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RESEARCH ARTICLE

Issue uncertainty and selections of policy instruments in policy pilots: evidence from China's long-term care insurance

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ABSTRACT

Policy pilots have been instrumental in governing China's economic and social development. Prior research has primarily concentrated on examining the types of policy pilots and their promotion strategies through the lens of central-local dynamics, and analysing the organizational models of policy pilots within specific contexts. However, there's a gap in understandinghow the central government employs policy instruments to foster organizational learning within pilots. In complex policy pilots, there is often uncertainty regarding objectives, pathways, and outcomes. Using China's Long-Term Care Insurance (LTCI) pilot as a case study, this research reveals that policy pilots utilize distinct sets of policy instruments during the organizational learning process, contingent upon the context. The first set of instruments indicates a shift in the central government's intervention intensity, ranging from weak to strong, employing autonomous, advocacy, and directive policy instruments in sequence. The second set of instruments shows an evolution in the depth of the central government's engagement with the policy issues, progressing from shallow to deep, with the use of booster, framework, and calibrated policy instruments, respectively. This study highlights how policy pilots employ a diverse array of instruments to navigate the intricacies of policy implementation when confronting complex social policy challenges.

1. Introduction

Policy pilot is almost ubiquitous in China's reform process. The governance style characterized by 'crossing the river by groping the stones' has played a crucial role in China's economic development, encompassing agriculture, state-owned enterprises, education, governance, and health (Florini et al., 2012; Heilmann & Perry, 2011; Husain et al., 2021). It is no exception in the field of social policy, which responds to society's needs and aims to enhance people's livelihoods. Local governments take the lead in responding to the social needs of local areas, and in order to establish a national consistent social security plan, the central government often passes a long period of social policy pilots to achieve a finalized system.

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Policy pilot is an intermediate process between policy formulation and implementation (Zeigermann & Ettelt, 2023), which involves the opportunity to explore alternative ways of achieving policy objectives, as well as the degree of openness to policy formulation, testing, and adjustment. To reduce the ambiguity in policy objectives, policy pilots require sufficient patience for redesign and recalibration (Stoker & John, 2009).

In China, policy piloting is regarded as a key governance strategy to promote rapid economic development (Heilmann et al., 2013). With the deepening of research on pilot mechanisms, scholars have begun to pay more attention to the types of policy pilots and promotion strategies, mainly from the following perspectives:

First, from the perspective of central-local interaction. Some studies emphasize that the promotion of piloting in China relies on top-down 'hierarchical policy piloting' (Heilmann, 2008), which is viewed as an intentionally designed and strictly controlled process by the central government. In contrast, China's decentralized structure gives local governments greater autonomy, and policy pilots are often promoted through a bottom-up 'pilot-approval' framework (Feltenstein & Iwata, 2005).

Second, context-specific piloting mechanisms have been paid attention to. Researchers have focused on differences in the organizational patterns of pilots across policy issues (Howlett, 2018), as well as four types of policy pilots based on the certainty of policy objectives and programmes (Zhu & Zhao, 2021). These studies emphasize the specific contexts of piloting and argue that there are significant differences in the promotion strategies and types of models of policy pilots in different contexts.

Third, research on the use of policy instruments still focuses on the interaction between the central government and the local government, and generalizes the types of policy instruments on this basis (Bemelmans-Videc et al., 2017; Lowi, 1972).

These studies not only enrich our understanding of the mechanism of policy piloting, but also provide theoretical guidance for the practice of policy piloting.

We argue that summarizing policy instruments in policy pilots from a central versus local perspective is only one way of making typological divisions. In particular, the existing literature points out that both summarizing the organizational patterns of pilots and refining policy instruments require analysis and summarization based on the specific context of the pilots. Indeed, 'uncertainty' is an important contextual factor in policy piloting, and the process of piloting usually involves a series of actions, such as pilot organization, implementation, evaluation and adjustment, aimed at transforming 'uncertainty' into 'certainty'.

Therefore, from a functionalist perspective, the study of how the adoption of policy instruments can contribute to policymakers' 'problem solving' is an entry point that cannot be ignored. Although there is already a consensus that policy pilots construct issue-specific organizational learning mechanisms, they are conducive to improving the adaptability of government governance by observing the different outcomes of policy interventions and continuously adjusting policy objectives and instruments (Schot & Steinmueller, 2018). However, in the face of long-term policy piloting, existing research has not been sufficiently systematic in its analysis of how to promote organizational learning through the selection of appropriate policy instruments.

This study aims to explore the following research questions by reviewing the pilot process of LTCI in China. First, what specific policy instruments have been adopted by the decision-making system to reduce the uncertainty of the issue in a given policy issue

context? Second, what are the characteristics of these policy instruments? Finally, how did these policy instruments contribute to organizational learning during the policy piloting process?

Answering the above questions is conducive to opening the 'black box' of policy pilot and gaining a comprehensive understanding of the process by which issues move from 'uncertainty' to 'certainty'. It also helps to clarify the myths about the choice of policy instruments during policy pilots and contributes to the scientific design of policy pilots.

2. Literature review

2.1. Policy pilots in specific contexts

With the continuous deepening of the research on policy pilots in China, scholars have made rich and diverse summaries of the organizational modes of policy pilots in specific contexts, which are mainly divided into two main categories. First, in terms of pilot promotion modes, under the interaction of two basic factors, namely central driving force and local competitiveness, pilots can be divided into four types: striving-type, designated-type, retroactive-type, and spontaneous-type (Jiang et al., 2024). On the other hand, generates different models such as demonstration-type, expansion-type, merit-type and comprehensive-type in specific contexts based on the internal and external validity of the policy instruments (Nutley et al., 2012). Second, in terms of pilot promotion strategies, there are different combinations of strategies in different contexts. With 'policy signaling' and 'weak administrative directives' dominating the pre-pilot phase, 'strong administrative directives' dominating the pilot implementation, and 'political incentives' being added to 'strong administrative directives' in the post-pilot phase (Shi, 2012). In the process of promoting the 'smart city pilot', some research indicated that the early stage relies mainly on 'independent exploration', while the later stage relies mainly on the central government's 'institutional temptation' instrument (Vujković et al., 2022).

In response to the differences in the types of pilots for complex and simple issues, related research has been divided into three main directions. First, researchers have explored the differences in pilot generation logic between complex and simple issues. For example, it is suggested that policy pilots for these two topics use two different types of logic, retrospective reasoning and inductive reasoning, respectively (Kistruck & Slade Shantz, 2022). Second, studies have emphasized the differences in policy pilot models for complex and simple topics. The 'crowdsourcing' pilot model, as a new type of model, is significantly different from the traditional 'pilot-scaling' model when dealing with policy innovation issues that are highly complex, time-critical, and have significant differences in local contexts (Füller et al., 2021). Thirdly, the study focuses on the mechanism of policy piloting in the context of issue uncertainty. It is necessary to build issue learning networks and promote knowledge production when facing complex issues (Landuyt & Moynihan, 2009). As uncertainty decreases and knowledge needs change, the organizational model of policy learning will be adjusted accordingly. Under uncertainty, policy pilots realize the integration and application of information from different sources by constructing a co-production mechanism of policy knowledge through the interaction and dialogue of multiple subjects (Loorbach et al., 2016).

2.2. Selection and classification of policy instruments

2.2.1. Key elements of selecting policy instruments

The selection of policy instruments to address public problems is a crucial topic in public policy studies. It contributes to a better understanding of the linkages between policy formulation and implementation, providing insights into the decision-making process of public policy (Howlett, 1991a, 1991b). The concept of policy instruments may seem simple, but it is complicated. The main reason is that the so-called 'instruments' are not as tangible as the 'instrument kit' in the hands of a carpenter. They are rather abstract and vague, essentially representing the logic of government behaviour or response mechanisms aimed at achieving political objectives. A more comprehensive explanation is that particular challenges in public administration may prompt decision-makers to generate specific action 'responses'. These responses form the basis for policy objectives, which must be examined, forecasted, or accomplished by the government through authoritative interventions or norms, referred to as 'instruments' (McDonnell & Elmore, 1987).

Although policy instruments are considered necessary for governments to coordinate the interactions of participants and improve policy outcomes, the attributes and conditions of application of policy instruments vary across governance models. The selections of policy instruments is a complex process influenced by a number of factors. First, the role of the subject of policy action is crucial, and the interests and ideology it pursues will guide its actions. One study defines public policy as a series of relevant decisions made by a subject or group of political actors in a particular context (James, 2003). Secondly, policy formulation is a objective-oriented process, and objectives provide the metrics for policy evaluation. Public policy is a decision made by a government to achieve a objective, including the objective itself and its means of realization (Jenkins, 1978). Thirdly, identifying policy attributes is crucial for policy implementation, which reflects the intrinsic characteristics, content and nature of the policy, thus revealing differences between different policies (Rogers et al., 2014). Fourth, the choice of policy instruments needs to be adapted to specific environmental factors (Taylor et al., 2012). Policy instruments are not simply a direct match between a problem and a solution, but are selected and applied according to a particular context. As the external environment changes, the choice of policy instruments will be adjusted accordingly. In addition, government capacity is an important factor influencing the choice of policy instruments.

2.2.2. Classification of policy instruments

The list of categorizations ranges from dozens of different types to simpler ones such as 'carrots' (enticements) and 'sticks' (threats, coercion). For the classification of policy instruments, there are different classification perspectives, such as resource theory and function theory. The perspective of resource theory, which takes 'government resources' as the clue, pays attention to the preferences of different managers for various kinds of government resources and their presentation forms, and then refines and develops the basic theory of policy instruments.

Specific types of policy instruments need to be placed under different conditions. The discussion of policy instruments in the policy pilot research is generally based on the perspective of resource theory, which summarizes and refines the types of instruments based on the intensity of central government intervention in policy pilots .

Researchers distinguish policy instruments according to the degree of 'regulation'. For example, policy instruments have been categorized according to different dimensions of coercion (Bemelmans-Videc et al., 2017; Lowi, 1972). Policy instruments are classified into three broad categories based on the three different ways in which governments exercise power – coercive power, reward and punishment power, and normative power: coercive policy instruments, material policy instruments, and symbolic policy instruments (Etzioni, 1975). On this basis, the categorization of policy instruments is further refined into regulatory, economic and informational instruments, with informational instruments representing the relatively weak force of government power (Bemelmans-Videc et al., 2017).

In addition to the perspective of resource theory, functional theory is the most basic perspective of understanding instruments. The extension of policy instruments from the perspective of functional theory is very broad, but the purposeful policy instruments are always neutral, and the effect is the standard of evaluating policy instruments (Capano & Lippi, 2017). Policy pilot itself is the process of policy 'solution'. Specifically, Policy pilot is to explore new solutions outside the existing policy system for specific issues, so as to correspond to certain uncertainties. Therefore, the purpose of policy pilot in the decision-making system is always to formulate and find the best action plan (Huitema et al., 2018).

Overall, the choice of policy instruments is a complex process that integrates policy objectives, policy attributes, policy environment and government capacity, and its influencing factors are numerous and complex. This study builds on previous analytical perspectives on policy instruments and explores changes in the use of policy instruments in specific contexts of policy piloting.

3. Analytical framework

3.1. Uncertainty in social policy issues

Uncertainty in public policy formulation and implementation is inevitable and thus constitutes an important context for policy pilot (Heazle & Pillar, 2012; W. Walker & Marchau, 2003). As early as the 1920s, the concept of 'uncertainty' was introduced to refer to risks that cannot be fully assessed or measured, and for which the probability of an outcome cannot be accurately calculated (LeRoy & Singell, 1987). In the context of decision-making, uncertainty refers to the gap between existing knowledge and the knowledge that decision makers need in order to make the best policy selections.

In the case of high uncertainty, policy making usually adopts the implementation of 'low regret' strategy and 'learning while doing' to improve the adaptability of decision-making (Nair & Howlett, 2017). Therefore, reducing the uncertainty of issues reflects the process of knowledge accumulation. With the change of knowledge accumulation, the key variables will be gradually screened out in the complex and chaotic state, the logical relationship between various elements will gradually become clear, and the solutions to complex issues will be more clear. The level of uncertainty is not fixed, but needs to be judged by the decision maker (Mosadeghi et al., 2013). This uncertainty clearly involves subjectivity, as it is influenced by the underlying values and perspectives of the decision-maker and the various participants involved in the decision-making process (W. E. Walker et al., 2010).

As far as uncertainty in the policy process is concerned, some scholars clearly distinguish three forms: substantive uncertainty, strategic uncertainty, and institutional uncertainty. Substantive uncertainty refers to uncertainty about the nature, causes, or solutions of the topics addressed in the policy process. Strategic uncertainty is uncertainty about the strategic selections made by the multiple actors in the policy process. Institutional uncertainty refers to the uncertainty surrounding the rules applied in the policy process (Koppenjan & Klijn, 2004).

This paper combines existing studies and believes that there are at least three situational types of policy pilots (As shown in Figure 1).

First, the uncertainty of the objectives. Policy objectives and options constitute the core elements of decision-making. The main considerations in the decision-making process can be categorized into 'value judgments' and 'factual judgments' (Simon & March, 2015). Among them, 'value judgment' focuses on the determination of the final objective, while 'factual judgment' involves the specific problems of objective realization and implementation. For the purpose of this paper, policy objectives are defined as the outcomes and scenarios that are expected to be achieved in solving a given policy problem, which represents the direction and vision of macro-reform.

Second, the uncertainty of the path. It means that policymakers have incomplete information about policy options, i.e. they are not fully aware of all possible policy options to solve a given policy problem (Hadorn et al., 2015). When the policy objectives are clearly established, it means that the direction and planning of the reform or pilot are relatively clear. At this stage, although the knowledge accumulation of the decision system on the issues is improved, the uncertainty level of the issues is further reduced. However, due to the stock of knowledge mastered by the decision-making system, the specific path to achieve the policy objectives is not clear, so it is impossible to judge the expectations and results. The use of paths rather than programmes here is mainly based on the idea that paths refer to specific policy plans at the micro level on the one hand, and on the other hand, they can also refer to strategies or means to achieve policy objectives.

Finally, uncertainty of outcomes implies that policymakers cannot predict the actual outcomes of policy options and their likely impacts, a situation defined as value uncertainty (Hadorn et al., 2015). When the policy objectives and paths are relatively clear, the decision-making system is relatively vague about the results of the policy output. In this

High level of uncertainty	Medium level of uncertainty	Low level of uncertainty
Policy objective uncertainty	Policy path uncertainty	Policy effect uncertainty

High   The level of the uncertainty   Low

Figure 1. Three stages of uncertainty levels.

stage, the knowledge stock of the decision-making system increases, and the level of issue uncertainty enters a low stage. Therefore, the three scenarios reflect the change in the level of uncertainty, which can be divided into three stages according to the uncertainty of the objectives, path and outcomes.

3.2. Policy piloting processes in differentiated contexts

Depending on the degree of `uncertainty', the objectives of the pilot, the implementation agents and the learning mechanisms showed marked differences in the three different contexts.

3.2.1. Uncertainty of policy objectives

When the policy objectives are uncertain, social demand usually appears in local areas. Due to the central government's limited understanding of the issue, the policy objectives, options and results of the issue are uncertain, so local governments often start to carry out autonomous exploration. Therefore, the main body of the pilot at this stage is the local government. In the case of a social Policy pilot, the purpose of the pilot is usually to take the lead in responding to a social need or social crisis that has arisen in a localized area. When the social contradictions focused on local areas gradually spread and produce universal characteristics, the central government begins to learn information about the related issues, understand the local instruments to alleviate social crises, and create new concepts on the basis of interaction and reflection (McFadgen & Huitema, 2017).

Many pilots are proposed with only a rough outline of the new vision, mission and orientation (Ettelt et al., 2015). This is due to the fact that when policy issues are intertwined with a large number of heterogeneous factors, presenting chaos, confusion, and disorganization, the decision-making system is in a period of high uncertainty, and it is not possible to accurately define the policy objectives and instrumental choices (Alavi & Leidner, 2001). Therefore, when the policy objectives are not yet clear, the central government will prioritize key information on the functions and positioning of the new concepts at the beginning of launching the pilot projects at the national level.

In conducting conceptual learning, it is crucial to establish an open learning platform on the issue that encourages active participation of all parties, sharing of their experiences and insights, as well as exchange of knowledge. Through this interaction of diverse information and knowledge, the understanding of policy issues can be deepened, which in turn effectively reduces uncertainty about the issues (Majone, 1989).

3.2.2. Uncertainty of policy paths

Although the decision makers is not clear specific path to achieve policy objectives, in the first stage of 'conceptualizing' instruments, high-level attention increases as social needs proliferate. And once high-level policymakers accept the new concept, authoritative advocacy piloting is initiated (Baier et al., 1986), and the subject of policy piloting shifts from local government to central government at this stage.

However, due to the limitations of the central government's understanding of policy issues, it tends to formulate broader 'framework' policy programmes. This ambiguity provides room for local governments to innovate on their own, thus encouraging them to actively explore locally appropriate implementation strategies in the light of their own

realities. Although the implementation of the pilots was primarily the responsibility of local governments, they had to be carried out within the policy framework set by the central government. The main objective of the central government in promoting the pilots is to explore and validate new policy options.

In order to determine the optimal policy options, the central government will select some key areas with good policy conditions to launch the formal pilot programme at the national level. A few leaders in local governments will quickly follow up, in order to reflect the loyalty mechanism to adjust the original local policy instruments according to the intention and preference of the central government (Füglister, 2012). At this time, the local government is not included in the formal national pilot programme, but the detailed rules are usually formulated based on the framework instruments proposed by the central government. The national pilot project organized by the central government undoubtedly reflects the central government's advocacy and promotion of local policies (Ettelt et al., 2015).

At this stage, the main task of the central government is to accept and evaluate the local pilot work. Through this process, the central government not only assesses the effectiveness of the local pilots, but, more importantly, it is able to identify problems that have arisen in the course of the piloting process, deepen

its understanding of the key issues, and explore core strategies to address them.

3.2.3. Uncertainty of policy outcomes

At a stage when there is uncertainty about policy outcomes, the central Government has accumulated valuable experience through the pilot cycle. This includes not only the grasp of policy direction and the choice of policy instruments, but also an in-depth understanding of policy pain points. During the pilot process, the central government clearly adjusted its strategy and explored the key elements of problem solving through the accumulation of local experience, information sharing and continuous learning.

In previous studies, once the policy objectives and paths were clear, the policy strategy was usually to adopt a 'nationwide approach' or a 'point-to-point' approach. However, the practice in recent years has shown that it is difficult to realize the full promotion and concretization of the policy only through the first phase of piloting. The clarity of the policy path not only implies the clarity of the policy plan, but also the clarity of the strategy for realizing the policy objectives.

For national social security policies, the central government usually does not formulate specific implementation rules, but rather unifies and standardizes parts of the system to ensure the relative fairness of the national welfare system.

In this stage, the purpose of re-piloting is mainly to test the effectiveness of the pilot and to see whether the pilot can be replicated and scaled up. As knowledge of the issue deepens, policymakers are often involved at the core of institutional design. Along with the urgent need for academic knowledge in policymaking, policymakers often delegate the task of learning to experts, aiming to improve their knowledge of facts and laws and to propose systematic policy options (Voß & Simons, 2018).

Policymakers can draw on multiple channels, including experts and research institutions, to develop a systematic understanding of the issues and focus on the core problems to be solved in order to achieve iterative reform solutions. Policymakers can use multiple channels, such as experts and research institutions, to develop a systematic
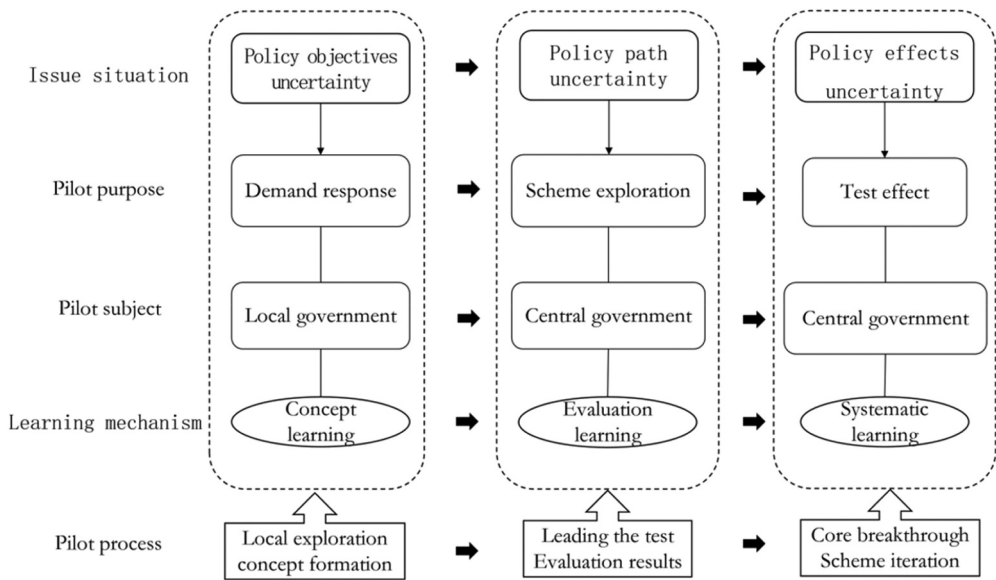
Figure 2. Adoption of policy instruments during policy pilot.

understanding of issues. They can also focus on the core issues to be resolved and realize the iteration of reform programmes (As shown in Figure 2).

4. Methods

This study focuses on pilot cases of China's LTCI policy, aiming to analyse the process of adopting a series of policy instruments as the uncertainty of a complex issue evolves.

Case study is a research methodology typically seen in social and life sciences (Merriam, 1988; VanWynsberghe & Khan, 2007). A 'Case Study' is an in-depth study of a single unit (Gerring, 2004). By collecting qualitative datasets from LTCI policy pilots, researchers can gain a deeper understanding of the phenomenon than they could using only one type of data (Heale & Twycross, 2018).

With the accelerated ageing of the population and the growth of demand for old-age care, the Chinese Government regards the issue of ageing as a top priority. The Government has taken measures to cope with the arrival of an ageing society in a number of dimensions, including institution-building, institutional reform and service innovation. Long-term care insurance, as a key social insurance system, aims to reduce the risk of care for the disabled and demented elderly. It not only provides financial relief to families of the elderly, but also promotes the development of the care service industry and the increase of employment opportunities. This paper will focus on the progress of the LTCI pilot for the following reasons.

First, the promotion of LTCI has gone through a long cycle since localities began exploring on their own in 2012, through the launch of pilots by the central government in 2016, to the launch of the second batch of pilots in 2020 and the implementation of the Unified Disability Rating Tool (UDRT) in 2021. The process involves the interests of multiple groups and has a high degree of complexity at the technical level (As shown in

Table 1). The central government's choice of policy instruments and clear division of labour in this process reflect the core characteristics of the key variables and ensure that the theoretical framework has sufficient explanatory power for this complex system.

Second, LTCI is a complex system involving a number of aspects, including financing mechanisms and treatment policy design. Although it originated in Germany, it has to be adapted to the specific circumstances of different countries and regions. For policymakers, both in understanding the fundamentals of LTCI and in localizing policy design, there is a need to continuously deepen their knowledge of the system. The purpose of doing so is to reduce uncertainty in the policymaking process and to ensure that a replicable and scalable LTCI system can be established nationwide. Therefore, the correlation between the selected cases and the key variables is very strong.

Participant observation is a commonly used method in social science research and is widely employed for collecting data on processes in qualitative research (Kawulich, 2005). It is useful for helping researchers understand policy practices and evaluate technologies and policies (Allen, 2010). The data in this paper are mainly derived from the first author's participant observation.

During the internship from March to July 2018 at the Office of the Leading Group for the Long-Term Care Insurance (LTCI) Pilot Work under the National Healthcare Security Administration, the first author engaged in data collection and analysis on the implementation of the LTCI policy through participant observation. The author's responsibilities included organizing and conducting research, drafting LTCI policy documents, and preparing for the pilot phase. She also closely monitored the dynamic changes in the pilot implementation areas, gathered data on the LTCI system in the pilot cities, and participated in seminars focused on the development of the LTCI system. These activities provided the first author with a comprehensive understanding of the LTCI system and

Table 1. Two pilots of LTCI in China.

	First batch of pilots	Second batch of pilots
Time span	2016.6-2020.8	2020.9-
Pilot regions	15 pilot regions, 2 key contact provinces	14 additional pilot regions
	Chengde, Hebei Province; Changchun, Jilin Province; Qiqihar, Heilongjiang Province; Shanghai; Nantong and Suzhou, Jiangsu Province; Ningbo, Zhejiang Province; Anqing, Anhui Province; Shangrao, Jiangxi Province; Qingdao, Shandong Province; Jingmen, Hubei Province; Guangzhou, Guangdong Province; Chongqing; Chengdu, Sichuan Province; Shihezi, Xinjiang Production and Construction Corps	Shijingshan District, Beijing; Tianjin; Jincheng City, Shanxi Province; Hohhot City, Inner Mongolia; Panjin City, Liaoning Province; Fuzhou City, Fujian Province; Kaifeng City, Henan Province; Xiangtan City, Hunan Province; Nanning City, Guangxi Zhuang Autonomous Region; Qianxinan Buyi Miao Autonomous Prefecture, Guizhou Province; Kunming City, Yunnan Province; Gannan Tibetan Autonomous Prefecture, Gansu Province; Urumqi City, Xinjiang
Policy objectives	1. Fundraising through social solidarity 2. Accumulating experience; 3. Adaptation to China's socialist market economy;	1. Mutual aid and solidarity approach to financing; 2. Adapting to the trend of economic development and population ageing 3. A multi-level LTCI system
Policy Principles	1. People-oriented; 2. Adherence to basic safeguards; 3. Sharing of responsibilities; 4. Adaptation to local conditions; 5. Innovation in mechanisms; 6. Integration and coordination;	1. People-oriented; 2. Independent operation; 3. Safeguarding the basics; 4. Shared responsibility; 5. Innovation in mechanisms; 6. Integrated and coordinated.

Source: Compiled by the authors.

offered insights into the policy-making sector's learning process, the construction of the LTCI system, and the political dynamics of the pilot process. As a result, the first author accumulated valuable first-hand information and data, laying a solid foundation for this study.

In addition, the authors were personally involved in the LTCI policy evaluation in August 2018 and the release of the 2021 Disability Assessment Tool, two key aspects that are crucial to the development of the LTCI system. Through close cooperation and extensive research with local governments, relevant departments and frontline staff, the authors have gained a deep knowledge and understanding of the LTCI pilot.

5. Pilot process of LTCI policies in specific situations

5.1. Pilot process in situations of uncertain policy objectives

5.1.1. Background of local pilots

The background of China's LTCI pilot scheme stems from the ageing of the population. During the Twelfth Five-Year Plan period, the process of population ageing in China has been accelerating, coinciding with the arrival of the first peak in the growth of the elderly population. From 2011 to 2015, the number of elderly people over the age of 60 increased from 178 million to 221 million, with an average annual increase of 8.6 million. The proportion of the elderly population increased from 13.3% to 16%, with an average annual increase of 0.54% points. At the same time, the ageing process is accompanied by the downsizing of the family and empty nesting. It is intertwined with the contradictions of the economic and social transition period, leading to a sharp increase in the demand for social old-age security and services. This means that China not only needs to recognize the importance and urgency of developing the field of ageing but also needs to take full advantage of the favourable opportunity presented by faster economic development and a lower social dependency ratio. China should actively implement a population ageing strategy.

As a result, discussions on topics related to population ageing are consistently focused on the challenges of an ageing population. At that time, the social contradictions caused by population ageing were not prominent, and the specific programmes and steps that China should focus on in response to the issue of elderly care were not clear. The main policy focuses on the development of elderly care institutions, promoting the concept of home care and community care services, and establishing health records for the elderly. The establishment of a LTCI agency has only been discussed and conceptualized by scholars, but it has not formally entered the central government's policy process.

5.1.2. Local independent exploration pilot phase

At this stage, the rate of ageing in specific regions exceeds the national average, leading to emerging social issues stemming from their unique social requirements. For example, Qingdao is one of the cities in China that entered the ageing process earlier than others, with a large and fast-growing elderly population and prominent characteristics of advanced ageing. In the Notice on Issuing the 12th Five-Year Plan for Population

Development of Qingdao, it is pointed out that the pace of population ageing in Qingdao is accelerating. The proportion of elderly people over 60 years of age in households will reach about 19.3% by the end of the 12th Five-Year Plan period. With the further reduction of family size, families are characterized by diversified structures, separate residences, and weak relationships. The proportion of single-person, single-parent, and empty-nest households has risen sharply, leading to a weakening of traditional family functions and an obvious lack of care for the elderly. In response to demographic changes and the significant challenges in caring for the elderly with disabilities, on 19 June 2012, the Qingdao Municipal Bureau of Human Resources and Social Security, along with nine other departments, jointly issued the 'Opinions on the Establishment of a Long-Term Medical Care Insurance System'. They initiated the exploration of implementing a LTCI system, initially referred to as the 'Long-Term Medical Care Insurance'. At this time, the exploration of the system was a 'sub-system' based on the basic medical insurance system. Within the framework of the basic medical insurance system, the two aspects of medical and nursing care were moderately separated. Long-term medical care insurance focused on medical care as its primary objective, specifically targeting the protection of elderly individuals who are disabled or semi-disabled, addressing the issue of 'having a place to stay' (Qingdao Long-Term Medical Care Insurance). The main objective of long-term medical care insurance is to provide medical care that focuses on protecting disabled and semi-disabled elderly individuals during their sickness.

After that, Shanghai launched an pilot medical care programme for the elderly in Minhang District in 2013. The programme was limited to individuals aged 80 and above, and it was designed based on the basic principles of 'government-led, social participation, home-based care, and supplemented by elderly care institutions'. In addition, Changchun City and Nantong City started to explore their own pilot programme before the national LTCI pilot programme was launched. Each location tailored the pilot programme to the specific needs of local socio-economic development, resulting in significant variations between the two programs.At the stage of uncertainty about policy objectives, local governments take the lead in responding to localized social crises and initiate exploratory pilots on their own, designing programmes that are tailored to local conditions.

5.1.3. Conceptual learning process of central government
The rapid growth rate of population ageing and the high demand for elderly care are not isolated issues in specific regions but rather a social problem that necessitates a unified nationwide response. In 2015, the Communist Party of China (CPC) explicitly proposed the task of exploring the establishment of LTCI during the 13th Five-Year Plan period in the Fifth Plenum of the 18th CPC Central Committee and initiated the development of a LTCI system. insurance system. However, there is no specific programme detailing how to implement the initiative. As a result, academics have begun to call for the construction of a LTCI system, the media have joined in the discussion of elderly disability issue, with social demand driving the government's attention to the issue of elderly care.

Prior to the local pilots, academics have begun to introduce the practical experience of foreign long-term care for the elderly and explore the feasibility of implementing commercialized LTCI in China. Despite the controversy over what kind of long-term care system to establish, there have been widespread calls to explore the establishment of

a long-term care insurance system as soon as possible in the face of the impending peak in the elderly population. In addition, in some regions, the phenomenon of 'socialized hospitalization' resulting from old-age incapacity has been reported in the media, and the problem of long-term occupation of medical resources and increased personal burdens has attracted widespread public attention.

In early 2016, leaders of the relevant authorities personally led a team to Nantong City to conduct research and seminars. When discussing the reasons for exploring LTCI in the first pilot areas, they pointed out that *'the demand for care services in the pilot areas is very strong, and there is a huge demand for long-term care for the disabled and semi-disabled population. . . . . . . data shows that the number of disabled and semi-disabled population in Nantong is as high as 320,000 people. The existing health insurance system does not have treatment standards and compensation mechanisms specifically for the care of the disabled, resulting in many disabled people having to be hospitalized for long periods of time to receive care, which not only adds to their financial burden, but also takes up valuable medical resources. . . . . . .'* shows that in regions where the problem of ageing is more prominent, the issue of care for the disabled elderly has become a focus of social concern and has attracted the great attention of local governments.

Prior to the official launch of the pilot, the relevant authorities had a preliminary understanding of the function and role of LTCI in addressing the care needs of the disabled and semi-disabled elderly, and optimizing the allocation of resources in the context of autonomous local pilots. In short, this stage is only a 'conceptual' understanding of LTCI, and whether the nationwide system is feasible and how implemented.

In the first stage of understanding of issues limited, the central government for long risks formed the 'concept', did not start the national long risks pilot, but by the social contradictions prominent region pioneered the pilot of autonomy, through the social demand across the country and the initial experience of local government, makes the relevant departments for the function of long risks to form 'concept'. The determination to carry out the pilot exploration of national long term protection insurance is established, and the task deployment of establishing long term protection insurance is put forward.

5.2. Situations of uncertainty in policy pathways

5.2.1. Pre-pilot preparations by central government

On the eve of the official launch of the pilot programme, the authorities made several preparations to increase awareness of the issue. First, the Ministry of Human Resources and Social Security (MOHRSS) established the LTCI Pilot Leading Group Office (LTCIO) in February 2016. Its main tasks are to study and formulate the framework of the LTCI system and track the progress of local LTCI pilots. Secondly, the LTCI Office summarized and compiled research reports on other countries' systems (e.g. Germany, Japan, South Korea, the Netherlands, and Denmark), including aspects such as system design, practices, and key issues. Before the competent authorities began designing the programme, they conducted a symposium with local autonomous pilots to gain insight into the external environment and local practices related to the implementation of the LTCI system. This helped them determine the best approach to initiate policy pilots.

When the research symposium was held, the representatives of various localities put forward that *'in terms of fund-raising, multichannel financing should be explored through*

the sharing of units, individuals, government, and society. Simultaneously, it is necessary to consider the actual financial situation of each place and encourage them to raise funds according to local conditions.'

During this phase, authorities discovered significant variations in the financing methods and institutional arrangements of LTCI systems at the international level. From the perspective of the pilot regions, there are also significant variations in the design of financing policies for LTCI. Economic development has entered a new normalized stage, and the economic and social environment facing the LTCI establishment is very complex. The situation of the LTCI policy pilot is quite complicated, and there is a lot of uncertainty in the authorities' understanding of LTCI, for example, whether it needs to be independently financed and how the level of benefits should be set.

5.2.2. Official pilots initiated by the central government

On the one hand, the competent authorities believe that policy pilots should be launched as soon as possible to respond to social demand and establish a plan for developing an ageing society at an early stage. On the other hand, it was initially decided that a certain amount of space should be reserved for local autonomous innovation. Based on this, the General Office of the Ministry of Human Resources and Social Security (MOHRSS) issued the 'Guiding Opinions on Carrying out the pilot of LTCI System' (No. 80 of MOHRSS [2016]) in June 2016. The document selected 15 cities, including Qingdao and Changchun, as well as two key provinces, to uniformly organize and conduct pilots aimed at exploring the establishment of a LTCI system. And the policy document only proposes 'framework policy instruments' for the insured population, the treatment population, the financing mechanism, and the payment of treatment (As shown in Table 2). Subsequently, each of the 15 pilot regions issued its own implementation plan and rules in accordance with the guidance.

5.2.3. Assessment learning process of the central government

After the launch of the first policy pilot, the authorities developed two learning approaches. The first is based on local pilots, allowing national pilot districts to carry out research projects to study and summarize ways of solving key problems in the pilots.

During the initial pilot phase, the learning process was segmented into seven primary research topics, which included 'coverage and participation policies', 'multi-channel financing and measurement methods', 'payment scope and standards', 'service platform construction', 'demand identification and rating', and 'administration and management standards'. The main purpose is to continuously improve the interpretation of the core issues of the topic.

Second, the multi-channel learning from local practice experiences has formed a virtuous feedback mechanism, including formal and informal methods. In the project 'Evaluation of the Operation of Pilot Cities of China's LTCI System' commissioned by the National Health Insurance Bureau and conducted by the International Center for Economic Exchanges (ICEE), we summarized the actual operational problems and experiences of the participants' contributions, the financing system, the level of benefits, the assessment instruments, and the management and administration of the system. During internal symposiums, we listened to summaries of the experiences from the pilot regions, the main challenges they encountered, and the

Table 2. Guidance on adjustments for China's LTCI pilots.

	First batch of pilots	Second batch of pilots
Policy document	Guidance on the development of LTCI pilot	Guidance on expanding the pilot of LTCI
Insured population	The main focus is on the population covered by the basic medical insurance for employees. Pilot areas may reasonably determine the scope of coverage according to the actual situation.	The pilot phase will start with the population covered by basic employee medical insurance. The pilot areas with conditions can gradually expand the scope of participants and adjust the coverage as the pilot exploration progresses, taking into account factors such as the level of economic development, fund-raising capacity and protection needs.
Recipients of benefits	Focus on addressing the basic care protection needs of the severely disabled, with priority given to eligible elderly people who are disabled and severely disabled.	Focus on addressing the basic care protection needs of the severely disabled, with priority given to eligible elderly people who are disabled and severely disabled.
Financing mechanisms	Raising funds through optimizing the structure of the Unified Account for Employees' Medical Insurance, transferring the balance of the Coordinated Fund for Employees' Medical Insurance and adjusting the rates of Employees' Medical Insurance Funding standards are determined reasonably according to the level of local economic development, demand for nursing care, the cost of nursing care services and the scope and level of protection, and in accordance with the principle of setting revenues and expenditures, balancing income and expenditure and leaving a small balance.	Exploring the establishment of a multi-channel financing mechanism for mutual assistance and shared responsibility. Funding is based on contributions from employers and individuals, with unit contributions deducted from employees' basic medical insurance contributions and individual contributions deducted from basic medical insurance individual accounts. Retired workers who have particular difficulties in making contributions may be given appropriate financial assistance.
Benefit payments	Differentiated treatment and protection policies are formulated according to the level of care and the mode of service delivery, etc. The overall level of fund payment for long-term care expenses that meet the requirements is controlled at around 70%.	Insured persons who have been treated by a medical institution or rehabilitation agency and whose disability has lasted for more than six months and who have been assessed and certified as disabled upon application are entitled to the relevant benefits in accordance with the regulations. Implement a policy of differential treatment and protection according to the level of care and mode of service delivery. Encourage the use of home and community care services. The overall level of fund payment for eligible care services is controlled at around 70%.

Source: Compiled from policy documents.

key objectives for the future. The pilot regions submitted relevant reports to the competent authorities in the form of work reports detailing the preliminary results of the pilot, key practices, the next steps of the work, and suggestions. Results of local studies on key issues and feedback from the local community, the competent authorities enhanced their comprehension and expertise on the fundamental aspects of the topic, thereby diminishing the level of uncertainty surrounding it.

For instance, eight of the first 14 cities used a first-generation disability assessment instrument, the Bachmann Scale. The pilot districts reported that the Barthel Scale was initially used in patient rehabilitation, often omitting demented older people. It was found to be inaccurate in screening for disability, highly subjective, and dependent on the assessor in practice. The authorities recognize that there is limited local capacity to develop scientifically comprehensive scales and that the Barthel scale is not applicable. Secondly, the access thresholds in the pilot regions vary widely, which is not conducive to

the uniformity of treatment receipt and does not reflect the fairness of LTCI as a social insurance system.

5.3. Pilots process under uncertain policy outcomes

5.3.1. Adjustments to the pilot programme by the central government

During the last phase of the pilot process, the central government further enhanced the accumulation of knowledge about the policy through accepting the effectiveness of the local pilot and absorbing the pilot experience, and gained a basic grasp of the policy objectives and path, which facilitated the adjustment of the pilot programme.

Based on the feedback from the pilot areas, the 'Guidance' programme was adjusted and refined. In 2020, the National Health Insurance Bureau and the Ministry of Finance issued the 'Guidance on Expanding the Pilot LTCI System', which expanded the programme to include 14 additional areas on top of the original 15 pilot cities and refined the pilot programme.

For example, with regard to the design of financing mechanism design, it was found in the pilot evaluation that LTCI was overly dependent on medical insurance, with more than 50% of the fund's financing coming from the medical insurance fund, which was not conducive to the establishment of independent LTCI and the maintenance of the system's benign development. Therefore, the 'Guiding Opinions on Expanding the Pilot Scheme' establishes independence in terms of the basic principles, namely, 'insisting on independent operation, focusing on the establishment of independent types of insurance, independent design, and independent promotion', and emphasizes 'unit and individual contributions' in terms of the financing mechanism. In addition, the treatment group emphasizes the 'protection of eligible disabled elderly persons and persons with severe disabilities', and the payment of treatment emphasizes the conditions for payment, i.e. 'disabled participants whose disability has lasted for more than six months and who have been assessed and recognized as disabled through an application', and so on. All of these elements were derived from feedback from the pilot regions, and further adjustments and refinements were made to the policy programme (as shown in Table 2).

5.3.2. Systematic learning process of the central government

During the symposium on LTCI held in September 2018, the competent authorities acknowledged that the standardized design of the system is crucial for the 'in-depth promotion of pilots'.

At this stage, the central government focuses on the development of standardized instruments in the system. In this process, it relies on experts in the relevant fields to design and measure the policy instruments.

The initial set of pilots also revealed that the key challenge with LTCI is the standardization of the system. This standardization is crucial as it forms the foundation for receiving LTCI benefits and payments from the fund.

In order to advance the issue of standardization, the central government has initiated more focused policy development and pilot projects in 2020. Specifically, the authorities commissioned the China Academy of Labor and Social Security Sciences (CLASS) to conduct a study on assessment standards for LTCI. The research team paid special

attention to the pilot cities of Suzhou, Qingdao, Shanghai, Jingmen and Chengdu, and conducted in-depth research on the design principles of the assessment instruments, problems encountered in the process of using them, management strategies, and the training of assessors. In addition, experts in related fields were organized to jointly develop a set of instruments specifically for assessing the level of incapacity.

The design of assessment instrument should be led by the central government to initiate a small-scale pilot, and move forward with harmonization in a timely manner after the test is passed. The competent authorities conducted an expert validation meeting on assessment standards in early 2021. Since then, the designed and developed assessment instrument has been tested on a small scale in Chengdu, Beijing, Shanghai, and Suzhou to verify the reliability and validity of the assessment instrument. The testing aimed to assess the consistency between the new version of the instrument and the local assessment instrument for elderly individuals with severe, moderate, and mild disabilities and dementia. After adjustments, the NHB introduced the Long-Term Care Disability Rating Assessment Criteria (pilot) in July 2021 to support its implementation and rollout in pilot areas.

6. Case analysis

6.1. Selection and generalization of policy instruments in a specific context

In the face of differentiated issue contexts, the central government has adopted diverse policy instruments to promote systematic learning. According to the established categorization of policy instruments, we can generalize them from two perspectives: resource-based and functional. Specifically, this involves two key dimensions: first, the intensity of the central government's intervention in the pilot, i.e. its level of coercion; and second, the depth of the central government's intervention in the issue, i.e. the precision with which it addresses the issue. In short, the intensity reflects the strength of the central government's control, while the depth reflects the extent to which the central government is focused on solving the issue.

From a resource-based perspective, the central government adopted different types of policy instruments depending on the strength of the intervention pilot. At the stage when the policy objectives are not yet clear, the central government's intervention is relatively small and local governments have greater autonomy. At this stage, local governments were able to design their own policy programmes according to their actual needs and resources, and used 'autonomous instrument'. When it enters the stage of uncertainty about the policy path, the central government begins to participate in policy pilots, but still gives local governments a certain degree of autonomy. The central government empowers local governments to carry out their tasks by providing policy frameworks, resource support and decentralization, using 'advocacy instrument'. In the phase of uncertainty, the central government has a clearer grasp of the design of the LTCI system and is therefore more deeply involved in the policy pilots. At this point, the central government not only refined the policy programme, but also focused on designing a standardized evaluation instrument. By giving local governments the legitimate authority to carry out specific duties and actions, local governments' autonomy was reduced and the central government adopted a 'directive instrument'. Overall, the degree of coercion

by the central government has gradually increased from autonomous to advocacy to directive instruments, the intensity of interventional pilots has changed from weak to strong.

In addition, from a functionalist perspective, the central objective of policy piloting is to develop and find the best course of action. In order to establish a harmonized policy programme across the country, the central government needs to accumulate knowledge. Thus, the choice of policy instruments is a continuous process of 'problem solving'. In the stage of uncertainty about policy objectives, the central government's involvement in the issue is relatively shallow, mainly proposing the basic orientation, role and vision of the policy, but not yet transformed into a concrete operational programme. The conceptualization of this stage represents an innovative thinking that provides new ideas for problem solving. These new ideas may come from a variety of sources, including policy-makers, local officials, and policy experts, and the central government uses 'facilitating instruments' to address localized social problems.

During the phase of policy path uncertainty, the central government translates novel concepts into a tangible policy framework and initiates pilot projects. As it designs the policy and launches the pilot, the central government employs 'framework instruments' to steer the direction of the pilot policy, yet its engagement in the specifics remains constrained.

In the phase of policy outcomes uncertainty, the central government pinpoints critical issues within the policy design by evaluating the experiences from previous pilots and assessing the outcomes. It then becomes deeply involved in the detailed design of these issues. To enhance the efficacy of the policy pilots, the central government utilizes 'calibration instruments' to fine-tune and perfect the policy framework, concentrating on the essential aspects of policy design.

In general, based on the understanding and learning of the issues, the central government has adopted 'facilitating instruments', 'framework instruments', and 'calibrating instruments' to progressively address the core issues of the issues.

6.2. Policy instruments promote organizational learning in policy pilots

LTCI is just one of the many international solutions to address the issue of disability among elderly. Considering China's special circumstances, including the economy's entry into a new normal, the difficulty of independent financing, and the many stakeholders, has made the process of piloting LTC insurance both lengthy and cautious. In China, policies to address old-age incapacity have gone through a three-stage process of change, from uncertain objectives, to uncertain paths, to uncertain outcomes. To address this challenge, the central government has adopted differentiated policy instruments to develop a deeper understanding of the topic through systematic learning.

At the stage of high uncertainty about policy objectives and policy issues, although the problem of ageing in China has been widely discussed by the media, experts and scholars, there is no consensus on which policy model should be used to address the problem of disability and dementia among the elderly. The policy pilots were motivated by the emergence of localized ageing needs in China that required a timely government response. Local governments were the main responders in the pilot. There were significant inconsistencies in local policy responses using 'autonomous

instruments' that were adapted to the local context. For example, the Qingdao pilot addresses the issue of 'social hospitalization' for the elderly through a system designed to address the medical needs of the elderly while at the same time reducing health insurance expenditures and saving health insurance funds. Shanghai, on the other hand, addresses the issue of disability among the elderly, while Nantong focuses on the life care needs of the elderly. In addition to the main functions of the pilot policies, the financing of

Prior to the official launch of the formal pilot, the central government used a 'facilitation instrument' to familiarize itself with the basic concepts and functions of LTCI through a variety of means, including local pilots and expert discussions. This included understanding how LTCI was organized and operated at the local level, the types of problems it could solve, and the actual effectiveness of the solutions. At this stage, the central government was not directly involved in the specific operation of the pilot, but rather used the facilitating role of local governments and social actors to promote the LTCI policy issue to policymakers and to help policymakers gain an initial understanding of the issue. This process laid the groundwork for addressing the issue of old-age incapacity care at the national level and for piloting it at the national level.

After clarifying the policy objective of addressing the risk of disability among older persons through LTCI, the central government initiated a national-level pilot programme and selected regions to participate in the pilot. At this point, the main objective of the pilot shifted to exploring the effectiveness of the LTCI programme. The ownership of the pilot also shifted from the local government to the central government. The central government used 'advocacy instruments' at this stage, i.e. participating in the process of piloting the policy while giving local governments some room for innovation. Although local pilots still lacked uniformity at this stage, there was a marked change from the previous approach of solving problems based solely on local realities. For example, in the Qingdao pilot, LTCI began to gradually cover medical care and daily living care; and in the Shanghai pilot, the LTCI entitlement population was extended to include the young elderly group. These changes indicate that the pilots are gradually moving towards wider application and deeper exploration.

Moreover, due to the limitations of the central government's understanding of LTCI, a 'framework instrument' was used, with broad policy options and specific implementation details designed by designated pilot regions. Through this instrument, the central government was able to evaluate and accept the effectiveness of the local pilots, with experience gained through a variety of channels, both formal and informal. This assessment and learning process brings new knowledge accumulation to the central government and provides clear ideas for the next stage of adjusting and refining the policy programme. This helps the central government to refine and construct a more rational and effective institutional framework for LTCI.

Following the acceptance and evaluation of the first phase of the pilot project, the Central Government's understanding of the LTCI system has become more comprehensive. Not only has it clarified the direction of adjustments to the system framework, it has also gained a more accurate grasp of the key aspects of the system's operation. At this stage, the central government drew on its accumulated knowledge to engage more deeply in the issue and adopted a 'calibration-type instrument' to adjust the framework
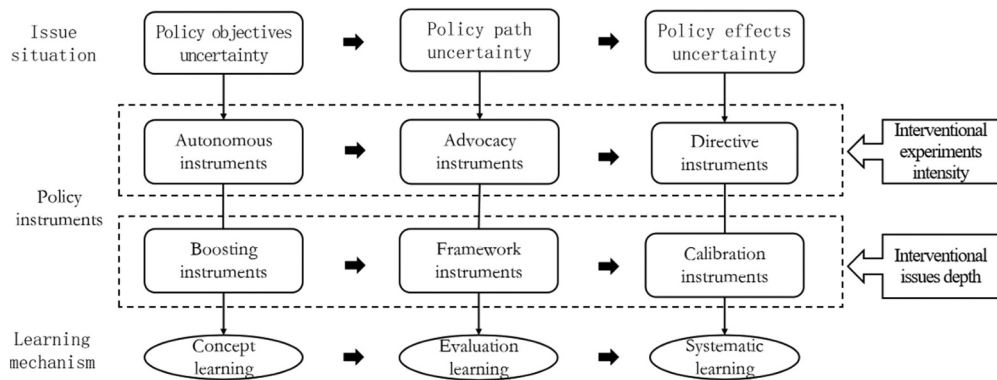
Figure 3. Policy instruments promote the organizational learning of policy pilots.

of the system, while expanding the scope of the pilot programme and leading the development and testing of a standardized instrument.

Through the use of 'calibration instruments', the central government was able to utilize experts and research teams to address the core issues of the system, which led to a more systematic and in-depth knowledge and understanding of the LTCI system, and thus to deeper involvement in the process of constructing the system.

In addition, the central government is testing and evaluating a standardized instrument for LTCI in pilot regions through a 'directive instrument', based on which the standardized instrument will be extended to the whole country (As shown in Figure 3).

7. Discussion

Through the case presented above, we demonstrate the application of pilot governance to the decision-making process for LTCI in China. We conceptualized three types of policy instruments in the policy pilot process: autonomous-conceptual, advocacy-framing, and directive-calibrated. These are arranged in order of intensity and depth of intervention, respectively. In a complex social policy pilot, we discovered that multiple sets of policy instruments need to be applied at different stages of the pilot. The adoption of these policy instruments is characterized by the emergence of sequential groups. This reflects not only the multidimensionality and ideological content of the complex problem itself but also the diversity and flexibility of policy pilot responses.

The purpose of this paper is not to explore the outcomes and assess the performance of LTCI policies in China's pilot cities based on traditional policy criteria (e.g. rates of healthcare cost inflation, rates of healthcare utilization, or access to long-term care). This evidence is well-documented in the literature (Brown et al., 2012; Chen & Ning, 2022; Feng et al., 2020). In this study, we examine reforms primarily in terms of how long-term policy pilots can find solutions to uncertain problems in complex systems and how adaptive policy instruments can offer innovative pathways for national LTCI policy development. Our analysis identified three key features.

First, a complex and long-term social policy pilot often goes through multiple pilot phases. How to deal with complex issues under conditions of uncertainty is a pressing

concern that policymakers are grappling with (Ylöstalo, 2020). Complex social issues often lack clear solutions and may require additional pilot approaches to resolve (Sabel & Zeitlin, 2010, 2012). Policymakers usually have imperfect information about which policies produce which outcomes, and they have no selection but to map out the policy space through a process of pilot (Callander, 2011). Healthcare is a classic example of a complex system due to the numerous interdependent components, enormous technological complexity, powerful material interests, and ideological biases (He et al., 2022a). As such, iterative policy pilot and in-depth learning are required, taking into account the complexity of the system, its context, its capacity, and its implementation process (He et al., 2022a, 2022b; Husain, 2017; Husain et al., 2021; Lipsitz, 2012). This shows that tinkering under uncertainty is not only an unconventional approach to economic change but also an important social policy mechanism (Heilmann, 2009).

Second, in the course of the policy pilots, the central government used two main policy instruments to respond to the changing issue context. On the one hand, the intensity of the central government's involvement gradually increased, with a corresponding decrease in local government autonomy. This pattern reflects the degree of control exercised by the highly centralized state in promoting national-level reform pilot projects, as well as the requirement that social policies be implemented uniformly across the country. As the pilots progressed, the standardization of the system tended towards consistency. On the other hand, the central government has also shown an increasing trend in the depth of its involvement in the issues, which suggests that its ability to master the issues is increasing. The use of these two types of policy instruments, from the perspectives of resource theory and functional theory, not only reveals the interaction between the central and local governments in the process of piloting wicked public policies (Head, 2022), but also demonstrates the path of the central government in exploring solutions through piloting.

Third, the choice of policy instruments not only implemented the policy, but also facilitated organizational learning by the central Government in the policy pilots. Through the use of facilitative and autonomous instruments, the central government familiarized itself with the positioning and functions of LTCI through conceptual learning. And in the process of using the framework-type and advocacy-type instruments, the problems encountered in the pilot in each region were identified through assessment learning. Finally, through the use of calibrated and directive instruments, the central government conducted systematic learning to analyse and solve the core problems in depth.

8. Conclusion

For a complex, long-cycle policy pilot, it is difficult for policymakers to have a clear understanding of the topic in one step, which leads to a 'learning-by-doing' approach to policy pilot. By reviewing the process of China's LTCI policy pilot, this paper examines how the uncertainty of the issue affected the selections of policy pilot instruments at different stages of the policy pilot process. In particular, we demonstrate how the central government understood the essence of the system construction and utilized flexible and diversified policy instruments to achieve the objective of policy pilot when the pilot programme entered the 'deep water period'. As policymakers' understanding of the issues increases and the uncertainty surrounding them

diminishes, the adoption of policy instruments by policymakers is differentiated into stages. On one hand, the intensity of the central government's involvement in the pilot varies, and on the other hand, the depth of the central government's involvement in the issue changes, so the adoption of policy instruments is characterized by sequential groups.

This study contributes to the understanding of how issue uncertainty affects the intensity and depth of government intervention and the changing strategies of policy instrument selection. It demonstrates the complexity of Policy pilot contexts and the diversity of pilot instruments in China. However, there are two limitations in this study. First, China's LTCI Policy pilot is still ongoing. It is important to monitor how uncertainty regarding policy issues influences the types and modifications of policy instruments. Second, the selections of policy instruments is influenced by the decision maker, the target audience, and a variety of other factors. This case focuses on the analysis of how the central government selects and applies policy instruments to promote organizational learning in three specific contexts of issues uncertainty. The focus is on describing how the policy instruments contributed to organizational learning in the pilot process, which is closer to an in-depth examination of the selection and application of policy instruments in a specific context.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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Author contributions

CC conceptualized, designed the research, and performed the analysis. JG and CC wrote the first draft and revised the article. JY collected the data. All authors have read and agreed to the published version of the manuscript.

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