

Interactions between Long-Term Care and Healthcare

Evidence from Korea's Long-Term Care Insurance Reforms

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About the Author

Eunkyeong Lee is a senior research fellow at the Korea Institute of Public Finance. She was a 2025–26 visiting scholar with the Asia Health Policy Program at APARC. Her research focuses on health economics and health policy, with particular interests in health and long-term care systems, population aging, and the fiscal sustainability of health spending. She received her PhD in economics from Cornell University.

Abstract

Population aging has increased the importance of understanding how long-term care interacts with healthcare. This paper examines the effects of Korea's Long-Term Care Insurance (LTCI) reforms on healthcare utilization by exploiting successive eligibility expansions through changes in the Grade 3 eligibility cutoff in 2008, 2012, and 2013. Using the Korea Elderly Cohort Database and a regression discontinuity difference-in-differences design with individual fixed effects, I estimate the causal effects of LTCI eligibility on overall and disease-specific healthcare utilization.

The results show that LTCI expansions significantly reduced inpatient healthcare utilization, with the effects following the 2008 introduction of LTCI substantially larger than those of subsequent eligibility expansions. The reductions were primarily driven by hospitalizations for diabetes and pneumonia, while outpatient visits for depression and dementia increased.

The findings suggest that LTCI both substitutes for avoidable inpatient care and complements outpatient care for conditions requiring continuous management. Rather than simply reducing healthcare utilization, LTCI reallocates healthcare use toward more appropriate patterns of care, highlighting the importance of better integrating long-term care and healthcare systems in rapidly aging societies.

Interactions between Long-Term Care and Healthcare

Evidence from Korea's Long-Term Care Insurance Reforms

Population aging has become one of the most pressing policy challenges facing many developed countries. As populations age, healthcare systems must accommodate growing numbers of older adults with chronic diseases, functional limitations, and cognitive impairment while maintaining fiscal sustainability (Blavet et al. 2026; Frank et al. 2026). With this in mind, long-term care (LTC) has attracted increasing attention as a potential means of improving the efficiency of healthcare systems (OECD 2025a). By providing assistance with the activities of daily living, medication management, and community-based support, long-term care services may substitute for costly hospital care and reduce avoidable healthcare utilization. Expanded access to long-term care may also improve the detection of unmet healthcare needs and facilitate access to medical services. Whether long-term care substitutes for or complements healthcare, therefore, remains an important empirical question (Forder et al. 2019; Kim and Lim 2015; Feng et al. 2020; Chen and Ning 2022; Serrano-Alarcon et al. 2022; Cho and Kwon 2023; Yao et al. 2025).

South Korea (hereafter Korea), which is experiencing one of the world's fastest rates of population aging, provides an ideal setting for examining this question. Older adults accounted for approximately 20 percent of the population in 2024, and this proportion is projected to exceed 40 percent by 2060 (Statistics Korea 2023). As a result, expenditures on both the National Health Insurance (NHI) and Long-Term Care Insurance (LTCI) systems are expected to increase substantially over the coming decades. In addition, Korea has long been characterized by exceptionally high levels of healthcare utilization (OECD 2025b). Compared with other OECD countries, Korea records among the highest numbers of physician consultations and inpatient

days per capita, raising persistent concerns regarding healthcare overutilization and inefficiency. Improving the coordination between healthcare and long-term care has therefore become an increasingly important policy priority.

The relationship between healthcare and long-term care is particularly relevant because the two systems often serve overlapping populations. Older adults with functional limitations, chronic diseases, or cognitive decline frequently require both medical care and long-term care services (Spiers 2025). Ideally, healthcare focuses on diagnosis and treatment, while long-term care provides assistance with daily living and ongoing supportive services. In practice, however, the boundary between the two systems is often blurred (OECD 2004; Leutz 1999). Individuals who lack access to appropriate long-term care may instead rely on hospital care—particularly long-term care hospitals—even when their primary needs are social rather than medical (Kim and Kwon 2021; Jeon and Kwon 2017). Consequently, expanding access to long-term care can potentially improve the efficiency and quality of healthcare delivery.

Since the introduction of the LTCI program in 2008, Korea has implemented a series of reforms that progressively expanded eligibility for long-term care services. The initial program targeted older adults with severe functional limitations, but subsequent reforms gradually lowered eligibility thresholds and expanded coverage to individuals with mild dementia and cognitive impairment. The government also introduced several complementary reforms to strengthen financial protection for dementia care through the NHI system. Together, these reforms provide a unique opportunity to examine how changes in long-term care policy influence healthcare utilization among older adults.

This paper presents an ongoing research agenda that examines the interaction between long-term care and healthcare in Korea using nationwide National Health Insurance Service claims data. The broader project consists of several empirical studies evaluating major LTCI reforms implemented between 2008 and 2018. These studies employ quasi-experimental research designs, including regression discontinuity and propensity score weighting difference-in-differences, to estimate the causal effects of long-term care expansion on healthcare utilization and expenditures. Particular attention is given to disease-specific mechanisms, heterogeneity across patient populations, and the potential substitution between healthcare and long-term care services.

This paper has two objectives. First, it reviews the institutional evolution of Korea's LTCI program and summarizes the existing evidence on the relationship between long-term care and healthcare utilization. Second, it presents the empirical framework and preliminary findings

from the ongoing research project, while outlining future work that will examine the effects of more recent dementia-related policy reforms. By documenting Korea's experience, this study aims to contribute to the broader discussion of how long-term care systems can improve the efficiency and sustainability of healthcare systems in rapidly aging societies.

Institutional Background

South Korea operates two complementary public insurance systems that are particularly important for older adults: NHI and LTCI. Together with the public pension, unemployment insurance, and industrial accident compensation insurance, they constitute the country's five major social insurance programs.

National Health Insurance

The NHI was introduced in 1977 and achieved universal population coverage by 1989, providing broad access to healthcare services with relatively low patient cost-sharing. Since the late 2000s, Korea has progressively expanded NHI benefits to improve financial protection and access to essential healthcare services. Under the 2009–2013 and 2014–2018 Mid-term Plans for Benefit Coverage Expansion, insurance coverage was extended to high-cost, previously non-covered but medically necessary services. Reforms also strengthened coverage for four major serious diseases (cancer, cardiovascular disease, cerebrovascular disease, and rare and intractable diseases), abolished additional physician choice fees, expanded insurance coverage for multi-bed hospital rooms, and introduced comprehensive nursing care services (Ministry of Health and Welfare 2015).

Building on these reforms, the government launched the National Responsibility Policy for Dementia in 2017. The policy reduced cost-sharing for patients with severe dementia, expanded insurance coverage for MRI examinations for suspected dementia, and included standardized neurocognitive diagnostic tests under the NHI, thereby substantially reducing financial barriers to dementia diagnosis and treatment (Ministry of Health and Welfare 2017).

Evolution of the Long-Term Care Insurance Program

South Korea introduced the LTCI program in July 2008 to provide publicly financed long-term care services for older adults with functional limitations who require assistance with the activities of daily living, such as eating, bathing, dressing, and mobility. Since its introduction,

the LTCI system has undergone several major reforms that progressively expanded eligibility, particularly for older adults with dementia and cognitive impairment.

Eligibility for LTCI is determined through a standardized assessment score administered by the National Health Insurance Service (NHIS). Following an application, trained NHIS assessors conduct home visits to evaluate applicants' physical and cognitive functioning and long-term care needs. Based on the assessment results and physician documentation, the LTCI Needs Certification Committee determines eligibility and benefit grade. Eligible beneficiaries may then receive either home-based or institutional care services, with copayment rates of approximately 15 percent and 20 percent, respectively.

At its introduction in 2008, the LTCI system consisted of three eligibility grades based on assessment scores: Grade 1 (95 points or higher), Grade 2 (75–94 points), and Grade 3 (55–74 points). Grade 1 represented the highest level of care needs and the most severe functional impairment, followed by Grades 2 and 3. Accordingly, beneficiaries in Grades 1 and 2 were eligible for both institutional and home-based care, whereas Grade 3 beneficiaries were eligible only for home-based services. The assigned care grade determined not only the types of services available but also the maximum monthly LTCI benefits, with higher-need beneficiaries receiving more generous benefit ceilings.

The LTCI program subsequently expanded coverage through two main mechanisms. First, the government broadened eligibility by lowering the threshold for Grade 3 beneficiaries. Second, it expanded coverage to older adults with dementia by introducing new dementia-specific eligibility categories.

The first mechanism involved two successive reductions in the Grade 3 eligibility threshold. In July 2012, the threshold was lowered from 55 to 53 points, resulting in approximately 39,000 additional beneficiaries. In July 2013, it was further reduced from 53 to 51 points, expanding eligibility to an additional 24,000 individuals.

The second mechanism expanded LTCI eligibility for individuals with dementia. In July 2014, the grading system was restructured from three to five grades, and Grade 5 was introduced for older adults with mild dementia. Eligibility required both the standard LTCI needs assessment and physician certification of dementia. Individuals with severe dementia who had substantial limitations in activities of daily living were already eligible under Grades 1–3 before the reform. Consequently, Grade 5 primarily expanded LTCI coverage to individuals with mild dementia who had previously been ineligible.

TABLE 1 LTCI grade and monthly maximum benefits (as of 2026)

Policy Changes	Grade 1	Grade 2	Grade 3	Grade 4	Dementia	
					Grade 5	Cognitive Support Grade
Institution Care	✓	✓				
	$1,887	$1,750	$1,653			
Home Care	✓	✓	✓	✓	✓	
	$1,698	$1,575	$1,033	$953	$817	$457
Day/night care center	✓	✓	✓	✓	✓	✓
		$1,647	$1,520	$1,479	$1,437	
July 2008	≥ 95 pts	75–94 pts	55–74 pts	—	—	—
July 2012			53–74 pts	—	—	—
July 2013			51–74 pts	—	—	—
July 2014			60–74 pts	51–59 pts	45–50 pts	—
Jan. 2018			—	—	—	<45 pts

Sources: Ministry of Health and Welfare (2017); Ministry of Health and Welfare (2025).

Note: According to National Health Insurance Service (2026):

Grade 1—Individuals who require complete assistance with activities of daily living (ADLs), with an LTCI assessment score of 95 or higher.

Grade 2—Individuals who require substantial assistance with ADLs, with a score of 75 to less than 95.

Grade 3—Individuals who require partial assistance with ADLs, with a score of 60 to less than 75.

Grade 4—Individuals who require partial assistance with ADLs, with a score of 51 to less than 60.

Grade 5—Individuals with dementia and an assessment score of 45 to less than 51.

Cognitive Support Grade—Individuals with dementia and an assessment score of below 45.

In January 2018, the government introduced the Cognitive Support Grade, making individuals diagnosed with dementia eligible for LTCI regardless of their level of physical functional impairment. Beneficiaries in this category primarily received cognitive intervention programs through community-based day-care centers. Similar to Grade 5, the reform mainly targeted older adults with cognitive impairment who had previously been excluded from LTCI coverage because they lacked substantial physical functional limitations.

In addition to expanding eligibility, the government also reduced financial barriers to LTCI utilization. In August 2018, eligibility for reduced copayments was expanded from households with income below 50% of the median income to all households below 100% of the median income. Subsidy rates for low-income beneficiaries were also increased: households below 50% of the median received copayment reductions from 50% to 60%, while households with

incomes between 51% and 100% of the median became eligible for a 40% copayment reduction. Approximately 214,000 beneficiaries were affected by this reform in 2018.

Taken together, these reforms progressively expanded LTCI coverage by broadening eligibility and reducing financial barriers to long-term care services. The staggered expansion of LTCI coverage provides a valuable institutional setting for examining whether expanded access to long-term care substitutes for or complements healthcare utilization among older adults.

Literature Review

Most studies examining the relationship between long-term care and healthcare utilization in Korea have focused on the 2008 introduction of the LTCI program (Kim and Lim 2015; Kim and Kwon 2021; Kim and Mitra 2022). The introduction of LTCI represented the largest and most clearly identifiable policy shock, making it particularly well-suited for causal evaluation because it was not confounded by subsequent policy reforms.

Overall, the evidence consistently suggests that LTCI reduced inpatient healthcare utilization, particularly hospital admissions, length of stay, and long-term care hospital use, while outpatient utilization remained largely unchanged. These findings support the view that long-term care services can substitute for inpatient healthcare, especially among older adults with substantial care needs.

For example, Cho and Kwon (2023) analyzed the implementation of LTCI using NHIS claims data for older adults between January 2008 and June 2009. Applying a generalized difference-in-differences design around the eligibility thresholds for Grades 2 and 3, they found that the introduction of LTCI had no significant effect on outpatient visits but reduced inpatient admission rates by 2.7 percent and length of stay by 15.6 percent. In particular, prolonged hospitalizations among Grade 2 beneficiaries declined, suggesting substitution between LTCI and NHI services. Similarly, Kim and Lim (2015) employed a regression discontinuity design to evaluate the initial effects of LTCI eligibility on informal care, LTCI expenditures, and medical expenditures. Their analysis found reductions in medical expenditures during the first year following implementation, although they did not examine healthcare utilization volumes.

Subsequent studies reached broadly similar conclusions. Kim et al. (2013, 2015), Kim and Mitra (2022), Shin (2022, 2025), and Sohn et al. (2025) consistently reported reductions in hospitalization, length of stay, inpatient expenditures, and long-term care hospital utilization among LTCI beneficiaries. Some studies also documented crowding-in effects, in which public LTCI

spurred additional family caregiving or private long-term care expenditures when public benefits were insufficient. Overall, the Korean literature suggests that LTCI is particularly effective for older adults with greater care needs and that better coordination between LTCI and NHI may improve healthcare efficiency.

More recently, Kim (2025) provides the most comprehensive evaluation of Korea's LTCI reforms between 2008 and 2018. Using regression discontinuity and event-study designs, the study finds that LTCI expansion reduced healthcare utilization among beneficiaries with severe functional limitations, as well as recipients of the Cognitive Support Grade. However, the analysis focuses on overall healthcare utilization and therefore provides limited evidence on the disease-specific mechanisms underlying these effects. In addition, the study examines LTCI reforms in isolation and does not account for the concurrent expansion of NHI coverage for dementia. Consequently, it remains unclear whether the observed changes in healthcare utilization are attributable to expanded long-term care services, reduced medical cost-sharing, or the interaction between the two systems.

Beyond eligibility expansions, recent studies have also examined other policy initiatives aimed at strengthening long-term care. For example, Choi et al. (2024) found that integrated care pilot programs reduced hospitalizations, particularly among high-utilization patients, by preventing unnecessary social admissions. Similarly, Kim and Yoo (2025) showed that reductions in LTCI copayments decreased avoidable hospitalizations and long-term care hospital stays, especially among low- and middle-income older adults. Together, these studies suggest that both expanding LTCI eligibility and reducing financial barriers to long-term care can improve healthcare efficiency by substituting for potentially avoidable hospital care.

International Evidence

Evidence from other countries likewise suggests important interactions between long-term care and healthcare utilization, although the magnitude and direction of the effects vary across institutional settings.

Japan provides particularly relevant evidence because Korea's LTCI system was largely modeled on Japan's. Using a regression discontinuity design, Takahashi (2023) examined the effects of more generous home-care benefits under Japan's LTCI program. The study found that increased benefit generosity substantially increased LTC utilization but did not improve health outcomes or reduce nursing home admissions.

Evidence from Europe also suggests that long-term care may substitute for healthcare utilization. Using administrative data from Spain, Serrano-Alarcón and colleagues (2022) exploited variation in eligibility for long-term care benefits and found that access to LTC benefits reduced avoidable hospital admissions and emergency department visits, particularly among individuals with greater care needs. Similarly, evidence from England highlights the importance of coordinating healthcare and long-term care systems. Liu et al. (2021) and Spiers et al. (2019) found that greater availability of residential and nursing care reduced hospital readmissions, delayed discharges, and inpatient expenditures, although evidence regarding home-based care and primary care utilization remains limited. Longo et al. (2023) further showed that interactions between long-term care and healthcare expenditures may indirectly influence mortality, emphasizing the importance of integrated health and social care systems. These findings suggest that expanding access to long-term care can improve the efficiency of healthcare systems by reducing avoidable hospital utilization while strengthening coordination between health and social care.

Evidence from China's LTCI pilot programs similarly supports a substitution effect between long-term care and healthcare services. Several studies report reductions in outpatient visits, inpatient admissions, and healthcare expenditures following the introduction of LTCI, while also documenting improvements in self-reported health and life satisfaction (Feng et al. 2020; He et al. 2025; Yang et al. 2023; Li et al. 2024; Yin et al. 2024). For example, Feng et al. (2020) exploited regional variation in the introduction of LTCI between Shanghai and neighboring cities using a difference-in-differences design and found that LTCI reduced healthcare expenditures, suggesting substantial potential cost savings through substitution from healthcare to long-term care services.

Research Gaps and Contribution

Overall, the existing literature consistently suggests that long-term care services can substitute for inpatient healthcare utilization, particularly among older adults with substantial care needs. Nevertheless, several important gaps remain.

First, most Korean studies focus on the initial introduction of LTCI in 2008, whereas considerably less attention has been paid to subsequent policy expansions. Second, although previous studies generally estimate the overall effects of LTCI on healthcare utilization, relatively little is known about the mechanisms underlying these effects. In particular, few studies distinguish healthcare utilization by disease group, making it difficult to determine whether long-term care substitutes for or complements healthcare services for specific medical conditions. Third,

existing studies typically evaluate either LTCI reforms or NHI reforms separately, leaving the interaction between long-term care expansion and healthcare coverage largely unexplored.

The broader research agenda presented in this paper seeks to address these gaps by examining successive LTCI reforms using nationwide NHIS administrative data and quasi-experimental research designs. Particular attention is given to disease-specific mechanisms, heterogeneity across beneficiary groups, and the interaction between long-term care and healthcare services. By examining how public long-term care provision affects healthcare utilization across diseases and policy settings, this study contributes to understanding how long-term care systems can improve the efficiency of healthcare resource allocation in rapidly aging societies.

Data and Empirical Strategy

This study uses the Korea Elderly Cohort Database v. 2.0 (KECDB 2.0) provided by the National Health Insurance Service. This is a stratified random sample consisting of approximately 512,000 older adults, representing roughly 8 percent of the population aged 60–80 years in 2008. The cohort is longitudinally followed from 2002 through 2019 and contains detailed individual-level information on healthcare utilization, healthcare expenditure, and demographic characteristics. More specifically, the dataset includes information on socioeconomic characteristics, including age, sex, insurance type, income proxy, disability status, region of residence, and mortality. It also contains detailed healthcare utilization records, including inpatient and outpatient claims and diagnostic information coded according to ICD-10. In addition, the database includes long-term care information, such as LTCI application records, eligibility grades, and LTC service utilization. However, LTCI-related information is only available for individuals who applied for LTCI benefits between 2008 and 2019. Facility-level characteristics of hospitals and long-term care institutions are also available.

Empirical Design

This paper is part of a broader research agenda examining successive LTCI policy reforms implemented between 2008 and 2018. The broader project consists of two parts. The first examines the introduction of LTCI in 2008 and the subsequent eligibility expansions implemented in 2012 and 2013, while the second investigates the 2018 dementia policy package, which simultaneously expanded LTCI and dementia-related NHI benefits. Because the latter analysis is still ongoing, this paper focuses on the 2008, 2012, and 2013 LTCI reforms.

Because LTCI assessment scores are observed only for individuals who applied for LTCI, the empirical analysis is restricted to the applicant sample rather than the full population. The unit of analysis is the individual observed over six-month periods of healthcare utilization. Healthcare utilization is aggregated into six-month intervals relative to each applicant's assessment period rather than calendar time, ensuring comparable pre- and post-reform observation windows across applicants.

The empirical analysis distinguishes between the introduction of LTCI in July 2008 and the subsequent eligibility expansions implemented in July 2012 and July 2013. The 2008 reform introduced an entirely new public insurance program and therefore generated a large policy shock. Since no additional eligibility reforms were introduced until July 2012, the effects of the initial introduction are examined using aggregated healthcare utilization across both two and four consecutive six-month periods. The regression discontinuity (RD) analysis uses a bandwidth of three assessment-score points around the original Grade 3 eligibility cutoff of 55, comparing applicants with assessment scores of 55–57 (eligible) and 52–54 (ineligible).

By contrast, the 2012 and 2013 reforms expanded the existing LTCI program by lowering the Grade 3 eligibility threshold from 55 to 53 points in July 2012 and from 53 to 51 points in July 2013, thereby extending eligibility to older adults with relatively milder functional limitations. Because these two eligibility expansions occurred only one year apart, healthcare utilization is observed during the two six-month periods before and after each reform in order to minimize contamination from subsequent policy changes, although some overlap in the post-reform observation periods cannot be completely ruled out.

For example, in the 2012 reform, applicants assessed during the second half of 2012 contributed observations on healthcare utilization from the second half of 2011 and the first half of 2012 as the two pre-reform periods, and observations from the second half of 2012 and the first half of 2013 as the two post-reform periods. Following the reduction of the Grade 3 eligibility threshold from 55 to 53, applicants with assessment scores of 53–54 became newly eligible for LTCI, whereas applicants with scores of 51–52 remained ineligible throughout the observation period. Thus, the policy generated plausibly exogenous variation in LTCI eligibility among applicants with otherwise similar levels of functional impairment. The 2013 analysis is constructed analogously around the new eligibility cutoff of 51.

To estimate the causal effects of expanded LTCI eligibility, this study employs a fixed-effects regression discontinuity difference-in-differences (RD-DID) design. The RD component compares applicants with assessment scores immediately above and below each eligibility cutoff, thereby

minimizing selection bias by comparing individuals with similar care needs. The DID component compares changes in healthcare utilization before and after each policy reform for applicants above and below the relevant cutoff, removing pre-existing differences around the threshold. Individual fixed effects control for time-invariant unobserved heterogeneity, while time fixed effects absorb common time shocks affecting all individuals.

The estimating equation is

$$Y_{it} = \alpha_i + \beta_1 ELIG_i \times POST_t + \beta_2 f(c_i) + \beta_3 X_{it} + \mu_t + \varepsilon_{it}$$

where Y_{it} denotes healthcare utilization for individual i during the six-month period t. $ELIG_i$ equals one if the individual's LTCI assessment score exceeds the eligibility cutoff, and $POST_t$ equals one for the application half-year and the subsequent half-year (t=0,1), and zero for the two preceding half-year periods (t=−2,−1). The running variable, c_i, is defined as the normalized assessment score relative to the policy cutoff, such that the cutoff equals zero. The function $f(c_i)$ represents a flexible polynomial in the running variable. The model additionally includes individual fixed effects (α_i), time fixed effects (μ_t), and time-varying covariates (X_{it}). Standard errors are clustered at the individual level.

The coefficient of interest (β_1) captures the intention-to-treat (ITT) effect of becoming eligible for LTCI due to the policy reform. Because eligibility does not necessarily imply actual utilization of LTC services, the estimates capture the average effect of expanded eligibility rather than the effect of service utilization itself. By exploiting policy-induced variation in eligibility rather than actual service use, the analysis avoids endogeneity arising from individuals' healthcare needs or decisions to use LTC services.

Because each eligibility expansion affected a relatively small number of applicants near the cutoff, the 2012 and 2013 reforms are stacked into a single analytical dataset to obtain pooled estimates. This stacked RD-DID specification improves statistical precision while estimating the average effect of the two eligibility expansions.

Finally, comparing the estimated effects of the 2008 introduction with those of the 2012 and 2013 eligibility expansions provides an additional validity check. If similar effects are observed across these independent policy reforms, the findings are less likely to reflect coincidental changes in healthcare utilization at a particular point in time and more likely to represent the causal effect of expanded LTCI eligibility. The two sets of reforms, therefore, provide complementary sources of identification, allowing the effects of both a large-scale program introduction

and subsequent incremental eligibility expansions to be examined within a unified empirical framework.

Validity Checks

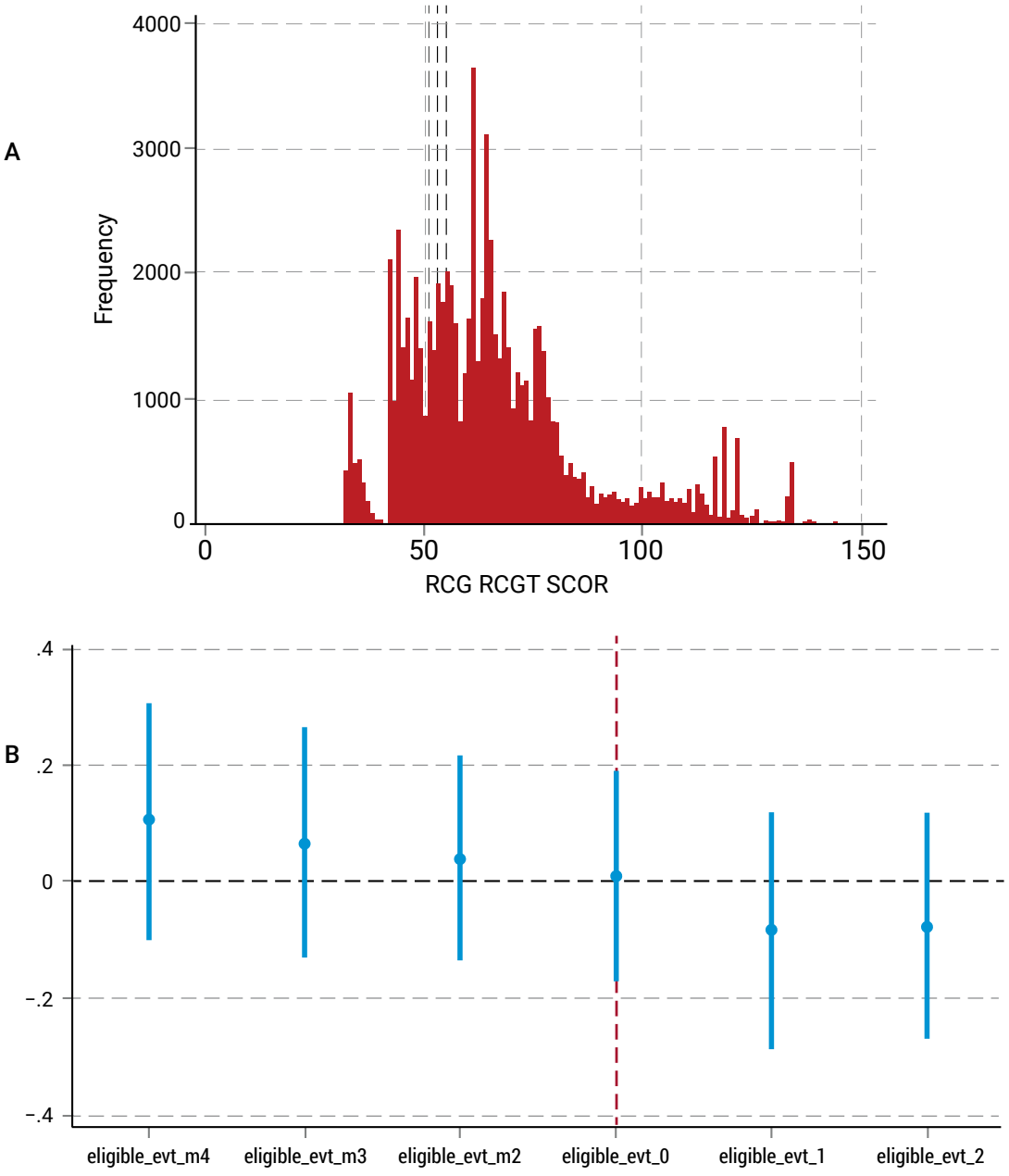
Before presenting the main results, I assess the validity of the identification assumptions underlying the RD-DID design. Specifically, I examine the key assumptions of the regression discontinuity design, including the absence of manipulation of the running variable and covariate balance around the eligibility thresholds. I also test the parallel trends assumption required for the difference-in-differences framework.

The first identifying assumption of the RD design is that applicants cannot precisely manipulate their LTCI assessment scores around the eligibility threshold. This assumption is plausible because assessment scores are determined through standardized evaluations conducted by trained NHIS assessors and are subsequently reviewed by the LTCI Needs Certification Committee, leaving little scope for strategic manipulation by applicants. Figure 1 plots the distribution of assessment scores around each eligibility cutoff and reveals no evidence of bunching or discontinuities. Although a formal McCrary (2008) density test could not be implemented because of software limitations, the visual evidence is consistent with continuity of the running variable and therefore supports the identifying assumption of the RD design.

The second RD validity check examines whether predetermined individual characteristics are balanced around each eligibility cutoff. Each baseline covariate is regressed on the eligibility indicator while controlling for the running variable. The results indicate that applicants immediately above and below the cutoffs are largely comparable in terms of observed characteristics. Although a small number of covariates exhibit statistically significant discontinuities around the 2012 and 2013 cutoffs, these variables are included as controls in all subsequent estimations. Overall, the covariate balance tests support the validity of the local comparisons around the eligibility thresholds.

Finally, the DID component requires that, in the absence of the policy reforms, healthcare utilization would have evolved similarly for applicants just above and just below the eligibility thresholds. To evaluate this assumption, I estimate event-study specifications that examine differential trends in the period prior to each policy reform. The estimated pre-policy coefficients are generally small and statistically insignificant, suggesting no systematic differences in pre-reform trends between the treatment and comparison groups.

FIGURE 1 Fixed-effects RD-DID validity check: distribution of LTCI assessment scores and event study



Note: Panel A: Distribution of LTCI assessment scores. Panel B: Event study, 2008 LTCI introduction on inpatient admissions

Source: Author.

Table 2 Fixed effects RD-DID estimation results for 2008 introduction of LTCI (t=−2, −1, 0, 1, bandwidth=2)

Total							
Inp_adm	Outp_visit	Inp_days	inpexp_total	outpexp_total	LTCH_inpadm	LTCH_inpdays	LTCH_inpexp
−0.211*	0.409	−4.440**	−689,503***	53,875	0.0162	0.104	−31,901
(0.108)	(0.956)	(2.181)	(241,963)	(65,696)	(0.0769)	(1.799)	(119,416)

Inpatient admission											
diabetes	hypertension	hyperlipidemia	pneumonia	CRD	brokenbone	chronicbone	bedsore	UTI	sequel	dementia	depression
−0.0497*	0.0358	—	−0.0319*	0.00793	−0.0329	−0.0363	−0.00756	−0.00548	−0.00685	0.00629	0.0126
(0.0283)	(0.0299)	—	(0.0164)	(0.0151)	(0.0229)	(0.0311)	(0.00767)	(0.00778)	(0.0166)	(0.0396)	(0.00831)

Outpatient visit											
diabetes	hypertension	hyperlipidemia	pneumonia	CRD	brokenbone	chronicbone	bedsore	UTI	sequel	dementia	depression
0.247	−0.258	0.0263	0.06	−0.129	0.148	−0.22	0.103	0.0175	0.0681	0.0826	0.101**
(0.181)	(0.184)	(0.0422)	(0.0819)	(0.114)	(0.163)	(0.710)	(0.123)	(0.0355)	(0.106)	(0.0640)	(0.0500)

Source: Author.

Note: *, **, *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Standard errors, clustered at the individual level, in parentheses.

Inp_adm = number of inpatient admissions; Outp_visit = number of outpatient visits; inpexp_total = total inpatient expenditure; outpexp_total = total outpatient expenditure; LTCH_inpadm = number of inpatient admissions at long-term care hospital (LTCH); LTCH_inpdays = LTCH inpatient days; LTCH_inpexp = LTCH inpatient expenditure.

ICD-10 codes: hypertension, I10–I13 and I15; hyperlipidemia, E78; acute respiratory diseases (pneumonia), J12–J18, J20–J22, and J69; chronic respiratory diseases, J40–J47 and J96; fractures, S22, S32, S52, and S72; musculoskeletal diseases, M00–M99; skin diseases, L00–L99; urinary tract infections, N10, N30, and N39; sequelae of cerebrovascular disease, I69; dementia, F00–F03 and G30; depression, F32–F34.

Table 3 Stacked fixed effects RD-DID estimation results for 2012 and 2013 LTCI expansions (t=−2, −1, 0, 1, bandwidth=2)

Total							
Inp_adm	Outp_visit	Inp_days	inpexp_total	outpexp_ total	LTCH_inpadm	LTCH_inpdays	LTCH_inpexp
−0.146*	−1.253**	−2.908*	−324,211*	−140,450***	−0.0501	−1.735	−97,499
(0.0793)	(0.639)	(1.644)	(189,129)	(49,768)	(0.0571)	(1.402)	(109,945)

Inpatient admission											
diabetes	hypertension	hyperlipidemia	pneumonia	CRD	brokenbone	chronicbone	bedsore	UTI	sequel	dementia	depression
−0.0149	−0.00326	−0.00051	−0.0101	−0.0131	0.0132	−0.00918	0.00545	−0.00277	−0.0124	0.0412	−0.0124
(0.0150)	(0.0128)	(0.000433)	(0.00990)	(0.00841)	(0.0219)	(0.0186)	(0.00763)	(0.00533)	(0.0145)	(0.0337)	(0.00850)

Outpatient visit											
diabetes	hypertension	hyperlipidemia	pneumonia	CRD	brokenbone	chronicbone	bedsore	UTI	sequel	dementia	depression
−0.0274	0.0613	−0.0336*	−0.0417	0.131	−0.163	−0.218	−0.0399	0.0689	−0.168	0.419***	0.0322
(0.108)	(0.102)	(0.0174)	(0.0586)	(0.0927)	(0.171)	(0.431)	(0.0945)	(0.0424)	(0.111)	(0.0796)	(0.0392)

Source: Author.

Note: *, **, *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Standard errors, clustered at the individual level, in parentheses.

Inp_adm = number of inpatient admissions; Outp_visit = number of outpatient visits; inpexp_total = total inpatient expenditure; outpexp_total = total outpatient expenditure; LTCH_inpadm = number of inpatient admissions at long-term care hospital (LTCH); LTCH_inpdays = LTCH inpatient days; LTCH_inpexp = LTCH inpatient expenditure.

ICD-10 codes: hypertension, I10–I13 and I15; hyperlipidemia, E78; acute respiratory diseases (pneumonia), J12–J18, J20–J22, and J69; chronic respiratory diseases, J40–J47 and J96; fractures, S22, S32, S52, and S72; musculoskeletal diseases, M00–M99; skin diseases, L00–L99; urinary tract infections, N10, N30, and N39; sequelae of cerebrovascular disease, I69; dementia, F00–F03 and G30; depression, F32–F34.

Results

This section examines whether expanded access to long-term care substitutes for or complements healthcare utilization. While most previous studies have focused on the introduction of LTCI in 2008, relatively little is known about the effects of subsequent coverage expansions or the mechanisms through which LTCI influences healthcare utilization. To fill this gap, I examine the effects of both the initial implementation of LTCI in 2008 and the subsequent eligibility expansions in 2012 and 2013 using the fixed effects RD-DID framework described above.

Table 2 presents the estimated effects of the 2008 LTCI introduction on healthcare utilization, while table 3 reports the pooled estimates for the stacked 2012 and 2013 eligibility expansions. Both the introduction of LTCI in 2008 and the subsequent Grade 3 eligibility expansions in 2012 and 2013 consistently reduced inpatient healthcare utilization during the first year following each reform. However, the magnitude of the reduction was considerably larger for the initial introduction of LTCI than for the later eligibility expansions. These findings suggest that expanding access to long-term care substituted for inpatient healthcare, with the largest effects occurring when LTCI was first introduced to individuals with previously unmet long-term care needs.

To better understand the mechanisms underlying these overall effects, I next examine healthcare utilization by disease group. The reductions in inpatient utilization were primarily driven by hospitalizations related to diabetes, pneumonia, and hyperlipidemia. These conditions are generally considered preventable or manageable through appropriate long-term care and community-based support. The findings therefore suggest that expanded access to LTCI may improve chronic disease management and lower preventable complications, thereby reducing the need for inpatient treatment.

The results also indicate that the relationship between long-term care and healthcare is not purely substitutive. While inpatient utilization declined for several physical conditions, outpatient visits increased for depression and dementia-related conditions following LTCI implementation. These findings suggest that LTCI may complement healthcare by facilitating access to mental healthcare services, improving the detection of cognitive impairment, and increasing the monitoring of patients with dementia. Given that mental healthcare remains relatively underutilized among older adults in Korea, increased outpatient utilization for these conditions likely reflects improved access to appropriate care rather than inefficient overutilization.

Overall, these findings suggest that the effects of LTCI differ across types of healthcare needs. Expanded access to long-term care substitutes for inpatient care for physical conditions that

can be prevented or effectively managed through supportive care, while complementing outpatient care for conditions requiring ongoing assessment and management, particularly depression and dementia. Rather than uniformly reducing healthcare utilization, LTCI appears to shift healthcare use toward more appropriate and potentially more efficient patterns of care.

Discussion and Conclusion

This paper examined the effects of Korea's LTCI reforms on healthcare utilization by exploiting the introduction of LTCI in 2008 and successive eligibility expansions implemented in 2012 and 2013. Using nationwide administrative claims data and a regression discontinuity difference-in-differences design, I find that both the introduction of LTCI and the subsequent eligibility expansions significantly reduced inpatient healthcare utilization. The reduction was substantially larger following the introduction of LTCI, suggesting that the largest substitution effects occurred when long-term care services first became available to older adults with previously unmet care needs.

Disease-specific analyses provide insight into the mechanisms underlying these effects. The reductions in inpatient utilization were primarily driven by hospitalizations for diabetes and pneumonia, consistent with improvements in chronic disease management and the prevention of avoidable hospital admissions. In contrast, outpatient visits increased for depression and dementia-related conditions, suggesting that LTCI improved access to mental healthcare and facilitated the ongoing assessment and management of cognitive impairment. These findings indicate that the relationship between long-term care and healthcare is heterogeneous across healthcare needs: long-term care substitutes for inpatient care for conditions that can be prevented or managed with supportive care, while complementing outpatient care for conditions that require continuous monitoring and treatment.

This study contributes to the literature in three ways. First, whereas previous studies of Korea have focused primarily on the introduction of LTCI in 2008, this paper evaluates subsequent eligibility expansions that have received relatively little attention. Second, by examining healthcare utilization across disease groups, it provides new evidence on the mechanisms through which LTCI influences healthcare utilization. Third, by comparing the effects of the initial program introduction with later eligibility expansions, the analysis shows that the healthcare effects of LTCI depend on both the extent of unmet long-term care needs and the stage of program development.

The findings also have important policy implications. Expanding access to long-term care can potentially improve healthcare system efficiency by reducing avoidable hospitalizations and expanding access to outpatient care for conditions that require continuous management. These results suggest that healthcare and long-term care should be viewed as complementary components of an integrated care system rather than as separate policy domains. Strengthening coordination between the NHI and LTCI systems may therefore improve both the efficiency and quality of care for older adults.

This paper represents the first stage of a broader research agenda on the interaction between long-term care and healthcare in Korea. Future research will examine subsequent LTCI reforms, including the introduction of Grade 5 in 2014 and the 2017–2018 dementia policy package, which simultaneously expanded LTCI eligibility and dementia-related NHI coverage. Evaluating these later reforms will provide a more comprehensive understanding of how long-term care and healthcare policies jointly shape healthcare utilization in rapidly aging societies.

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