversight and institutional capacity necessary for effective participation (Prud’homme, 1995).

From a decentralization perspective in which “vertical accountability” is reduced, any failure to curb corruption is the result of incomplete or lack of “horizontal accountability”. However, this conclusion is contradicted by a study in West Bengal (India) which suggests that the strength of upward accountability (especially to political parties) is at least as influential in combating corruption as downward accountability to communities. When these vertical accountabilities are weak, horizontal accountability structures designed into community-based monitoring systems can degenerate into corruption networks between community representatives, local elected officials and local government officers (Véron, William, Corbridge and Srivastava, 2006).

There is also research that notes that improvements in quality of services as well as limitations on corruption, is through inter-jurisdictional competition. This means that improvement in public services functions like competition in commercial market place. As such, political and economic competition between jurisdictions would reduce the opportunity of civil servants to extract rent from its constituency (Brennan and Buchanan, 1980). A similar analysis was made in China which emphasized competition among localities discourages governments from establishing interventionist and distortionary policies that might drive away valuable factors of production to less interventionist jurisdictions. Interjurisdictional competition, therefore, could result in lower levels of corruption in decentralized economies (Jin et al., 1999).

The downside of providing discretionary authorities to lower tiers of government is that it could enhance rent seeking opportunities at local level because of discretion authority of local politicians and bureaucrats who are more susceptible and accessible to the demands of local interest groups (Tanzi, 1995). Therefore the local elite captures activities of the local government (Bardhan and Mookherjee 2000), which is particularly the problem if there is a weak horizontal accountability. In these circumstances preferences of constituencies can be ignored by (1) the patron-client relationships that is present in local electoral behavior in developing countries; and (2) the lack of clear mandate of local elections in these countries. Moreover, even if local constituents can express preferences in their votes, and the elected officials want to satisfy the voters' needs, local bureaucracies may be poorly motivated and qualified to carry out their responsibilities (Prud'homme, 1995). Finally, in a non-democratic political system, the basic premise that sub-national governments have a stronger incentive to provided local public goods more efficiently may not apply at all (Tanzi, 1995).

A good example of the problems of decentralization is the case of Uganda which has engaged in decentralization and has been characterized in terms of a "Dual-Mode" system of local governance. This includes a "technocratic mode" as well a "patronage mode". Under a "technocratic mode," conditional funding from the center is earmarked for particular programs but with little local participation. In contrast, the "patronage mode" is an elaborate system for local "bottom-up" planning, but with limited resources, which are largely consumed in administrative costs and political pay-offs. Along with the spoils of a committee system controlling contracts and appointments, these resources provide the means for building political alliances and loyalty (Francis and James, 2003).

The literature proposes several ways to reduce corruption in regard to the delivery of public services (Azfar et al., 2001) which could be summarized as followed: (i) Civic engagement by capacity of citizens as well as the media and non-governmental organizations so as to ensure engagement with government; (ii) Intergovernmental oversight between different levels of government. Examples include central government oversight of local government operations, or budgetary constraints (or limits to taxing authority) imposed by the center on lower levels of government; and (iii) Public sector ethics and discipline as a way in which each government body regulates and constrains the behavior of its own officials. Examples include ethical training, anticorruption provisions and provision for periodic audits (Ostrom, Schroeder, and Wynne, 1993). In this framework, decentralization can provide spaces for enhanced rates of participation civil society.

Overall it can be stated that the nature of debate on decentralization and corruption focuses on the incentive problem. In a decentralization model, authority is shifted away from unsupervised central bureaucrats that seek to maximize bribe incomes, toward elected officials of local governments whose objective is to maximize the chances of staying in power. Economic corruption tends to be replaced by political corruption in the form of diversion of services to local elites (Galasso and Ravallion 2005).

2.1.6 Decentralization and social services delivery

As mentioned in the first section of this chapter, the advantage of decentralization in terms of improving service delivery is based on the Oates Theorem (Oates, 1972) and could be applied to a wide range of services including social assistance programmes to help the poor. Therefore, decentralization is promoted by the political establishment as a way of addressing social issues at local level by increasing accountability of local government to its citizens.

A practical example of how decentralization could have a positive impact on social service delivery is detailed in a study in Albania (Alderman, 2002), where the central government provides a small amount of social assistance to nearly 20% of its population. The income distribution system allowed a degree of local discretion in determining its distribution. The study indicates that, compared to other safety net programs in low-income countries, social assistance in Albania is fairly well targeted to the poor through a decentralized system. Moreover, the communes appear to be using local information to target these funds more effectively. However, the latter study also demonstrated that decentralization could increase disparities between regions.

The problem arises when decentralization is accompanied with spending limits and revenue collection options so that local government will “internalize” the cost of this programmes to its citizens. From a principal agent point of view, this would “internalize” the cost of anti-poverty programmes. The downside of this approach, is an increase regional disparities as poor sub-national entities would have less financial resources compared to rich sub-national entities. This effect is reinforced from a policy perspective, as decentralization is often used by national governments as a means to off-loading expenditures from national budgets, with the result that the cost of service provision shifts to local authorities without corresponding finances or other resources (Agrawal & Ostrom, 2001).

The combination of internalization of cost and the willingness of sub-national government to assert its own independence vis-à-vis the central government, can lead to the introduction of fees at health clinics, or increase of local taxes (i.e. garbage disposal tax, water tax, etc.). These forms of taxes could become a burden to local development and the local poor, in particular as local district funds might not always be spend on the local village development, which was the case in Uganda (Ellis and Mdoe 2003; Ellis and Bahiigwa, 2003). A similar result of local elites “high-jacking” economic resources in decentralization is found in India where inequality within villages and distribution of land influences the relative power of the poor in local decision making and consequently the worsening of targeting the poor through the program (Galasso and Ravallion, 2005). As such, there is evidence that there is a mechanism whereby inequality is perpetuated through the local political economy. In

this case, the more unequal the initial distribution of assets, the worse the positioned the poor as the rich will capture the benefits of external efforts to help the poor.

The core problem of decentralization as well as public service delivery is related to high multi-dimensional inequality (i.e. not only compared to income, but also literacy, political participation, media attention, etc.) in transition and developing countries. In these circumstances decentralized social provision could lead to additional rent-seeking opportunities for local bureaucrats, such as through charging of user-fees, as well as the capturing of issues relevant to the local elite (Bardhan and Mookherjee, 2000).

In sum, decentralization could have two contradiction effects, in regard to anti poverty programmes and social services provision. On the one hand there is a clear informational advantage of sub-national government regarding programmes administrated on behalf of the centralized government. On the other hand, the benefits from additional information costs can easily be outweighed if anti-poverty programmes are captured by local elites or when local government decides to introduce userfees in the context of “internationalization” of costs, which at least in a theoretical sense was meant to address the principal agent problem.

Synthesis of Fiscal decentralization and public services

This chapter discussed the role of decentralization as well as the manner in which public services are delivered. This is important as many developing countries, which suffer from high poverty rates and high inequality, are also engaged in decentralized exercises. Unfortunately, the debate does not distinguish between deconcentration, delegation and devolution. Deconcentration means the transfer of responsibilities to lower levels within central government. Delegation means the change of mandate and authority to other government units, while devolution is normally understood as the shifting away of decision-making power to lower and independent public organisations. Decentralization may also be combined with, or turn into privatization, if responsibility and resources are transferred from the public to the private sector. The lack of distinction makes it more difficult to measure the effect of decentralization.

The objective of the decentralization exercise is to generate effective and responsive delivery of public services, in countries which inherited a centralized public administration. However, a number of factors may contribute to poor performance of local government, such as weak local tax bases, which means that local governments are overly dependent on central resources, weak mechanisms for monitoring the performance of local civil service, lack of political oversight due to weak civil society engagement, etc. In these circumstances local governments could be captured by local elites (Bardhan and Mookherjee, 2000 and Francis and James, 2003). This situation can be reinforced by a low basic level of literacy and political awareness among citizens. This might result in trade off between an informational advantage of community-based targeting and an accountability disadvantage in a decentralization exercise. In sum, it could therefore be stated that the variation of quality of centrally provided goods are lower, compared to decentralized public services. This means that decentralization could provide better services than the center, if the institutional setting (i.e. local participation and oversight, etc), but if these foundations are lacking

(i.e. lack of education of the population, etc), then decentralization could degenerate into worse public services delivery.

Chapter 2.2: Fiscal decentralization and public service delivery in China

Introduction

In the last fifty years, China went through several phases of decentralization and centralization. This included vertical decentralization (i.e. between the central government and local government) and horizontal decentralization (i.e. between government and State Owned Enterprises). In general, fiscal decentralization affected provincial levels governments in various ways, ranging from providing a “help hand”, such as the “buying in” of local bureaucracy that had a stake in the successful development of Township Village Enterprises (TVEs), to market sector experimentation such as the introduction of Economic Processing Zones (EPZ). The downside of fiscal decentralization, in combined with privatization lead to “marketization” of public goods. In practices this meant that previous free and accessible health and education services, became commodities for which citizens had to pay for through the introduction of userfees. This reduced accessibility, in particular for the poorer segments of society and had also a negative effect on vulnerability.

This chapter presents the effects of fiscal decentralization in China. The first section “history of decentralization and regional inequalities” emphasizes the different waves of decentralization and centralization in China. The second section “fiscal administration and introduction of userfees in China” highlights the changing the role of the tax administration authorities during the overall transition of China. The third section “Fiscal decentralization and State Owned Enterprises” focuses on the privatization process and its effect on public service delivery. The fourth section “Fiscal decentralization and political centralization” discusses the mechanisms of control of the centre in the context of decentralized state. The fifth section “Fiscal decentralization, userfees and social services” emphasizes the inter-relationship between these elements. Finally, the “Synthesis of fiscal decentralization and public service delivery in China” summarize the most important issues of this chapter.

2.2.1 History of decentralization and regional inequalities

Since the founding of the People's Republic of China in 1949, the state structure shifted several times between decentralization and recentralization. This started in the 1950, when the Soviet model of centralized planning was introduced and the State Council was allocated a central role vis-à-vis local government. The central authority exercised direct administrative control over local governments through three central planning mechanisms: the physical planning of production, the centralized allocation of materials, and the budgetary control of revenues and expenditures (Feltenstein and Iwata, 2005).

In this period the central government assigned revenue sources and expenditure responsibilities to regions, including strict jurisdiction over tax rates, set mandatory spending targets for certain major budgetary categories and determined the total size of provincial budgets. As such, revenue and expenditure targets were disaggregated at the provincial level. The overall framework has therefore resulted in budget surpluses being remitted to the center and budget deficits being eliminated by transfers from the center. This institutional framework allowed the central government to redistribute

fiscal resources so as to equalize fiscal capacity across provinces and smooth provincial spending across time.

In 1957 there was a shift back from centralization to decentralization. This time the reform focused on State Owned Enterprises (SOE), which, with their profits or losses, were transferred to provincial governments. Some authors suggest that this fiscal decentralization exercise led to an increase in disparities in per capital expenditure across China (Donnithorne, 1973 and Donnithorne, 1976). This was because fiscal autonomy led to a fall in inter-regional transfers and therefore a decrease of remittances from rich province to poor provinces. However, another study highlights that this was not the case for poor provinces that were dependent on transfers from the center as they had a larger increase in social services and investment (Tochkov, 2007).

The period of decentralization was short lived as in the early 60s, control over all large and medium-sized state enterprises was returned to the central authorities. This was linked to the start of the cultural revolution. After this event, there was a new movement of decentralization, which provided provincial entities more discretion over their budgets. This was necessary because of the continuing turmoil caused by the Cultural Revolution that ended in 1969 (Feltenstein and Iwata, 2005) which had a severe effect on the economy as well as society at large. In this context, fiscal decentralization was a means to provide economic incentives to public companies so as to overcome the economic decline caused by the Cultural Revolution. Again, some authors suggest that this period was accompanied with growing disparities in per capita spending (Oksenberg & Tong, 1991).

In the beginning of the 1980, the relationship between the center and provinces changed again with the introduction of fiscal contracts. These fiscal contracts were not standardized over the country and some provinces had different kinds of condition concerning the amounts of remittances, lump-sum transfers and revenue sharing with the central government (Knight & Li, 1999). In the second half of 1980, local provinces started offering tax concessions and exemptions to local enterprises with the objective of generating revenues provided by FDI in their localities (Ma, 1997). This was linked to the creation of four Special Economic Zones (and subsequently a tranche of 'open cities') to allow foreign enterprises, in new joint ventures with Chinese counter parts, special privileges including a relaxed regulatory and bureaucratic environment as well as tax holidays. Besides these tax-concessions, provinces channeled revenue from local fees, surcharges and other sources not sanctioned by the center into extrabudgetary funds that were not subject to central control. All these factors undermined the authority of the central government and eroded its fiscal position.

The link between fiscal decentralization and inequality was again debated, during the period of market reforms in the 1980s. Some research indicates (Ma, 1997) that the redistribution role of the fiscal system weakened between 1983 and 1991 due to tax evasion by provincial governments, which caused the amount of interregional transfers to decline. This was also suggested by Raiser (Raiser, 1998) who showed that fiscal transfers exacerbated regional disparities, because they were allocated by the central government to selected provinces based on political networks rather than equity considerations. The inter-governmental relationship has been also addressed by Knight and Li (Knight and Li, 1999) who investigated provincial budgets over the 1983–1991 period and concluded that net transfers destabilized provincial

expenditure. Furthermore, Bahl (Bahl, 1999) observed that expenditure equalization across provinces declined between 1990 and 1995.

By 1994, this system of fiscal contracts was abolished and a uniform sharing formula required all provinces to remit 75% of their revenue from the value-added tax to the center (Bahl, 1999). Moreover, income from provincially-owned state enterprises was assigned entirely as revenue to regional governments, thus largely eliminating incentives for tax evasion via extra-budgetary accounts. This reform assisted the central government in regain its fiscal power, but the impact of the reform on regional disparities and interregional smoothing is not yet clear.

2.2.2 Fiscal administration and introduction of userfees in China

Prior to the reform of 1979, the fiscal relations between the central and provincial governments could be described as one of “unified revenue collection and unified spending”. Basically, the provincial governments collected most of revenue generated from within the province, on average over 80%, including taxes and (mostly) profits from state-owned enterprises. In this context, China has never had a central tax administration system as all taxes, with the exception of excises and customs, were collected by local governments and then transferred to the central government. From a fiscal point of view, China budgetary policy essentially consisted of tax collection and profit by the center that were subsequently redistributed to province. This system was also referred to as “eating from one pot” (Feltenstein and Iwata, 2005).

In the beginning of the 1980, China adopted a fiscal contract system (Oi 1992, Wong 1997). Under the new system, the central government codified a set of tax laws and regulations that defined tax bases and tax rates, but left the implementation of these policies to local state entities. Locally collected taxes were shared between the central and local governments according to pre-negotiated sharing contracts. Given the stipulated high tax rates, many local governments opted to use their discretion to give special tax concessions to enterprises and foreign investors so as to encourage FDI as well as general investment in their jurisdiction. This effectively allowed local governments to set their own tax rates, with little interference from higher level governments. The central and provincial fiscal relationship was therefore nickname “eating from separate kitchens”.

Under the fiscal contracting system, provincial governments entered into five year fiscal contracts with the central government. Because of their experimental nature, the contractual arrangements varied across provinces and over time. The fiscal contracting system could be described as followed (Wong, 1997 and Bahl, 1999): Firstly, “central fixed revenue” was defined to include custom's duties, direct tax or profit remittance from the central government supervised State-Owned Enterprises (SOE), and some other taxes. All other revenue fell under the heading “local revenue.” Secondly, the local revenue was divided between the central and provincial governments according to pre-determined sharing schemes.

The effect of fiscal contract system was to place the central government at a relative disadvantage in revenue sharing and led to a steady decline in central government’s share of national tax revenue. To halt the erosion of fiscal decline as well as further clarify the definition of tax rights, China introduced a new fiscal arrangement based on clear tax assignment between central and local governments in 1994 (Hsu 1999). Under the new system, the personal income tax and the corporate income tax on

locally owned state enterprises and non-state enterprises were assigned to the local government, while the income tax on centrally owned enterprises was assigned to the central government. The value-added tax was shared (75% central and 25% local). The government also created a nationwide State Administration of Taxation, separate from the Local Administration of Taxation. This new fiscal system represented an additional improvement in the definition of tax rights because it assigned each level of the government its own tax base (Berkowitz and Li, 2000). In general, the contract system worked and it was more common to have extra subsidies than extra revenue remittance. This suggests that, as far as the central–provincial relations in China, the “soft budget constraint” problem (Kornai, 1988) constituted a greater constraint than the “predation” problem of local government.

Starting 1994, the “fiscal contracting system” was replaced by “separating tax system.” Under the new system, “local revenue” has been redefined as revenues from local taxes and the local portion of the shared taxes (Bahl, 1999). The major local taxes constituted now the income taxes from all enterprises other than central government enterprises, business tax from the sales of services and personal income tax. The most important shared tax was the value added tax (VAT) of which 25% belonged to the provincial government, uniform across provinces. The post-1994 phase also eliminated the variations of the revenue sharing rules from the 1980s.

Another element of the reform that was introduced in the 1994 focused on the “extra-budgetary revenue”, which consisted of tax surcharges and user fees levied by central and local government's agencies, as well as some earnings from SOE. The extra-budgetary revenue emerged in the 1950s but only became institutionalized after the reform. Unlike the budgetary local revenues, the extra-budgetary local revenues were not subject to sharing with the central government. While about 70% of the extra-budgetary funds were earnings retained by SOE and by their supervisory government agencies at the central and local levels, about 30% of the extra-budgetary funds were used for government expenditures to supplement the budgetary funds (Fan, 1996).

In sum, the Chinese central government's post-reform treatment was to provide fiscal incentives to individual provinces, both from budgetary revenue and extra-budgetary revenue. The center therefore provided “space” for the local government to experiment, but at the same time made provinces responsible for the own expenditures. This could be considered the “internationalization of costs” which is one of consideration to ensure that fiscal decentralization would not lead to negative externalities. The downside was that the “internationalization of costs”, in combination with a general trend of marketization of public goods during transition, led to introduction of userfees on health and educational services that were previously considered freely accessible. This had a negative effect on the poor and marginal segments of society as they are the most dependent on these services, which in turn increased vulnerability.

2.2.3 Fiscal decentralization and State Owned Enterprises

In pre-1978 China, a multitude of bureaucrats in both central ministries and various levels of local government, often referred to as ‘grandmothers-in-law,’ controlled a typical enterprise. These bureaucrats exercised not only control rights, but also rights to intercept cash flows and to extract in-kind resources from enterprises under their jurisdictions. Property rights of state enterprises were also ill-defined. The reform that

began in 1978 transferred the administration of the vast majority of state enterprises to local governments. It also granted state enterprises autonomy in determining output, pricing and, increasingly, investment decisions, and gave enterprise managers and workers financial incentives (Li 1997). The reform gradually liberalized product markets and encouraged a massive entry of profit-oriented non-state firms, which were often TVEs that produced consumer goods, which were generally scarce.

Before the reforms of 1979, firms and industries had no incentive for firms and industries to perform, neither to maximize profit. However, this changed significantly with the fiscal decentralization reform initiated in 1979. Reforming of State Owned Enterprises (SOE) became a priority for the Chinese government. The objective was the establishment of a 'modern enterprise system' which would improve performance as well as economic growth in general. With this in mind managers of State Owned Enterprise were given more and more responsibility on daily decision-making (Naughton, 1995). In addition, State Owned Enterprises (SOE) would also compete with township and village enterprises. However, many SOE had difficulty to become profitable and government resources were needed to support these companies.

Before the Asian financial crises in 1997, China was on the road to integrated SOEs with the growing private sector so as to emulate the development success of the South Korean Chaebol model. This meant that unprofitable State Owned Enterprises would be taken over by private firms in the same sector to create national champions. After the Asian crises of 1997, which demonstrated weak corporate governance in many of these national champions, the Chinese government opted to introduce hard-budget constraints, which in combination with market entry of private sector companies, led to massive lay-offs of state workers.

Despite the introduction of a hard budget constraint, the link between State Owned Enterprises and local government still existed and is sometimes referred to as "bureaucratic integration" (Bai, Tao and Tong 2007). The close relations between local government and state owned enterprises was caused by the direct private benefit gained from industries under their jurisdiction as well as the reliance on the local firms and industries for building up support for their reappointment. So although direct subsidies from central and local governments may be reduced, other fiscal devices, such as tax relief, government contracts and protectionism could increase.

Besides personal profit, there were also political economy arguments for support of State Owned Enterprises (SOE), such as the maintaining of local employment, which is particularly important in the absence of unemployment insurance. This support could also include production specifications and taxation (Young 2000). A good example was the protectionism by Shanghai's regional government through specifications and additional taxes on cars manufactured outside the province. This sparked trade retaliations by Hubei province which imposed a 70,000 yuan (\$8,500) tariff on cars produced in Shanghai (China Daily, 28 January 2000).

The case of local protection demonstrates the limitation of Oates decentralization Theorem for the following three reasons: (i) the negative externalities of economic protectionism as local entities enjoy benefits of protection, while the negative effect would be felt by the country as a whole; (ii) the lack of economic of scale in production. This is because protectionism, and retaliatory actions, would lead to market segmentation and thus block optimal allocation of production resources; and (iii) the impediment of inter-jurisdictional competition leads to less economic growth. As such, WTO accession, which at least in a theoretical sense requires an equal

playing field, would not only benefit foreign companies and national enterprises, but also between local companies from different regions in China.

Fiscal decentralization also had an impact through the development and massive growth of Township Village Enterprise (TVE). Originally, local leaders were more effective at launching new enterprises than private entrepreneurs, especially in the beginning of the reform period when there was an underdevelopment in the market (Ody, 1992). As local leaders had political, social, and personal connections, they could find capital resources through the state banking system (Che and Qian, 1998). In addition, local leaders had the advantage of networks when they interacted with agents outside their local jurisdiction. In general, local leaders were given the incentive to initiate rural enterprises and were in a unique position to furnish key services that others may not have been able to provide in a transition country.

The result of the close relationship between local bureaucrats and TVE were that officials were “bought into” the development process and had a stake in further marketization. This is referred to as the “helping hand”. A key element in this was that a local government could keep a significant portion of the increased tax revenue that results from their policy decisions (Jin, Qian and Weingast 2005). However, there seems to be a shift from the “helping hand” in the beginning of the transition phase when networks were important in gaining access to key resources, to the “grabbing hand”, which inhibited private sector development and economic growth (Chen, 2004) through protectionism corruption and cronyism. In this context, the fiscal recentralization, which forces provinces to seek revenue for off-budget taxes, could be socially more costly by creating pressure to charge users fees as well as pursuing protectionist policies.

2.2.4 Fiscal decentralization and political centralization

As discussed in the previous section, China policy shifted several times from decentralization to centralized over the last 50 years. However, decentralization to lower tiers of government was particularly evident from its fiscal system through fiscal contract system (1980–1993) and revenue assignment system (1994–present). Under fiscal contract system, each subnational government level contracted with the next level up to meet certain revenue remittance targets, which could be either a nominal amount or a percentage share. Therefore, China's fiscal system is largely decentralized while its political governance structure is rather centralized with strong top-down mandates and a homogeneous governance structure (Zhang, 2006).

The last decentralization exercise is referred to as *Fenzao chifan*, which means preparing meals from separate stoves. This metaphor is used in terms of fiscal decentralization as local government has expanded its taxing authority, without a clear mandate on duties and obligations of the various tiers of government. This led to duplication of efforts, between the five tiers of government which are: (1) central; (2) provincial; (3) prefecture; (4) county; and (5) township. The duplication of efforts can also be considered one of negative effects of decentralization.

By providing more freedom to take initiatives, local officials pursued their own agenda, which is in line with the Oates Theorem of decentralization that states decentralized system is always more efficient than a centralized system for supplying local public goods as local government knows what the “preference” is of their constituency. However, and unlike, democratic countries on which the Oates Theorem

was based, the career track of Chinese officials is still controlled by the center through appointment and promotion as well as through the membership of the Chinese Communist Party (Huang, 2001). In particular, through the cadre management system as well as the target responsibility system, the central government steers local cadres towards the national agenda, with explicit targets ranging from economic growth to fertility control.

As such, China has a decentralized fiscal system within a centralized political system. In combination with the *target responsibility system*, a policy framework was created with yardstick competition among local officials by rewarding or punishing them on the basis of economic performance (Zhang 2006). This competition is supported institutionally through standardized statistical data and accounting systems. This was demonstrated by examining the turnover data of top provincial leaders in China (Li and Zhou 2005) which indicated that the internal political market also serves as a disciplinary mechanism for local officials to promote economic growth. This finding suggests that the governance structure matters to economic growth in China.

2.2.5 Fiscal decentralization, userfees and social services

Fiscal decentralization in China has led to the growth of extra-budgetary financing, which in itself was a result of centralization of tax collection as local government sought more autonomy. The change from budgetary revenue to off-budget revenue was the consequence of change in the form of local government. Local government officials benefited from both official budgetary and off-budget revenues. A perverse reaction to the centralization of budget process was the growth of off-budget discretionary spending of local tax revenues. Fiscal centralization therefore changed the form of corruption to extra-budgetary sources. As such, fiscal decentralization shifts the burden of school and health funding to the local level, which particularly affected the poor and rural counties as they had struggled to generate revenues (Park, Rozelle, Wong, & Ren, 1996), and as a result, inequality increased (Brown and Park, 2002).

The introduction of userfees had negative effect on schooling as they are mostly funded at the local level. This means that rich provinces tend to produce more human capital per capita than do poor provinces. Resource constraints affect access to schooling by individuals in different parts of China, especially in rural areas and in the West. The place of a person's birth has therefore become one of the most important determinants of that person's adult skill level (Knight & Song, 1999). This source of inequality is reinforced by the *hukou* policy that charges children of interregional immigrants additional fees for schooling which can amount to as much as 10% of total family income just for the right to attend school (Xie, 1999).

A similar trend is visible in the health sector as China has gradually stepped back from providing free, or subsidized, health benefits to its people. With the decentralization of public health responsibilities down to provincial level, which in turn was transferred to the counties and municipalities, many sub-national entities could not afford to support these services. The effect was that by 1998, according to the Health Services Survey, 87% of the rural population and 44% of the urban population had no health care benefits and had to pay out-of-pocket for all medical costs (Banister and Zhang, 2005). As such, payment for medical and pharmaceutical treatment can also drive families into dire poverty.

Another phenomenon of decentralization in the health sector is that in rural areas some 50% of the village clinics are now privately run, with most of the remaining publicly run facilities reliant on fee charged directly from patients. A particular issue here is the unwillingness of both private and public clinics to provide preventative care without payment. Furthermore preventative services administered by the public health institutions have seen a decline in their level of government funding to less than 50% of revenue, with an increasing reliance on fee paying services. The emphasis on income generation shifted the focus of public health away from prevention towards treatment and cure. The consequences were particularly severe for the rural poor (Dummer and Cook 2007).

As predicted by theory, decentralization led to greater inequality not only in wealth, but also in services delivery in the social sectors, between provinces and regions. This has led to large differences in public spending on education and in teacher quality across regions. This is evident from the World Bank (World Bank, 1999b) which reported that the recurrent per-pupil expenditure in the wealthiest 10% of counties was more than 4.5 times that in the poorest 10% in 1997. This source of inequality is reinforced by the vestiges of *hukou* policy that made it difficult to move to another region, or at an additional cost. For example, children of interregional immigrants had to pay an additional fees for schooling that can amount to as much as 10% of total family income just for the right to attend school (Xie, 1999).

Synthesis on fiscal decentralization and public service delivery in China

In the last fifty years China went several times from central to decentralized state structures. In general, fiscal decentralization affected provincial levels governments in various ways, ranging from providing a “help hand”, such as the “buying in” of local bureaucracy that had a stake in the successful development of Township Village Enterprises (TVEs) to market sector experimentation with policies which resulted in economic development and massive poverty reduction. The downside of fiscal decentralization, combined with privatization, lead to “marketization” of public goods. In practices this meant that previous free and accessible health and education services, became commodities for which citizens had to pay for through the introduction of userfees. Although, this can be considered “internationalization” of costs, its effects were a reduction of accessibility, in particular for the poorer segments of society and has also a negative affects on vulnerability.

However, the fiscal decentralization experience in China has also demonstrated its limits as local entities pursue there own interests at the expense of the whole country, in particular in the field of economic development. From a political economy perspective this could be explained by the economic benefit of the established local bureaucrats which have interests in the success of the companies within their jurisdiction. However, the negative effects for China as whole could be through negative externalities, the lack of economic of scale in production and the impediment to inter-jurisdictional competition. It is in this context that WTO accession could be beneficial because it, at least in a theoretical sense, requires an equal playing field, not only between foreign companies and national enterprises, but also between local companies from different regions within China.

Finally, the downside of fiscal decentralization was inequality, both at the inter regional, as well as within regions increased. The former was caused by the reduction of inter-provincial transfers while the latter was caused by the introduction of userfees both in health and the education sector. This latter increased the barrier to public services access for poor households. This again could have negative effect on poverty in several ways as higher userfees: (i) lead to higher vulnerability, as “out of pocket” health care expenditures rise; (ii) increase in Inter-Generational Transmission (IGT) of poverty as poor households lack the resources to finance education of there children; (iii) in combination with the *hukou* system and lack of local participation, confines households to (poor) jurisdictions that have inferior public services.

Chapter 2.3: Empirical evidence on the extend that public service delivery is a determinant of fiscal decentralization

Introduction

Motivated by what influences fiscal decentralization in China, this research focuses on the determination of fiscal decentralization in terms of public service delivery. Three elements of public service provisions that can be identified that influence fiscal decentralization: (i) spillover effects of public service delivery (Besley and Coate, 2003); (ii) the economy of scale when producing local services and goods (Alesina and Spolore, 1997); and (iii) internal coordination cost *within* government (Gilbert and Picard, 1996). In the context of China, fiscal decentralization and public service delivery have also been accompanied by growth of budgetary revenues and expenditures as well as the introduction of userfees.

The definition in this chapter of fiscal decentralization consists of devolving revenue sources and expenditure functions to lower tiers of government. The operationalization of fiscal decentralization in China is by focusing on the share of local budget revenue and expenditure compared to national budget as well as the share of extra-budgetary revenue and the share of extra-budgetary expenditure compared to national budget. The dependent variable will therefore emphasize the amount of fiscal decentralization, while the independent variables will measure the quality of public services as measured by three education variables (amount of students per teacher in primary education, amount of students per teacher in secondary education and amount of students per teacher in higher education) and three health care variables (amount of doctors per bed, amount of beds per health institute and amount of medical personal per doctor). This research uses a panel dataset covering 28 provincial from 1982 till 1999. The first step is to analyzing these four families of regressions consists of an OLS regression and Fixed Effect. The second step is to undertake an a Two-Stage Least Squares (TSLS) and TSLS with Fixed Effect, which will be endogenousized by four variables of political decentralization (the integration score for party secretaries, the integration score for governors, tenure measured in years for party secretaries and tenure in years for governors) as well as rural and urban inequality. These variables will therefore be used as an instrumental variable for public service delivery.

Although political decentralization in China is different from other countries, it can be measured in terms of “closeness” of the China’s political party to its local residence. The “closeness” could determine the quality of public services as the government would become pro-active in service delivery. Political integration could be used as an instrumental variable as a political system is often used to assert citizens’ needs (Joshi, p7, 2006). Rural and urban inequality could also influence public services as high inequality would reduce the quality of governance as the elite captures the state provisions (Bardhan & Mookherjee, 2000).

The remainder of this chapter is organized as followed. The first section “fiscal decentralization and public service delivery” highlights the inter-relationship between these two elements. The second section “Data description” describes the data as well as the sources. The third section “Methodology” presents the OLS regressions, Fixed Effect, and Two Stage Least Square (TSLS) regressions and TSLS with Fixed Effect. The fourth section emphasizes the results of various regressions. Finally, the section

“Conclusion and synthesis on the determinants of fiscal decentralization in China” highlights the limitations of this chapter as well as suggests policy recommendations.

2.3.1 Fiscal decentralization and public services in China

Since the founding of the People's Republic of China in 1949, the Chinese state structure shifted between decentralization and recentralization. This included vertical decentralization processes (i.e. between the central government and local government) and horizontal decentralization process (i.e. between government and state owned enterprises). Prior to the reform of 1979, the fiscal relations between the central and provincial governments could describe as one of “unified revenue collection and unified spending”. In this arrangement, the provincial governments collected most of the revenue generated from within the province, on average over 80%, which included taxes and (mostly) profits from state-owned enterprises (Feltenstein and Iwata, 2005).

After 1979, China adopted a fiscal contract system (Oi 1992, Wong 1997). Under the new system, the central government codified a set of tax laws and regulations that defined tax bases and tax rates, but left the implementation of these policies to local state entities. Locally collected taxes were then shared between the central and local governments according to pre-negotiated sharing contracts. Given the stipulated high tax rates, many local governments opted to use their discretion to give special tax concessions to enterprises and foreign investors so as to encourage investment in their jurisdiction. This effectively allowed local governments to set their own tax rates, with little interference from higher level governments. Under the fiscal contract system, each subnational government level contracted with the next level up to meet certain revenue remittance targets, which could be either a nominal amount or a percentage share. The retention was negotiated between the individual subnational governments and central government.

By 1994, the fiscal system was reformed and a uniform sharing formula required all provinces to remit 75% of their revenue from the value-added tax to the center (Bahl, 1999). Moreover, income from provincially-owned state enterprises was assigned entirely as revenue of regional governments, thus largely eliminating incentives for tax evasion via extra-budgetary accounts. This reform assisted the central government in regain its fiscal power. The current decentralization efforts are therefore referred to as *Fenzao chifan*, which means preparing meals from separate stoves. This led to local government expanded taxing authority, without a clear mandate on duties and obligations of the various ties of government.

In comparison with other transition countries, fiscal federalism in China is characterized by an institutional arrangement that emphasizes the importance of regional decentralization and transition. This is also referred to as Chinese Style fiscal federalism (Qian and Roland, 1998), which is contrary to the existing studies the role of government incentives in economic performance (Qian and Weingast, 1996). In other developing and transition economies government is often seen as a central barriers to economic development, by providing these governments with the incentives to promote market development is especially critical. Specifically, the "market-preserving federalism" theory (e.g., Weingast, 1995; Montinola, Qian, and Weingast, 1995) argues that by devolving regulatory authority from the central to local governments, the interventionist role of the central government can be limited, by creating a hard budget constraints.

A side effect of the hard budget constraint was that spending inequalities among Chinese provinces were translated into wider spatial inequalities in access to health care (Kanbur Zhang, 2005b, OECD, 2006). More specifically, and using provincial level data, (Jin and Zou, 2005) examined the fiscal relationship between central and provincial governments in China. They used the relative importance of the provincial government of fiscal decentralization variables, both on the revenue side and the expenditure side, and analyzed the impacts of fiscal decentralization on economic growth. Another study emphasized that fiscal decentralization on health outcomes in China using a panel data set with nationwide county-level data (Uchimura and Jütting, 2007, Duret 2000). They find that counties in more fiscal decentralized provinces have lower infant mortality rates compared to those counties in which the provincial government retains the main spending authority. However, for those local governments that have only limited revenues, their ability to spend on local public goods such as health care depends crucially upon intergovernmental transfers. A similar trend is visible in the education sector. The introduction of userfee's led to a negative effect on schooling as they are mostly funded at the local level. This reinforced the inequalities of human capital per capita than do poor provinces (Knight & Song, 1999).

The downside of fiscal decentralization was therefore the growth of extra-budgetary financing. The change from budgetary revenue to off-budget revenue was a consequence of a centralization of the budget process as there was a growth of off-budget discretionary spending of local tax revenues. Fiscal decentralization therefore shifts the burden of school and health funding to the local level, which particularly effected the poor and rural counties as they had struggled to generate revenues with a weak tax-base (Park, Rozelle, Wong, & Ren, 1996). Through the introduction of userfees, China has gradually stepped back from providing free health benefits. Moreover, local government might even play the role of a “grabbing hand” by charging more for basic health care. This is reinforced by the interjurisdictional spill-over effects of health care. In these circumstances immunization may not have priority for local government as they have less incentive to provide such services. This is because the benefits of such a programme would be largely felt by other provinces. This issue is of particular importance in regard to the large scale of migration.

2.3.2 Data Description

The objective of this research is to measure the effects of public service delivery in the health and education sector, on fiscal decentralization, using a panel dataset. The panel dataset covers 28 provincial, 1982 till 1999. The dataset is limited to 1999 because the variable of political integration is limited to this year, which is used as an instrumental variable. Tibet is excluded for lack of data. The provinces of Guangdong-Hainan and Sichuan-Chingqing have been merged to make the various datasets compatible.

To analyze the determinants of fiscal decentralization in the context of China, it is important to look at determinants of not only revenue and expenditure side, but also on the extra-budgetary revenue and extra-budgetary expenditures. Therefore Fiscal decentralization (FDⁱ) have the following variables:

1. Fiscal decentralization 1 (FD¹): The provincial budgetary expenditure as share of the total national budgetary expenditure. This data is on provincial level as

well as annual level and was provided by Jing Jin and Heng-fu Zou of the World Bank.

2. Fiscal decentralization 2 (FD²): The provincial budgetary revenue as share of the total national budgetary revenue. This data is on provincial level as well as annual level and was provided by Jing Jin and Heng-fu Zou of the World Bank.
3. Fiscal decentralization 3 (FD³): The provincial extra-budgetary expenditure as share of the total national budgetary expenditure. This data is on provincial level as well as annual level and was provided by Jing Jin and Heng-fu Zou of the World Bank.
4. Fiscal decentralization 4 (FD⁴): The provincial extra-budgetary revenue as share of the total national budgetary revenue. This data is on provincial as well as annual level and was provided by Jing Jin and Heng-fu Zou of the World Bank.

To measure the quality of public service delivery in health and education sector, the following six independent variables are used:

1. Education 1 (Edu1): public services in the higher education sector, which are the amount of teachers divided by the amount of students at this level of education. This could measure the quality of public services in higher education. The data is based on China Statistical Data Compilation of Michigan University.
2. Education 2 (Edu2): public services in the secondary education sector, which are the amount of teachers divided by the amount of students at this level of education. This could also measure the quality of public services in secondary education. The data is based on China Statistical Data Compilation of Michigan University.
3. Education 3 (Edu3): public services in the primary education sector, which are the amount of teachers divided by the amount of students at this level of education. This could also measure the quality of public services in primary education. The data is based on China Statistical Data Compilation of Michigan University.
4. Health 1 (HC1): public services in health care as measured by the amount of doctors (per 10000) divided by the amount of beds (per 10000). This measures the quality of public service delivery in health sector. The data is based on China Statistical Data Compilation of Michigan University.
5. Health 2 (HC2): public services as measured by the number of beds in Health Institution divided by the number of health Institutions. This measures the quality of public service delivery in health sector. The data is based on China Statistical Data Compilation of Michigan University.
6. Health 3 (HC3): public services as measured by the number of medical personnel provincial divided by number of doctors. This measures the quality of public service delivery in health sector. The data is based on China Statistical Data Compilation of Michigan University.

The Two-Stage Least Squares (TSLS) and TSLS with Fixed Effect (FE) estimations are run with the following six instruments, which are respectively four political decentralization variables as well as rural and urban inequality variables:

1. Political decentralization 1 (Poldec1): the integration score for party secretaries from 1 (lowest) to 4 (highest). Political integration could be used as an instrumental variable as political system is often used to assert citizens' needs (Joshi, p7, 2006). If the integration score is higher, than the party secretary is closely integrated into its jurisdiction and "know" what its residence desire. The data was provided by Yiu Por Chen, from the University of DePaul in Chicago.
2. Political decentralization 2 (Poldec2): the integration score for governors, which is measured the same way as for partyint. Political integration could be used as an instrumental variable as political system is often used to assert citizens' needs (Joshi, p7, 2006). If the integration score is higher, than the governor is closely integrated into its jurisdiction and "know" what its residence desire. The data was provided by Yiu Por Chen, from the University of DePaul in Chicago.
3. Political decentralization 3 (Poldec3): tenure measured in years for party secretaries. The longer the tenure within a province, the more integrated the party is with its jurisdiction. As such, it would be more likely that the party secretary is more closely associated with its constituency and to be more responsive to its needs. This means that they would provide better health and educational services. Political integration could be used as an instrumental variable (Joshi, p7, 2006) as political system is used to assert citizens' needs. The data was provided by Yiu Por Chen, from the University of DePaul in Chicago.
4. Political decentralization 4 (Poldec4): tenure in years for governors. The longer the tenure within a province, the more integrated the party is with its jurisdiction. As such, it would be more likely that the party secretary is more closely associated with its constituency and to be more responsive to its needs. This means that they would provide better health and educational services. Political integration could be used as an instrumental variable (Joshi, p7, 2006) as political system is used to assert citizens' needs. The data was provided by Yiu Por Chen, from the University of DePaul in Chicago.
5. Rural Inequality (RI): Inequality of rural areas is measured by the Engles inequality, which is from the China Statistical yearbook. This is particular the case as inequality can affect the quality of public service as more inequality leads to less public services (Bardhan & Mookherjee, 2000). For instance, inegalitarian societies are shown to generate more redistribution than less inegalitarian ones. This is because the middle class "promote" public services for everybody.
6. Urban Inequality (UI): Inequality of urban areas is measured by the Engles inequality, which is from the China Statistical yearbook. This is particular the case as inequality can affect the quality of public service as more inequality leads to less public services (Bardhan & Mookherjee, 2000). For instance, inegalitarian societies are shown to generate more redistribution than less inegalitarian ones. This is because the middle class "promote" public services for everybody.

As such there are four families of regressions with four different dependent variable (FD¹, FD², FD³ and FD⁴) and six public service independent variables of which three

health care variables (HC1, HC2 and HC3) as well as three education variables (Edu1, Edu2 and Edu3). Finally for the TSLS and TSLS with FE, we use six instrumental variables (Poldec1, Poldec2, Poldec3, Poldec4 and RI and UI).

2.3.3 Methodology

To measure the impact of the quality of public services on fiscal decentralization, we use the following regression: Ordinary Least Squares (OLS), Fixed Effect (FE) and Two-Stage Least Squares (TSLS) and TSLS with FE. This will be undertaken with respectively four families of regressions, which have the same independent variables. Therefore, the four families of regressions, which are the following equations:

$$(1) FD_{pt}^i = \alpha + \beta_1 Edu1_{pt} + \beta_2 Edu2_{pt} + \beta_3 Edu3_{pt} + \beta_4 HC1_{pt} + \beta_5 HC2_{pt} + \beta_6 HC3_{pt} + \chi_p + \delta_{pt}$$

The equation has the following annotation: FD^i are the Financial Decentralization variables (with $i=1$ is budgetary expenditure as share of the total national budgetary expenditure, $i=2$ is provincial budgetary revenue as share of the total national budgetary revenue, $i=3$ is provincial budgetary expenditure as share of the total national budgetary expenditure and $i=4$ is provincial extra-budgetary revenue as share of the total national budgets), Edu1 is public services in the primary education sector (amount of students per teacher in primary education), Edu2 public services in the secondary education sector (amount of students per teacher in secondary education), Edu3 is public services in the higher education sector (amount of students per teachers in higher education), HC1 is health care services (amount of doctors divided by the amount of beds) and HC2 is health care provisions (amount of medical health institutes divided by number of doctors in health institutes), HC3 is health care provisions (i.e. amount of medical health institutes divided by number of doctors in health institutes), p is one of the respective 28 provinces, t is respective one of the individual year starting from 1982 till 1999, α is the constant, $\beta_{1..6}$ are the respective coefficients of the independent variables, χ is the individual characteristics (for Fixed Effect) and δ is random error.

The variables of fiscal decentralization would identify how the quality of public service delivery affects which elements of fiscal decentralization. This is particular important in the context of China as the effects of budgetary revenue and expenditures are considered key elements in the reform of public administration (Luo, Zhang, Huang and Rozelle, 2007). The second step is to undertake a fixed effect regression. Fixed effects methods essentially offer control for all stable characteristics of the observations and therefore isolates the effects of public service delivery in the health and education sector on fiscal decentralization. The F-test will measure if the Fixed Effect is significant, thereby taking the advantage that panel data offers.

The third step is to apply a Two-Stage Least Squares (TSLS) and TSLS with FE. We use the OLS regression models which assumes that errors in the dependent variable are uncorrelated with the independent variable(s). When this is not the case (for example, when relationships between variables are bidirectional), linear regression using ordinary least squares (OLS) no longer provides optimal model estimates. Therefore the Two-Stage Least Square (TSLS) regression addresses the problems of OLS regression by controlling for potential simultaneity and omitted variables bias, which is related to the endogeneity between decentralization and public service delivery. There could be two reasons for this which are: (i) financial decentralization

could also affect public service delivery through, for example the capture of local elite of the state, within a highly decentralized administration; and (ii) financial decentralization, through the Oates Decentralization theory could enhance public service delivery.

The instrumental variables for the Two-Stage Least Squares (TSLS) are four variables representing political integration and two variables representing respectively rural inequality (RI) and urban inequality (UI). In total there are therefore six instrumental variables, while there are six dependent variables. The four political integration variables are linked to public services delivery because the former will increase “the responsiveness” to needs of their citizens (Joshi, p7, 2006) and therefore the performance will increase in the health and education sector. In addition, inequality has a relationship on public services delivery as a less unequal society “promotes” public services for everybody (Bardhan & Mookherjee, 2000).³¹

We control for the quality of the instruments through first-stage of TSLS method and through Hansen-Sargan test that focuses on overidentifying restrictions. We check that excluded instruments are collectively relevant to public service delivery in the first-stage of the TSLS method. The Hansen-Sargan test, checks if the joint null hypothesis of the instruments are valid i.e., uncorrelated with the error term, and that the excluded instruments are correctly excluded from the estimated equation. Under the null, the test statistic is distributed as chi-squared in the number of overidentifying restrictions. A rejection casts doubt on the validity of the instruments. For the TSLS estimator, the test statistic is calculated as N*R-squared from a regression of the Instrumental Variables residuals on the full set of instruments. In addition, as with the FE, the F-test will measure if the Fixed Effect are significant.

2.3.4 Results

This section presents the results of the four regressions (respectively FD^1 , FD^2 , FD^3 and FD^4). Each family of regression includes OLS, Fixed Effect, TSLS and TSLS with FE. This can be viewed in table 6, 7, 8 and 9. The results of the first stage regression are demonstrated in annex 2 (table 15, 16, 17 and 18).

Table 6: Regression on provincial fiscal decentralization 1(FD^1)

	OLS	FE	TSLS	TSLS, FE
Edu1	1287.982*** (212.1683)	1209.49*** (211.0413)	1087.298 (5363.09)	1038.651 (5366.751)
Edu2	-432.6834*** (68.32852)	-424.8523*** (68.08892)	-944.2326 (978.3665)	-906.0782 (975.1865)
Edu3	3.930235 (90.8988)	-25.65013 (90.94661)	-2853.795 (2328.873)	-2885.708 (2352.86)
Health1	1.215074*** (.45694)	2.070783*** (.5318163)	14.97917 (17.20482)	14.28942 (16.68519)
Health2	39.91022 (79.51607)	93.7456 (81.98455)	-1578.631 (2011.045)	-1573.613 (1999.282)
Health3	.7070092***	1.000923	16.43894	15.90545

³¹ In this context it should be noted that decentralization increases inequality between jurisdiction and not necessarily within jurisdictions.

	(.2418015)	(.2644289)	12.73383	(12.27351)
Constant	.3447052	-.6351297	-22.50835	-21.54065
	(.752248)	(.8266415)	(30.17749)	(29.44066)
R-square	0.01	0.02	0.09	0.09
F-test		69.79		3.36
		(0.00)		(0.00)
Observation	433	433	383	383
Significant	* is significant at 10%, ** is significant at 5% *** significant at 1%			

Table 6 presents the results of the first regression with the dependent variable Fiscal decentralization 1 (provincial budgetary expenditure compared to total national budgetary expenditure). This table indicates that under OLS and OLS with Fixed effect, Edu1 and Edu2 as well as Health 1 have a positive impact on provincial budget expenditure. Health care 3 is only significant with the OLS regression. However, there are no TSLS and TSLS with FE that are significant. The F-test demonstrates that the Fixed Effect are significant in both the OLS and TSLS regressions.

Table 7: Regression on provincial fiscal decentralization 2 (FD²)

	OLS	FE	TSLS	TSLS, FE
Edu1	-2301.965***	-2449.9***	-12235.39**	-12202.68**
	(472.0221)	(480.0168)	(5625.976)	(5821.707)
Edu2	-117.8441	-130.2585	-2282.973**	-2296.269**
	(151.9693)	(154.8693)	(1025.807)	(1057.856)
Edu3	-344.5202*	-388.1865*	-1332.954	-1263.526
	(201.2379)	(206.8595)	(2445.429)	(2552.319)
Health1	-.0853182	.7464832	-8.118668	-8.219313
	(.9218267)	(1.209625)	(17.98752)	(18.09964)
Health2	-161.5982	122.9881	2248.374	2278.566
	(173.3768)	(186.4751)	(2108.136)	(2168.768)
Health3	-1.15925***	-.9735483	-.4816455	-.6127877
	(.5087568)	(.6014478)	(13.30433)	(13.31398)
Constant	6.11036***	5.458806	16.65485	16.99334
	(1.536294)	(1.880209)	(31.54311)	(31.93643)
R-square	0.01	0.00	0.01	0.01
F-test		37.22		9.78
		(0.00)		(0.00)
Observation	433	433	383	383
Significant	* is significant at 10%, ** is significant at 5% *** significant at 1%			

Table 7 presents the results of the second regression with the dependent variable Fiscal decentralization 2 (provincial budgetary revenue compared to the total national budgetary revenue). In the OLS regression, Edu1, Edu2 and Health3 are significant, while under OLS with Fixed Effect, Edu1 and Edu3 are significant. With the TSLS and TSLS with FE, Edu1 and Edu2 are significant and have a negative impact. This could indicate that better public service delivery in higher education would have a negative effect on fiscal decentralization. This could indicate that higher education,

and to a lesser extend secondary education, would suffer externalities and would need a minimum amount of “centralization” to be able to provide public services. An alternative hypothesis is that local government wishes to capture revenues, through userfees, in secondary and higher education. The F-test demonstrates that the Fixed Effect are significant in both the OLS and TSLS regressions.

Table 8: Regression on provincial fiscal decentralization 3 (FD³)

	OLS	FE	TSLS	TSLS, FE
Edu1	-2043.254*** (211.3259)	-2110.413*** (212.7216)	-9622.6*** (3520.851)	-9623.261*** (3625.011)
Edu2	-223.2283*** (68.04499)	-241.3044*** (68.63101)	-1555.086** (642.0816)	-1573.649** (658.6968)
Edu3	-233.0974** (90.38705)	-265.9455*** (91.67069)	-1588.657 (1529.878)	-1568.782 (1589.256)
Health1	-.5533207 (.4391103)	-.5676422 (.5360504)	-9.690947 (11.27009)	-9.560623 (11.27013)
Health2	-439.3083*** (78.60536)	-468.9924** (82.63727)	829.1226 (1319.637)	831.4871 (1350.43)
Health3	-.4565342* (.2359097)	-.5307225 (.2665342)	-2.933665 (8.337745)	-2.854838 (8.290234)
Constant	4.810337*** (.725071)	5.135954*** (.8332229)	21.10818 (19.76485)	21.09921 (19.88591)
R-square	0.00	0.00	0.02	0.02
F-test		54.97 (0.00)		6.96 (0.00)
Observation	433	433	383	383
Significant	* is significant at 10%, ** is significant at 5% *** significant at 1%			

Table 8 presents the results of the third regression with the dependent variable Fiscal decentralization 3 (provincial extra-budgetary expenditure compared to the total national budgetary revenue). In the OLS regression, Edu1, Edu2, Edu3 and Health2 and Health3 are all significant, while in the OLS with Fixed Effect, Edu1, Edu2, Edu3 and Health2 are significant. With the TSLS and TSLS with FE, Edu1 and Edu2 are again significant and have a negative impact. Again, this could indicate that higher education, and to a lesser extend secondary education, would suffer from negative externalities and would need a minimum amount of “centralization” to be able to provide public services. An alternative hypothesis is that local government wishes to capture revenues, through userfees, in secondary and higher education. The F-test demonstrates that the Fixed Effect are significant in both the OLS and TSLS regressions.

Table 9: Regression on provincial fiscal decentralization 4 (FD⁴)

	OLS	FE	TSLS	TSLS, FE
Edu1	-2177.927*** (263.1419)	-2275.789*** (264.8623)	-13178.68** (5255.001)	-13174.66** (5350.178)
Edu2	-534.1049*** (84.72298)	-562.2454*** (85.45335)	-2475.437*** (961.2315)	-2528.783*** (972.175)

Edu3	-336.9016***	-386.773***	-1911.785	-1866.827
	(112.4141)	(114.1403)	(2271.491)	(2345.594)
Health1	-.7207095	-.72869	-17.30188	-16.83605
	(.5337524)	(.6674432)	(17.13335)	(16.63366)
Health2	-556.7838***	-596.4278***	1416.942	1412.928
	(97.39444)	(102.8927)	(1977.204)	(1993.108)
Health3	-.2523305	-.3171007	-7.158805	-6.838112
	(.2897418)	(.3318651)	(12.72138)	(12.23561)
Constant	5.769589***	6.156694***	35.51505	35.06692
	(.8841029)	(1.037456)	(30.09348)	(29.34974)
R-square	0.00	0.00	0.03	0.03
F-test		49.77		4.56
		(0.00)		(0.00)
Observation	433	433	383	383
Significant	* is significant at 10%, ** is significant at 5% *** significant at 1%			

Table 9 presents the results of the fourth regression with the dependent variable Fiscal decentralization 4 (provincial extra-budgetary revenue compared to the total national budgets). In the OLS regression and OLS with Fixed Effect, Edu1, Edu2, Edu3 and Health2 are all significant. With the TSLS and TSLS with Fixed Effect, Edu1 and Edu2 are significant. It is important to note that under all three regressions (OLS, Fixed Effect, TSLS, and TSLS with FE) Edu1 and Edu2 are significant. Again, this could indicate that higher education, and to a lesser extend secondary education, would suffer negative externalities and would need a minimum amount of “centralization”. In addition, and in combination with the results of the third family of regressions (Table 8: with dependent variable extra-budgetary expenditures), could indicate that local government does not only collect more usersfees, but also spends more money on public education in secondary and higher education. The F-test demonstrates that the Fixed Effect are significant in both the OLS and TSLS regressions.

To explain the interaction between the four dependent variables measurement, we also undertake a correlation between FD^1 , FD^2 , FD^3 and FD^4 , which can be view in Table 10 below:

Table 10: Correlations between FD1, FD2, FD3 and FD4

	FD^1	FD^2	FD^3	FD^4
FD^1	1.0000			
FD^2	0.6064	1.0000		
FD^3	0.6203	0.7295	1.0000	
FD^4	0.6265	0.7481	0.9763	1.0000

Table 10 indicates that all fiscal decentralization variables are correlated with each other and this could also explain why FD^3 and FD^4 (0.9763) results are similar in table 8 and 9. This could mean that extra-budgetary expenditure and extra-budgetary revenue are closely linked to one another, as well as that this secondary and higher education are a determinant factor in fiscal decentralization. This could be linked to “internalization of cost” which is difficult with a large migrating population.

Taking into account all four regression FD^1 , FD^2 , FD^3 and FD^4 as well as the correlation Table, the following observation could be made: (i) public service delivery in higher education (Edu1) and secondary education (Edu2) have a negative impact on fiscal decentralization. As previously suggested, this could be linked to negative externalities, due to migration. For higher education and additional argument could be added, which is that the cost of universities could be relatively high for a single local government entity. A negative impact could therefore indicate that the economies of scale could be a factor in limiting fiscal decentralization; (ii) there is a high correlation between FD^3 and FD^4 , indicating that there is a strong correlation between extra-budgetary expenditures and revenues. However, this seems to be driven by the public service delivery in higher and secondary education; and (iii) Health 1 and Health 2 have, if any, limited effect on fiscal decentralization. In this regard, it should be noted that the quality of public service delivery in the health sector is not significant in any of the TSLS and TSLS with FE. However, this could also be linked to the fact that public service delivery in health sector are not linked to individual users, as is the case with public service delivery education sector, which have a relationship with “the amount of students”. Unfortunately, a similar approach could not be undertaken in the health sector as there are no statistics in terms of “the amount of patients”.

Conclusion and synthesis on the determinants of fiscal decentralization in China

This research focused on the determines of fiscal decentralization by three education variables (amount of students per teacher in primary education, amount of pupils per student in secondary education and amount of pupils per student in higher education) and three health variables (amount of doctors per bed, amount of beds per health institute and amount of medical personal per doctor). The conclusions are the following:

1. There is a negative impact of the quality of public services in higher education (edu1) and secondary education (edu2) on fiscal decentralization. In other words, the quality of public service delivery has a negative impact on fiscal decentralization. This could be linked to the negative spill-over effects that cannot be captured by local government of people with secondary and higher education that tend to be more mobile. This is particularly relevant as migration is major phenomena in China.
2. The combination of a significant of higher education (Edu1) and secondary (Edu2) from both extra-budgetary expenditures (Table 8) as well as extra-budgetary revenue (Table 9) could indicate that userfees are not only charged, but also spend locally. However, the fact both variables are negative could indicate that centralized systems are better at providing educational services, then decentralized entities.
3. Compared to the education sector, health has only a marginal influence, if any, on fiscal decentralization. This is somewhat surprising as it could be argued that the introduction of userfees could provide additional incentives for local government to fiscal decentralize. Therefore, the introduction of userfees, does not necessarily improve the quality of health care, which has important policy implications.

However, we have to interpret our results with caution. First of all, there is a very high inequality urban and rural divide in terms of service delivery, in particular as there is currently a policy of fiscal decentralization. Unfortunately, the independent variable does not allow to be disaggregated into an urban and rural region. Secondly, userfees is also a barrier to public services and has to be taken into consideration (Dummer T. and Cook I. 2007). Although userfees could contribute to extra-budgetary revenue, it is more likely that this remains “informal transaction costs” which are not registered officially. Thirdly, the issue of migration, is still quite complicated as on the one hand the *hukou* system limits migration, while on the other hand migration is clearly a reality in China. Despite these limitations this research does provide an evidence of the various determinants of fiscal decentralization in China.

Chapter 2.4: Empirical analysis of vulnerability and public service delivery in China

Introduction

Vulnerability has become a prominent issue for poverty researchers (Dercon, 2001, Mansuri and Healy 2000, Wood 2003), in particular in developing and transition countries. It is especially of interest in China, as this country has lifted about 500 million people out of poverty, although inequality has been rising both on a rural-urban basis and between coastal and inland regions (Fan 1995a, Gustafsson & Shi, 1998; Ravallion and Chen 1998, Yang, 1999 and Yao, 1999, Fan 1995b, Fan, Zhang and Zhang 2002, Kanbur & Zhang, 2005a, Wan 2007).

Unfortunately the issue of vulnerability has only been studied on a limited basis in China (Jalan and Ravallion, 1999, Jalan and Ravallion 2001, Mc Culloch and Calandrino, 2003) and use household level data. There are several reasons why the issue of vulnerability is of growing importance in the context of China. Firstly, although China is rapidly evolving economically, inequalities on regional and social level are also on the rise.³² In these kinds of circumstances, it is important to estimate vulnerability as this provides a more dynamic poverty perspective, instead of using absolute poverty measurements which often focus on income and expenditure variables (Lipton and Maxwell, 1992). Secondly, the aspect of vulnerability plays an important role in the decisionmaking of the poor because their resilience to negative shock is low (Wood 2003). Therefore, vulnerability does not just result from poverty, it can also reinforce poverty. Thirdly, a relative small number of households in China have an average consumption below the poverty line, but a much larger number of households are just above the poverty line (Mc Culloch and Calandrino, 2003). This means that with a relative minor negative shock, households could fall back into poverty. Finally, vulnerability is important from social cohesion perspective as a negative economic shock could create civil strife and therefore threaten the development of a harmonious society in China.

This chapter enriches the literature on vulnerability by focusing on the quality of public services in the health care and education sector. The issue of public services has been debated particularly in the context of fiscal reforms (Luo, Zhang, Huang and Rozelle, 2007), but not in terms of vulnerability. Vulnerability in this chapter is defined as the risk to events in which a bad outcome could move the household into poverty.³³ The operationalization of this definition is to focus on food consumption expenditures on provincial level. The assumption is that food consumption expenditure is the last item households would reduce when becoming poor. Therefore, a reduction (or increase) of expenditure would increase (or decrease) vulnerability. This definition of vulnerability is reflected in the field of food insecurity which notes that vulnerability is “an aggregated measure, for a given population or region, of the risk of exposure to food insecurity” (Downing, 1991). Practical examples of vulnerability being measured through food consumption expenditures are evident

³² Some coastal provinces in China have development indicators that perform more like a middle income country (such as in the area of literacy and infant mortality), while in western China these variables are comparable to low income countries (Kanbur & Zhang, 2005b).

³³ This definition combines two elements: (i) the risk to an event in which a bad outcome could move the household into poverty (Alwang, Siegel and Jørgensen, 2001); and (ii) the identification of geographical area which is more vulnerable than other areas (Guillaumont 2006).

from the literature (Barrett 1999, Christiaensen and Boisvert 2000). The quality of public services is measured by three education variables (amount of students per teacher in primary education, amount of students per teacher in secondary education and amount of students per teacher in higher education) and two health variables (amount of doctors per bed and the amount of beds per hospital).

The methodology in this chapter determines the effects of public service deliveries in the health and education sector on vulnerability as measured by food consumption using annual panel data covering 1982 to 1999. The first step is to use an OLS regression and Fixed Effect (FE). The education sector is critical as it influences human capital accumulation, which is a key asset in increasing the capacity to seek employment or engage in productive activities as well as to recover from crises (Adam and Jane 1995, Campa and Webb 1999). The health sector is important in terms of reducing vulnerability because descending households often have income shocks arising from ill health (Jalan Ravallion 1999, Sen 2003). Therefore the quality of both education and health sectors have an important role in reducing vulnerability.

The second step is to undertake a Two-Stage Least Squares (TSLS) and then a TSLS with Fixed Effect, which will instrumentalize public service delivery by four variables of political decentralization (integration score for party secretaries, integration score for governors, tenure in years for party secretaries and tenure in years for governors) as well as rural and urban inequality. Although political decentralization in China is different from other countries, it can be measured in terms of “closeness” of the China’s political party to its local residence. The “closeness” could determine the quality of public services as the government would become pro-active in service delivery. Political integration could be used as an instrumental variable as political system is often used to assert citizens’ needs (Joshi, p7, 2006). Rural and urban inequality could also influence public services as high inequality would reduce the quality of governance as elite capture state provisions (Bardhan & Mookherjee, 2000). We control for the quality of the instruments through first-stage of TSLS method, Hansen-Sargan test, the Hausman test and the F-test. Finally, to ensure additional robustness we introduce lags of respective 1 and 2 years.

The remainder of this chapter is organized as followed. The first section “Vulnerability and reforms of public services in China” provide an overview of the changes in the health and education sector in China during the transition period and its potential effect on vulnerability. The second section “Data description” describes the data as well as the sources. The third section “Methodology and robustness tests” presents the OLS regressions, Fixed Effect, Two Stage Least Square (TSLS) and TSLS with Fixed Effect regressions as well as the robustness tests. The fourth section “Results” presents the outcome of various regressions and its impact on vulnerability. Surprisingly, we also find a positive impact on the quality of public service delivery in the lower education. Finally, the section “Synthesis and recommendations” highlights the limitations of this research as well as suggests policy recommendations that might reduce vulnerability in China.

2.4.1 Vulnerability and reforms of public service delivery in China

It is widely acknowledged that the reform in China which started in the beginning of the 80s has led to dramatic economic growth and reduction of poverty, although inequality increased significantly after the 1990s (Fan 1995a, Gustafsson & Shi,

1998; Ravallion and Chen 1998, Yang, 1999 and Yao 1999, Fan 1995b, Fan, Zhang and Zhang, 2002, Kanbur & Zhang, 2005a, Wan 2007). The issue of vulnerability has only been studied on a limited basis in China (Jalan and Ravallion, 1999, Jalan and Ravallion 2003, McCulloch and Calandrino 2003). These studies demonstrate that, income and inequality have simultaneously increased dramatically. This is also reflected in the provincial food consumption expenditure, deflated by CPI, in China (see Table 11). This table indicates that the growth of means of food consumption from 155 yuan in 1982 to 309 yuan in 1999. However, both the Standard Deviation and the range also increased dramatically, respectively for Standard Deviation from 49 in 1982 to 137 in 1999 and for the range from 252 (293.22-41.15) in 1982 to 617 (798.26-180.37) in 1999.

Table 11: Food consumption expenditures in China (in deflated yuan)

	Mean	Std Deviation	Minimum	Maximum
1982	155.86	49.45	41.15	293.22
1983	173.36	46.44	119.41	313.77
1984	185.78	52.92	124.88	355.04
1985	192.25	53.65	134.26	383.12
1986	206.65	64.37	144.28	432.042
1987	213.98	68.19	145.84	451.00
1988	211.61	71.90	134.54	453.49
1989	208.55	75.14	127.28	455.31
1990	222.26	72.76	138.86	462.18
1991	231.51	77.48	152.95	482.90
1992	235.76	80.05	150.12	499.88
1993	239.87	92.16	104.66	546.31
1994	268.53	105.18	165.99	587.64
1995	289.39	122.77	192.56	718.75
1996	299.72	138.95	99.87	807.83
1997	307.65	131.74	175.52	799.02
1998	300.39	131.60	176.67	784.94
1999	309.52	137.71	180.37	798.26

Source: China Data Center of the University of Michigan

Besides, the increase in food consumption, the transition also had an important effect on public service provisions. Prior to the reforms China provided, through the introduction of the Cooperative Medical System (CMS), primary health care services to the majority of the Chinese rural population, that reduce the infant mortality rate from about 200 per 1000 life births (in 1949) to 47 per 1000 life births (in 1974), and increase life expectancy from 35 to approximately 65 years (Liu et al., 1995)³⁴. As such, China had a model for community financing and organization of health care that was considered to be China's 'first health care revolution'. Similar results were achieved in the education sector where a pre-communist literacy rate of 20%, and

³⁴ Pre-revolutionary deaths which occurred were linked to: (i) enteric infections, such as typhoid fever, bacillary dysentery and cholera; (ii) hookworm disease; (iii) childhood measles (often fatal), smallpox epidemics, diphtheria and tuberculosis, malaria, kala-azar, schistosomiasis, tetanus of the umbilical cord, venereal diseases; and (v) more widely, high death rates caused by impact of floods, drought, war or epidemic (Worth, 1973). Under CMS, the financing of health care relied on a pre-payment plan, which included farmers' premium contributions (0.5–2% of a peasant family's annual income), village Collective Welfare Fund, and subsidies from higher level governments.

school enrolment of about 40-20%, improved to a literacy rate of 69% and nearly all children received a primary education by the end of the 70s (Hannum and Park, 2003).

When transition started in 1978, public services provisions, such as health care and education services, tend to have rising costs that were transmitted by an increase in userfees (Milanovic, Lanjouw, Paternostro, 1999). The health care sector, in combination with de-collectivization in rural areas and privatization of State Owned Enterprise (SOEs), led to dramatic reduction of health care provisions and the introduction of services fees. This resulted in 87% of the rural population and 44% of the urban population to have no health benefits and pay for all medical costs directly out-of-pocket (Banister and Zhang, 2005). In addition, this increased inequality as well as reduced the ability of the poor to access health care services in China. This situation creates greater health vulnerability for those who are initially at greater risk of disease but not under the cover of social protection (Zhu, 2004).

This had negative ramification for health care provisions in terms of vulnerability as health stricken households resort to out-of-pocket expenditure with which most of China's people pay for basic level of care at clinics or outpatient departments of hospitals (Henderson *et al.*, 1994). But for catastrophic or chronic medical needs these costs are high, the poorer people often cannot afford pharmaceuticals or hospital fees. In practical terms, this means that if an individual gets very sick, his or her family may not be able to pay for needed medications or hospital costs. From a vulnerability perspective access to health care is important as many of the households that fall below the poverty line were actually health-stricken rather than poverty-stricken (Gustafsson and Li 2004, Banister and Zhang 2005). In addition, medical services can help patients recover from ill health as well as mitigate the burden of medical expenditure. This latter has a strong crowd-out effect on other goods and services, which include human capital investment³⁵, physical capital investment³⁶ and investment in development of human well-being³⁷ (Wang, Zhang Hsiao, 2006).

Because of the lack of health care coverage, the health insurance industry in China has developed rapidly, especially since the 1990s. However, the increased wealth gap between urban and rural incomes still remains a problem as rural residents lack the means to pay for insurance. In turn, this leads to a growing gap in terms of quality and accessibility of services between rural and urban areas (World Bank, 2005). Low coverage exposes rural Chinese residents to health and financial risks, and may have negative effects on economic development, both because they have to keep financial

³⁵ Human capital investment. Expenditures on education for children or adults are human capital investments that tend to increase productivity in the long run. The results from this study indicate that medical expenditures, especially due to hospitalization, significantly affect households' investment on education expenditure. Households with ill health members invest less investment in education than households without ill health members.

³⁶ (2) *Physical capital investment in farm production.* The results of this study also suggest that households with ill health members spend less on physical capital investment for farm production, such as farming tools and seeds, than households without ill health members. The increase of each 100 Yuan in medical expenditure leads to 0.22 percentage point decline (4.5 Yuan decline) in farming investment. Thus, excessive medical expenditure reduces physical capital investment in farm production, and therefore reduces farming productivity.

³⁷ *Investment in development of human well-being.* In addition to economic development, many households' consumptions are critical for the human survival and well-being, such as food, clothes, and social activity. Households with ill health members and high medical expenditures must sacrifice their consumptions on those categories, which could have both short- and long-term negative impacts on human development.

buffers as well as because the lack of medical treatment lead to loss of productive workforce, and a reduction of investment in human capital. All of these have a negative impact in terms of vulnerability.

In the education sector, the situation was similar as in the health sector. Despite the introduction of the “Law of Compulsory Education” in 1986 which officially made nine years of schooling compulsory throughout China (six years of primary school, three years of middle school), only 76% of the counties had realized universal primary education in 1995 (He, 1996). The inequality in education is caused by the fact that the schools are funded at the local level and therefore have lower quality and less equipment. Resource constraints differentially affect access to schooling of individuals in different parts of China, especially in rural areas and in the West (Heckman, 2005). Moreover, economic reform also changed the opportunity cost for the poor. For example, a rural family’s income is now more closely linked to its own work effort, which leads to children, especially girls, from households that are poor to have a drop-out rate three times higher than households that are not financially constraint (Connelly and Zheng 2003). Migrants in the urban areas face addition financial burdens as they have to pay “education endorsement fees” (*jiaoyu zanzhu fei*). This can be a heavy burden for parents given the large concentration of migrants in low-paying occupations (Zai and Por, 2007).

2.4.2 Data Description

The objective of this research is to measure the effects of public service delivery in the health and education sector, on vulnerability, using a panel dataset. The panel dataset covers 28 provincial from 1982 till 1999. The dataset is limited to 1999 because the variable of political integration, which is an instrumental variable in the TSLS, is limited to this year. Tibet is excluded for lack of data. The provinces of Guangdong-Hainan and Sichuan-Chingqing have been merged to make the datasets compatible.

To measure food consumption expenditure, we weight urban food consumption expenditure as well as rural food consumption expenditure with the urbanization rate (see equation 1), which is referred to as Weighted Food Expenditure and is the dependent variable. In addition, we use five independent variables of which three variables to measure the quality of the education sector (respectively amount of students per teacher in primary education, amount of students per teacher in secondary education and amount of student per teacher in higher education), while two variables to measure the quality of the health sector (respectively amount of doctors per bed as well as amount of medical persons per bed). In addition, we use political integration as well as rural and urban inequality as instrumental variables of public services delivery in the TSLS.

The description of the data as well as the sources areas as followed:

1. Weighted Food Expenditure (WFE): The Weighed Food Expenditure is Urban consumption weighed by urban population as well as rural food expenditures weighed by rural population (see equation 1), deflated by Consumer Price Index (CPI). Although using a weighed average is discouraged as this destroys information, it had to be done so as to make it compatible with data at provincial level. This panel data is by province and by year. A person is counted as rural if he/she was born in rural areas or has at least lived in rural

areas for one year. This variable is based on China Statistical Data Compilation of Michigan University. Furthermore, food expenditure is negatively associated with vulnerability. This is because it is assumed that food expenditure items is a basic necessities that is the last item households would spend less on during crisis and increase during better times. Moreover, this definition is used widely in the food insecurity literature (Barrett 1999, Christiaensen and Boisvert 2000) and is noted in equation 2.

$$(1) \quad WFE_{pt} = \sum_t \sum_p Urb * UFE + \sum_t \sum_p (1-Urb)RFE$$

$$(2) \quad V_{pt} = -WFE_{pt}$$

With the following annotations: WFE is the deflated weighted food expenditure, Urb is the percentage of urbanized population, UFE is the deflated Urban Food Expenditure, RFE is Rural Food Expenditure, V is vulnerability, p one of the is the respective province 28 provinces, t is the respective individual year starting from 1982 till 1998. To measure public service delivery in health and education sector, the following five independent variables are used:

2. Education 1 (Edu1): public services in the higher education sector, which are the amount of teachers divided by the amount of students at this level of education. This could measure the quality of public services in higher education. The data is based on China Statistical Data Compilation of Michigan University.
3. Education 2 (Edu2): public services in the secondary education sector, which are the amount of teachers divided by the amount of students at this level of education. This could also measure the quality of public services in secondary education. The data is based on China Statistical Data Compilation of Michigan University.
4. Education 3 (Edu3): public services in the primary education sector, which are the amount of teachers divided by the amount of students at this level of education. This could also measure the quality of public services in primary education. The data is based on China Statistical Data Compilation of Michigan University.
5. Health 1 (HC1): public services in health care Amount of doctors (per 10000) divided by the amount of beds (per 10000). This measures the quality of public service delivery in health sector. The data is based on China Statistical Data Compilation of Michigan University.
6. Health 2 (HC2): public services number of medical personnel provincial divided by number of doctors provincial. The data is based on China Statistical Data Compilation of Michigan University.

The Two-Stage Least Squares (TSLS) and TSLS with Fixed Effect (FE) estimations ran with the following six instruments, which are respectively four political decentralization variables well as rural and urban inequality variables:

7. Political decentralization 1 (partyint): the integration score for party secretaries from 1 (lowest) to 4 (highest). Political integration could be used as an instrumental variable as political system is often used to assert citizens' needs (Joshi, p7, 2006). If the integration score is higher, than the party secretary is closely integrated into its jurisdiction and "know" what its

residence desire. The data was provided by Yiu Por Chen, from the University of DePaul in Chicago.

8. Political decentralization 2 (govint): the integration score for governors, which is the same as for partyint. Political integration could be used as an instrumental variable as political system is often used to assert citizens' needs (Joshi, p7, 2006). If the integration score is higher, than the governor is closely integrated into its jurisdiction and "know" what its residence desire. The data was provided by Yiu Por Chen, from the University of DePaul in Chicago.
9. Political decentralization 3 (partyten): tenure measured in years for party secretaries. The longer the tenure within a province, the more integrated the party is with its jurisdiction. As such, it would be more likely that the party secretary is more closely associated with its constituency and to be more responsive to its needs. Therefore, they would provide better health and educational services. Political integration could be used as an instrumental variable (Joshi, p7, 2006) as political system is used to assert citizens' needs. The data was provided by Yiu Por Chen, from the University of DePaul in Chicago.
10. Political decentralization 4 (govint): tenure in years for governors. The longer the tenure within a province, the more integrated the party is with its jurisdiction. As such, it would be more likely that the party secretary is more closely associated with its constituency and to be more responsive to its needs. As such, they would provide better health and educational services. Political integration could be used as an instrumental variable (Joshi, p7, 2006) as political system is used to assert citizens' needs. The data was provided by Yiu Por Chen, from the University of DePaul in Chicago.
11. Rural Inequality (RI): Inequality of rural areas is measured by the Engles inequality, which is from the China Statistical yearbook. This is particular the case as inequality can affect the quality of public service as more inequality leads to less public services (Bardhan & Mookherjee, 2000). For instance, inegalitarian societies are shown to generate more redistribution. This is because the middle class "promote" public services for everybody.
12. Urban Inequality (UI): Inequality of urban areas is measured by the Engles inequality, which is from the China Statistical yearbook. This is particular the case as inequality can affect the quality of public service as more inequality leads to less public services (Bardhan & Mookherjee, 2000). For instance, inegalitarian societies are shown to generate more redistribution. This is because the middle class "promote" public services for everybody.

2.4.3 Methodology & Robustness test

To measure the impact of service delivery on vulnerability, we use the following regressions: Ordinary Least Squares (OLS), Fixed Effect (FE) and Two-Stage Least Squares (TSLS) and TSLS with FE. This approach has been chosen as the OLS regression does not control for potential simultaneity and omitted variables bias, which is related to the endogeneity between food consumption and public service delivery. Unfortunately, the variables on public service delivery could not be disaggregate between rural and urban areas as the data is only on provincial level. Therefore we use weighed food consumption expenditure as a dependent variables to

measure the effect of public services on vulnerability, which is the following Fixed Effect equation:

$$(3) \quad V_{pt} = \alpha + \beta_1 \text{Edu1}_{pt} + \beta_2 \text{Edu2}_{pt} + \beta_3 \text{Edu3}_{pt} + \beta_4 \text{HC1}_{pt} + \beta_5 \text{HC2}_{pt} + \chi_p + \delta_{pt}$$

The equation has the following annotation: V is Vulnerability as measure by Weighed Food Expenditure (Equation 1 and 2), Edu1 is public services in the higher education sector (amount of students per teacher in higher education), Edu2 public services in the secondary education sector (amount of students per teacher in secondary education), Edu3 is public services in the primary education sector (amount of students per teachers in primary education), HC1 is health care services (amount of doctors divided by the amount of beds on the provincial level) and HC2 is health care services (amount of medical health institutes divided by number of doctors in health institutes), p is one of the respective province 28 provinces, t is the respective individual year starting from 1982 till 1998, α is the constant, $\beta_{1,5}$ are the respective coefficients of the independent variables, χ is the fixed effect and δ is random error.

The second step is to undertake a fixed effect regression. Fixed effects methods essentially offer control for all stable characteristics of the observations and therefore isolates the effects of public service delivery in the health and education sector on vulnerability. The F-test measures if the Fixed Effect is significant, thereby taking the advantage that the panel data offers.

The third step is to apply a Two-Stage Least Squares (TSLS) as well as TSLS with Fixed Effect. However, the OLS regression models assume that errors in the dependent variable are uncorrelated with the independent variable(s). When this is not the case (for example, when relationships between variables are bidirectional), linear regression using ordinary least squares (OLS) no longer provides optimal model estimates. Therefore the Two-Stage Least Square (TSLS) regression addresses the problems of OLS regression by controlling for potential simultaneity and omitted variables bias, which is related to the endogeneity between vulnerability and public service delivery. This is because vulnerability could also affect public service delivery as low food consumption could indicate an overall “poor” province, which would also have a negative effect on the quality of public services.

The instrumental variables for the Two-Stage Least Squares (TSLS) are four variables representing political integration and two variables representing respectively rural inequality (RI) and urban inequality (UI). In total there are therefore six instrumental variables, while there are five dependent variables. The four political integration variables are linked to public services delivery because the former will increase “the responsiveness” to needs of their citizens (Joshi, p7, 2006) and therefore the performance will increase in the health and education sector. In addition, inequality has a relationship on public services delivery as a less unequal society “promotes” public services for everybody.

We control for the quality of the instruments through first-stage of TSLS method and through Hansen-Sargan test that focuses on overidentifying restrictions. We check that excluded instruments are collectively relevant to public service delivery in the first-stage of the TSLS method. The Hansen-Sargan test, checks if the joint null hypothesis of the instruments are valid i.e., uncorrelated with the error term, and that the excluded instruments are correctly excluded from the estimated equation. Under the null, the test statistic is distributed as chi-squared in the number of overidentifying restrictions. A rejection casts doubt on the validity of the instruments. For the TSLS

estimator, the test statistic is calculated as $N \cdot R^2$ from a regression of the IV residuals on the full set of instruments. We also use the Hausman test, to verify if there the TSLS with FE is indeed more desirable than OLS with FE. In addition, as with the FE, the F-test will measure if the Fixed Effect are significant.

Finally we introduce two time lags of respectively 1 year and 2 years, to determine the effect on public service delivery on food consumption over time. This could be a robustness test in addition to the TSLS with FE. The reason for this is that it could take 1 or 2 years when reforms are initiated to actually have effect on vulnerability. This could be a “policy lag” in which a change in policy could take several years to have an effect on the dependent variable. A practical example could be that vulnerability due to human capital accumulation, could take a few years to actually decrease vulnerability.

2.4.4 Results

This section presents the results of the four regressions, which are respectively OLS regression, Fixed Effect, Two-Stage Least Squares (TSLS) regression and Two-Stage Least Squares (TSLS) regression with Fixed Effect. This can be viewed in table 12. Finally, we introduce a lag of respectively 1 year (Table 13) and 2 years (Table 14) into all these regressions. The results of the first stage regression are demonstrated in annex 3.

Table 12: Regression on provincial vulnerability with no lag (T_0)

	OLS	FE	TSLS	TSLS, FE
Edu1	-250624.4*** (25133.11)	-262329.1*** (25547.4)	-418555** (191029.8)	-420579.1** (196106.2)
Edu2	11932.83 (7971.745)	12431.71 (8017.985)	-61354.63** (31209.3)	-61350.97* (32464.87)
Edu3	38743.84*** (10908.44)	33429.31*** (11238.9)	78870.21 (71382.04)	77800.42 (73657.18)
Health1	39.12394 (45.14423)	45.63448 (58.51675)	303.469 (1085.963)	304.5571 (1104.838)
Health2	-48.53819* (27.961)	-61.83762* (32.69077)	252.4186 (749.9417)	253.7904 (763.7897)
Constant	-199.25 (73.58438)	-168.6565* (88.2466)	-739.9688 (1991.471)	-750.114 (2044.109)
R-square	0.15	0.12	0.13	0.13
F-test		34.87 (0.00)		17.96 (0.00)
Hansen-Sargan p-value			0.64	0.64
Observation	421	421	375	375
Significant	* is significant at 10%, ** is significant at 5% *** significant at 1%			

Table 12 presents the results of the all the regressions with no lags and note that the quality of education (Edu1) at higher education is significant in all four regressions. This means that the better service delivery at higher education would reduce vulnerability. The quality of secondary education (Edu2) has a negative impact on

vulnerability under TSLS and TSLS with Fixed Effect, but not with an OLS regression and Fixed Effect. The quality of primary education (Edu3) has positive impact on vulnerability in the OLS and Fixed Effect, although not in the TSLS with FE. This means that, under OLS and FE, vulnerability would increase if public services in primary education would improve. This is somewhat surprising as it is expected that education at the lower level would have a more direct impact on vulnerability. However, this result could be linked to a selection bias as the poor households withdraw their children, especially girls, from school, if the household needs additional resources or because of opportunity costs, i.e. children earn money by working in field, instead of going to school (Connelly and Zheng, 2003). The quality of health sector has only partially reducing vulnerability as Health 2 has a negative impact with the OLS and OLS with Fixed Effect, although not at the TSLS. The Hausen-Sargans Test indicates that there is no over identification and the F-test demonstrates that the Fixed Effect are significant in both the OLS and TSLS regressions. The Hausman test demonstrates a significant result (Prob>chi2 = 0.0189) which indicates that the TSLS with FE is preferable to the OLS with FE. Finally, the first test demonstrates that the instrumental variables are moderately significant (see annex 3: table 19).

Table 13: Regression on provincial vulnerability with lag of 1 year (T₀₊₁)

	OLS	FE	TSLS	TSLS, FE
Edu1 - lag1	-258543*** (26082.35)	-272094.5*** (26513.98)	-362815.1** (182794.8)	-364650.9* (188092.3)
Edu2 - lag1	3164.871 (8016.313)	3624.24 (8058.345)	-84470.95*** (32329.31)	-84418.14* (33520.46)
Edu3 - lag1	41054.02*** (11224.99)	35058.61*** (11567.39)	131101.6* (77200.39)	130133.8 (79945.85)
Health1- lag1	28.78076 (47.19402)	26.8225 (62.92536)	425.3241 (1034.343)	424.463 (1055.286)
Health2 - lag1	-46.18959 (29.2322)	-65.64078*** (34.8011)	279.9138 (740.5842)	279.7866 (756.1961)
Constant	-192.1111 (77.28889)	-144.1626 (94.78968)	-984.2035 (1891.677)	-993.8993 (1945.718)
R-square	0.14	0.11	0.12	0.12
F-test		35.52 (0.00)		19.11 (0.00)
Hansen-Sargan p-value			0.57	0.57
Observation	397	397	375	375
Significant	* is significant at 10%, ** is significant at 5% *** significant at 1%			

Table 13 presents the results of the all the regression is with a lag of 1 year. Education (Edu1) at higher education is again significant in all four regressions. The negative impact demonstrates that better quality of education in higher education leads to less vulnerability with a lag of 1 year. Again, the quality of secondary education (Edu2) has a negative impact on vulnerability under TSLS and TSLS with Fixed Effect, but not with a OLS regression and Fixed Effect. This means that vulnerability would increase if public services in primary education would improve. The results for the

quality of primary education are again surprising, as this has a positive impact on vulnerability in the OLS, OLS with Fixed Effect and TSLS, but not TSLS with Fixed Effect. The quality of health sector has only partially reducing vulnerability with Health 2 with Fixed Effect, but is not significant with the other regressions. The Handsen-Sargans test indicates that there is no over identification and the F-test demonstrates that the Fixed Effect are significant in both the OLS and TSLS regressions. The Hausman test demonstrates a significant result ($\text{Prob} > \chi^2 = 0.0179$) which indicates that the TSLS with FE is preferable to the OLS with FE. Finally, the first test demonstrates that the instrumental variables are moderately significant (see annex 3: table 20).

Table 14: Regression on provincial vulnerability with lag of 2 years (T_{0+2})

	OLS	FE	TSLS	TSLS, FE
Edu1 – lag2	-270637.8*** (22472.59)	-275490.3 (22674.08)	-279462.2	-281604 (181602.7)
Edu2 – lag2	1623.345 (8564.861)	1336.014 (8614.852)	-76584.11**	-76529.15** (32142.99)
Edu3 –lag2	50811.55*** (10689.63)	48519.21 (10894)	165469.5**	164326.2** (79211.39)
Health1-lag2	-52.12408** (22.79463)	-56.16358 (23.43893)	339.5132	339.7856 (941.4623)
Health2-lag2	-105.4477* (20.45173)	-111.8159 (20.92808)	164.6647	165.3374 (667.9178)
Constant	-74.41443 (49.85406)	-57.40195 (47.17312)	164.6647	-899.5028 (1737.391)
R-square	0.13	0.12	0.17	0.17
F-test		37.23 (0.00)		23.96 (0.00)
Hansen-Sargan p-value			0.60	0.60
Observation	372	372	375	375
Significant	* is significant at 10%, ** is significant at 5% *** significant at 1%			

Table 14 presents the results of the all the regression is with a lag of 2 year which are less clear-cut that the results of the previous two tables. The quality of higher education (Edu1) is only significant and negative with OLS regression, while the quality of secondary education (Edu2), is significant and has a negative impact on vulnerability under TSLS and TSLS with FE. In addition, the quality of primary education (Edu3) has a positive impact with OLS, Fixed Effect and TSLS. This means that vulnerability would increase if education services are improved at primary education. As mention earlier, we suspect that this is linked to earlier drop-out of children. The health sector has only limited effect on vulnerability as Health 1 and Health 2 having a negative impact with OLS, although not with a stand OLS and TSLS. The Handsen-Sargans Test indicates that there is no over identification and the F-test demonstrates that the Fixed Effect are significant in both the OLS and TSLS regressions. The Hausman test demonstrates a significant result ($\text{Prob} > \chi^2 = 0.0814$) which indicates that the TSLS with FE is preferable to the OLS with FE. Finally, the

first test demonstrates that the instrumental variables are moderately significant (see annex 3: table 21).

The combination of the four regressions (OLS, FE, TSLS and TSLS with FE) with various time lag of respective 1 year and 2 years provide a robust result. The following observations can be made: (i) First and foremost, the quality of secondary education has negative impact on vulnerability with TSLS with FE in all time lags and is therefore robust. This means that public services in secondary education reduces vulnerability; (ii) the quality of higher education have a negative impact on vulnerability with TSLS with FE with no lags and 1 lag. This means that secondary education reduces vulnerability; and (iii) the quality of primary education has positive impact with TSLS with FE with a lag of 2 years; and (iv) quality of health care has, at most, only a partial positive effect on reducing vulnerability, but non in TSLS with FE.

The most surprising result is that in this research, education a primary level has a somewhat positive impact on vulnerability. This could be explained by a high level of inequality as well as a selection bias as the poor households could withdraw their children, especially girls, from school, if the household needs additional resources or due to opportunity costs (Connelly and Zheng, 2003). Therefore, only a selected group would benefit from additional services deliveries in primary education. This is why vulnerability could increase together with additional service deliveries at primary level.

Synthesis and policy recommendations

This research presented in this chapter focused on the relationship between vulnerability, as measured by the dependent variable of food consumption expenditure, and the quality of public services as measured by three education variables (amount of students per teacher in primary education, amount of student per teacher in secondary education and amount of student per teacher in higher education) and two health variables (amount of doctors per bed and the amount of beds per hospital). The conclusion is fourfold: (i) the quality of primary education has a negative impact on vulnerability, probable due to high inequality and to the selection bias of children from poor families being taken out of school (Connelly and Zheng, 2003); (ii) the quality of the secondary education service has a negative impact on vulnerability in all time lags with TSLS with Fixed Effect. Therefore, these results are strongly robust; (iii) the quality of higher education service has a negative impact on vulnerability. However, these results are less robust than the one with secondary education; and (iv) the health care has also a partially positive impact under the fixed effect.

As indicated earlier, we suggest that the positive impact in primary education could be linked to, high inequality and a selection bias as the poor households withdraw their children, especially girls, from school, if the household needs additional resources or because of opportunity costs, i.e. children earn money by working in field, instead of going to school (Connelly and Zheng, 2003). This is particularly relevant for migrant people as they often face addition costs in gaining access to public services such as through the “education endorsement fees” which is also referred to as *jiaoyu zanzhu fei* (Zai and Por, 2007). As such, service delivery in primary education could have a positive impact on vulnerability as only a small group of people get adequate education. At higher education, only students that can afford this education, would be

able reduced vulnerability, through the large positive externalities associated with education.

However, we have to interpret our results with caution. First of all, there is a very high inequality urban and rural divide in terms of service delivery, in particular as there is currently a policy of fiscal decentralization. Unfortunately, the independent variable does not allow to be disaggregated into an urban and rural region. Secondly, the issue of insurance has not been adequately addressed, which is relevant for the health sector. Thirdly, the issue of userfees, as a barrier to public services, has not been taken into consideration. The consequence of this is that the quality of public services could increase, but that these services are only for a selected group of middle and upper class people, while the poor are excluded. Finally, the difference in results could be linked to the fact that public service delivery in health sector are measured as individual users, which is the case with public service delivery in the education sector, which have a variable with “the amount of students”. Unfortunately, a similar approach could not be undertaken in the health sector as there are no statistics in terms of “the amount of patients”. This could explain the different result in between the education and health sector.

Despite these limitations, this chapter does present a clear relationship between vulnerability and the quality of public services from 1982 to 1999. The policy implication of this research is that to reduce vulnerability would reduce social tension and contribute the development of a harmonious society in China. The Government of China could take the following policy measures into consideration:

1. To increase access to primary education. Despite the “Law of Compulsory Education” in 1986 which officially made nine years of schooling compulsory throughout China (six years of primary school, three years of middle school), it is clear that poor families tend to withdraw their children, especially girls from school (Connelly and Zheng, 2003). This is also a problem for migrant children, which have to pay “education endorsement fees” (Zai and Por, 2007). To address this issue, China could be inspired by international experience, in particular from Brazil, in which poor households get a monthly allowance if there children attend school and attend regular health check-up. For girls there would be an additional allowance as there is gender discrimination in China;
2. To increase the quality of higher education. Encourage human capital accumulation in an equitable manner as this research indicates that human capital formulation is closely linked to the reduction in the probability of becoming poor. Therefore, stimulate the accumulation of human capital, both at secondary as well as university level, would increase resilience of a region as it increases the capacity to cope with stress as well as to recover from crises situations. An entry point could be to introduce an amendment into the compulsory education law and extending the current 9 year period of free education by several years
3. To improve the function of health care system in China. The current system is only marginally improved vulnerability. In addition, it is highly likely that the userfees provide additional barriers to vulnerable and poor segments of society are excluded from these services. A possible solution could be to extend the health insurance coverage, in particular to rural populations. This would ensure that the health care system is accessible to a broader group of society,

thereby encouraging human capital accumulation as well as development of a productive workforce. Both elements would reduce vulnerability.

With these measures, vulnerability in China would be reduced by increasing the resilience of the population to negative shocks on a macro level (i.e. macro-economic instability, financial market instability, oil price shock, etc) and on micro level (i.e. household member are effected by chronic disease, accident at work, etc.). This would contribute to the strengthening of the social cohesion as well as to the wellbeing of households in China. Moreover, in any potential future economic downturn households would have the capacity in absorbing negative shocks, thereby reducing the prospect of civil strife and enhancing political stability. These are all key elements in the development of a harmonious society in China.

Conclusion

After twenty-five years of experience, China's reforms have produced remarkable results. The most important lesson is that successful reform, in terms of economic growth and poverty reduction, is by no means clear cut and predictable. At the beginning of reform in 1978, China was still in the aftermath of the culture revolution which has severely distorted economic structures as well as the society as a whole. The success was even more remarkable when taken into consideration the challenges of a transition country (i.e. domination of state sector, political economy of state owned enterprises, lack of institution for “pricing”, etc.) and the challenges of developing country (i.e. largely an agricultural based production sector, lack of physical infrastructure, overpopulation, high rate of migration and urbanization, etc.).

Despite the development and transition challenges, China managed to develop policies that were relevant for this country in terms of achieving growth rates and poverty reduction. The role of policy experimentation was important as this provided the opportunity to develop policies that were tailored to the socio-economic challenges of China. As such, the fiscal decentralized government structures helped to develop policies at the provincial level, where the risk of policy failures could be managed. If successful, these policies could be adopted at national level. Examples of these were the de-collectivization of rural commune system and the establishment of Export Processing Zones (EPZ) in the Eastern region.

The downside of fiscal decentralization was that inequality, both at the inter regional, as well as intra regional, increased. The former was caused by the reduction of inter-provincial transfers while the latter was caused by the introduction of userfees both in health and the education sector. This also increased the barrier to public services delivery by poor households. The introduction of userfees could have negative effect in several ways as it: (i) lead to higher vulnerability, as “out of pocket” health care expenditures rise; (ii) increase in Inter-Generational Transmission (IGT) of poverty as poor households lack to opportunity to send there to school; and (iii) in combination with the *hukou* system, condemn households to (poor) jurisdictions in which they have inferior public services.

Another component of this thesis is the aspect of vulnerability in China. This is of particular importance in rapidly growing developing countries as a growth of the newly established middle class are sensitive to economic down-turn. In these circumstances, the urban middle class could participate in civil strife and street demonstration, which are currently limited to the rural areas. Reducing vulnerability could avoid the dire political consequences of a severe economic downturn in the aftermath of the Asian financial crisis in 1997, which led to massive civil strife in the region. As such, addressing the issue of vulnerability could contribute to the development of a harmonious society.

It is because of these reasons that the nexus of vulnerability, public service delivery and fiscal decentralization are important from an academic perspective as well as from a policy debate perspective. More specifically, the value-added of this thesis are the following:

Empirical analysis of regional income vulnerability and inequality in China using an asset based framework

1. On the Empirical analysis of regional income vulnerability and inequality in China using an asset based approach, the conclusions are the following: (i) liquid assets and human capital contribute to the reduction of vulnerability, while health care does not reduce vulnerability; (ii) Interior and Western region have higher degree of vulnerability, while the Eastern region has a lower vulnerability, which “peaks” around 1995; and (iii) the inequalities *within* regions contributes about 20-30% to vulnerability, while inequality *between* regions contributes about 70-80% to vulnerability.

The policy implication is therefore that any policy that focuses on reduction of vulnerability in China should aim at supporting the accumulation of human capital and liquid assets as well as increasing accessibility of health care. Furthermore, regional development strategy should be established to address inequality in the Interior and Western region;

2. On the empirical evidence on the extend that public service delivery is a determinant of fiscal decentralization, the conclusions are the following: (i) public service delivery in higher education (Edu1) and secondary education (Edu2) have a negative impact on fiscal decentralization. As previously suggested, this could be linked to negative externalities, due to migration. For higher education and additional argument could be added, which is that the cost of universities could be relatively high for a single local government entity. The negative impact could indicate that the economies of scale could be a factor in limiting fiscal decentralization. For example running universities could be expensive for local government; (ii) the strong correlation between extra-budgetary expenditures and revenues highlights that these two effects are growing in tandem; and (iii) Health 1 and Health 2 have, if any, limited effect of fiscal decentralization.

The most remarkable element in this section is that the conclusion could be linked to the spill-over effects of public goods that cannot be captured by local government as people with secondary and higher education tends to be more mobile. This is particularly relevant as migration is major phenomena in China.

3. On the empirical analysis of vulnerability and public service delivery in China, This research focused on the relationship between vulnerability, as measured by the dependent variable of food consumption, and the quality of public services as measured by three education variables (amount of students per teacher in primary education, amount of student per teacher in secondary education and amount of student per teacher in higher education) and two health variables (amount of doctors per bed and the amount of beds per hospital). The conclusion is fourfold: (i) the quality of primary education has a negative impact on vulnerability, probable due to high inequality and to the selection bias of children from poor families being taken out of school (Connelly and Zheng, 2003); (ii) the quality of the secondary education service has a negative impact on vulnerability in all time lags with TSLS with Fixed Effect. Therefore, these results are strongly robust; (iii) the quality of higher education service has a negative impact on vulnerability. However, these results are less robust than the one with secondary education; and (iv) the health care has also a partially positive impact under the fixed effect.

The most relevant policy issue is that despite the “Law of Compulsory Education” in 1986 which officially made nine years of schooling compulsory

throughout China (six years of primary school, three years of middle school), it is clear that poor families tend to withdraw their children, especially girls from school. This is also a problem for migrant children, which have to pay “education endorsement fees” (Zai and Por, 2007). To address this issue, China could be inspired by international experience, in particular from Brazil, in which poor households get a month allowance if their children attend school and attend regular health check-up. For girls there would be an additional allowance as there is gender discrimination in China

Finally, it should be noted that the overall developmental success and poverty reduction were not anticipated, both in China as well as the first wave of Asian Tigers. However, by increasing both the accessibility as well as the quality of public services, vulnerability could be reduced thereby contributing to the development of a harmonious society. This is particularly important as it is evident that the next 25 years would be more difficult in terms of achieving sustainable economic growth as current economic problems are linked to multi-faceted, like urbanization, environmental regulation, water-management, etc.

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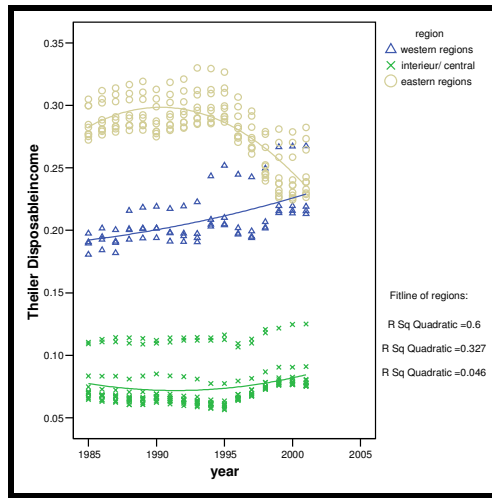
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Annex 1: Graphics of independent Theil index as well as the decomposition

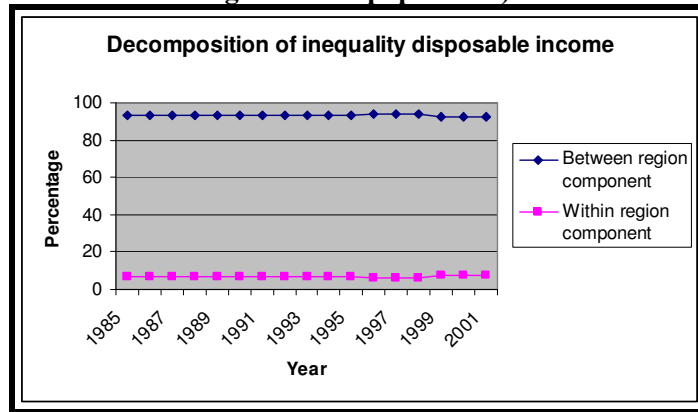
Figure 12: Graphic disposable income Disposable income (weighed urban income with non-agricultural population + weighed rural income with agricultural population)



Source: China Data Centre of the University of Michigan

In figure 12, the variable of disposable income has a high degree of inequality. The Eastern region has a higher level of inequality compared to the Western and Interior region. The inequality in Eastern region has increased until 1990 and then decreased. In addition, the Western region has increased in equality between 1985-2000, while inequality in interior region remained stable.

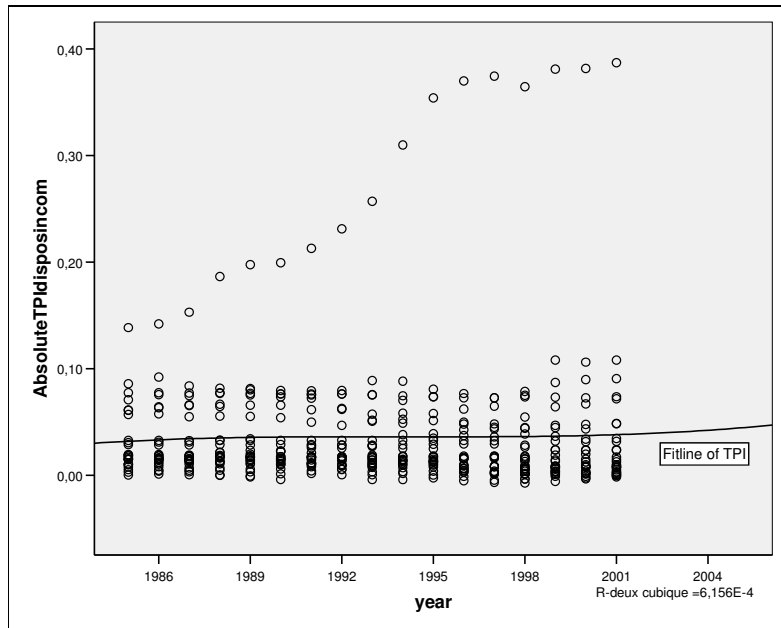
Figure 13: Decomposition of the Theil index on disposable income (weighed urban income with non-agricultural population + weighed rural income with agricultural population)



Source: China Data Centre of the University of Michigan

In figure 13, the decomposition of inequality remained stable, with the within region decomposition at around 8 percent, while the between regional component is around 92 percent.

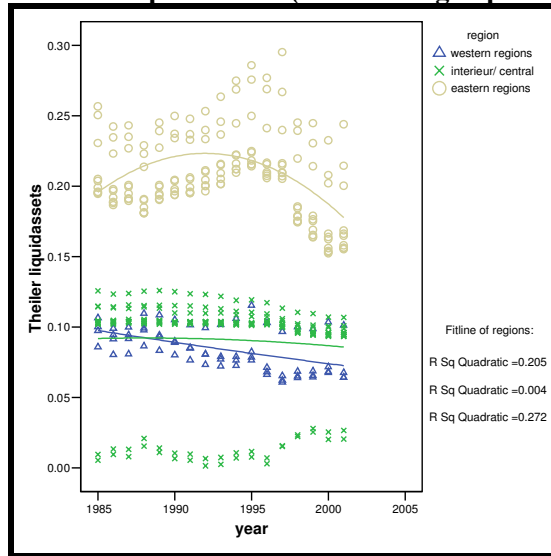
Figure 14: TPI of the disposable income (weighed urban income with non-agricultural population + weighed rural income with agricultural population)



Source: Data provided by Belton M. Fleisher and Min Qiang, Ohio University and China Data Centre of the University of Michigan

In figure 14, the TPI of inequality remained stable and with the exception of Qinghai province which increases rapidly to about 0.39 compared to other provinces, which stay stable at between 0.0 and 0.1.

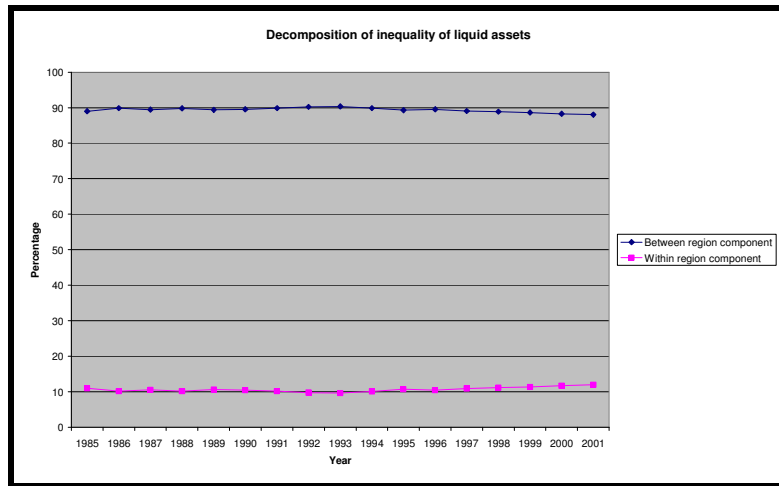
Figure 15: Theil of Liquid Assets (bank saving deposits per capita)



Source: China Data Centre of the University of Michigan

In figure 15, the inequality in liquid assets has increase in the Eastern region rises until about 1995 and then decreased, while the Interior remains stable. In addition, the inequality in for the Western region decreases slightly.

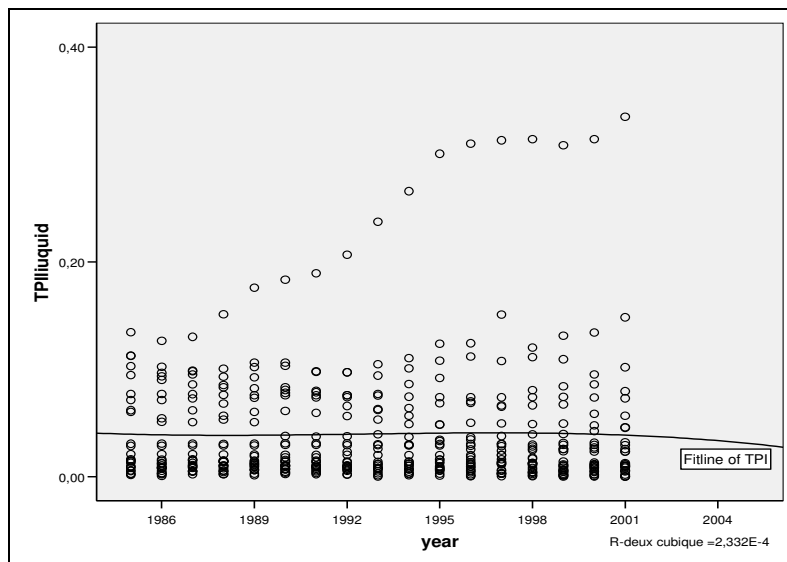
Figure 16: Decomposition of the Theil index on Liquid assets (bank saving deposits per capita)



Source: China Data Centre of the University of Michigan

In Figure 16, the decomposition of inequality of liquid assets demonstrates that inequality within the region component is about 10 percent, while the between regional component is about 90 percent.

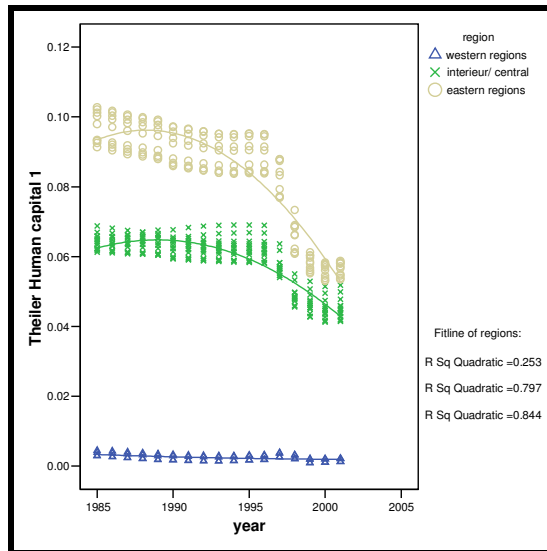
Figure 17: TPI of liquid assets (bank saving deposits per capita)



Source: Data provided by Belton M. Fleisher and Min Qiang, Ohio University and China Data Centre of the University of Michigan

In figure 17, the TPI of inequality remained stable and with the exception of again Qinghai province which increases rapidly to about 0.35 compared to other provinces, which stay stable at between 0.0 and 0.5.

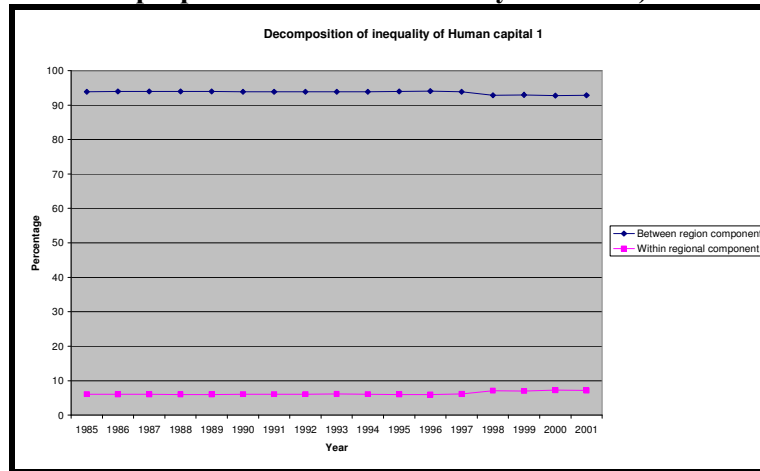
Figure 18: Theil of Human capital 1 (amount of people with at least secondary education)



Source: Data set on Human capital provided by Belton M. Fleisher and Min Qiang, Ohio University

In figure 18, inequality of the Eastern region is higher than the Western and Interior region. In addition, inequality in the Eastern in human capital 1 has decreased drastically between 1985 till 2001. This is also the case for the Interior region although to a lesser extend. The inequality in Western region remains is lower that the other two regions and remains stable during the period under observation.

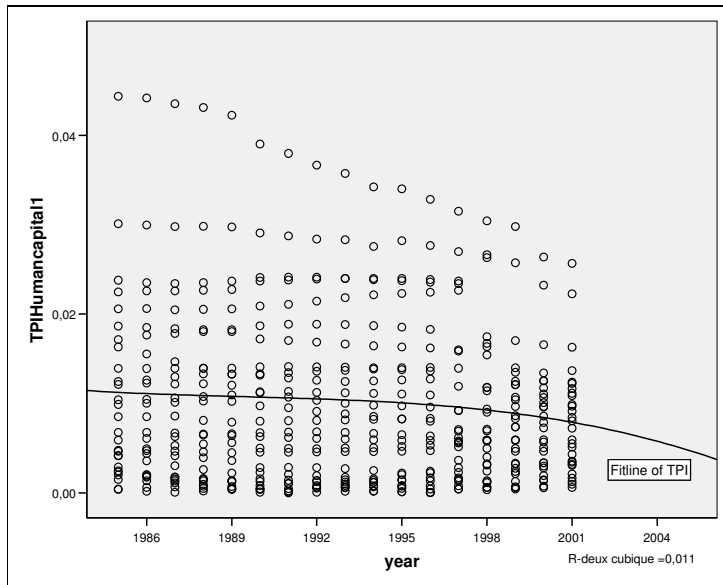
Figure 19: Decomposition of the Theil index on Human capital 1 (amount of people with at least secondary education)



Source: Data set on Human capital provided by Belton M. Fleisher and Min Qiang, Ohio University

In Figure 19, the decomposition of inequality in Human capital 1 remained stable, with the within region decomposition at around 8 percent, while the between regional component is around 92 percent.

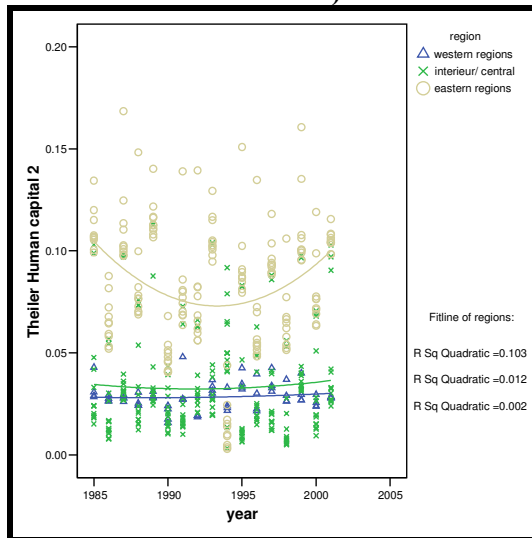
Figure 20: TPI of Human capital 1 (Amount of people with at least secondary education)



Source: Data provided by Belton M. Fleisher and Min Qiang, Ohio University and China Data Centre of the University of Michigan

In figure 20, the TPI of inequality is steadily declining, in particular the province (at the top) Xinjiang province which decreased drastically from 0.04 to 0.02, which the other provinces remain stable at between 0.00 and 0.02.

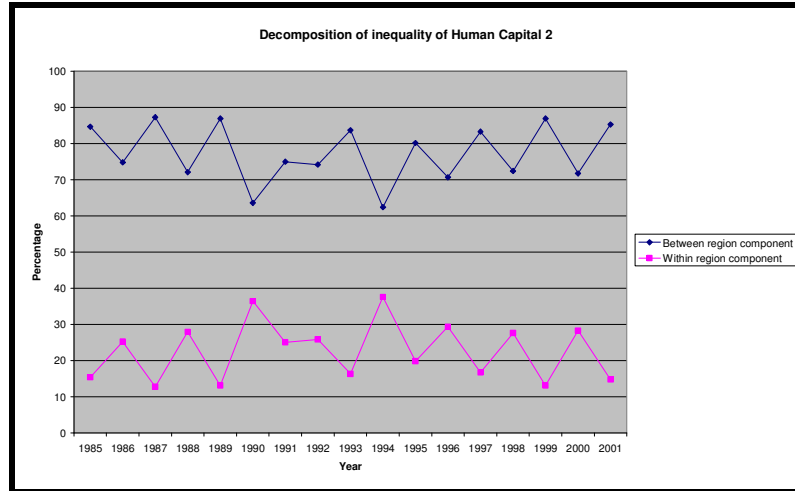
Figure 21: Theil of Human capital 2 (Amount of people with at least colleague education)



Source: Data set on Human capital provided by Belton M. Fleisher and Min Qiang, Ohio University

In figure 21, the inequality in the Eastern region is higher than the Western and Interior regions. In addition, the Eastern region has decreased until 1995, and then increased after that year. The inequality of the Western and Interior region remains stable.

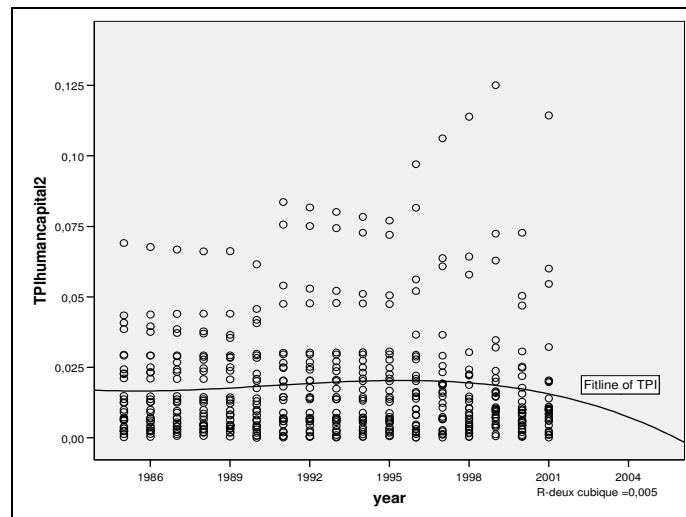
Figure 22: Decomposition of the Theil index on Human capital 2 (Amount of people with at least colleague education)



Source: Data set on Human capital provided by Belton M. Fleisher and Min Qiang, Ohio University

In Figure 18, the decomposition of inequality of human capital 2 is not stable compared to other variables. The within regional composition is 12-39 percent, while the between regional component comprises 88-61 percent.

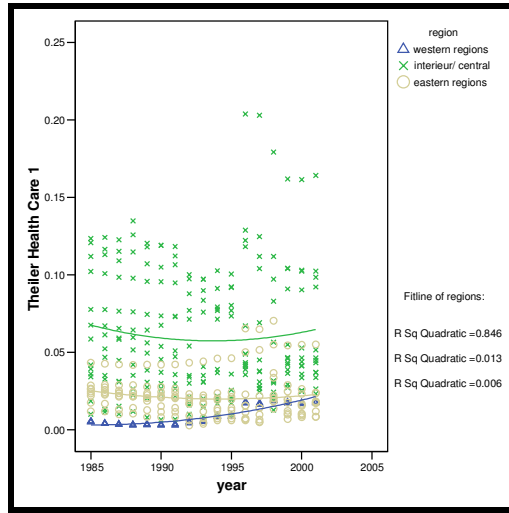
Figure 23: TPI of Human capital 2 (Amount of people with at least colleague education)



Source: Data provided by Belton M. Fleisher and Min Qiang, Ohio University and China Data Centre of the University of Michigan

In figure 23, the TPI of inequality remained stable and with the exception of again Xinjiang province which increases rapidly from 0.075 to 0.125, while other provinces stayed stable at between 0.0 and 0.05.

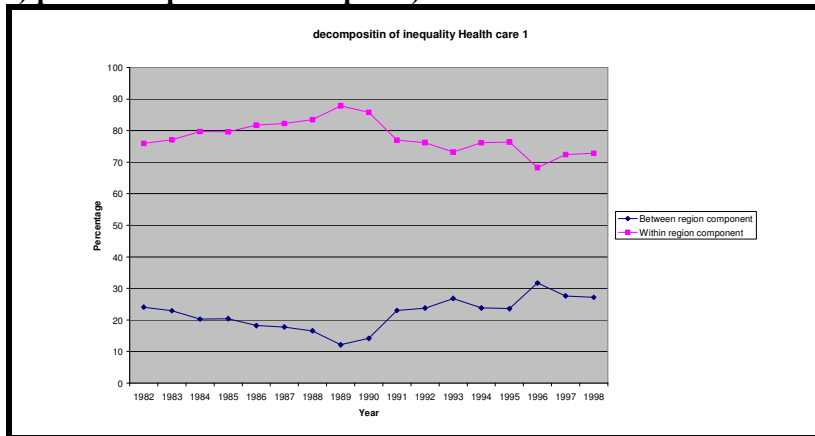
Figure 24: Theil of Health care 1 (number of beds (unit) per 10000 persons in hospitals)



Source: China Data Centre of the University of Michigan

In figure 24, the Interior region has a higher inequality than the Eastern and Western regions. The Eastern region inequality remained stable, while the inequality in the Western region increases.

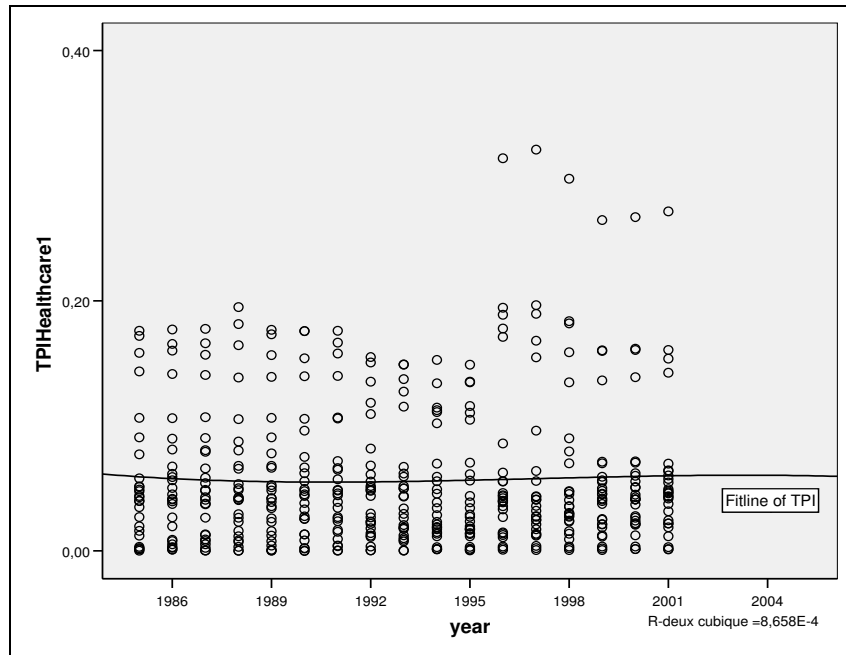
Figure 25: Decomposition of the Theil index on Health care 1 (number of beds (unit) per 10000 persons in hospitals)



Source: China Data Centre of the University of Michigan

In figure 25, the within regional component is higher than the between regional component. This is contrary to other vulnerability variables. The within regional varies between 70-90 percent, while the between regional component contributes 10-30 percent.

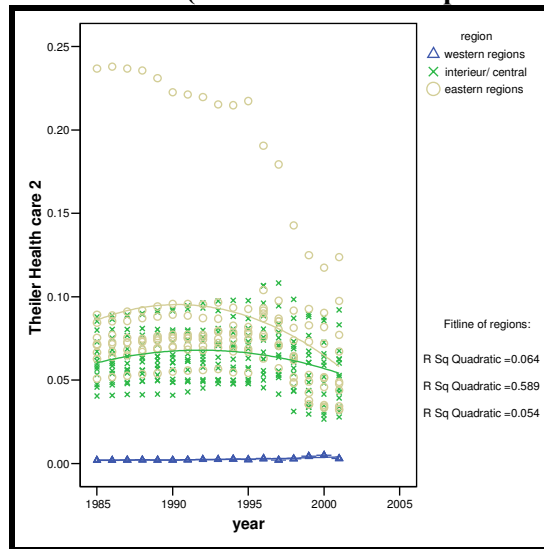
Figure 26: TPI of Health care 1 (number of beds (unit) per 10000 persons in hospitals)



Source: Data provided by Belton M. Fleisher and Min Qiang, Ohio University and China Data Centre of the University of Michigan

In figure 26, the TPI of inequality remained stable and with the exception Yunnan province which increases rapidly to 0.3, while other provinces stay stable at between 0.0 and 0.2.

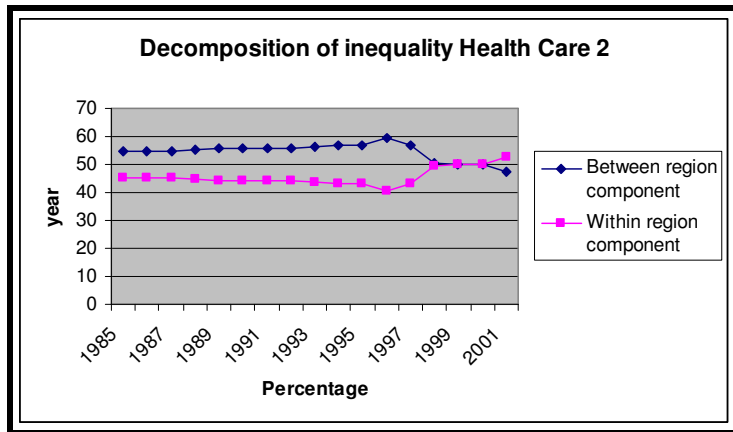
Figure 27: Theil of health care 2 (Number of medical personnel in hospitals)



Source: China Data Centre of the University of Michigan

In figure 27, the inequality of health care 2 in the Eastern region is higher than the Interior and Western regions. The Eastern region increased until 1990 and then decreases. Although to a less extent, this is also the case for the Interior region. The Western region remained stable between 1985 and 2001.

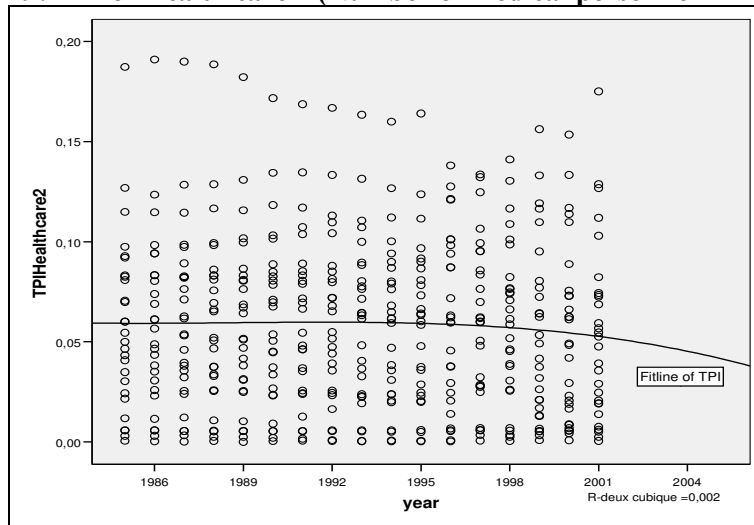
Figure 28: Decomposition of the Theil index on Health care 2 (Number of medical personnel in hospitals)



Source: China Data Centre of the University of Michigan

In figure 28, the between inequality between regions contributes about 55 percent until 1998. Between 1998-2000 it is about 50 percent. In 2001 it is 48 percent. These results are mirrored by the within region component.

Figure 29: TPI of Health care 2 (Number of medical personnel in hospitals)



Source: Data provided by Belton M. Fleisher and Min Qiang, Ohio University and China Data Centre of the University of Michigan

In figure 29, the TPI of inequality quite dispersed for all provinces, between 0.0 and 0.2. However, Zhejiang province rapidly declined from about 0.18 at the beginning of the period to 0.8 in 2001.

Annex 2: Results of first stage regression on fiscal decentralization

Table 15: Result of First stage regression with Fiscal Decentralization 1

Endogenous Variables	Instrumental variables						Wal che(6)	Pro>chi2	
	poldec1	poldec2	poldec3	poldec4	Rural inequ.	Urban inequ.			
Edu1	3.88e-06	-.0000115	2.83e-06	1.03e-06	4.47e-06	-.000021***	.0012412***	268	0.0000
Edu2	-.0000151	-9.18e-06	2.90e-06	-.0000342***	.0000138**	.0000483***	-.0016779***	155	0.0000
Edu3	-.0000262	-.0000232	-8.28e-06	8.56e-06	1.26e-06	.0000328***	.0006307	98	0.0000
Health1	.0031332	.0175453***	-.0031592**	.0006223	-.0013691	-.0007264	.7866464***	24	0.0006
Health2	7.24e-06	4.73e-06	.000015**	1.81e-06	.0000172***	-.0000306***	.0020277***	80	0.0000
Health3	.0034192	-.025196***	.0030888	-.0003245	.0020609	.0044293***	1.146831***	19	0.0040
Significant									

* is significant at 10%, ** is significant at 5% *** significant at 1%

Table 16: Result of First stage regression with Fiscal Decentralization 2

Endogenous Variables	Instrumental variables						Wal che(6)	Pro>chi2	
	poldec1	poldec2	poldec3	poldec4	Rural inequ.	Urban inequ.			
Edu1	3.88e-06	-.0000115	2.83e-06	1.03e-06	4.47e-06***	-.000021***	.0012414***	269	0.0000
Edu2	-.0000151	-9.18e-06	2.91e-06	-.0000342***	.0000138**	.00004838***	-.0016788***	156	0.0000
Edu3	-.0000261	-.0000231	-8.29e-06	8.56e-06	1.24e-06	.0000328	.0006318	98	0.0000
Health1	.0031309	.0175289***	-.0031577**	.0006216	-.0013678	-.0007223***	.7863775***	80	0.0000
Health2	7.28e-06	4.70e-06	.000015**	1.80e-06	.0000173***	-.0000306***	.0020262***	80	0.0000
Health3	.0034548	-.0251876***	.0030805	-.0003105	.0020563	.0044274***	1.147025***	19	0.0040
Significant									

* is significant at 10%, ** is significant at 5% *** significant at 1%

Table 17: Result of First stage regression with Fiscal Decentralization 3

Endogenous Variables	Instrumental variables						Wal che(6)	Pro>chi2	
	poldec1	poldec2	poldec3	poldec4	Rural inequ.	Urban inequ.			
Edu1	3.88e-06	-.0000115	2.83e-06	1.03e-06	4.47e-06***	-.000021***	.0012413***	269	0.0000
Edu2	-.0000151	-9.18e-06	2.91e-06	-.0000342***	.0000138**	.0000483***	-.0016785***	155	0.0000
Edu3	-.0000261	-.0000231***	-8.28e-06**	8.56e-06	1.25e-06	.0000328	.0006314***	98	0.0000
Health1	.0031317	.0175346***	-.0031582**	.0006218	-.0013683	-.0007237	.7864708***	24	0.0006
Health2	7.27e-06	4.71e-06	.000015**	1.81e-06	.0000173***	-.0000306***	.0020267***	80	0.0000
Health3	.0034425	-.0251905***	.0030834	-.0003153	.0020579	.0044281***	1.146957***	19	0.0040
Significant									

* is significant at 10%, ** is significant at 5% *** significant at 1%

Table 18: Result of First stage regression with Fiscal Decentralization 4

Endogenous Variables	Instrumental variables								Wal che(6)	Pro>chi2
	poldec1	poldec2	poldec3	poldec4	Rural inequ.	Urban inequ.	Constant			
Edu1	3.91e-06	-.0000115	2.83e-06	1.00e-06	4.47e-06***	-.000021***	.0012401***	268	0.0000	
Edu2	-.0000153	-9.17e-06	2.87e-06	-.0000342***	.0000137**	.0000482***	-.0016734***	155	0.0000	
Edu3	-.0000263	-.0000233	-8.23e-06	8.57e-06	1.38e-06	.0000328***	.0006257*	98	0.0000	
Health1	.003144	.0176235***	-.0031666**	.0006256	-.0013749	-.0007461	.7879223***	23	0.0000	
Health2	7.07e-06	4.89e-06	.0000149	1.85e-06	.0000171	-.0000306	.002035	80	0.0000	
Health3	.0032498	-.0252352	.0031274	-.00039	.0020823	.0044382	1.145933	19	0.0039	
Significant	* is significant at 10%, ** is significant at 5% *** significant at 1%									

Annex 3: Results of first stage regression on vulnerability and public service delivery

Table 19: Results of First stage regression with 0 year lag

Endogenous Variables	Instrumental variables					Rural inequ.	Urban inequ.	Constant	Wal che(6)	Pro>chi2
	poldec1	poldec2	poldec3	poldec4	poldec5					
Edu1	3.07e-06	-8.89e-06	2.22e-06	1.18e-06	5.17e-06***	-0.0000213***	.0012202***	269	0.0000	
Edu2	-8.04e-06	-0.00014***	7.47e-07	-0.0000319***	.0000162***	.0000514***	-.001978***	168	0.0000	
Edu3	-0.0000156	-0.0000392*	-8.29e-06	9.64e-06	1.48e-06	.0000353***	.0004878	107	0.0000	
Health1	.003427	.0181432***	-.0036955***	.0005853	-.000825	-.0007517	.7591623***	26	0.0002	
Health2	.0013993	-.025299***	.0047601**	-.0004909	.0001418	.0043119***	1.255065***	21	0.0020	
Significant										

* is significant at 10%, ** is significant at 5% *** significant at 1%

Table 20: Result of First stage regression with 1 year lag

Endogenous Variables	Instrumental variables					Rural inequ.	Urban inequ.	Constant	Wal che(6)	Pro>chi2
	poldec1	poldec2	poldec3	poldec4	poldec5					
Edu1	3.90e-06	-0.000108	2.45e-06	1.42e-06	5.34e-06***	-.0000212***	.0012026	268	0.0000	
Edu2	-0.000101	-0.000128	1.75e-06	-0.000032***	.0000165***	.0000505***	-.001952***	163	0.0000	
Edu3	-0.000189	-0.0000334	-8.77e-06	8.96e-06	8.64e-07	.0000343***	.0005746	102	0.0000	
Health1	.003524	.0176689	-.0035572	.0006218	-.0008209	-.0007572***	.7588133	24	0.0004	
Health2	.001637	-.0247431**	.0043224***	-.0007268	-.0000801	.0044987***	1.259529***	20	0.0023	
Significant										

* is significant at 10%, ** is significant at 5% *** significant at 1%

Table 21: Result of First stage regression with 2 year lag

Endogenous Variables	Instrumental variables					Rural inequ.	Urban inequ.	Constant	Wal che(6)	Pro>chi2
	poldec1	poldec2	poldec3	poldec4	poldec5					
Edu1	3.03E-06	-8.78E-06	2.32E-06	7.15E-07	0.0000048***	-.0000212***	0.0012331*	259	0.0000	
Edu2	-2.78E-06	-0.0000156	8.55E-08	-0.0000315***	0.0000171***	0.0000523***	-0.0020852	172	0.0000	
Edu3	-0.0000136	-0.0000424**	-8.79e-06	.0000111*	2.78e-06*	.0000356	.0003974	107	0.0000	
Health1	.0033776	.018159***	-.0038515***	.0006781	-.0007554	-.0005001***	.7425174***	26	0.0003	
Health2	.0010594	-.0250415***	.0053077***	-.0007915	-.0002349	.0034495***	1.320115***	19	0.0046	
Significant										

* is significant at 10%, ** is significant at 5% *** significant at 1%