International Journal of China Studies
Vol. 10, No. 2, December 2019, pp. 223-249

Ageing Society and China's Welfare Regime: Examining the Sub-National Variations in Pension Provision (2005-2015)

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Abstract

Most research focussing on the welfare state is based on the assumption that welfare regimes are homogenous entities. However, substantial local differences exist in the provision of welfare services. This paper examines the factors causing marked regional differences in pension provision in China. The study finds that pension provision is segmented across four regional clusters depending on the level of pension coverage and generosity. The analysis reveals that regional fiscal capacity is the strongest predictor of pension differences across the four clusters which in turn is a consequence of the institutional stickiness from the policy priorities generated through the economic reforms. This path dependent mode of policy making is reflected along the two gauges of preferential policy index and location quotient of regional industrial development. The welfare regionalism in case of pension provision in China is thus explained by the economic regionalism of geographic conditions and local opportunity.

Keywords: *China, ageing society, pensions, welfare regionalism, path dependency*

1. Introduction

Demographic transition might be a destined phenomenon but the choice of dealing with it is ultimately a policy decision. There is no automatic gearing mechanism that propels the rise in welfare spending in response to demographic ageing. Public policy needs to be rejiggered to address the issue of population ageing. From intergenerational justice, reduced labour supply to fiscal sustainability, the challenges are many and varied. It goes without saying that demographic change and its interaction with social policies will

strongly shape both future economic growth and the sustainability of social support systems.

China has passed through a demographic transition in just twenty years, a feat that took about a century in the developed countries. The Chinese case is thus useful for exploratory research on the development of welfare states. In many ways, China is exceptional with its vast size, distinctive culture, and unusually radical politics. Moreover, China's record of economic growth and active state leadership seems favourable for gradual expansion of the welfare state. Most importantly, China stands as a critical test case for the study of the constraints that limit the reach of the welfare state in the developing world. The study of the Chinese welfare state is thus fundamental in the field of comparative social policy and definitely more relevant for the developing world than the studies of western industrial economies.

1.1. Ageing China: The Demographics

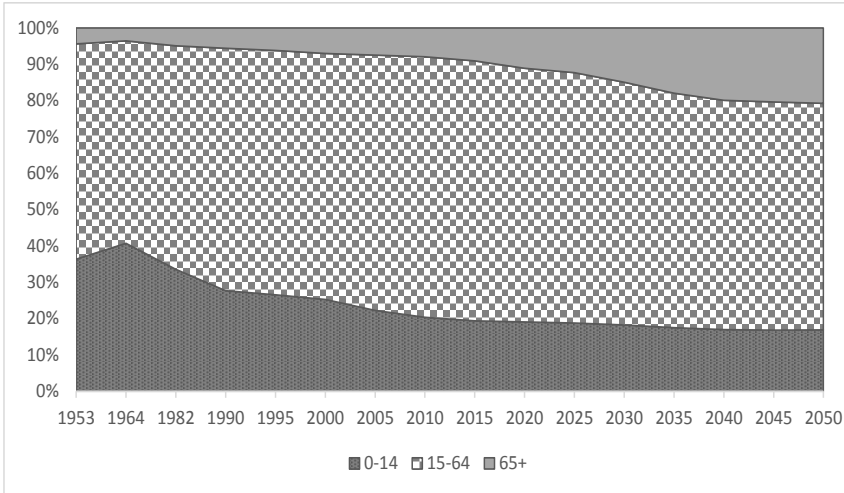
Demographic change is driven by fertility, mortality and longevity changes that have the power to reshape society in a profound manner. Longevity in China has made remarkable gains. The life expectancy at birth increased from 43 in 1960 to 75 in 2013. But perhaps it is the changes in fertility recorded in China that have been the most erratic in the world. The rapid decline in fertility in China came in the 1970s when the *wan xi shao* (later, longer, fewer) campaign was launched. In other words, the campaign called for later marriages, longer intervals between births and fewer births (Golley and Tyers, 2013). By the end of the decade, the campaign was pushed further with the adoption of one-child policy in 1979.[2] In China, the total fertility rate has fallen from 6.4 in 1949 to a level well below 2.0 in 2000, a historic change that over the next 50 years will turn China's population pyramid upside down (see Appendix A). There have been two baby booms in the case of China. The first coincided with the formation of the PRC (People's Republic of China) in 1949 as reflected in the large 0-4 year-old base of the 1950 population pyramid. The second boom came in the years of recovery after the Great Leap Forward in the early 1960s. These large cohorts as they matured into child-bearing years are reflected in the 2005 population pyramid (Eggleston and Tuljapurkar, 2011).

China has thus undergone a rapid demographic transition from high mortality and high fertility to relatively low mortality and low fertility. The sequence has been followed previously in Japan and Republic of Korea. However, the timing of ageing transition makes China's case quite unique. It will be the first major developing country to become an ageing country before it becomes moderately developed. Between 2010 and 2040, the elderly population in China will rise from 7 per cent to somewhere between 15 and

20 per cent of its total population. In some cities, the elderly could make up almost 33 per cent and 50 per cent of the population. The real demographic challenge is therefore the uneven pace of change, both temporally and geographically. In the simulations created to assess the impact of ageing on family structure, it has been found that while the burden will increase enormously, there will be significant differences in rural and urban areas (Lin, 1994). Owing to the differences in the birth rates in rural and urban areas, Lin found that by 2030, the old-age burden will quadruple in urban areas but only increase two-fold in rural regions. Subsequent studies have corroborated the forecast. The National Aged Population surveys by Peking University in 2002 and 2005 provide valuable insights into familial support for the elderly. The data revealed that intra-household transfers remained the main channel of support for the elderly both in urban and rural areas. However, while 37.8 per cent of the elderly depended on pensions as their main financial source in urban areas, only 5.5 per cent did so in rural areas. In terms of elderly support, private transfers have also decreased from 50 per cent in 1995 to 25 per cent in 2002 (Eggleston and Tuljapurkar, 2011).

It has been predicted that China will face three population peaks in future, each bearing a different policy implication. In 2020, China's working population will total one billion, that would necessitate creation of more jobs. In 2040, China will have a considerable proportion of elderly population that will necessitate policy changes in elderly care. Lastly, by 2045, China's population is expected to reach its peak of 1.534 billion, possibly making it more dependent on food imports (Hu, 2011).

Figure 1 Age Structure of China (1953-2050)



2. Theoretical Framework

2.1. China's Welfare Regime and Regional Fragmentation

Much of the scholarship on welfare regimes has stressed the natural link between democracy and welfare. Comparative welfare research has systematically excluded authoritarian cases from models and theories. While the scholars admitted that communist countries did have extensive welfare arrangements, but the phenomenon was considered unique as it was shaped by 'Marxist-Leninist ideology and the skewed logic of the command economy' (Inglot, 2008). However, if the size of the welfare state was measured not by the share of GDP, but by the share of public consumption in the total consumption, socialist countries had two to three times bigger welfare states than the capitalist ones (Kornai, 1992). The provision of welfare by an authoritarian regime is seen as an attempt to consolidate state interest rather than any particular group interest. In a tacit agreement, under authoritarian rule, the welfare benefits are traded for political compliance. The proactive role of elites in authoritarian policymaking also contrasts with the social policy in democracies, which is usually a result of the activities of social movements, organized interests, unions and parties. Welfare in this sense is about taking preventive action to avoid future challenges to regime stability.

Disregarded by welfare classifications, the Chinese welfare regime defies any easy characterization. Neither does it conform to the post-socialist retrenched welfare model, nor does it fit into the larger welfare state canon of the Anglo-European world. And for a long time China did not figure even in the common conceptualizations of the 'capitalist' welfare state in Asia. At best, China is often characterized as an emerging, underdeveloped welfare state – a welfare state in transition with huge prospects but no definite form. In the preface to the Chinese edition of the *Three Worlds*, Esping-Andersen gives two alternative interpretations of the East Asian welfare model: either as a hybrid of the liberal and conservative model or as an emerging fourth welfare regime (Lee and Ku, 2007; Kam, 2012). Within the welfare set-up, the Chinese social security system has been referred to as an arrangement 'designed to absorb the shock of entitlement collapse (loss of employment); to deliver relief rather than development; support short-term consumption rather than long-term poverty or vulnerability and to deal with symptoms rather than causes' (Cook, Kabeer and Suwannarat, 2003). The Asian Development Bank (2002) has described the Chinese system as most closely matching up with a conservative welfare regime. Some scholars, however, are quite optimistic about the emergence of welfare state in China. The welfare system in China is thus viewed as a stage in the politically directed development of a genuinely welfare oriented regime, a goal that can possibly be realized in 2049 (Zheng, 2008). Utilizing the welfare state regime

approach in studying the Chinese welfare state, it has been concluded that while retaining indigenous elements, China shows strong convergence with East Asian capitalist societies (Li, 2005).

The sequencing in China is indeed different from the history of welfare regime development in the advanced industrial economies. Welfare provisions in China started despite low levels of bottom-up demand. The pre-reform welfare regime in China had an obvious socialist overtone. The system provided comprehensive welfare benefits, including healthcare, education, housing, elderly care and child care based on non-contributory labour insurance. Production and social security had strong ties both in urban areas through the SOEs (state-owned enterprises) and in rural areas through the people's communes. Though termed as egalitarian, the welfare regime was highly stratified across occupational status and residential location. However, despite the stratification and the relative exclusion of some, the financial burden of welfare was tremendous. Particularly, the 'iron rice bowl' (*tie fan wan*) or 'cradle to grave' kind of support had crippled economic productivity and hindered work incentives. Predictably, the welfare benefits could not be sustained for long and had to be abandoned when China went the market way in the 1980s. Integration into the world economy has no doubt resulted in welfare retrenchment in comparison to Mao's socialist China. The SOEs downsizing that ensued brought a dramatic shift in China's welfare system from the work-unit responsibility system sponsored by the state to a contribution-based insurance system. Post-1978 the Chinese social policy mainly stressed two main points – one was to "support market-oriented economic reform through the enhancement of productivity", and second was to "stabilize the society via mitigation of social tensions" (Ministry of Labour and Social Security, 1999). In order to follow the rather contradictory points, the Chinese social welfare model moved toward a dualist system with a mix of diversified funding and welfare responsibilities.

In 2008, *China Daily* reported that China is likely to become a welfare state in 2049 with universal medical care and old age pensions. The report prepared by Chinese experts based on field investigation and foreign experience said the country would undergo three stages to eventually achieve the target. The first stage from 2008 to 2012 would see the creation of a safety net, which would include minimum living allowances, medical insurance and pensions for all urban and rural residents. From 2013 to 2020, the government would keep improving welfare policies and measures to make the social security network stable and sustainable. From 2021 to 2049, it would further improve provisions to eventually "build a socialist welfare society with Chinese characteristics" (*China Daily*, 2008).

With the Hu Jintao–Wen Jiaobao administration in 2002, the focus came to be placed on making China's development more human and people-

oriented. The goal of a harmonious socialist society was sought to be achieved through redistributive mechanisms and major improvements in the fields of education, medical care and social security. And indeed, among the social policy goals of the Chinese government, 'social harmony' comes up as the centerpiece of future welfare strategy. In recent years, the Chinese government has committed to guiding the development, extension and institutionalization of a social protection system. In moving towards a harmonious society, the new welfare set-up acts as a 'safety net' for urban poor and a 'shock absorber' in mitigating social tensions resulting from market-oriented reforms.

Under Xi Jinping, the Chinese welfare apparatus is becoming more sound and mature. The 13th Five Year Plan (2016-2020) providing the blueprint of China's development goals and social welfare in terms of improving people's livelihood is a major highlight of the plan. Significantly, the social policy is geared to address the fragmented local officialdom as the way to mitigate social instability and bringing in a fair-for-all system. In contemporary China, the political-ideological environment with regard to social welfare emphasizes social equity and a 'human-centred' policy orientation. The difference in the new approach towards social welfare under the Xi administration comes from the efforts to promote mass support for the party by initiating service-oriented policies catering to the hitherto marginalized sections of society. The new welfare policy thus recognizes the importance of giving social protection to the vulnerable sections. The main thrust of policymaking under Xi Jinping is to achieve the goals of an integrated rural-urban social policy system and prepare for an ageing society. The move to overhaul the *hukou* system and improving migrant workers access to health care, pensions, education and other benefits can be seen as an important step in expanding the welfare spread of the state.

For long the focus of China's leaders had been to modernize the economy, lift living standards and meet material needs. At the 19th National Congress of the Communist Party of China, Xi and his team declared that the Party will now focus on social needs and demands for welfare and equity. The Chinese president made it quite clear in his speech – "What we now face is the contradiction between unbalanced and inadequate development and the people's ever-growing needs for a better life." The declaration also serves as an upfront reference to the adaptation needed for the changed conditions of an ageing society and growing economic inequality. Social welfare, in fact, lies at the heart of Xi's new deal of ensuring adaptive governance to the populace. Enhancing and broadening social services such as pensions and healthcare is being seen as the most important pathway to achieve a better life for all.

Thus in the current phase of China's welfare regime, the leadership is acutely aware of cost concerns and does not intend to introduce the Scandinavian style generosity in social insurance, at least not in the medium-

term. Efforts are focussed on improving the current system rather than just increasing the spending. Needless to say, a major part of the effort is to coalesce the patchwork of geographical and social fragmentation that marks the social security system of the nation. The Chinese leadership aims to form a functioning social insurance system that covers the entire population in a seamless manner. However, the unbalanced economic and social development of the country constitutes the most serious challenge – the gap between rich and poor territorial units has widened considerably in the post-reform era. These imbalances "are threatening stability and pressuring Chinese leaders to establish more socially responsive institutions" (McNally, 2008). Fragmented welfare generates compartmentalized sets of winners and losers. The social costs of only a slice of excluded citizenry is hard to see and even the professional budgetary analysts cannot reach a consensus on the 'real' impact of social policy. On the other hand, universal benefits are transparent and with high visibility of both benefits and costs. A raise for one becomes a raise for all and the leaders thus get universal support by offering benefit increases to broad swathes of the population. Given the demographic pressures faced by China, the future of its welfare regime rests on how the sub-national variation will be handled.

Due to internal diversity coupled with vast size and population, China defies comparison with other nations. China can more appropriately be compared to Europe as a whole than to individual European countries (Pomeranz, 2000). Indeed, the fragmented system reveals the tensions in programmatic and particularistic mode of policy making. The central government in China displays programmatic policy style in vying for legitimacy by promising to enact policies that have low degree of selectivity of the beneficiary groups. The local governments however have particularistic political practices ranging from log rolling, constituency service, and intensive interest group involvement in policy making. Particularism also tends to be clientelistic and patronage-oriented (Lynch, 2006). Occupational programs provide crucial resources for particularistic politicians (Shefter, 1994). Occupationally based social insurance programs plainly lend themselves far more than do universal programs to the kind of fine-grained targeting of incentives on which particularistic political competition thrives. Clientelistic politicians thus have high propensity to expand welfare policies in ways that enhance fragmentation and to oppose proposals that would harmonize existing programs.

There have been a number of expositions centering around the regional development variation in China. Scholars have looked at the rapid growth and regional variation in development in China from a political economy perspective that emphasizes gradualism, experimentation, export-led growth, and state capitalism as the driving forces of change (Malesky and London, 2014). Studies have also stressed the experimentation at the regional level that

led to successful 'regional pilots' and policy frameworks of dual track pricing, township and village enterprises (TVEs) and special economic zones (SEZs) insulated regional economy from negative externality (Coase and Wang, 2013). The Chinese provincial economic development has been characterized as a system of regionally decentralized authoritarianism that linked regional economic performance to the political promotion. Thus experimentation was linked to cadre evaluation and management and propelled the economic development in regions with varying degrees of success (Xu, 2011).

In the case of sub-national variation in China, local governments are seen to display characteristics of a local developmental state. Local governments act like corporations in their management of state firms while utilizing a "combination of inducements and administrative constraints characteristic of a state corporatist system" to both encourage and control the private sector (Oi, 1999). In quite the same vein, the 'market preserving federalism' theory stipulates that the central government committed itself to fiscal reforms that allowed local governments to keep marginal revenues, aligning local government incentives with revenue maximization and leading to pro-market and pro-growth policies and behaviour (Montinola, Qian and Weingast, 1995). Federalism induced competition among jurisdictions that resulted in experimentation and imitation as well as increased factor mobility through competition for capital and migrant labour. The promotion incentives of county leaders have also been looked into to understand the sub-national development variation in China. The hierarchical promotion system provides incentives based on performance that is gauged along the two national strategic priorities of social stability and economic growth (Bulman, 2016). This system has incentivized leaders in poorer regions to emphasize stability maintenance, leading to less effective government-business relations and lower institutional capacity, and it has incentivized leaders in the wealthier regions to focus on economic growth, which propelled effective government-business relations and heightened control over local cadres.

Analyzing the Chinese welfare regime, scholars opines that China has not one but many and different welfare states (Gao, 2012). The greatest divide is the rural-urban divide. The urban welfare state is more akin to those in western industrial countries and the rural welfare state is close to those in the least developed countries. In the context of China's highly decentralized mode of governance, there is a paradox in the expansion of state capacity in China in the provision of pensions. Any effort to expand the scope of state activity in pension welfare will be met by a loss of control over the local agents responsible for the delivery (Pei, 2006). This may eventually lead to the dilution or dispersion of state capacity, if not its erosion. In the specific domain of uneven regional social welfare coverage and pension provision in China a study found that the push to increase pension coverage has not reduced, rather

reproduced economic inequalities (Frazier, 2010). It was found that there has been an overwhelming appropriation of pension revenues by the local officials to mitigate social risk but the redistribution has largely benefitted only the urban pensioners who constitute a crucial political constituency.

2.2. Path Dependency

Variations and dissimilarities in policy outcomes have a temporal context. Programs and policies are specifically entrenched in time and history as a result of which the set of choices available at any given moment are contingent on the choices made in the previous periods. In fact, underpinning much of the discourse on policy processes and policy change lies the basic notion that policies differ as a result of past experience. There is no 'blank sheet' of infinite possibility in a policy area – the options for future policymakers are restricted by past policy paths (Oakeshott, 1966). A theoretically informed analysis of policy trajectories is what is needed to decouple policy variations. The organizing concept of path dependency thus provides a useful mechanism to analyze temporal processes in policy developments. More specifically, the idea of path dependency fully captures the forces at work in decoding the spatial variations of public policies.

In dealing with the adoption and diffusion of technological standards, the concept of path dependence was developed in economics principally by two authors, W. Brian Arthur and Paul A. David. According to Arthur, there is path dependency when a technology is subject to self-reinforcement, and positive feedback. One condition for such positive feedback is the existence of increasing returns – a situation where the increased production or the increased use of a certain product leads to an increased utility (Arthur, 1994). In a seminal work, "Economics of Qwerty," Paul David further advanced the concept by arguing that the path dependent adoption of the Qwerty keyboard is driven by the interaction of three factors. The first is 'system scale economies', i.e. increasing returns to production. The second is 'technical interrelatedness' that brings about complementarity between the technologies to make it productive. The last factor is the 'quasi irreversibility of investment' that refers to the higher learning costs entailed in switching to an alternative way that restrains change. Once an actor has learned to operate one of the keyboards, he or she would have to incur higher learning costs to switch to the other system (David, 1985).

Moving beyond the technological field, the idea of path dependency has gained currency in social sciences particularly in the domain of policy analysis. Policy learning considers "policy legacies to be one of the most significant elements in determining present and future policy" (Greener, 2002). North uses path dependency as a central concept in his theory of

institutional change. In terms of understanding policy development as path dependent, past policy decisions are institutions in terms of current policy decisions: they act as structures that can limit or shape current policy options.

> Path dependency is a process that constrains future choice sets – at every step along the way there are choices – political and economic – that provide real alternatives. Path Dependency is a way to narrow conceptually the choice set and link decision-making through time. (North, 1990)

The most important conditions of path dependence as a theoretical framework is the presence of 'lock-in/institutional stickiness'. In the absence of exogenous shock, a path dependent process will result in lock-in which is characterized by a state of equilibrium having minimum potential for endogenous change. Since paths are selected contingently, lock-in can take place on any path, not necessarily an optimal one.

A number of claims have been evoked in the application of path dependence to social processes – specific patterns of timing and sequence matter; small events can lead to large consequences; particular consequences, once introduced are very difficult to reverse; and political development is often punctuated by critical moments or junctures that shape the basic contours of social life. In conceptualizing the concept of path dependency, it is argued that path dependence seeks to uncover the deterministic characteristics of institutional patterns set in motion by the critical junctures in historical sequences (Mahoney, 2000). There can be two forms of path analysis. One is the self-reinforcing sequence where the increasing returns and cost of switching over entrench particular actions. Second is the reactive sequence in which each move is a chain reaction to the earlier move creating a path trajectory. Path dependency is beyond simply the understanding of continuity – a perceived failure of a habitual path may lead to the search for alternatives but that search process is itself path dependent (Crouch and Farrell, 2004).

Paul Pierson is perhaps one of the first scholars to import the concept of path dependence to political science. While he stresses the danger of concept stretching, Pierson argues that path dependence should very well apply to the political sphere. In fact, according to him, the concept should be even more relevant for political science than it is for economics (Pierson, 2004). He argues that the condition of increasing returns is always present in the case of political institutions because they create common expectations among actors and thus lower the transaction costs associated with coordinating behaviour. Moreover, institutions often involve high set-up costs, create incentives for maintenance and have learning effects.

In particular, Pierson argues that four factors of political life produce increasing returns, which he also calls "positive feedback": 1) The central role of collective action and corresponding collective action problems, which

makes institutional reforms less likely than in the more competitive and thus flexible environment of a market. 2) The high density of institutions is a source of increasing returns, because the institutions complement each other. 3) Political authority and power asymmetries can be sources of positive feedback. Actors may use their power positions to change the rules of the game in a way that further enhances their power positions. 4) Another source of positive feedback can lie in the complexity and opacity of politics. It is much more difficult to measure success in the political sphere than in the economic sphere and consequently it is more difficult to decide how to change an institution.

The literature on path dependence is not only limited to the conceptualizations, there is also a typological dimension. Broadly, path dependence as applied to institutional and policy analyses has two major types or models viz., utilitarian and normative. The utilitarian model relates with the consequential or calculative logic. Within this model, human agents tend to select an option based on utilitarian cost-benefit calculations or assessments. The central mechanism of path dependency becomes the increasing returns that are visible in self-reinforcing, positive feedback processes. Path preservation in utilitarian model also reflects the conscious, rational and strategic choice made on the part of human agents. Institutions are thus adopted even at sub-optimal level because actors perceive that the cost involved in transformation outweighs any potential benefit. This creates a reflective, intentional tendency to follow a set path. The story of Qwerty keyboard is a classic example of utilitarian path dependence.

Normative model, on the other hand, pertains to the logic of appropriateness and is driven by rules, values and norms as opposed to material interests. In this model, agents act on the basis of rule-defined or norm-driven practices, identities, and interests that specify the appropriate behaviour in a given situation. In an institutional environment, the motivation thus comes from ideational concerns such as legitimacy, reputation, and prestige (March and Olsen, 1989). The path continuity in normative model is ensured through legitimation by developing a criteria of appropriateness, resource distribution and constitutional rules. While the two models are different in logic, they share the same conception of agency in terms of the outcome-orientation and consequential thinking. A strong illustration of normative path dependence is the persistence of Scandinavian model of welfare state owing to the assumption that it is 'based on a unique combination of the values and norms of universality, solidarity and market-independence' (Cox, 2004).

In this paper, path dependence has been utilized as an important theoretical construct that explains the sub-national variations in pension policy in China. Pension policies are primarily shaped by three types of institutions – state capacity (ability to tax); nature of bureaucracy or political parties

(patronage-oriented or programmatic); and feedback effects from earlier policy decisions (Orloff, 1993). The paper thus seeks to uncover the sub-national variations in pension provisioning in China and employ the notion of path dependency to account for the variance.

3. Research Design

The study is a descriptive research design and adopts a mixed method approach. The study conducts cluster analysis to ascertain the extent of fragmentation in Chinese social security provision at the sub-national level. The clusters are determined based on the ranking method in terms of the generosity and coverage of social security across the 31 provinces in China. The study also makes a correlation between the socio-economic conditions and the particular characteristics of each cluster groups. The findings are then substantiated by the theoretical explanations and models pertaining to regional fragmentation and welfare state. Two important indicators of preferential policy index (PPI) (Demurger, Sachs, Woo, Bao and Chang, 2002) and location quotient (LQ) of regional industrial development has been used to prove the path dependent mode of policy making and the resultant spatial impact on social policy.

3.1. Data Set Description

This study is based on the construction of a provincial-level panel dataset (2005-2015) using statistics sourced from the various *Statistical Yearbooks of China* (National and Provincial). The statistics have been compiled annually by the National Bureau of Statistics (NBS) and the Ministry of Human Resources and Social Security (MOHRSS) of the People's Republic of China. The dataset compiled for the study comprises the 31 provinces and province-level cities in mainland China and does not include the regions of Hong Kong, Macao and Taiwan. Out of the 31 provinces in mainland China, there are four municipalities (Beijing, Tianjin, Shanghai and Chongqing) that have been granted administrative status equivalent to a province. All relevant data is averaged for 2005 through 2015 and the 31 provinces have been ranked according to the two measures of generosity and coverage of social security insurance. The ranks have then been used as input for conducting cluster analysis.

3.2. Dependent Variable(s)

A dependent variable is the phenomenon to be examined, understood and explained through causal factors. In the present study, the dependent variable

is the Chinese social security system from 2005 to 2015. In analyzing the policy change, the study looks at the two main dimensions of generosity and coverage. Generosity is measured as annual per capita expenditures for old-age insurance. Coverage pertains to the total number of people in a particular province covered by the old-age insurance. Besides being the dependent variables, the generosity and coverage dimensions also serve as variables for clustering of Chinese provinces on welfare provision.

3.3. Independent Variable(s)

Broadly, the study makes use of five main explanatory or independent variables viz., endowment, openness, dependency, urbanization and development. Endowment refers to fiscal capacity and measured by local budgetary revenue for each province. The openness dimension is measured by the total value of imports and exports to gross regional product in each province. The dependency variable refers to the old-dependency ratio (persons 60 or above in the total population) in each province. The level of urbanization in each province is measured by the percentage of urban population in total population. The economic development of each province is measured by gross regional product (GRP) per capita.

3.4. Empirical Test: Cluster Analysis

The present study tests the fragmented nature of welfare in Chinese provinces with cluster analysis, a multivariate statistical method that groups similar cases that are internally homogeneous and different from other clusters. The first step in cluster analysis is the identification of the number of clusters. This is done by employing a hierarchical agglomerative method – Ward's method – that searches for the N x N similarity matrix and sequentially merges the most similar cases from smaller clusters to larger ones. That is, the method starts out with each case forming a cluster of its own and then adds cases one by one to form clusters of similar cases until finally all cases come together within one group.

In the clustering output based on Ward's method, the agglomeration schedule shows the step-by-step clustering process – which clusters were combined on a particular step and the total error in the clustering solution. The 'big jump' in error or distance coefficient needs to be identified. This pretty big jump in distance coefficient is seen at a stage – also known as the 'step of elbow' (represented by a sharp turn in the screen diagram). The number of clusters is calculated by subtracting the step of elbow from the total number of cases.

3.4.1. K-Means Clustering

The clustering of Chinese provinces in this study uses the k-means clustering technique that forms a fixed number of clusters for a given dataset. The Lloyd's algorithm, mostly known as k-means algorithm, is used to solve the k-means clustering problem. The algorithm uses iterative refinement to produce a final result. The inputs are the number of clusters K and the data set. K-means stores k centroids (based on squared Euclidean distance) that it uses to define clusters. A point is considered to be in a particular cluster if it is closer to that cluster's centroid than any other centroid. When no point is pending, the first step is completed and an early groupage is done. At this point we need to re-calculate k new centroids as barycentres of the clusters resulting from the previous step. After we have these k new centroids, a new binding has to be done between the same data set points and the nearest new centroid. A loop has been generated. As a result of this loop we may notice that the k centroids change their location step by step until a stage when they no longer change (MacQueen, 1967).

3.5. Preferential Policy Index (PPI)

In explaining the divergence of regional income in China, the preferential policy index for each province from 1979 to 1994. The present study makes use of this index in exhibiting the path-dependent mode of policy making in the provision of Pensions in the contemporary period.

The construction of the preferential policy index is based on the number of designated open economic zones in a province and the extent of the preferential treatment. The construction of this index relies on available information on designated open economic zones across China, gathered from different sources, as well as a subjective classification based on their importance in terms of special treatment given to investors and industrial enterprises. Given the various degrees of preferential policies that open economic zones offer, we assigned their host provinces the following weights:

Weight 3: Special Economic Zones and Shanghai Pudong New Area.

Weight 2: Economic and Technological Development Zones and Border Economic Cooperation Zones.

Weight 1: Coastal Open Cities; Coastal Open Economic Zones; Open Coastal Belts; Bonded Areas in major port cities, Major cities along the Yangtze River, All Capital Cities of inland provinces and autonomous regions.

Weight 0: No Open Zone.

3.6. Location Quotient (LQ)

In order to have a better understanding of the comparative (dis)advantages of China's provinces, the study calculated the location quotient of China's provinces. The location quotient is a commonly used spatial economic analysis method (Isserman, 1977). This technique compares the local economy to a reference economy, in the process attempting to identify specializations in the local economy. Location quotient compares the regional share of economic activity in a particular industry to the national share of economic activity in the same industry. The result reveals the degree of regional specialization in each industry. If the location quotient for a particular industry is less than one, the region is less specialized than the nation, while location quotients greater than one reveal greater specialization of the industry in the local economy than in the national economy. To calculate any location quotient, the following formula is applied. The location quotient of region j in industry i can be calculated as:

$$LQ_{i,j} = \frac{\text{Provincial employment in industry i/Total provincial employment}}{\text{National employment in industry i/Total national employment}}$$

The study looks at the accumulation of location quotient across the three strata of industry – primary, secondary, and tertiary – in each cluster from 2005-2015.

4. Findings

4.1. Cluster Analysis Results

The study finds that the coverage and generosity of pension provision in China is segmented across four regional clusters – privileged (provinces with very high levels of coverage and generosity), intermediate (provinces that cluster based on medium-level benefits in coverage and generosity), indigent (provinces that are lagging behind in both coverage and generosity), and hybrid (mix of high and medium performance in coverage and generosity).

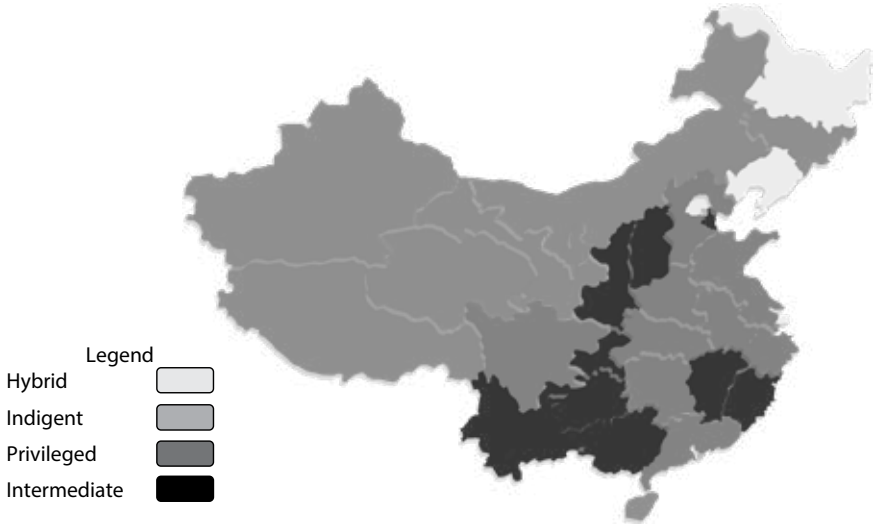
Table 1 Clustering of Provinces

Cluster	Province	Generosity Rank	Coverage Rank
1	Beijing	23	10
1	Liaoning	21	5
1	Heilongjiang	25	13
1	Shanghai	22	7
2	Inner Mongolia	24	23
2	Jilin	26	19
2	Hainan	28	28

Table 1 (continued)

Cluster	Province	Generosity Rank	Coverage Rank
2	Tibet	31	31
2	Gansu	20	27
2	Qinghai	29	30
2	Ningxia	30	29
2	Xinjiang	27	24
3	Hebei	8	11
3	Jiangsu	2	2
3	Zhejiang	6	4
3	Anhui	7	14
3	Shandong	1	3
3	Henan	3	8
3	Hubei	11	9
3	Hunan	9	12
3	Guangdong	5	1
3	Sichuan	4	6
4	Tianjin	18	22
4	Shanxi	16	17
4	Fujian	14	15
4	Jiangxi	19	16
4	Guanxi	17	21
4	Chongqing	10	18
4	Guizhou	15	26
4	Yunnan	13	25
4	Shaanxi	12	20

Figure 2 Clustering of Generosity and Coverage of Pension Welfare (2005-2015)



4.1.1. Hybrid

There are four provinces in this cluster. Beijing and Shanghai as the tier-1 cities rank very high on the socio-economic development parameters. While generosity is in medium range, the coverage of social security is quite high. Liaoning performs extremely well on both fronts and Heilongjiang provides both moderate coverage and benefits. Except Liaoning, the provinces in this cluster defy normal explanatory power of local socio-economic conditions on the provision of social security.

Table 2 Socio-economic Ranking of Provinces in the Hybrid Cluster

	Dependency	Openness	Endowment	Urbanization	GRP/Capita
Beijing	19	5	6	1	2
Liaoning	7	10	7	6	8
Heilongjiang	23	25	23	8	16
Shanghai	6	1	3	9	1

4.1.2. Indigent

The indigent cluster consists of eight provinces most of which crowd together in the northwest region of China. These provinces rank very low in both coverage and generosity of social insurance. The socio-economic development also displays low ranks in this cluster and thus lends support to the causal connection between the level of economic development and the provision of social insurance. The dependency rank is low which means the social risk is limited and could also explain the less generous and limited coverage of benefits.

Table 3 Socio-economic Ranking of Provinces in the Indigent Cluster

	Dependency	Openness	Endowment	Urbanization	GRP/Capita
Inner Mongolia	25	24	18	3	6
Jilin	21	13	25	7	11
Hainan	22	8	28	25	23
Tibet	31	31	31	28	28
Gansu	20	30	27	23	30
Qinghai	29	26	30	13	21
Ningxia	30	22	29	12	17
Xinjiang	28	28	26	24	18

4.1.3. Privileged

There are 10 provinces in the privileged cluster that mainly comprises the developed eastern coastal region of China. The social insurance registers very high ranks in terms of both coverage and generosity. The level of socio-economic development is in the medium-high range and explains the positive relation with provisioning of social insurance.

Table 4 Socio-economic Ranking of Provinces in the Privileged Cluster

	Dependency	Openness	Endowment	Urbanization	GRP/Capita
Hebei	16	15	10	5	15
Jiangsu	3	3	2	10	5
Zhejiang	13	7	5	11	4
Anhui	5	16	15	15	26
Shandong	8	9	4	17	9
Henan	17	17	9	20	22
Hubei	10	18	11	18	12
Hunan	4	23	14	21	19
Guangdong	27	2	1	22	7
Sichuan	2	14	8	30	24

4.1.4. Intermediate

The intermediate cluster comprises 9 provinces dominated by the Western region of China. The social security coverage and generosity is largely in the medium-range. The socio-economic indicators of development also comprise medium ranking.

Table 5 Socio-economic Ranking of Provinces in the Intermediate Cluster

	Dependency	Openness	Endowment	Urbanization	GRP/Capita
Tianjin	9	4	13	2	3
Shanxi	26	21	19	4	20
Fujian	18	6	12	14	10
Jiangxi	15	12	20	16	25
Guanxi	11	19	22	26	27
Chongqing	1	11	17	27	13
Guizhou	12	29	24	31	31
Yunnan	24	27	21	29	29
Shaanxi	14	20	16	19	14

4.2. Regression Results

The regression results are reported in the following tables. For each dependent variable, the model employed is the standard multiple regression with all five predictors inputted together. The results comprise the model summary, analysis of variance and the regression coefficients.

Table 6 Model Summary of Regression

Dependent Variable	R	R-Square	Adjusted R-Square	Std. Error of the Estimate
Coverage	0.956	0.915	0.897	227.775
Generosity	0.834	0.695	0.634	89.891

Predictors: (Constant), Development, Dependency, Endowment, Urbanization, Openness

Table 7 Analysis of Variance

		ANOVA				
		Sum of Squares	df	Mean Square	F	Sig.
Coverage	Regression	13875784.03	5	2775156.805	53.490	.000[a]
	Residual	1297034.749	25	51881.38996		
	Total	15172818.77	30			
Generosity	Regression	460452.5853	5	92090.51706	11.397	.000[a]
	Residual	202010.7695	25	8080.430782		
	Total	662463.3548	30			

[a] Predictors: (Constant), Development, Dependency, Endowment, Urbanization, Openness

Table 8 Regression Coefficients

Predictor Variable	Regression Coefficients					
	Coverage			Generosity		
	B	SE B	β	B	SE B	β
(Constant)	-286	834.7		-670	329.4	
Dependency	-14.4	20.9	-0.045	26.24	8.248	0.389
Openness	-0.23	0.257	-0.11	-0.16	0.101	-0.36
Endowment	0.663	0.052	1.1537	0.112	0.021	0.936*
Urbanization	14.57	18.62	0.07	14.4	7.348	0.331
Development	-0.01	0.005	-0.238	-0	0.002	-0.42

*$p < 0.001$

4.3. The Worlds of Welfare: Accounting for Cluster Variance

The regression results reveal regional fiscal capacity as the strongest predictor of pension differences across the four clusters. Delving deep into the causes for differential fiscal resources, the study makes use of path dependency theory to explain the cluster differences. Path dependency in the case of pension fragmentation in China is illustrated by two important indicators – the preferential policy index (PPI) and the location quotient (LQ) of industrial sectors.

The preferential policy index covers the period from 1978 to 1994 when the economic reforms and opening up was setting the stage for development in China. The preferential treatment accorded to some provinces led them to prosper economically and led to improved social governance as well. On the other hand, the provinces that were not given priority in reform remained undeveloped. This uneven development scenario has persisted ever since and reflects also in other arenas such as social policy. As the PPI of the four clusters reveals, the privileged cluster scores the highest, followed by hybrid, intermediate and then indigent. This implies that the preferential policies have played an important role in creating a lock-in effect in case of pension provisioning across Chinese provinces.

Another important measure of path dependency is the location quotient of provinces by the three strata of industry. The privileged cluster has developed specialization in secondary and tertiary industries that are the most revenue

Figure 3 Preferential Policy Index of Clusters (1979-94)

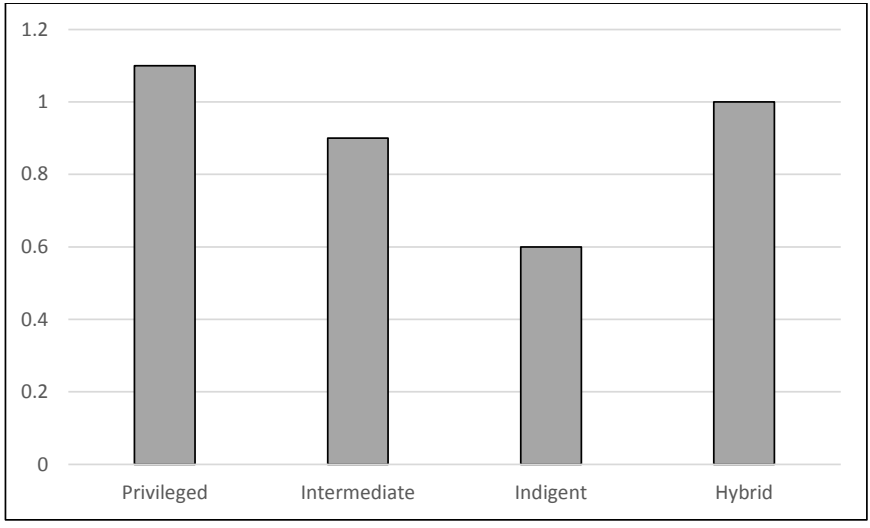
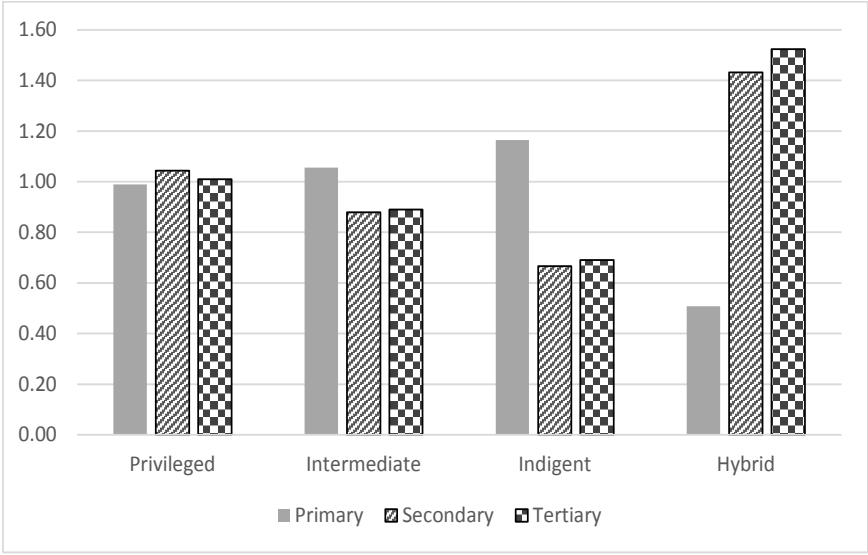


Figure 4 Location Quotient of Clusters by the Three Strata of Industry (1995-2005)



generating. The hybrid cluster has the highest location quotient in secondary and tertiary sectors as it consists of two ultra-modern, highly developed provinces of Beijing and Shanghai. The intermediate cluster has a moderately developed secondary and tertiary sector and also relies heavily on the primary sector. The secondary and tertiary sector is underdeveloped in the indigent cluster and most specialization is overwhelmingly in the primary sector.

The clusters displaying the high levels of coverage and generosity have the specific set of provinces that not only have the geographical advantage in industrial development but were given systematic preference in terms of policies to attract foreign investment. The clusters with medium or low level of coverage and generosity have geographical and natural endowment constraints in attracting investment.

The industrial structure created in the past thus created a self-reinforcing effect and led to the differences in the fiscal capacity of the regional clusters which in turn reflects in the social policy. Thus, looking specifically at pensions at sub-national level, the welfare regionalism is explained by the path dependent mode of policy making that varied across regional clusters in China.

Appendix A

PPI (Preferential Policy Index) 1979-1994	
Beijing	0.67
Liaoning	1.24
Heilongjiang	0.67
Shanghai	1.76
Inner Mongolia	0.67
Jilin	0.67
Hainan	1.57
Tibet	0.33
Gansu	0.33
Qinghai	0.33
Ningxia	0.33
Xinjiang	0.67
Hebei	1.24
Jiangsu	1.43
Zhejiang	1.43
Anhui	0.62
Shandong	1.43
Henan	0.33
Hubei	0.62
Hunan	0.33
Guangdong	2.86
Sichuan	0.62
Tianjin	1.43
Shanxi	0.33
Fujian	2.71
Jiangxi	0.33
Guanxi	1.24
Chongqing	N/A
Guizhou	0.33
Yunnan	0.67
Shaanxi	0.33

Appendix B

Location Quotient of Chinese Provinces by the Three Strata of Industry

	1995			2000			2005		
	Primary	Secondary	Tertiary	Primary	Secondary	Tertiary	Primary	Secondary	Tertiary
Beijing	0.20	1.75	2.04	0.23	1.44	2.03	0.15	1.03	2.19
Tianjin	0.32	2.11	1.44	0.40	1.82	1.42	0.42	1.70	1.29
Hebei	0.97	1.14	0.93	0.98	1.13	0.94	1.01	1.27	0.79
Shanxi	0.82	1.30	1.10	0.93	1.11	1.03	0.97	1.10	0.97
Inner Mongolia	0.99	0.96	1.06	1.09	0.73	1.06	1.20	0.66	0.97
Liaoning	0.59	1.65	1.28	0.75	1.17	1.31	0.81	1.07	1.22
Jilin	0.85	1.17	1.18	1.00	0.85	1.12	1.06	0.77	1.08
Heilongjiang	0.70	1.49	1.20	0.99	0.94	1.07	1.08	0.88	0.98
Shanghai	0.17	2.24	1.63	0.26	1.90	1.60	0.16	1.62	1.73
Jiangsu	0.79	1.47	1.02	0.84	1.32	1.02	0.62	1.61	1.08
Zhejiang	0.81	1.37	1.07	0.76	1.37	1.14	0.55	1.75	1.07
Anhui	1.15	0.78	0.89	1.20	0.70	0.89	1.14	0.92	0.86
Fujian	0.95	1.03	1.07	0.94	1.09	1.04	0.84	1.31	1.00
Jiangxi	1.05	0.79	1.10	1.04	0.64	1.22	1.02	0.92	1.02
Shandong	1.03	1.09	0.85	1.06	1.05	0.85	0.90	1.28	0.93
Henan	1.13	0.86	0.84	1.28	0.78	0.67	1.24	0.93	0.72
Hubei	0.97	0.96	1.11	0.96	0.81	1.22	0.95	0.82	1.22
Hunan	1.16	0.71	0.92	1.22	0.65	0.89	1.20	0.73	0.92

Appendix B (continued)

Location Quotient of Chinese Provinces by the Three Strata of Industry

	1995			2000			2005		
	Primary	Secondary	Tertiary	Primary	Secondary	Tertiary	Primary	Secondary	Tertiary
Guangdong	0.71	1.25	1.40	0.82	1.16	1.19	0.74	1.29	1.16
Guanxi	1.26	0.52	0.90	1.24	0.45	1.00	1.25	0.47	1.04
Hainan	1.15	0.51	1.14	1.23	0.43	1.06	1.27	0.45	1.03
Chongqing	N/A	N/A	N/A	1.13	0.68	1.02	1.01	0.90	1.06
Sichuan	1.19	0.69	0.87	1.19	0.64	0.94	1.13	0.77	0.99
Guizhou	1.39	0.43	0.68	1.35	0.41	0.85	1.28	0.43	1.03
Yunnan	1.43	0.43	0.59	1.48	0.41	0.62	1.55	0.42	0.66
Tibet	1.46	0.20	0.74	1.48	0.26	0.74	1.37	0.39	0.94
Shaanxi	1.12	0.84	0.88	1.11	0.73	1.01	1.13	0.78	0.98
Gansu	1.10	0.76	1.00	1.19	0.61	0.96	1.28	0.58	0.93
Qinghai	1.13	0.79	0.91	1.22	0.59	0.94	1.10	0.73	1.07
Ningxia	1.11	0.83	0.91	1.16	0.80	0.88	1.08	0.93	0.93
Xinjiang	1.07	0.82	1.01	1.15	0.61	1.04	1.19	0.56	1.07

Notes

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1. UN data.
2. The fifth plenum of the 18th Party Congress of the Communist Party of China in October 2015 shifted the policy from a one-child to two-child.

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