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Labor Engine or Welfare Trap: New Evidence from the Impact of China's Long-Term Care Insurance Policies on Labor Market Performance

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Abstract

The long-term care insurance system is a crucial social service policy for disabled and elderly individuals with dementia in the context of the unfeasible traditional family old-age care model. Through the support of the social insurance model for old-age care security, it effectively addresses and meets the actual needs of long-term care recipients. This has become a significant way to alleviate the burden of disabled and demented elderly individuals, mitigate the impacts of ageing, and create employment opportunities for family caregivers. Using the long-term care insurance pilot policy implemented in Qingdao in 2012 as a quasi-natural experiment, this paper estimates the influence of long-term care insurance on the labor market performance of the pilot city using the synthetic control method of project policy evaluation. Several robustness tests of the labor market effects of long-term care insurance are conducted, utilizing two placebo methods based on time and space, and the ranked test method. The study's findings demonstrate that the implementation of the long-term care insurance policy pilot has a constructive influence on the employment choices of workers in the labor market. Specifically, it encourages participation in the workforce and expands the scale of labor force participation in the pilot cities. Furthermore, the policy's effect strengthens over time and has a marked positive effect on average employee wages, thereby spurring labor supply growth. Through further analysis, it can be determined that the pilot cities have contributed to an average annual growth of around 1 million people in total labor force participation between 2013-2017, surpassing the potential growth rate by approximately 10.5%. Additionally, during this period, the average employee wage displays a linear upward trend with a maximum increase of over 5,000 pounds per capita per year. This suggests a substantial effect on the overall performance of the labor market due to its growth-promoting influence. In addition, the analysis of the heterogeneity of its impact mechanism demonstrates that the long-term care insurance policy aims to enhance the willingness of tertiary

industry workers to work and considerably increase the likelihood of their entry into the labor market. It also improves labor income expectations of urban private and self-employed workers, resulting in a virtuous circle of enhanced labor and employment driven by the increased value of labor and the strengthened willingness to participate.

Keywords

Long-term care insurance policy, Labor market performance, Policy effect, Synthetic control methods

1. Introduction

With the rise of industry and modernization comes the dilemma of an ageing population that is expected to keep working, coupled with the gradual emergence of a pension deficit. The pressure posed by the unyielding increase in labor supply, poor labor productivity, insufficient consumption capacity, the burden of social pensions, and other limitations hindering China's economic development, is not propelling its economic operations towards a one-way path. Instead, the "new normal" phase in China's economic development is confronted with a decrease in labor supply, increased labour factor costs, inadequate capacity for independent innovation of organizations, and an unreasonable human resource's structure. Under the "new normal", China is encountering "supply-side" challenges such as diminished supply, amplified labor costs, inadequate independent innovation capacity of firms, and an irrational structure of human resources. Additionally, "demand-side" pressures, including limitations on the income of older workers, feeble consumption ability, and the gradual enlargement of the pension gap, must not be overlooked. At the same time, it is important to acknowledge the "demand-side" threats, such as the income limitations faced by the elderly workforce, their lack of financial capability to consume, and the gradually increasing pension gap. It must not be underestimated that the availability of LTC insurance may allow many older people to opt for the type of LTC arrangement that perfectly fits their requirements Thuong, 2021). The development of long-term care insurance presents a model of social protection for senior citizens that aligns with the cultural traditions, current circumstances, and future growth of China. As the ageing population faces disabling living situations, China's long-term care insurance policy has been implemented since 2012 to meet their individualized needs. The policy has successfully alleviated the pressing issues of old-age pressure and the mismatch between labor supply and demand by reducing the effective labor force. Therefore, evaluating the policy's impact on labor supply has become crucial.

In March 2021, the government work report emphasized the need to promote the integration of healthcare and leisure, and steadily implement the long-term care insurance system pilot. Currently, China's social long-term care insurance covers almost 120 million policyholders. In China, the long-term care insurance system has the potential to become another national social insurance system, given the important role it plays in coping with the aging of the population. There are several reasons for this, including the need for sustainability of the medical insurance fund and financial pressure resulting from an aging population. Perhaps the most crucial factor, however, is the weakening of

family care function caused by changes in family structure and concept. Its primary function is to offer care services to individuals with disabilities and guarantee that the family of the care recipient can engage in employment in a typical manner Jing, 2010). Therefore, the long-term care insurance system represents social security which not only enhances the welfare level of residents but also crucially ensures the sustainable operation of the labor market Jing, Xing, & Wang, 2021). This paper aims to evaluate the various effects of long-term care insurance policies on overall labor supply decisions and labor market performance. It will elucidate the direction and extent of these impacts scientifically to provide a foundation for the creation of public policies and explore ways in which these policies can contribute to alleviating the imbalance between labor supply and demand.

The paper's marginal contribution is to systematically assess the impact mechanism of long-term care insurance. The goal is to release labor supply from the burden of caregiving and thus promote labor participation and value. The policy effect of long-term care insurance's pilot practice in Qingdao is evaluated. In terms of research, previous studies have primarily focused on the interaction between family care informal caregiving) and labor participation. This paper expands upon these findings by investigating the impact of long-term care insurance policy on market performance, specifically the degree of labor supply. The study further explores the policy effects of long-term care insurance from two perspectives, encompassing a wider range of the study object - labor value. Rewritten: The research broadens our understanding of the labor market, and extends the analysis of long-term care insurance policy impacts. In terms of research methodology, the traditional double-difference processing group often suffers from endogenous limitations to sample selection bias, leading to biased estimations of policy effects. To obtain unbiased estimations, previous studies have employed microdata as the dataset for evaluating labour market decision-making performance. In this paper, we establish the optimum weights of the control group in line with the attributes of the regional macro data. Furthermore, we select the synthetic control approach to address the endogeneity problem encountered with the traditional double-difference method. We do this to enhance the credibility and efficacy of the results obtained, thereby providing a dependable footing for initiating regional policy adjustments.

2. Literature Review and Research Hypotheses: Mechanisms of Impact on Labor Market Performance

2.1 Literature Review

The implementation of a long-term care insurance scheme serves as a crucial measure to mitigate the effects of the ageing population on the labor market. The impact of such a policy on employment hinges on the strict demand for labor generated by family care. Therefore, a clear understanding of the correlation between the working-age population and family care is imperative.

1) Market manifestations of labor supply: working-age population and "family caregiving"

China's ageing rate ranks first among middle-income and high-income countries. The rapid ageing will persistently hamper China's labor supply and decelerate economic growth by an average of 1.07

percentage points each year for the next five years. Du and Feng 2021) investigated this using a panel of 25 years' worth of data from 122 countries. The effect of "family care for the elderly" is theoretically presumed to be the primary cause of the social phenomena of a decreasing rate of participation in the labor force, limited labor supply, and significant population ageing Du, 2021). In the 1980s, Soldo et al. 1983) and Brody et al. 1986) conducted research on the correlation between family caregiving, children's labor, and employment Soldo, & Myllyluoma, 1983; Brody & Schoonover, 1986). Chen 2016) provided an extensive explanation of the "substitution effect" of "family caregiving" - the constraint of familial factors and the resulting likelihood of the working-age population being compelled to withdraw from the labor market and engage in caregiving instead Chen, Fan, Zhao, & Chu, 2016) Another group of scholars argues that intergenerational mobility theory Becker et al., 2018) [8] suggests that external economic support could impair intergenerational mobility, resulting in a significant reduction in children's willingness to participate in the labor force, and ultimately causing a decline in society's overall labor force participation rate Song et al., 2019). Bauer and Sousa-Poza's 2015) study revealed a negative correlation between older adults requiring care and their labor market involvement SONG, ZHENG, & WU, 2019). This suggests that caregiving responsibilities within families may diminish the workforce. Colombo et al. 2011), in their OECD report, observed that the significant number of women taking on caregiving roles impacts female participation in the labor market Bauer & Sousa-Poza, 2015).

Hypothesis 1: Long-term care insurance policies will positively impact workers' employment status and decisions, including the size of their labor participation and the value of their labor representation.

In practice, the data gathered from the China Household Tracking Survey CHTS) in 2010 and 2012 indicates a negative correlation between "family caregiving" and labor force participation. However, following 2016, the proportion of elderly caregivers decreased in conjunction with the labor force participation rate, which contradicts traditional theories. Carmichael and Charles 1998) explained the phenomenon at the theoretical level and identified two pathways through which "family caregiving" affects children's employment: the "substitution effect" and the "income effect". The "substitution effect" implies that individuals will leave or reduce their participation in the labor market due to elder care responsibilities, while "income effect" suggests a decrease in labor supply as a result of family caregiving duties. The "income effect" results in an increase in the willingness of some individuals to supply labor due to the increased cost of living resulting from "family caregiving." Usually, the "substitution effect" will dominate. However, in certain circumstances, such as a significant wealth gap or widespread lack of healthcare and social welfare, the "income effect" may prevail. In such cases, "family caregiving" must increase the labor supply Carmichael & Charles, 1998). The responsibility of providing "family care for the elderly" may actually motivate individuals to work more or for longer hours. Therefore, the effect of "family caregiving" on the labor force participation rate of the working-age population is not consistent, as it relies on the balance between the "substitution effect" and the "income effect". This conclusion aligns with the findings of this paper's long-term care

insurance study. This paper aims to clarify the hypothesis that long-term care insurance impacts the labor market supply performance.

Hypothesis 2: The implementation of long-term care insurance policies is predicted to have a limited impact on enhancing labor market outcomes, including worker participation and the value of labor.

The impact of long-term care insurance policies on labor supply can be explained by both income and substitution effects that theoretically counteract each other, ultimately resulting in a limited impact. The "income effect" is primarily caused by the uncertainty of moral hazard and adverse selection. These factors increase workers' expected income level and risk aversion, leading to a reduction in labor supply in the current period. Furthermore, they might incentivize workers to exit the labor market, creating an equivalent of welfare dependency stemming from the external guarantee effect triggered by long-term care benefits. The "substitution effect" mainly alleviates the burden on workers who provide informal care for their disabled family members, thus reducing labor-leisure time constraints and increasing the effective labor supply to boost productivity. Because long-term care insurance policies can affect labor supply through both the substitution effect and the income effect, adjusting the cost of leisure, the influence of long-term care insurance on labor supply relies on evaluating the impact on workers themselves.

2.2 Study of other Major Effects of long-term care Insurance Policies

Most research on international long-term care insurance policies has focused on analyzing factors influencing their selection and the effects of implementation. Objective evaluations will be used unless marked otherwise. Technical terms will be explained when first used. These factors include financial security Brown & Finkelstein, 2008), improved quality of care Caroli & Godard, 2016), effective mitigation of the "caregiving responsibility trap" Courbage & Plisson, 2012), and alleviation of family caregiver stress Norton, 2000). Common academic structures will be employed, and clear and concise language will be used throughout while adhering to standard grammar rules and conventions. Thuong 2021) Depending on factors such as the degree of substitutability between informal and formal caregiving, the level of parental altruism, and the curvature of the utility function, there may be an uncertain impact of children's altruism on parental decisions regarding long-term care insurance Thuong, 2021). Using assistance provided to healthy parents as a proxy for altruism, the study found that children's altruism has a negative effect in Germany and Israel but is not significant in the United States, France, or Spain Norton, 2000). The Long-Term Care Insurance LTCI) system has a noteworthy effect on social welfare. For instance, LTCI positively influences the health and quality of life of seniors with disabilities. However, its ability to ease the financial burden of families with elderly members with disabilities may be restricted. Therefore, implementation of the LTCI system not only reduces physical and mental health problems for healthcare clients and providers, but also alleviates the financial burden on families while promoting the development of the healthcare service industry and the improvement of the healthcare service system Thuong, 2021). As well as promoting the optimal allocation of health insurance funds, Wang and Feng 2021) argue that home care subsidies replace the

use of medical resources and improve the health of those being cared for, thereby reducing medical expenditures; specifically, home care subsidies have led to a decrease in hospitalization costs of about 10.5% and a decrease in the costs paid by health insurance of about 10.3% WANG & FENG,2021). However, some studies point to the negative effects of such policies, such as potential moral hazard Courbage & Roudaut, 2008), and Cooper and Frank's 2014) study suggests that the policies may lead to "moral hazard," whereby insurance holders may become overly dependent on insurance-provided care, and even more so when they are unable to pay for their care Cooper & Frank, 2014). insurance holders may become overly reliant on the care services provided by insurance, which may even lead to the overuse of care services Schut & Van Den Berg, 2010).

2.3 Employment Effects of Long-term Care Insurance Policies

The study assesses how the availability of early childhood education and care ECEC) impacts maternal employment in a novel setting, as well as the rate of ECEC expansions prompted by the CSSCC Zhang & Managi, 2021). The study findings indicate that a 1% rise in the capacity rate of early childhood education and care ECEC) facilities for children aged 0-5 is associated with an increase in maternal employment. This increase in capacity predicts a 0.27% rise in the probability of working for mothers Zhang & Managi, 2020). Extrapolated margin theory posits that providing family care may cause individuals to temporarily quit their jobs or retire early, thus impacting employment. However, the implementation of long-term care insurance policies can alleviate the burden of family care, increasing individuals' willingness to continue working and decreasing their inclination to retire early, resulting in a boost in overall employment rates. This conclusion was drawn by Heimueller in 2007. In addition to the employment-enhancing pathway, mainstream research also examines the health effects on labor supply. Caring for the elderly not only results in children experiencing "time poverty" and withdrawing from the labor market but also depletes the caregiver's energy and causes psychological stresses like tension and anxiety. These stressors endanger the caregiver's physical health and ultimately restrict their entry into the labor market. The introduction of long-term care insurance can potentially lessen the strain on informal caregivers and improve their overall well-being, ultimately leading to an increase in employment. According to Mayhew et al. 2021), the implementation of long-term care insurance could have a positive impact on employment within the healthcare industry. Wang 2012) suggests that health is a crucial element of human capital that can boost labor productivity and decrease time lost to illness, thus affecting labor employment Wang, 2012). However, certain scholars contend that long-term care insurance policies could have negative impacts on the labor market by reducing the work motivation of specific workers Kopecky & Koreshkova, 2014). Or, for instance, Costa-Font and colleagues 2018) discovered that providing cash benefits to long-term care insurance policyholders in Spain effectively alleviated the financial strain of care provision on their households. Consequently, this income effect reduced labor sentiment. Costa-Font, Jimenez-Martin, & Vilaplana, 2018)

Hypothesis 3: The implementation of long-term care insurance policy will positively impact the employment status of workers by improving their health. The policy's influence on the employment

decision of some workers will be positively affected by releasing the labor force and increasing the potential choice between labor and leisure, generating incentives for labor supply, which is called the time effect of labor. However, subjective evaluations have been excluded to maintain objectivity. Technical term abbreviations have been explained where necessary, and the text's conventional structure has been maintained. Clear and concise language has been used with a logical flow and causal connections between statements. The language has been kept formal and balanced, using precise word choices and grammatically correct sentences without filler words and colloquial expressions. Consistent citation and footnote style have been followed, and quotes have been clearly marked. The analysis examines the direct health effect and indirect time effect by heterogeneity analysis, without making subjective evaluations or using biased language. Technical terms are clearly explained, and the language is standardized and grammatically correct with appropriate spellings and vocabulary choices.

Hypothesis 4: There exists heterogeneity in the impact of the long-term care insurance policy on labor supply depending on the industry and employment unit in which the work is carried out. This is referred to as the labor supply effect of welfare policies, which provides distinct incentives for various types of employment, leading to a differential pattern of decision-making among workers. Long-term care insurance policies may increase labor demand through various means such as additional deductions for employing workers in different industries, employment subsidies, and healthcare incentives for individuals. They can also stimulate labor supply by reducing hiring costs and expanding the job market Costa-Font, Jimenez-Martin, & Vilaplana, 2018). However, the selection of workforce is not solely influenced by subjective assessments, as the labor market phenotype materializes when laborers have an objective choice to engage in work, based on labor worth, and this objective criterion reflects the nature of the industry and organization. Considering the heterogeneity of industrial structure, unit welfare level, and policy maturity across different regions of China, the labor market's performance will be more sensitive in the eastern region, given its concentration of big cities, more developed economy, and balanced industrial structure. This will result from a shift in the proportion of the tertiary industry, which acts as an "absorbing container" of employment in response to the pilot project of the long-term care insurance policy. Technical terms will be explained at their first usage. After the implementation of the long-term care insurance policy, the labor market's performance will become more sensitive to changes in the proportion of tertiary industry employment. Likewise, the labor market performance of urban self-employed workers and those in private industries will be more sensitive to factors such as labor time flexibility and income level elasticity compared to urban workers.

The variations in industrial structure and establishment characteristics impact labor supply decisions via diverse channels, resulting in divergent outcomes. This paper presents the aforementioned hypotheses.

3. Sample, Variable and Model Settings

3.1 Analytical Methods and Modeling

The challenge of evaluating the policy impact of long-term care insurance on the labor market centers on whether it affects workforce participation rates. However, quantitatively testing this hypothesis is hindered by two primary methodological limitations. The traditional assessment method commonly employs the double-difference approach, which necessitates a parallel trend between the treatment and control groups prior to the policy implementation node to ensure intergroup comparability. However, the treatment group's selection bias is frequently present, creating a specific bias. However, the reasons behind selection bias in the treatment group are unique, leading to inevitable endogenous issues. Secondly, it is challenging to eliminate the concurrent interference of multiple comparable policies, which could undermine the assessment's validity. Examples of such policies include gradual delayed retirement, personal tax reform, and other employment policies. Besides, the selection of the pilot for long-term care insurance is predicated on demographic characteristics, the level of economic development, and the availability of healthcare resources. The treatment group does not satisfy the assumptions of random grouping, thereby introducing bias in the results. Randomized grouping assumptions can easily lead to biased results. For instance, Qingdao's aging population started 12 years earlier than the entire country and 7 years earlier than Shandong Province. Moreover, the proportion of disabled and semi-disabled populations is high. Therefore, directly selecting the control group for double differencing will cause an overestimation of the policy effect.

The synthetic control method extends its limitations by determining optimal weights for the control group based on data characteristics. The method measures the similarity between the treatment and control groups using predictor variables before the intervention to constitute a "counterfactual" event.

3.2 Model Settings

Suppose there are $C+1$ cities, with city 1 beginning implementation of a long-term care insurance policy in period T_0, while the remaining N cities do not participate in the pilot policy. Y_{1it} represents the potential outcome of the labor market in city i after implementing the policy in period t, and Y_{0it} represents the potential outcome without implementing the policy in period t the counterfactual outcome). To obtain the causal effect of long-term care insurance, τ_{it}, it must be calculated as $\tau_{it} = Y_{1it} - Y_{0it}$, where $i = 1, \cdots, C+1$, $t = 1, \cdots, T$. The labor market performance of City i in period t was observed and the results were recorded as follows: $Y_{it} = D_{it}Y_{1it} + (1 - D_{it})Y_{0it} = Y_{0it} + \tau_{it}D_{it}$. Where D_{it} represents the state of City i subject to the long-term care insurance policy intervention during period t. If city i is subject to policy intervention in period t, it is given a value of 1; otherwise, it is assigned a value of 0. The assumption is that the first city is subject to policy intervention at the beginning of the period, while the remaining

N cities are not subject to long-term care insurance policy intervention in any period. For $t > T_0$, the labor market effect of long-term care insurance policy can be expressed as follows: $\tau_{it} = Y_{1it} - Y_{0it} = Y_{1t} - Y_{0it}$. In order to estimate the counterfactual outcome Y_{0it} for City 1, Y_{0it} can be represented by the following model Abadie et al., 2010). Since City 1 has implemented a long-term care insurance policy, the potential outcome Y_{1it} can be observed at $t > T_0$. However, the potential outcome without the policy's implementation is unobservable FENG, HAN, & CHEN, 2021).

$$Y_{0it} = \delta_t + \theta_t Z_i + \lambda_t \mu_i + \varepsilon_{it},$$

Among them, δ_t in the equation is a time fixed effect， Z_i is an observable $(K \times 1)$-dimensional covariate denoting a control variable that is not affected by the long-term care insurance pilot; θ_t is a $(1 \times K)$-dimensional vector of unknown parameters, λ_t is a $(1 \times F)$-dimensional vector of unobservable common factors, and μ_i is an $(F \times 1)$-dimensional vector of coefficients, ε_{it} is an unobservable short-run shocks in each city assuming that they satisfy a mean of 0 at the city level.

$$Y_{0it} - \sum_{j=2}^{C+1} \omega_j^* Y_{kt} = \sum_{j=2}^{C+1} \omega_j^* \sum_{s=1}^{T_0} \lambda_t \left(\sum_{n=1}^{T_0} \lambda_n' \lambda_n \right)^{-1} \lambda_s' \left(\varepsilon_{js} - \varepsilon_{1s} \right) - \sum_{j=1}^{C+1} \omega_j^* \left(\varepsilon_{jt} - \varepsilon_{1t} \right),$$

It can be shown that in general the above equation converges to 0, and thus the counterfactual potential result approximation for $T_0 \le t \le T$, region 1 can be expressed in terms of a synthetic control group, thus:

$$Y_{0it} = \sum_{j=2}^{C+1} \omega_j^* Y_{kt},$$

Derive an estimate of the policy effect as:

$$\tau_{1t} = Y_{1t} - \sum_{j=2}^{C+1} \omega_j^* Y_{kt},$$

The key is to find appropriate weights W^* to determine the vector W^* of synthetic controls by approximating the solution.

3.3 Selection of Data Sources and Indicators for Variable Interpretation

According to the "Guiding Opinions on Expanding the Pilot Long-Term Care Insurance System" released by the Ministry of Human Resources and Social Security in 2020, the first group of pilot cities consists of a total of 15 locations, including Chengde City in Hebei, Changchun City in Jilin, Qiqihar City in Heilongjiang, Shanghai City, Nantong City and Suzhou City in Jiangsu Province, Ningbo City in Zhejiang Province, Anqing City in Anhui Province, Shangrao City in Jiangxi Province, and Qingdao in Shandong Province. Hubei Jingmen, Guangdong Guangzhou, Chongqing, Sichuan Chengdu, and Xinjiang Production and Construction Corps Shihezi have been added to the list that already includes Beijing, Shanxi Jincheng, Fujian Fuzhou, Guangxi Nanning, and Shaanxi Hanzhong, comprising the second batch of 14 pilot cities. This paper employs balanced panel data from 2008-2017 for Qingdao and the remaining first two batches, including 23 pilot cities. The data sources used are the China Urban Statistical Yearbook and the National Bureau of Statistics of China's website from previous years. The aim of this study is to simulate the labor market performance in Qingdao, the city where the long-term care insurance policy was implemented, by comparing it to the labor market performance in other cities where the policy was not implemented. We will estimate the average effect on the labor market performance by comparing it with the real situation after the pilot long-term care insurance policy. This study adopts an empirical approach. Since the synthetic control method necessitates similarity between the characteristics of the other cities in the sample and those of Qingdao, and to prevent "interpolation bias", we selected a sample of 24 cities, which were identified by the Ministry of Human Resources and Social Security MOHRSS) as part of the first two batches of pilot cities for long-term care insurance. In this sample, Qingdao is the treatment group, whereas the remaining 23 cities are the reference group.

The explanatory variables in this study measured the labor market performance of individual, residing in prefecture-level city C during period. Technical abbreviations will be defined upon first use. The study considered two main dimensions: the total number of labor force participants, which indicates employment status, and the proxy variable indicators, which reflect the value of labor supply. Among these variables, the total number of labor force participants includes both working and unemployed populations during period. Considering that China's working-age population ranges from 18 to 59 years old, the labor participation rate is no longer age-appropriate due to recent expansion in the age structure and range of the population. As a result, a more representative proxy variable for labor participation rate is chosen Liu et al., 2022). It is primarily determined by adding the number of employed individuals, the number of urban private and self-employed individuals, and the number of registered unemployed individuals in urban areas at the end of the year. This provides a comprehensive measure of labor market participation and the degree of labor force under the workers' employment status. The selected indicator that reflects the value of labor force supply is the average employee wage. This is because in the pilot phase, it is necessary to cover the employee population that participates in basic medical insurance. Specifically, each city's pilot will cover the population of urban employees that participate in medical insurance. The pilot program in each city has expanded the coverage of the

long-term care insurance system to include participants of urban workers' medical insurance [32]. This indicates a significant overlap between the scope and audience of both insurance policies, as well as the linkage between the average salary of employees and the coverage of long-term care insurance. It is pertinent to refer to the provisions of China's urban workers' medical insurance for determining the scope of participation. The main explanatory variables consist of the treatment group and the control group of the pilot policy implementation.

This paper utilizes Abadie and Gardeaabal's 2003) study to model the conditions prior to the adoption of long-term care policy within the selected city. The model uses various predictive control objects with synthetic controls weighted in YU, HUANG, KANG, & YU, 2021). The objective is to create a simulation of the potential labor market performance of a city that has not implemented long-term care insurance by using a weighted average of other cities. This simulation will be compared with the actual labor market performance of Qingdao to estimate the impact of long-term care insurance on the pilot city's labor supply. In order to adhere to the fundamental principle of the synthetic control method, the weights are selected in such a way that the determinants of labor supply market performance in the synthetic city correspond, as far as possible, with those in the actual pilot city before the pilot policy's implementation. Therefore, the predictor variables also known as control variables) that were chosen to create the synthetic control object were matched with the treatment group based on three levels of influencing factors: economy, population, and employment.

This paper examines the interplay between predictive control variables and labor market performance. The selected factors that influence the labor force employment within the population are economic population, regional gross domestic product, second and third industries proportion of GDP, regional per capita GDP, total population at the end of the year, and population density. These five variables indicate the economic and demographic situation of each research pilot city. Total wages of active employees: The direct reason for labor force participation is to receive payment for work. Evaluating the labor supply market's performance includes changes in labor participation as one of the crucial reference indicators. According to the assumption that the high dependency ratio among the elderly population, the family-based model for old-age care, and the rural-urban aging pattern will increase the responsibilities for workers to provide elderly care Abadie & Gardeazabal, 2003). It is also the most direct variable to evaluate labor market performance. The average employee wage is an essential indicator that reflects the degree of value in labor supply and regulates the coverage of the long-term care insurance system and contribution base. The change in policy underwriting affects the value of people's labor supply, employment opportunities, and cultural environment. 9) Financial Burden of Education: Labor employment is closely linked to individual endowments, including workers' education levels. This link is influenced by both the external socio-economic environment and demographic structure. According to the research of scholars, the correlation between high education development and labor force participation follows a "U" curve. This suggests that until a certain level is reached, higher education negatively influences participation in the labor force [35]. Therefore, this

paper does not specifically choose the education level, but rather selects regional education spending/fiscal revenue to reflect the education financial burden rate, indicating the level of the regional economy's dedication to worker education. 10) The count of participants in urban basic medical insurance: Since the current long-term care insurance policy primarily covers urban health insurance-insured workers, it is important to note that changes in medical insurance coverage rates directly impact people's way of life and work patterns Jing & Xing, 2021). Therefore, the number of participants in urban basic medical insurance in each region is used to reflect the coverage rate of medical insurance.

4. Main Empirical Analysis

4.1 Impact of Long-term care Insurance Policies on Labor Force Participation

When using the total labor force participation as the explanatory variable, table 1 reports the weight combinations that compose the synthetic Qingdao via the synthetic control method. A total of 23 cities were chosen, with Nantong, the city with the largest weight, ranking 10th. Meanwhile, the table presents a comparison of crucial economic predictor variables between actual Qingdao and synthetic Qingdao before the implementation of Qingdao Long-term Care Insurance in 2012. The difference between the real Qingdao and synthetic Qingdao, concerning the total number of labor force participation, which is our primary concern, was only 0.4%, 0.1%, and 5% in the three years before the policy implementation, 2008-2010. In addition, we selected pre-pilot years at random to assess the effectiveness of the method and found a goodness of fit as high as 0.99. This indicates that the synthetic growth path for Qingdao's labor force participation closely aligns with the actual growth path. From Table 2, it is evident that of the chosen variables impacting the labor force participation decision-making factors, the value added of the second and third industries, education burden rate, and regional GDP per capita have only a minimal difference of 1.1%, 0.07%, 0.2%, and 2.2%, respectively. The interval between the real and predictor variables in Qingdao is smaller compared to other sample cities. The labor force participation variable is also more consistent with the actual scenario, suggesting a better correlation with market performance. This implies a relatively high similarity of the influencing factors' variable performances on labor force participation. Exercise objectivity in evaluations unless clearly marked as such. Ensure a clear and concise logical structure and causal connections between statements without utilizing ornamental or biased language. Adhere to conventional style and format for academic writing with balanced, precise vocabulary and grammatical correctness while avoiding colloquial or informal expressions. Therefore, we posit that the synthetic control method is more appropriate for the features of Qingdao prior to the enforcement of the long-term care insurance policy. It is also well-suited for evaluating the impacts of the long-term care insurance policy.

Table 1. Synthesis of Qingdao's Weights for each City Explanatory Variable: Total Labor Force Participation)

City	Hohhot	Suzhou	Nantong	Chengdu	Urumqi
Weight	0.243	0.237	0.297	0.162	0.061

Table 2. Predictor Variable Fitting and Gaps Explanatory Variable: Total Labor Force Participation)

Varibles	Treated	Synthetic	Gap
Gross regional product million yuan)	5.39e+07	4.60e+07	0.1466
Value added of the secondary sector as a share of GDP %)	49.255	49.83554	0.0118
Value added of tertiary sector as a share of GDP %)	45.9225	45.95652	0.0007
GDP per capita yuan)	62829.5	64270.34	0.0229
Total population at the end of the year 10,000 persons)	763.63	593.3715	0.2230
Total wages of employees on duty 10,000 yuan)	4376892	3856748	0.1188
Population density per /km2)	695.75	659.811	0.0517
Financial burden ratio for education %)	0.1939275	0.1943992	0.0024
Number of urban basic medical insurance participants	2999646	3172280	0.0576
Total number of labor force participants 2008)	974796.2	979056.6	0.0044
Total number of labor force participants 2009)	1097540	1099076	0.0014
Total number of labor force participants 2010)	1300176	1229548	0.0543

Figure 1 illustrates the impact of long-term care insurance policy on labor force participation performance in the market, estimated using the synthetic control method. The timeline ranges from 2008, five years prior to the pre-policy implementation, to 2017 after the policy. The growth trajectories of total labor force participation in both synthetic and real Qingdao in 2012, prior to the policy implementation, overlap almost perfectly, indicating a successful replication of the growth paths of labor force participation through the synthetic control results before policy implementation. Therefore, the growth path of labor force participation in Qingdao before the policy implementation reflects the synthetic control outcomes precisely. Since the implementation of the long-term care insurance policy in 2012, the total labor force participation has steadily increased, leading to a significant gap with synthetic Qingdao. The gap with the counterfactual set of synthetic Qingdao is lower in 2013, likely due to a delay in the policy's impact. However, the gap has gradually risen and is projected to exceed the total number of labor force participation in synthetic Qingdao after 2016. The

difference between the two suggests that the execution of a long-term care insurance policy has a considerable impact on the labor force's participation performance, compared to the group in Qingdao that did not enforce long-term care insurance. This effect is significant in enhancing the market efficiency of labor force decision-making regarding participation.

To demonstrate the effect of long-term care insurance on the labor force participation market, we measured the difference in total labor force participation between the actual and synthetic samples from Qingdao before and after the policy's implementation. The graph in Figure 2 illustrates that between 2008 and 2012, the difference in labor participation between the two groups remained relatively stable with insignificant fluctuations. However, since the policy implementation in 2012, the gap has significantly widened. The gap first increased in 2014, reaching around 1 million people, and has continued to rise linearly with fluctuations between 1-2 million people in 2016.

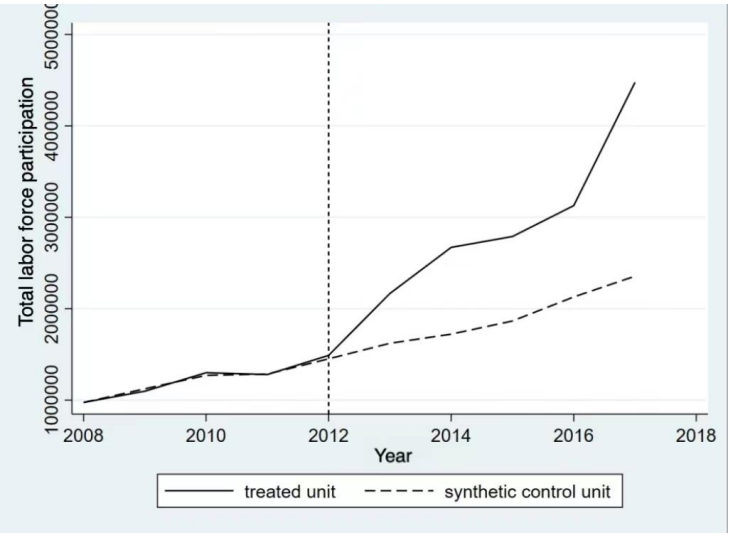


Figure 1. Effects of Qingdao's LTC Insurance Policy on Labor Participation

Since the implementation of the pilot long-term care insurance system in Qingdao in 2012, it has been observed that the total labor force participation has increased on average by about 1 million people per year during the five years after the implementation of the pilot system in comparison to the synthetic Qingdao sample. This suggests that the implementation of the long-term care policy has positively impacted the employment status and the employment decision of the labor force, that is, the decision to participate in the labor force. The proposed hypothesis examines the potential for labor force release to generate substitution effects. Specifically, the hypothesis explores pathways to encourage labor participation that reduce the need for workers to provide informal care for disabled family members at home. This, in turn, can alleviate the labor-leisure time constraints and increase the effective labor force supply. On the other hand, the policy has a positive impact on health and labor force participation by freeing up otherwise unproductive labor through the provision of healthcare coverage. This increases the likelihood of choosing to participate in the labor force and creates a certain incentive for

labor supply as a health benefit. Additionally, the policy significantly boosts the size of the labor force in Qingdao.

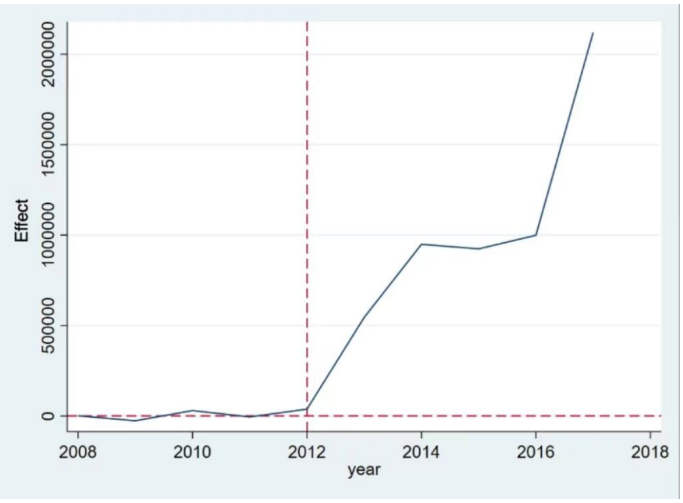


Figure 2. Impact of Long-Term Care Insurance Policies on Average Employee Wages

4.2 Impact of Long-Term Care Insurance Policies on Average Employee Wages

The impact of the long-term care insurance policy on the average salary of employees is illustrated in Figure 3. Whether labor force participation or average employee wage is used as the explanatory variable, the values of Qingdao and its synthetic target are closely matched prior to policy implementation with a strong fitting effect. However, after the implementation of the property tax policy, the gap between the two values significantly widens. The value of synthetic Qingdao's average employee wage is noticeably lower than that of the actual Qingdao's average employee wage and its growth rate. The difference lies in how long-term care insurance policy impacts the labor supply value, specifically the average wage of employees. This suggests that the policy has a "promotional effect" on the average wage of Qingdao employees, significantly boosting the value of labor supply. By calculating the variance between the authentic Qingdao sample and the artificially created Qingdao sample averages, Figure 4 provides a clearer overview of the progress trajectory of the long-term care insurance policy as it pertains to the median income of workers. The variance demonstrated a slight downward trend following the policy's adoption before sharply increasing in a straight upwards fashion. The maximum variance surpassed 10,000 yuan per individual. This confirms the hypothesis that the long-term care insurance policy strongly promotes the growth of the average employee wage, which serves as a proxy variable for the value of labor supply. At the same time, we also monitor the trend of the policy impact, which indicates a brief and feeble decline in 2012-2013. Subsequently, the policy impact continues to rise, possibly due to the delay in the transmission of the policy's stimulus to the extent of the labor supply's value and the public's expectation of marginal growth.

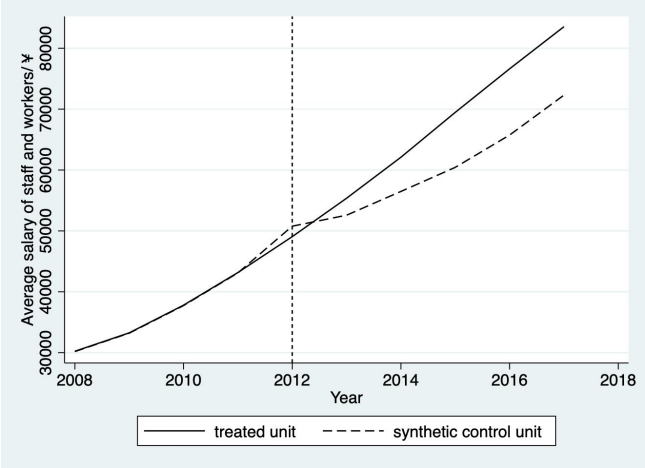


Figure 3. Effects of Qingdao's LTC Insurance Policy on Average Salary of Staff and Works

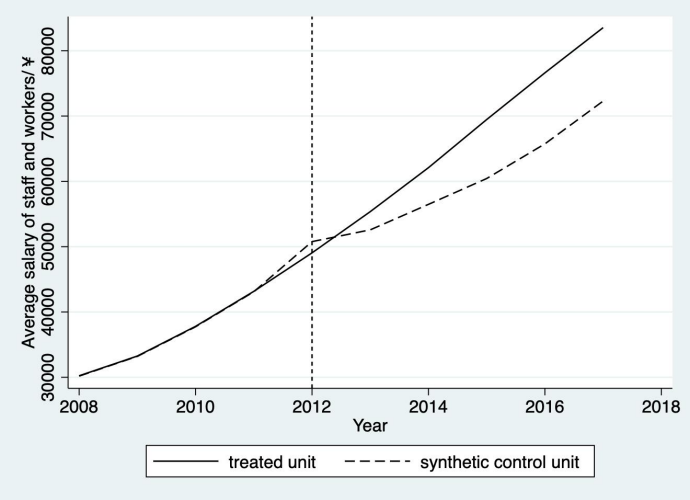


Figure 4. Difference in Treatment Effects

4.3 The Effect of the Implementation of long-term Care Insurance Policies on Labor Market Performance

While previous research suggested that the adoption of long-term care insurance policies had a favorable impact on the labor market, relieving the burden of informal caregiving, with the policy's time substitution effect on labor employment exceeding the income effect, and promoting health-related developments capable of enhancing individual employment Jing & Xing, 2021), there is a theoretical time lag effect where the rise in willingness to work, probability of health, and average wage increase occurs sequentially. However, a theoretical time lag effect may occur between the increase in willingness to work and the potential improvement in health, and the subsequent rise in average wages. On the other hand, the impact of long-term care insurance on the labor supply's value will be influenced by both public expectations and policy stimulus intensity. During the initial pilot phase, the public had varying expectations regarding the effectiveness of long-term care insurance

policy, with some being relatively weak while others were strong. Over time, it was discovered that the policy stimulus gradually met the expectation, and the policy effect displayed marginal incremental enhancement. Therefore, a phenomenon of continuous improvement of the policy's impact occurred.

It is important to assess the adequacy of the model fit utilizing the synthetic control method. Specifically, when using the average employee wage as the explanatory variable, the attached table displays the composition of weights that make up synthetic Qingdao. The city with the highest weight is Fuzhou, ranked 15th with a weight of 33.6%. Technical term abbreviations will be explained upon first use. Based on the comparison of predictor variables presented in the table, it is apparent that the average wages of employees randomly selected for the three years preceding policy implementation differ only slightly between real Qingdao and synthetic Qingdao, with a difference of only 0.16%. This result suggests that synthetic Qingdao is a more suitable fit for this analysis. In the attached table, it is evident that the actual and projected values of the remaining selected factor variables influencing employees' average wage are closely aligned. This emphasizes that a better variable fit for labor supply value degree, characterized by employees' average wage, yields relatively high similarities for other factor variables that may have an influence. Therefore, it can be confirmed once again that the method is appropriate for determining the effectiveness of a long-term care insurance policy with regard to adequately matching sample characteristics.

5. Robustness and Heterogeneity Test

5.1 Robustness Testing

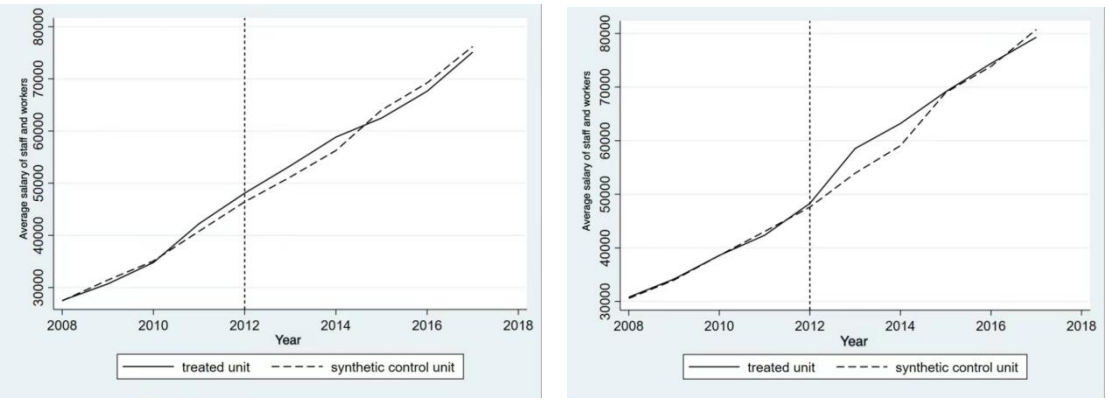
Based on prior experience, it is necessary to conduct the following robustness test for the policy implementation city if the synthetic control object fits well with the city in the pre-policy implementation period. To ensure that the policy effect based on the synthetic control method is not a coincidental occurrence, it is necessary to consider unobserved exogenous factors that may trigger significant differences, such as policies that ease employment or adjustments to health insurance policies. These factors may cause a considerable discrepancy between the actual sample and the synthetic control sample with respect to labor force participation and the average wage of employees.

1) Placebo test

Drawing on the placebo test method employed by Abadie and Gardeazabal 2003) and other researchers, this technique is akin to a sham experiment in the following manner: Choose a city from the control group that does not implement long-term care insurance and compare the policy's effect before and after its implementation via the synthetic control method. If the outcome is similar to that of Qingdao City, it fails the robustness test, indicating that the evidence supporting the effectiveness of Qingdao's long-term care insurance policy is weak. The reverse holds if the outcomes differ.

Referring to the practice of Liu and Fan 2013), respectively, select the average employee wage synthesis with the highest weight in Fuzhou and the lowest weight in the city of Chengdu. The figure 5 illustrates the dissimilarity between Chengdu and Qingdao as well as the similarity between Qingdao

and itself. The weight measures the extent of similarity/dissimilarity, with the largest weight indicating strong similarity and the smallest weight showing great disparity. The data used for the synthetic control analysis is based on actual samples.



(1) Synthetic Fuzhou (2) Synthetic Chengdu

Figure 5. Placebo test Results (Average Salary of Staff and Works)

Figure 51) displays the results of the placebo test for Fuzhou, whereas Figure 52) exhibits the results for Chengdu. The actual samples display minimal change before and after the virtual policy time point. They always fluctuate gradually up and down along the trend of the synthetic object. There is no significant difference in policy effects between the Figure and the synthetic Qingdao. This suggests that the synthetic control method matches the average employee wage trend of both cities accurately, and there are no abrupt changes in the fitting situation of the two cities after the long-term care insurance policy's implementation. Therefore, this partially verifies the hypothesis that the implementation of the long-term care insurance policy affects Qingdao's average employee wage. The implementation genuinely affected Qingdao's average employee wage, ruling out the influence of other common chance factors.

On the other hand, the impact effect of labor participation test is based on a time-based placebo test. The method involves changing the real policy time to a certain time before implementing the sham policy. Then, observing whether the before and after policy gap is similar to the original estimation becomes the core of this process. It is conducted to test the robustness of the Qingdao long-term care insurance policy effect. To ensure comparability and accessibility of the results, we selected 2010 as the control year to guarantee equal observability of pre-policy changes based on available data. The results of the test are presented in Figure 6, indicating that no significant changes occurred in the total labor participation scale between synthetic subjects and the real-world scenario between 2010-2012. Furthermore, the observed minor differences are negligible compared to the estimated effect after 2012. Therefore, this provides strong evidence of the effectiveness of the Qingdao long-term care insurance policy.

2) Sequencing test

In the preceding analysis, we observe that Qingdao's long-term care insurance policy produces a 10.5% rise in labor force participation and a 2.1% increase in the employees' average wage. However, we cannot ascertain whether these estimated effects differ from zero in a statistically significant manner. Thus, we conduct a ranking test similar to the statistical rank test to evaluate the policy's estimated effects' statistical significance. The primary objective is to assess if other cities exhibit similar features to Qingdao with regards to labor force involvement and mean employee salaries in relation to their own synthetic samples, and to determine their respective probabilities. Assuming the cities in the control group implemented long-term care insurance in 2012, this study estimates the policy effects using synthetic control methods. Two proxy variable indicators are constructed for each synthetic sample, namely labor force participation and average employee wages. The study then compares the actual effects observed in Qingdao with the hypothesized effects in the control group of cities. A significant difference between the effects of the two policies indicates that the impact of long-term care insurance on the performance of Qingdao's labor supply market is significant and not merely a coincidence.

The effectiveness of this method depends on the synthetic control group for the city prior to policy implementation having a strong fit. In other words, the group should align well with the city's characteristics before the policy was put in place. The RMSPE value of the synthetic control object prior to 2012 should be limited within a specific range, typically not surpassing twice the RMSPE value of the treatment group. This is crucial because if the synthetic control object is not adequately fitted prior to policy implementation, the ultimate difference can be attributed to a poor fit rather than policy implementation. The RMSPE value can be seen in the table provided. Figure 7 displays the distribution of the order of the discrepancies when utilizing total labor participation and average employee wage as predictor variables.

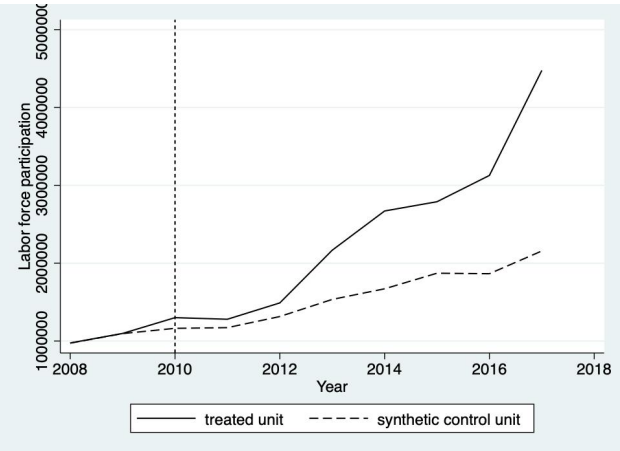
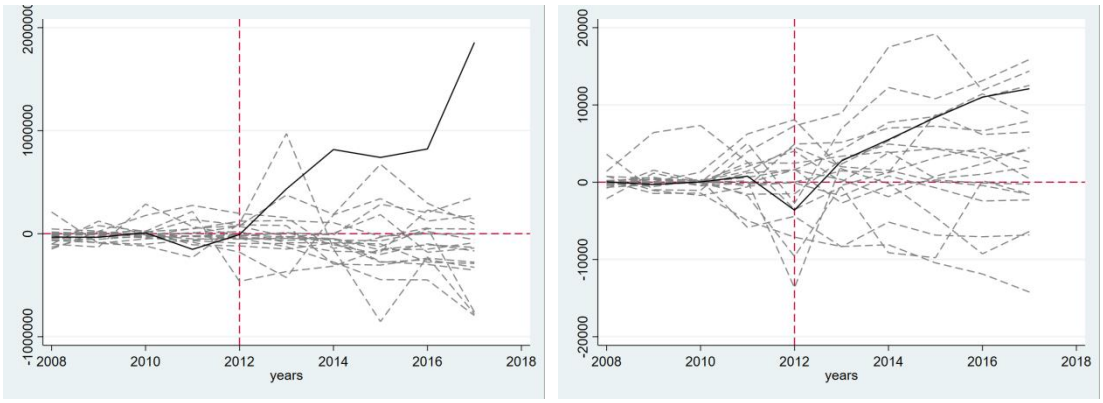


Figure 6. Placebo Test Results (Labor Force Participation)



(a) Labor Force Participation b)Average Salary of Staff and Works

Figure 7. Sorting Distribution of the Difference of the Sequencing Test

5.2 Heterogeneity Analysis

The preceding analysis indicates that long-term care insurance policies positively impact labor market performance, while regional labor supply depends significantly on the structure of the industry in which employment is situated and the nature of the employment unit. Is this effect present, and how does it differ among cities? Heterogeneity among workers in primary, secondary, and tertiary industries, as well as heterogeneity among employment units based on private and self-employment in urban areas versus urban units, suggest the program may produce negative welfare effects or create distortions. It is indicated that the initial motivation for long-term care insurance policies was to distribute the risk of care for elderly individuals who were disabled or suffering from dementia. This was intended to alleviate the burden on family members who were of age-appropriate working age and encourage capable workers to remain active in the labor force. In this paper, we construct a double-difference model utilizing the double-difference method. The model centers around the first pilot implementation of long-term care insurance in China, which serves as a natural experiment.

$$Y_{it} = \gamma_0 + \beta_1 reform_t + \beta_2 treat_i + \beta_3 reform_t * treat_i + \alpha X_{it} + \varepsilon_{it}$$

Explained variable Y_{it} represents the labor market performance of city i in the state during the period of long-term care insurance policy implementation in t. Consistent with the above synthetic control variable approach to explained variables, there are two measures of the total number of labor force participants: one reflecting the employment status related to the labor force, and the other showing the average wage of employees indicating the degree of value of the labor force supply. The primary explanatory variable is the implementation of long-term care insurance, represented by the variable $reform_t$. This is a time dummy variable that indicates whether the policy was implemented

prior to the first national long-term care insurance pilots in 2016 $reform_t$ =0) or after $reform_t$ =1). The focus of this paper is on the coefficients β_3 of the interaction term between the implementation of the policy and whether the city is included in the first list of pilot cities $treat_i$ =1) or not $treat_i$ =0), as represented by the dummy variable " $reform_t * treat_i$ ". In this paper, we use two grouping methods to examine policy effects' heterogeneity. First, we group the total number of labor force participation and focus on the industrial properties of the labor force. These properties are classified into primary, secondary, and tertiary industries based on the type of industrial structure to which the work performed belongs.

The average employee wages are partitioned based on the variation in the type of employment units, namely, urban private, self-employed, and urban units. Labor market performance may be impacted by additional regional preferences and institutional factors, in addition to the aforementioned variables. In this paper, we seek to more fully account for the impact of multiple factors on labor force participation and labor value by eliminating multicollinearity and adding X_{it} as a vector of control variables. These control variables include regional GDP, total population at year-end, the regional registered unemployment rate in cities and towns, the average number of people in the workforce, education expenditure, and participation in urban medical insurance. The data sample displays logarithmic behavior due to its large order of magnitude, which makes it vulnerable to numerical interference.

According to the model and data presented above, this paper performs panel fixed-effect regression analysis on labor force participation LFP) and average employee wages AWOE) for panel data from 285 large and medium-sized cities throughout China from 2008 to 2020. The constructed double-difference model is used and the regression results control for regional characteristics and time. The specifics are shown in Table 3.

Table 3. Main Regression Results

variability	1)	2)	3)	4)
	LFP		AWOE	
	regression to baseline	full-scale model	regression to baseline	full-scale model
did	0.789***	0.464***	0.640***	0.0700***
	0.105)	0.1000)	0.0612)	0.0234)
lnpgdp		0.219**		0.398***

		0.0859)		0.0201)
lntpa		1.346***		-0.199***
		0.268)		0.0627)
lnrupi		0.679***		0.0166*
		0.0367)		0.00861)
lnanoe		0.637***		-0.233***
		0.0744)		0.0174)
lnpiu		0.0445*		-0.0480***
		0.0254)		0.00595)
lnedu		0.307***		0.646***
		0.0781)		0.0183)
Constant	1.097***	-16.30***	10.73***	0.773**
	0.0115)	1.536)	0.00673)	0.359)
R-squared	0.016	0.246	0.031	0.783

Notes. Standard errors in parentheses； *** p<0.01, ** p<0.05, * p<0.1.

Based on the main regression findings, the results are in line with the outcomes of the synthetic control method mentioned earlier. This suggests that the synthetic control estimation results have passed the robustness test. The initial rollout of China's long-term care insurance policy pilots in 2016 had a greater impact on labor market performance in terms of labor participation and labor value. In terms of labor participation, the pilot policy results in the experimental group being 78.9% higher than the control group overall. Additionally, the average wage level of employees in the experimental group is 64% higher than in the control group. Both results for groups 1) and 3) are significant at the 1% level. Neither changes nor improvements were necessary in this text.

There are variations in the effects of the long-term care insurance pilot policy on the job market performance of different industry categories and types of employment units. Therefore, to account for the heterogeneity of labor force participation in various industries, the labor force sample was divided into sub-samples based on the industry type of the first, second, and third labor force sizes. Similarly, to examine the heterogeneity in labor force employment units, the sample average wages of employees were divided into sub-samples based on the type of employment unit urban private and individual, and urban units), and regression was conducted accordingly. The results are presented in Tables 4 and 5.

Table 4. Regression Results by Labor Participation by Industry Type

LFP			
variability	1)	2)	3)
	Primary_ind	secondary_ind	tertiary_ind

did	-2.033***	-13.71***	9.249***
	0.233)	1.988)	2.638)
lnpgdp	-0.516**	-0.00312	1.089
	0.200)	1.709)	2.268)
lntpa	0.518	-6.430	36.19***
	0.627)	5.334)	7.079)
lnrupi	-0.0317	0.601	1.174
	0.0855)	0.730)	0.969)
lnanoe	0.443**	41.72***	10.67***
	0.174)	1.480)	1.965)
lnpiu	0.105*	0.759	1.732***
	0.0593)	0.506)	0.672)
lnedu	0.0395	-1.458	8.048***
	0.182)	1.553)	2.061)
Constant	-0.208	-72.19**	-362.1***
	3.588)	30.53)	40.52)
R-squared	0.047	0.285	0.083

Notes. Standard errors in parentheses； *** p<0.01, ** p<0.05, * p<0.1

Table 5.6 Regression Results by Employee Average Wage by Employment Unit Type

variability	1)	2)
	emp_end	pri_urban
did	-0.0293	0.138**
	0.0225)	0.0643)
lnpgdp	0.0736***	0.303***
	0.0193)	0.0547)
lntpa	0.0126	0.606***
	0.0603)	0.172)
lnrupi	0.00539	0.0387
	0.00825)	0.0266)
lnanoe	0.741***	-0.0331
	0.0167)	0.0468)
lnpiu	-0.00285	-0.0318**
	0.00572)	0.0160)
lnedu	0.0419**	0.486***
	0.0175)	0.0492)

Constant	-0.356	-9.019***
	0.345)	0.987)
R-squared	0.533	0.257

Standard errors in parentheses;*** p<0.01, ** p<0.05, * p<0.1.

According to the difference-in-difference DID) regression results presented above, the long-term care insurance policy has a notable positive impact on labor market participation regarding workers in the tertiary industry. This effect is evident in the table as the proportion of workers in the service industry within the tertiary sector continues to grow. Especially with the development of network technology, the new employment pattern is primarily concentrated in the industry (LIU & FAN, 2013). Further analysis indicates that this trend is due to the movement of the labor force to sectors with higher productivity, continuous improvement in workers' professional skillsets, and increased levels of urbanization. Mobility, the continuous improvement of workers' vocational skill quality and the strengthening of urbanization levels, should render the third industry workforce as the main foundation for the long-term care insurance policy pilot that has a significant and positive impact on labor participation. Furthermore, this policy can even reduce the possibility of negative effects on primary and secondary industry workers. In addition, the table indicates that private and self-employed labor groups in urban areas have the greatest impact on the average employee wage. This may be attributed to the fact that these labor groups typically have greater flexibility in working hours and higher income elasticity and multiplier. Additionally, the availability of long-term care insurance significantly increases the expectation of labor value, which is a pathway for the creation of leisure-work. This is the transmission path in which the "substitution effect" outweighs the "income effect," as private and self-employed workers possess more flexible work schedules, greater income elasticity, and multipliers. This strongly supports hypothesis 3, which states that long-term care insurance policies generate a certain degree of labor supply incentives, with a significant labor time effect, where the indirect time effect prevails. However, the table indicates that the impact on the labor value of urban employees is not significant, and the 13.8% rise in the labor value of self-employed and private urban workers is statistically significant only at the 5% level. Therefore, to comprehend the findings, it is necessary to consider Hypothesis 2, which suggests a limited impact on the labor value, namely the workers' average wage, due to the non-significance of the "substitution effect" currently. This outcome is due to the uncertainty surrounding both the "substitution effect" and the "income effect".

6. Discussion

6.1 Discussion of Results

Based on the theoretical proposal that long-term care insurance policy affects labor market performance, this paper empirically analyzes the impact of long-term care insurance policy on labor market performance and its differences. The pilot events of long-term care insurance policy carried out

in Qingdao in 2012 and the first pilot cities across the country in 2016 are used for this analysis. Panel data of 285 large and medium-sized cities across the country in the period of 2008-2020 is also utilized. Synthetic control method, a newly developed method in the literature of program evaluation, is employed to aid the analysis. The present study empirically analyzes the effect of long-term care insurance policies on the labor market performance of Qingdao and its variations.

The study finds that:

The overall findings on the impact of long-term care insurance on the labor market performance of Qingdao, including labor force participation and average employee wages, indicate a noteworthy positive growth effect. However, variations in economic development, population age structure, industrial structure levels, as well as policy implementation details, intensity, and strength, result in different impacts of the pilot policy on labor market performance. The effect on labor market performance also varies based on industry and employment unit type.

Qingdao City implements a long-term care insurance policy to increase labor participation and unlock the potential of workers, leading to improved market performance in labor decision-making. This implies that the "substitution effect" has a much greater impact than the "income effect", and the primary mode of the "substitution effect" is to alleviate the burden on employees to offer informal care to their family members with disabilities. The primary mechanism of the "substitution effect" seeks to alleviate the burden on workers to provide informal care for their disabled family members. This would ease the labor-leisure time constraint and allow workers to increase their effective labor supply. This effect also impacts the average worker wage level, which represents labor value, and this persistent "increasing effect" indicates that the long-term care insurance policy has a positive impact on the labor market performance of the pilot cities as expected by the design.

Further analysis reveals that the disparity in the effect of the initial pilot cities on workforce supply in diverse industries and the worth of labor in diverse employment units is a significant factor contributing to the ambiguity between the policy's direct and indirect effects. Due to labor mobility to high-productivity sectors, continual enhancement of workers' vocational skills, and the strengthening of urbanization, the long-term care insurance pilot policy has had a significant positive impact on labor participation, mainly among workers in the tertiary industry. Subjective evaluations have been excluded unless clearly marked as such. The information is presented in clear, concise sentences with a logical flow and causal connections between statements. Technical term abbreviations are explained upon first use, and the language is clear, objective, and value-neutral with a passive tone and impersonal construction. The structure follows common academic sections, with factual and unambiguous titles. The language is formal and avoids contractions, colloquial words, informal expressions, and unnecessary jargon. The text is free from grammatical, spelling, and punctuation errors.

Correctly guiding the scientific design of long-term care insurance policy expansion can enhance the value of the labor force and release effective labor force. This can be achieved by implementing

welfare policies such as employment subsidies for tertiary industry workers, improved social insurance for flexibly employed workers, and preferential healthcare policies for individuals. These policies can support the current employment status quo and efficiently promote the performance of the labor market.

6.2 Policy Recommendations

The objective of implementing the long-term care insurance policy is to resolve structural conflicts in the labor market, ensuring that labor market performance returns to normal operation. This will prevent the disruption of the labor market equilibrium resulting from the absence of welfare policies. From this, it is clear that the implementation of long-term care insurance policy will positively impact the employment decisions of workers when the labor market reaches a normal state of supply and demand. This would efficiently reduce the cost of care for the working population and prevent the adverse effects of care substitution on the labor participation scale. Thus, long-term care insurance policy can be an effective way to tackle these issues. Since labor market performance is crucial for maintaining steady and sustainable economic growth in a country or region, population aging will inevitably result in insufficient labor supply, worsen the decline of the demographic dividend, and hamper the functionality of the labor market. Ultimately, this can hinder the economy's long-term development [38]. According to the empirical findings of this study, long-term care insurance policy has a clear positive impact on labor market performance. As a significant component of China's pension security system, it carries positive policy implications for the country's future labor market, social security system, and long-term economic growth.

1) Expanding the coverage of long-term care insurance policies in accordance with the ageing population is crucial. It is important to maintain objectivity and avoid subjective evaluations, as well as including concise and necessary information in simple sentences with a logical structure. Technical term abbreviations should be explained upon first use. The use of clear and objective language with a neutral tone, avoiding biased, emotional, figurative, or ornamental language is highly recommended. Passive tone and impersonal construction should be used, with first-person perspectives avoided unless absolutely necessary. High-level and standard language should be utilized with consistent technical terms, and common sentence structure employed while avoiding unusual or ambiguous terms. Adhering to style guides, utilizing consistent citation, and employing a consistent footnote style while avoiding filler words is necessary. The language should be formal without contractions, colloquial words, informal expressions, and unnecessary jargon, with positions on subjects made clear through hedging. Clear structure with a logical progression and causal connections between statements are important. Bias should be avoided, as well as utilizing subject-specific vocabulary when it conveys meaning more precisely than a similar non-technical term. Finally, grammatical correctness is essential, including the elimination of grammatical errors, spelling mistakes, and punctuation errors. On one hand, expanding the geographic scope of pilot cities is promoted by the clear effects of long-term care insurance policy on labor market performance. However, each pilot city batch is limited in number and

dispersed in distribution, and the system is "fragmented", leading to issues of mutual convergence concerning coverage scope, financing models, cost-consumption mechanisms, benefits payments, and fund management across different locations. There are issues with the scope of coverage, funding model, cost-consumption mechanism, benefit payment, fund management, and other components of program implementation across various regions, which do not achieve mutual articulation [39], and there is a considerable amount of ground to cover before the formation of a nationally coordinated resource allocation. Currently, the long-term care insurance system prioritizes coverage for urban workers, with Shanghai being the only city covering urban workers and residents over the age of 60. However, the empirical results indicate that the tertiary sector has served as a major employment absorption container. Consequently, it has become a key factor in the long-term care insurance policy's improved performance in the labor market. This has significantly increased the labor force's willingness to work and reduced the number of unemployed workers, thereby improving the overall workforce capability. This results in an enhanced willingness for the labor force to work, decreased likelihood of early retirement, and increased employment opportunities due to improved individual health. Therefore, considering the employment structure of workers in the tertiary industry and their disadvantages in obtaining insurance coverage, it is justifiable to refer to the concept of basic medical insurance and mandate that all participating workers have an equal opportunity to receive long-term care insurance coverage. It is advisable to establish a comprehensive care insurance system that covers both urban and rural areas with adequate protection, as well as providing family caregivers with more time and energy to participate in or return to the workforce. Establishing a care insurance system that provides equal and appropriate protection for all individuals in urban and rural areas would allow family caregivers to have more time and energy to participate in employment or return to work (ZHANG & SAN, 2023). Additionally, practical protection should be prioritized for the disability risks of urban flexibly employed individuals and migrant workers to fully alleviate the disincentive effect that informal family caregiving has on the labor market.

2) Multidimensional long-term care insurance policies can coordinate relationships between primary service providers. The conclusion of this paper highlights the extraordinary and unsustainable phenomenon and effect that occurs when the "income effect" of family elder care exceeds the "substitution effect". To prevent bias and facilitate the well-being of older workers, it is crucial to coordinate communication between primary service providers. Firstly, a major issue with the current long-term care insurance policy's service provision is the inadequacy of available care services. This not only limits the policy's effectiveness in promoting labor market performance but also undermines its fundamental purpose. The policy aims to provide disabled individuals with comprehensive care services, thereby freeing their family caregivers from labor constraints. Secondly, to maximize labor market potential vertically, develop labor resources on the care services' supply side vigorously, creating more jobs and job training. Focus on information linkage on the demand side while considering the employment return of the recovered workforce. The objective is to enhance the work

environment, extend access to fundamental civic amenities in urban and rural areas, and endeavor towards enhancing the migrant populace's social security framework to enable them to benefit from developmental dividends. Ultimately, this will yield a dual rise in labor productivity and participation rate Qu and Jie , 2017).

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