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A model to support the young generation by combining mortgage finance and policy pension programs

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요 약

Establishing a supplementary pension system to support young people is necessary when distrust in the national pension is increasing due to discussions on national pension reform and concerns about the depletion of funds. Simultaneously, a comprehensive support plan to improve young people's access to home ownership amid high housing prices is needed. To this end, this study presents a model combining mortgage finance (traditional and reverse mortgages) and policy pension programs to support homeownership and retirement income for young people. The model we propose has a policy effect similar to that of the current policy finance system, which provides low-interest loans to young people to purchase houses. However, instead of this type of support, a portion of the repayment amount is transferred to retirement pension funds for youths. The model is a subsidy program that allows young people to save money in an account and use it as a living fund for retirement. This can be considered a more desirable policy direction for securing the younger generation's retirement income than simply providing low-interest loans to them. The model was evaluated to potentially increase the income replacement ratio of total pension benefits by up to 11.8 percentage points, depending on the size of the mortgage loan.

Key words: national pension, young generation, supplementary pension, mortgage finance, retirement income

Ⅰ. Introduction

Korea has an advanced retirement income security system (national pension, retirement pension, and individual pension), but the system hasn't been in place for a long time, so not many seniors are fully prepared for retirement through pensions.

Currently, to supplement public and private

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pensions, Korea is introducing a basic pension system and a reverse mortgage system (housing pension, farmland pension) that utilizes assets. The basic pension system was introduced for the elderly who could not join the national pension or had very low benefit amounts due to a short enrollment period, while the reverse mortgage system was introduced as a supplementary pension system, allowing the elderly to entrust real estate assets and receive money in the form of a monthly pension. The housing pension (reverse mortgage) is a system that allows the elderly to securitize their housing assets and receive cash payments in the form of an annuity every month to cover living expenses.

Meanwhile, according to the 5th Long-Term Financial Estimates of the National Pension (see Lee, 2023), the national pension fund is expected to be depleted by 2055. Young adults are a generation that is highly anxious about securing old-age income through public pensions due to the potential depletion of the national pension fund. Additionally, they are a generation facing difficulties in purchasing housing due to high housing prices, which also limits their access to supplementary pension systems, such as housing pensions, that can supplement public pensions in old age.

According to Statistics Korea (2023), the number of marriages is decreasing every year, and Lee (2022) showed that the most common reason for the decrease in marriages is the rising cost of marriage, such as buying a house. Therefore, there is a need for a combination of support measures that will not only increase access to home ownership for young people but also increase the amount of pension for retirement income security.

Research on the investments of millennials, primarily those in their 20s and 30s, shows that their top financial goals are ‘saving for a home’ and ‘accumulating retirement assets’ (see Park and Jung, 2020). In this context, Korean retirement pensions (second tier) are, in principle, prohibited from early withdrawal, but exceptions include cases such as buying housing, illness requiring medical treatment for more than six months for the subscriber or the subscriber’s immediate family, bankruptcy, and personal rehabilitation. According to Jung (2023), as of 2021, the number of members who withdrew their retirement pension contributions for these exceptional reasons was 55 thousand, with the total amount reaching KRW 1.9 trillion. Of these, home purchases account for 65.2%, or KRW 1.26 trillion, indicating that if subscribers withdraw their pension contributions to buy a home, the second tier of the retirement income security system could collapse. The high level of anxiety among young people about the retirement income security system is a major threat to Korea’s retirement income security system. The problem

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of old-age income security may become more serious when today's young people reach old age, and the role of the pension system within the current old-age income security framework (national pension-retirement pension-private pension) may be limited. Therefore, to build a stable old-age income security system, it is necessary to promote policies that increase the retirement income of the elderly and alleviate young people's concerns about their future retirement income. Millennials will have a relatively harder time accumulating retirement funds than their parents, but they will need these funds more because they are expected to live longer in retirement (see Byun and Son, 2021).

As a way to achieve this goal, this study proposes a combined model of mortgage finance (traditional and reverse mortgages) and a policy pension system to simultaneously support home ownership and old-age income (pension) for young people. Although house prices have been declining in recent years, they remain high, and interest rates are also elevated, leading to social side effects such as young people avoiding marriage due to the burden of buying a house. Therefore, the model presented in this study can be expected to lower the barriers to home ownership through long-term mortgage financing. This study proposes a retirement income support scheme that can supplement the inadequacy of public and private pensions for young people by designing a product that allows consumers to accumulate a portion of their mortgage repayments (e.g., 10% of their mortgage repayments) into their retirement pension accounts, with the option to withdraw the contributed amount after retirement. This approach has a policy effect similar to the current financing system that provides low-interest loans for young people to purchase homes. However, rather than simply offering low-interest loans, it can be viewed as a subsidy program that allows a portion of the repayment amount to be deposited into young people's retirement pension accounts. Therefore, while this program may offer relatively less accessibility to home ownership compared to low-interest loan programs if considering only home ownership accessibility, it still promotes home ownership through long-term mortgage support and simultaneously supports retirement pensions. In this sense, it represents a more desirable policy direction for ensuring retirement income security for young people.

The introduction of a subsidy policy to revitalize private pensions has been discussed several times in Korea. The combined model of mortgage financing and policy pension system proposed in this study should also be actively considered as part of a subsidy system to increase the amount of old-age pension for young people.

Recently, Lew and Ma (2015), Ma (2022),

Ma and Kim (2019), and Ma and You (2023) have discussed the risk assessment of the current housing pension and measures to expand the pension benefits of housing pensions. These existing studies have primarily focused on retirement income security using real estate assets for middle-aged and older adults who already own their homes. However, this study differs from previous research in that it seeks to propose policy measures to support both homeownership and retirement income security for young adults who do not currently own a home. In other words, while most research on old-age income security has focused on the current elderly and those approaching retirement age, this study stands out by addressing the issue of old-age income security for young people, who are facing anxiety due to the fiscal challenges of the national pension system and the growing instability of the labor market. Research on retirement income security rarely addresses the situation of young adults today. The future income risk that young people will face due to the fiscal risk of the national pension and the unstable labor market is a problem that requires immediate attention. Delaying a solution to this problem until the income risk for young people becomes a reality may result in much higher social costs than addressing it now. Therefore, the purpose of this study, which is to support a stable retirement income security system for young people by linking mortgage finance and policy pension (mortgage loan accumulation retirement pension), is timely and relevant. This study aims to provide a practical alternative through the design of rational policy pension products. It is complementary to existing studies focusing on public and private pensions, and it is significant in that it contributes to the establishment of a comprehensive old-age income security system that includes public and private pensions, as well as supplementary pensions.

This study is organized as follows. Following the introduction in Chapter 1, Chapter 2 discusses options for supplementing the deficient public pension system. Chapter 3 designs a combined mortgage financing and supplemental pension model and examines the potential pension amount available to young adults at retirement. Chapter 4 presents the results of the analysis, and Chapter 5 concludes the study.

II. Plans for Supplementing Inadequate Public and Private Pensions

1. Plans to Subsidize Private Pensions

In this study, we will examine the cases of other countries that subsidize private pensions

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to compensate for the lack of public pensions and increase the rate of private pension participation, as well as the cases of previous studies that discuss the effectiveness of introducing this type of system in Korea.

Subsidizing private pension contributions, such as the Riester Rente program in Germany, is said to be beneficial in that it provides a substantial incentive to contribute to pension savings, thereby increasing the number of low- and middle-income people who use private pensions and reducing the fiscal expenditure on basic pensions due to the potential occurrence of elderly poverty in the future (see Chung and Kang, 2017).

Germany's Riester Rente program provides subsidies for public pensioners to enroll in private pensions that meet certain criteria to make up for shortfalls in the public pension system. The subsidy in Riester Rente consists of a basic subsidy of €154 (with an additional lump sum bonus of €200 for first-time members aged 25 or younger since 2008 to encourage younger people to join), a spousal subsidy of €154 if the member has a spouse, and €185 per child (€300 for those born after 2008). When the subsidies are combined with the additional tax benefits, the government's share of pension contributions ranges from 72% to 44%, depending on the size of the annual income in the previous year. Meanwhile, the New Zealand government introduced the KiwiSaver Scheme in 2007, which aims to increase the participation rate in private pensions through automatic enrollment and subsidized payments to secure people's retirement income and develop the financial industry. Under the auto-enrollment system, all employees in New Zealand aged 18 to 65 are automatically enrolled in KiwiSaver when they start work. The workers also receive a Kick Start grant of NZD1,000 when they first enroll in KiwiSaver, and up to NZD521 a year from the government if they meet the minimum out-of-pocket contribution requirements (at least 3% of gross salary, 2% before 2012). In addition, if workers have been KiwiSaver members for 3 years or more, they can receive a grant of NZD5,000 for a maximum of 5 years at NZD1,000 per year of membership. If a couple purchases their first home together, they can receive a maximum grant of NZD10,000. KiwiSaver has a very high enrollment rate, especially among low-income earners under NZD50,000, who make up a large proportion of the population, and is considered to play a significant role in helping low-income earners secure a source of retirement income. Chung and Kang (2017) estimated that if South Korea were to adopt a system like Germany's Riester Rente, subsidized spending could result in a net savings increase of about twice the amount of money spent.

2. Combination Model of Mortgage Finance and Policy Pension in the EU

The development and provision of various supplementary pension schemes that can complement the inadequate public and private pension systems for retirement security is a global concern (see Al-Umaray et al., 2018). Based on the idea of a combined model of traditional mortgage and reverse mortgage (see Al-Umaray et al., 2018), which was proposed as part of the European Union's efforts to develop new products utilizing real estate assets, this study aims to design such a model for the Korean context and analyze its feasibility.

As a similar study in the Korean market, Ha and Cho (1997) proposed a lifetime housing model that combines long-term mortgage loans and reverse mortgages to promote lifecycle housing stability. They proposed this model to stabilize retirement life and also resolve the instability of the housing market. The EU combination model proposed in the study by Al-Umaray et al. (2018) is a slightly more advanced model than that of Ha and Cho (1997), as it goes beyond the policy of simply combining mortgage loans and reverse mortgage loans as in Ha and Cho (1997). The EU model accumulates some of the repayments of mortgage loans as pension funds for after retirement on behalf of subscribers, with the government granting tax relief benefits to financial institutions. The EU's combined model (a home purchase with tax relief allocated to a pension account) proposes that financial institutions contribute to a pension fund until a consumer reaches state pension age (SPA), at which point the consumer can withdraw cash (in the form of a lump sum or annuity). Young adults need support for both homeownership and retirement income, and this model could be a useful way to promote homeownership among young adults while also allowing them to save for retirement. At retirement, the consumer can withdraw funds accumulated in the retirement account as a lump sum or annuity, and at the same time, the consumer can initiate a reverse mortgage (a lifetime mortgage plan) and receive a lump sum or annuity. Therefore, the total retirement income generated by the EU model is the sum of the withdrawals from the accumulated pension fund from the mortgage loan and the amount from the reverse mortgage annuity.

Ⅲ. Combining Mortgage Finance and Supplementary Pension

1. Designing a Combined Model

Over time, the cash flows of traditional mortgages and reverse mortgages move in opposite directions, and it is necessary to design the actuarial structure of the combined

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model to support young people by considering this characteristic. In Korea, since the housing pension, a reverse mortgage program similar to the U.S. government-guaranteed reverse mortgage (HECM), was introduced in 2007, it has been evaluated as well established. Therefore, the combined model of mortgage finance (traditional mortgage and reverse mortgage) and policy pension program in this study is designed to integrate these elements as shown in 〈Figure 1〉.

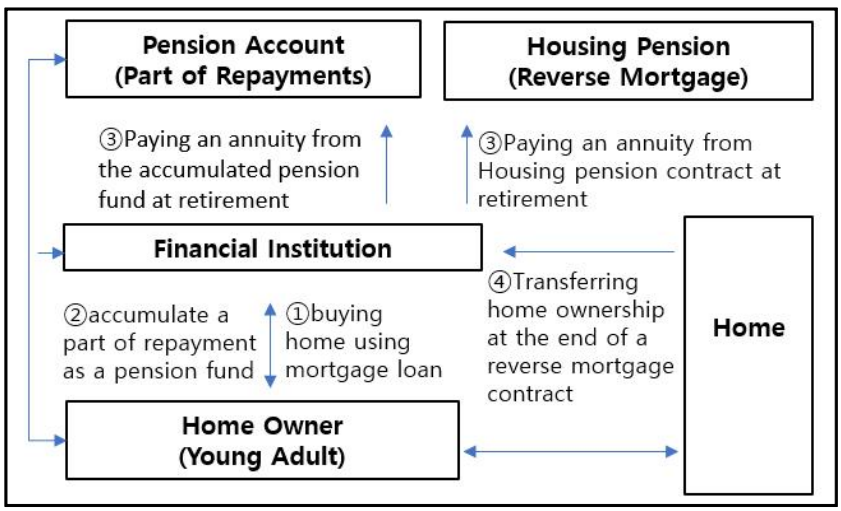
The system flow diagram of the combined mortgage finance and policy pension program model in 〈Figure 1〉 is described more specifically as follows:

① Consumers (young adults) use long-term mortgage loans to purchase homes.

② The financial institution contributes a percentage of the mortgage repayment (e.g., equal to 10% of the repayment) to the consumer's pension account each month and continues to maintain the account after the mortgage contract ends until the consumer reaches retirement age (e.g., age 65).

③ Consumers (young adults) later sign a reverse mortgage (housing pension) contract using the same house when they reach retirement age, and withdraw the pension amount from their accumulated pension account along with the housing pension to fund their retirement.

④ The consumer retains ownership of the home until the end of the reverse mortgage contract, at which time ownership is transferred to the financial institution upon the termination of the reverse mortgage contract.

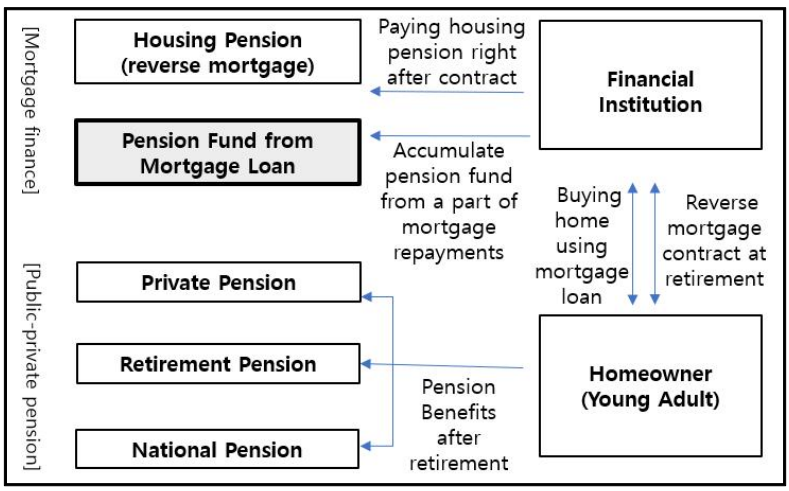


〈Figure 1〉 Structure of the combined model of mortgage finance and policy pension program

This study aims to establish a multilayered old-age security system by integrating pension accounts linked to mortgage finance into the current system, which includes basic pension, national pension, retirement and personal pensions, and supplemental pensions such as housing pensions. For example, in the case of mortgage policy financial support for young people in Korea, the Korea Housing Finance Corporation offers preferential interest rates to low-income young people, newlyweds, and the socially disadvantaged. Additionally, the Housing and Urban Fund provides support for long-term mortgage loans, such as the "Purchase Funding Loan for Newlyweds" and "Steppingstone Loan for Homeownership," at lower interest rates than other mortgage loans on the market. The combined model presented in this study can be a more desirable policy direction for securing old-age income for young people, as it allows them to allocate a portion of their loan repayments to their retirement pension funds rather than merely providing low-interest loans for home purchases.

2. The Amount of Pension Available to Young Adults at Retirement

This study will design a model that combines mortgage finance (both traditional and reverse mortgages) with a policy pension program and analyze its feasibility as part of an effort to develop a new supplemental pension product. For young adults, the combined model will allow them to increase the amount of their retirement benefits,



〈Figure 2〉 Conceptual diagram of the public and private pensions system and mortgage finance linkage model

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including those derived from mortgage loans, as illustrated in 〈Figure 2〉.

The mortgage loan accumulation retirement pension in 〈Figure 2〉 is a program that allows young adults to purchase a home using a long-term mortgage loan, where a certain portion of the monthly repayment (e.g., 10% of the repayment) during the repayment period (e.g., 20 or 30 years) is allocated as a pension reserve in the consumer's account. This accumulated amount can then be withdrawn in the form of an annuity after the support period ends.

If the saved amount at time t of a mortgage loan-funded pension plan is and the total repayment period is n months, the accumulated total future value of the pension fund at time n months in the future can be expressed as follows.

$$FV_{cum} = \sum_{t=1}^{n} c_t \prod_{\alpha=t}^{n} (1+r_\alpha) \qquad \langle \text{Eq. 1} \rangle$$

where FV_{cum}: The cumulative future value of the accumulation after n months

c_t: A part (10%) of mortgage repayment at time t

n: Mortgage repayment period

r_α: Required yield rate at time $t=\alpha$

We can allow contributions to be withdrawn immediately at the maturity of the mortgage (*t*=*n*), or we can allow them to be withdrawn after a certain number of years (d) or at a certain age (e.g., 65) (*t*=*n*+*d*). In this case, the cumulative future value of the accumulation evaluated based on the start point of the withdrawal (*t*=*n*+*d*) can be expressed as follows.

$$FV_{cum}^{d} = FV_{cum} \times \prod_{t=n+1}^{n+d} (1+r_t) \qquad \langle \text{Eq. 2} \rangle$$

where FV_{cum}^{d} : The cumulative future value of the accumulation after n+d months

d: The time period between loan maturity and withdrawal initiation

Assuming a long-term installment withdrawal in the form of an annuity based on the future value of the accumulation, the present value of the total annuity, valued at the beginning of the future withdrawal, can be expressed as follows.

$$PV_{pension} = a \times \sum_{t=n+d}^{n+d+x} \left(\frac{1}{1+j} \right)^{t} \qquad \langle \text{Eq. 3} \rangle$$

where $PV_{pension}$: The present value of the total annuity

a: Monthly pension amount

x: Pension payment period

j: Pension interest rate (fixed rate)

The monthly pension amount of the mortgage loan accumulated pension model is

determined as shown in 〈Eq. 4〉 under the equivalance condition where the cumulative future value of the accumulated amount and the present value of the total pension amount at the withdrawal start point are equal.

$$a = \frac{PV_{pension}}{\sum_{t=n+d}^{n+d+x}\left(\frac{1}{1+j}\right)^{t}} \qquad \langle \text{Eq. 4} \rangle$$

Meanwhile, if we enroll in a housing pension at the start point of withdrawal from the mortgage loan accumulation pension, we can receive a monthly payment from the housing pension separately every month as shown in 〈Eq. 5〉 (see Ma and You, 2023).

$$A = \frac{(PL - p_0)}{\sum_{t=0}^{L-1}\frac{1}{[(1+m)(1+i)^{t}]}} \qquad \langle \text{Eq. 5} \rangle$$

where A: Monthly payment of housing pension

PL: Principal limit (=loan to Value (LTV) of housing pension)

p_0: Initial lump sum guarantee premium

L: Number of months remaining to the life span

m: Monthly guarantee rate

i: Expected interest rate

The monthly payment amount of the housing pension is determined based on the loan limit (PL, principal limit), which is the loan to value (LTV) of the reverse mortgage, as shown in 〈Eq. 5〉.[1] Ultimately, the total pension amount that can be received from mortgage finance at the time of retirement is the sum of the mortgage loan accumulated pension amount (a) and the monthly payment from housing pension (A).

Ⅳ. Analysis Results

1. Assumptions Used in the Analysis

1) Mortgage interest rate

We can examine the time series data of fixed and variable mortgage interest rates (based on new transactions) in the Bank of Korea's database and analyze the trend of mortgage interest rates from January 2013 to November 2023. During this period, mortgage rates stayed below 4.0% per annum but began to rise above 4.0% in 2022. As of November 2023, the average fixed rate is 4.47%, and the average variable rate is 4.49%. In this study,

1) The HECM in the U.S. is known for allowing the highest LTV of any reverse mortgage product currently available in the world. If the borrower is 65 years old, the HECM is known to allow LTV close to 60%, compared to 20% in Australia, 20% for lifetime mortgages in the U.K. (see Alai et al., 2014). While the LTV of Korean housing pension is not known, it can be assumed that the program allowing for high level of LTV as in the HECM because it is designed similarly to the HECM in the U.S.

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we will assume a mortgage rate of 4% for a 20-year term and 4.5% for a 30-year term, based on the mortgage rate levels over the past year.[2)]

2) Housing price

According to the trend of house prices and the year-on-year growth rate derived from the apartment sales price index provided by the Korea Real Estate Board DB between November 2003 and November 2023, the average change rate since 2013 is 1.6%. This is significantly lower than the average change rate of 2.9% for the entire period since 2004, primarily due to the sharp decline in prices since 2022. This study analyzes the long-term average change rate of apartment sales prices assuming 2% and compares the cases of 1% and 3% to see the impact of house price change rate on the results of this study.[3)]

3) Assumptions used in the analysis

The assumptions for all of the variables used in this study's analysis, including mortgage rates and home price growth rate, are as 〈Table 1〉.

2. Estimated Total Pension Benefit amount

1) Case 1 (initial housing price: KRW 300 million, loan maturity: 20 years, housing price growth rate: 2%)

〈Table 2〉 shows the size of the pension amount after retirement (at age 65) that can be provided by the mortgage loan and reverse mortgage loan linkage system.

〈Table 1〉 The assumptions for each of the variables

- Subscriber age: 30 years old
- Housing price: 300 million won, 500 million won
- Mortgage LTV: 30%, 50%, 70%
- Mortgage loan maturity: 20 years, 30 years
- Mortgage interest rate: 4% (20-year maturity), 4.5% (30-year maturity)
- Mortgage loan pension plan contribution: 10% of repayments
- Investment return: same as the mortgage interest rate
- Housing price growth rate: 1%, 2%, 3%
- Initial pension age: 65 years old

LTV, loan to value.

2) For reference, according to data published by the Banking Federation's consumer portal, the average mortgage rates of 16 banks as of November 30, 2023 for mortgage loans with a maturity of 10 years or more is 4.7%.

3) For reference, the long-term forecast for the growth rate of housing prices applied to the monthly payment calculation model of the current housing pension program is also known to be around 2%.

〈Table 2〉 Example of pension amount calculation (assuming housing price: KRW 300 million, loan maturity: 20 years, housing price change rate: 2%) (unit: KRW)

Mortgage subscriber age	30 years old		
Initial housing price	300 million		
Loan amount (LTV)	90 mil. (30%)	150 mil. (50%)	210 mil. (70%)
Loan maturity	20 years		
Loan interest rate	4.0%		
Monthly repayment (CPM)	545,382	908,970	1,272,559
Pension contribution (10% repayment)	54,538	90,897	127,256
Investment return	4.0%		
Initial pension age	65 years old		
Pension fund at age 65 from mortgage loan	36,411,928	60,686,547	84,961,166
Monthly pension amount (a)	196,876	328,127	459,377
Housing price change rate	2.0%		
Housing price at age 65	603,773,899		
Monthly housing pension amount (A)	1,540,920		
Total pension amount (a+A)	1,737,796	1,869,047	2,000,297
Ratio to housing pension (a/A)	0.13	0.21	0.30

Note: 1) The monthly pension payment (a) from mortgage loan is calculated assuming that the pension will be paid for 24 years (288 months) by referring to the life expectancy of a 65-year-old female in the Korean Life Expectancy Table of 23.6 years.

2) Housing pension amount (A) was checked using the "Estimated Housing Pension Search" function on the Korea Housing Finance Corporation website.

LTV, loan to value; CPM, constant-payment mortgage.

As shown in 〈Table 2〉, even for the same home purchase, borrowers with higher LTVs are more likely to be burdened with higher principal payments, leaving them relatively less able to save for retirement income. However, on the other hand, this is the case where the mortgage contribution subsidy will be the largest, so even if the purchase of the home does not allow the borrowers to save enough for retirement income, they will be able to make up for it with the mortgage contribution.

2) Case 2 (initial housing price: KRW 300 million, loan maturity: 20 years, housing price growth rate: 1%)

Future housing price change rate can affect the size of borrowers housing pension benefit at drawdown (age 65): the lower the housing

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price change rate, the smaller the housing pension benefit they will receive. As shown in 〈Table 3〉, compared to the results in 〈Table 2〉 above, we can see that the size of the housing pension payment at retirement (age 65) is significantly reduced (by 68%) from 1,540,920 to 1,048,920 if we assume a lower housing price change rate from 2% to 1%.

3) Case 3 (initial housing price: KRW 300 million, loan maturity: 20 years, housing price growth rate: 3%)

On the other hand, the higher the housing price change rate, the larger the size of the housing pension the borrower will receive at retirement. If we assume an increase in the housing price change rate from 2% to 3%, we can observe that the size of the housing pension payment at retirement (age 65) increases significantly by 137%, from KRW 1,540,920 to KRW 2,109,810 (〈Table 4〉).

4) Case 4 (initial housing price: KRW 300 million, loan maturity: 30 years, housing price growth rate: 2%)

As the maturity of the loan increases, the

〈Table 3〉 Example of pension amount calculation (assuming housing price: KRW 300 million, loan maturity: 20 years, housing price change rate: 1%) (unit: KRW)

Mortgage subscriber age	30 years old		
Initial housing price	300 million		
Loan amount (LTV)	90 mil. (30%)	150 mil. (50%)	210 mil. (70%)
Loan maturity	20 years		
Loan interest rate	4.0%		
Monthly repayment (CPM)	545,382	908,970	1,272,559
Pension contribution (10% repayment)	54,538	90,897	127,256
Investment return	4.0%		
Initial pension age	65 years old		
Pension fund at age 65 from mortgage loan	36,411,928	60,686,547	84,961,166
Monthly pension amount (a)	196,876	328,127	459,377
Housing price change rate	1.0%		
Housing price at age 65	425,658,219		
Monthly housing pension amount (A)	1,048,920		
Total pension amount (a+A)	1,245,796	1,377,047	1,508,297
Ratio to housing pension (a/A)	0.19	0.31	0.44

LTV, loan to value; CPM, constant-payment mortgage.

〈Table 4〉 Example of pension amount calculation (assuming housing price: KRW 300 million, loan maturity: 20 years, housing price change rate: 1%) (unit: KRW)

Mortgage subscriber age	30 years old		
Initial housing price	300 million		
Loan amount (LTV)	90 mil. (30%)	150 mil. (50%)	210 mil. (70%)
Loan maturity	20 years		
Loan interest rate	4.0%		
Monthly repayment (CPM)	545,382	908,970	1,272,559
Pension contribution (10% repayment)	54,538	90,897	127,256
Investment return	4.0%		
Initial pension age	65 years old		
Pension fund at age 65 from mortgage loan	36,411,928	60,686,547	84,961,166
Monthly pension amount (a)	196,876	328,127	459,377
Housing price change rate	3.0%		
Housing price at age 65	856,172,743		
Monthly housing pension amount (A)	2,109,810		
Total pension amount (a+A)	2,306,686	2,437,937	2,569,187
Ratio to housing pension (a/A)	0.09	0.16	0.22

LTV, loan to value; CPM, constant-payment mortgage.

size of the monthly repayment decreases, but the loan principal and interest must be repaid over a relatively longer period.

If the maturity of the loan is increased from 20 to 30 years, the monthly payment decreases by 83.1% from KRW 545,382 to KRW 456,017 (LTV: 30%), KRW 908,970 to KRW 760,028 (LTV: 50%), and KRW 1,272,559 to KRW 1,064,039 (LTV: 70%). However, on the other hand, the accumulated savings at retirement (age 65) will be different because the savings period will be 120 months longer.

As we can see in 〈Table 5〉 the accumulated amount will be increased KRW 36,411,928 to KRW 43,348,791 (LTV: 30%), KRW 60,686,547 to KRW 72,247,985 (LTV: 50%), and KRW 84,961,166 to KRW 101,147,179 (LTV: 70%). As a result, the monthly pension benefit generated by the contributions at retirement would increase by 125%, from KRW 196,876 to KRW 246,405 (LTV: 30%), KRW 328,127 to KRW 410,676 (LTV: 50%), and KRW 459,377 to KRW 574,946 (LTV: 70%).

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〈Table 5〉 Example of pension amount calculation (assuming housing price: KRW 300 million, loan maturity: 30 years, housing price change rate: 2%) (unit: KRW)

Mortgage subscriber age	30 years old		
Initial housing price	300 million		
Loan amount (LTV)	90 mil. (30%)	150 mil. (50%)	210 mil. (70%)
Loan maturity	30 years		
Loan interest rate	4.5%		
Monthly repayment (CPM)	456,017	760,028	1,064,039
Pension contribution (10% repayment)	45,602	76,003	106,404
Investment return	4.5%		
Initial pension age	65 years old		
Pension fund at age 65 from mortgage loan	43,348,791	72,247,985	101,147,179
Monthly pension amount (a)	246,405	410,676	574,946
Housing price change rate	2.0%		
Housing price at age 65	603,773,899		
Monthly housing pension amount (A)	1,540,920		
Total pension amount (a+A)	1,787,325	1,951,596	2,115,866
Ratio to housing pension (a/A)	0.16	0.27	0.37

LTV, loan to value; CPM, constant-payment mortgage.

5) Case 5 (initial housing price: KRW 500 million, loan maturity: 20 years, housing price growth rate: 2%)

If the original home price is relatively high at the time of purchase, the size of the loan repayment will be larger, leading to a larger pension contribution, and consequently, a higher level of pension benefits. Additionally, the size of the housing pension at retirement will be larger, resulting in relatively higher estimated total pension benefits at retirement (〈Table 6〉).

Assuming a higher initial home price of 500 million won instead of 300 million won, the monthly pension benefit generated by the savings at retirement would increase by 167%, from 196,876 won to 328,127 won (LTV: 30%), 328,127 won to 546,878 won (LTV: 50%), and 459,377 won to 765,629 won (LTV: 70%). Meanwhile, the estimated housing pension at retirement (age 65) would increase by 161%, from KRW 1,540,920 to KRW 2,479,740.

〈Table 6〉 Example of pension amount calculation (assuming housing price: KRW 500 million, loan maturity: 20 years, housing price change rate: 2%) (unit: KRW)

Mortgage subscriber age	30 years old		
Initial housing price	500 million		
Loan amount (LTV)	90 mil. (30%)	150 mil. (50%)	210 mil. (70%)
Loan maturity	20 years		
Loan interest rate	4.0%		
Monthly repayment (CPM)	908,970	1,514,951	2,120,931
Pension contribution (10% repayment)	90,897	151,495	212,093
Investment return	4.0%		
Initial pension age	65 years old		
Pension fund at age 65 from mortgage loan	60,686,547	101,144,245	141,601,943
Monthly pension amount (a)	328,127	546,878	765,629
Housing price change rate	2.0%		
Housing price at age 65	1,006,289,832		
Monthly housing pension amount (A)	2,479,740		
Total pension amount (a+A)	2,807,867	3,026,618	3,245,369
Ratio to housing pension (a/A)	0.13	0.22	0.31

LTV, loan to value; CPM, constant-payment mortgage.

6) Summary of analysis results

〈Table 7〉 shows the difference in total pension amounts by loan maturity (20 years, 30 years), initial house price (300 million won, 500 million won), loan LTV (30%, 50%, 70%), and house price growth rate (1%, 2%, 3%) as analyzed in this study.

7) Comparing the effect of mortgage interest rate reduction with that of subsidizing a certain percentage of the repayment (e.g., 10% of the repayment)

In this study, we designed a product in which a portion of the mortgage repayment (e.g., 10% of the repayment) is credited to the consumer's (young adults) pension account, allowing the savings to be withdrawn by the consumer after retirement. This approach has a similar policy effect to the current system of providing low-interest loans to young people; however, instead of offering low-interest loans, it functions as a subsidy program that enables young people to save part of the repayment amount in a retirement pension account for their old age. This can be considered a more desirable policy direction in terms of securing

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〈Table 7〉 Total pension amount that can be procured from mortgage finance (unit: KRW)

Maturity	House price	LTV (%)	Growth rate (%)	Total pension	Ratio
20 years	300 mil.	30	1.0	1,245,796	0.19
			2.0	1,737,796	0.13
			3.0	2,306,686	0.09
		50	1.0	1,377,047	0.31
			2.0	1,869,047	0.21
			3.0	2,437,937	0.16
		70	1.0	1,508,297	0.44
			2.0	2,000,297	0.30
			3.0	2,569,187	0.22
	500 mil.	30	2.0	2,807,867	0.13
		50	2.0	3,026,618	0.22
		70	2.0	3,245,369	0.31
30 years	300 mil.	30	2.0	1,787,325	0.16
		50	2.0	1,951,596	0.27
		70	2.0	2,115,866	0.37

Note: Ratio represents the ratio of the mortgage retirement pension benefit to the housing pension benefit.
LTV, loan to value.

old-age income for young people compared to simply providing low-interest loans (〈Table 8〉).

In this study, we evaluated the effective mortgage rate that would be applied if the subsidy payment (10% of the monthly repayment) were excluded from the proposed model and based on the actual repayment made by the consumer. The effective mortgage rate is 2.81% for a 20-year maturity and 3.62% for a 30-year maturity, as shown in 〈Table 9〉. Thus, for a 20-year maturity, while the contract interest rate is 4.0%, the effective mortgage rate is 2.81%, representing a 1.19% point reduction. For a 30-year maturity, the contract interest rate is 4.5%, but the effective mortgage rate is 3.62%, representing a 0.88% point reduction.

3. Estimated Income Replacement Ratio of Mortgage Retirement Pension Benefit

The national pension is designed so that the income replacement ratio for individuals with

〈Table 8〉 Effect of interest rate reduction (unit: KRW)

Loan maturity	Monthly repayment	Actual repayment	Accumulated amount	Contract interest rate (%)	Actual interest rate (%)	Reduction effect (%p)
20 years	908,970	818,073	90,897	4.0	2.81	1.19
30 years	760,028	684,025	76,003	4.5	3.62	0.88

Note: Housing price: 300 mil., LTV: 50%.

〈Table 9〉 Projections of average subscription period and actual income replacement ratio for new recipients of the national pension old-age benefit

Year	Average subscription period (years)	Actual income replacement ratio (%)
2020	18.6	24.2
2030	20.4	23.2
2040	21.5	22.0
2050	23.3	22.3
2060	27.3	24.9

Source: Jung (2023).
Note: 1) The actual income replacement ratio refers to the ratio of the first-year monthly pension amount to the lifetime average income (B value in the benefit formula) of old-age pension recipients in the given year.

an average income over a 40-year subscription period will be maintained at 40% starting from 2028. Therefore, if a person's lifetime average income is higher than the average income of all subscribers, or if the total subscription period is shorter than 40 years, the actual income replacement ratio may fall below 40%. Jung (2023) presented the projected actual income replacement ratio for new recipients of the national pension (old-age pension), which, as shown in the 〈Table 9〉, is significantly lower than the nominal income replacement ratio of 40%.

According to the study by Choi et al. (2021), the estimated income replacement ratio of the national pension for potential housing pension subscribers aged 65 as of 2019 had an average value of 26.1%, which is slightly higher than the values in 〈Table 9〉. The income replacement ratio for the housing pension was estimated at an average of 38.2%, indicating that the income replacement ratio of the housing pension is higher than that of the national pension.

In the previous 〈Table 7〉, we examined the ratio of mortgage retirement pension benefits

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to housing pension benefits. Therefore, by using the relationship with the income replacement ratio of 38.2% for potential housing pension subscribers in 〈Table 10〉, we can estimate the income replacement ratio of mortgage retirement pension benefits. In the study by Choi et al. (2021), considering that the average property value of the housing owned by the analyzed housing pension subscribers is 492 million KRW, the estimation was based on the 500 million KRW valuation ratio shown in 〈Table 7〉.

The income replacement ratio of the mortgage retirement pension was estimated to reach up to 11.8%, depending on the loan amount (LTV at the time of enrollment). In this case, when added to the income replacement ratio of the national pension and housing pension shown in 〈Table 10〉, a total income replacement ratio of 76.1% (=26.1%+38.2%+11.8%) can be achieved. For reference, among EU countries, Southern European nations have the highest actual income replacement ratios for public pensions, with Greece and Italy at 77% and Spain at 79% (see Jung, 2023; 〈Table 11〉).

Ⅴ. Conclusion

As young people's distrust of public pensions grows due to discussions on national

〈Table 10〉 Average income replacement ratio for 65-year-old housing pension subscribers

	Actual subscribers (%)	Potential subscribers (%)
National pension	21.9	26.1
Housing pension	26.2	38.2
Total	48.1	64.3

Source: Choi, et al. (2021).

〈Table 11〉 Estimated income replacement ratio of mortgage retirement pension

LTV	Ratio of the mortgage retirement pension to the housing pension	Income replacement ratio of the mortgage retirement pension
30%	0.13	0.050 (=0.13×0.382)
50%	0.22	0.084 (=0.22×0.382)
70%	0.31	0.118 (=0.31×0.382)

Note: Income replacement ratio of housing pension for potential subscribers: 0.382.
LTV, loan to value.

pension reform and concerns about fund depletion, it is necessary to establish a supplementary pension system that can support old-age pensions to alleviate young people's anxiety about their future income. At the same time, since young people are a generation that faces difficulties in purchasing a home due to high housing prices, it is essential to provide a comprehensive support plan to increase access to home ownership.

To achieve this goal, this study proposes a combined model of mortgage finance (including both traditional and reverse mortgages) and a policy pension system to simultaneously support home ownership and old-age income (pensions) for young people. Despite the recent decline in house prices, they remain high, and interest rates are also elevated, leading to social side effects such as young people avoiding marriage due to the financial burden of buying a home. The model presented in this study is expected to lower the barriers to home ownership through long-term mortgage financing. This study analyzes the potential for providing retirement income support for young people by designing a product that allows them to allocate a portion of their mortgage repayments (equivalent to 10% of their mortgage repayments) to their retirement pension accounts, which can then be withdrawn after retirement.

The model proposed in this study may be relatively less advantageous in terms of accessibility to home ownership for young people compared to the current low-interest mortgage programs. However, as the proposed program still promotes home ownership through long-term mortgage support while simultaneously supporting retirement pensions, it presents a more desirable policy direction in terms of ensuring retirement income security for young people.

The introduction of a subsidy policy to revitalize private pensions has been discussed several times in Korea. In this context, the model combining mortgage finance and the policy pension system proposed in this study should be actively considered as part of a subsidy system to increase the amount of old-age pensions for young people.

According to the result of this analysis, the income replacement ratio of the mortgage retirement pension was estimated to reach up to 11.8% depending on the loan amount.

However, this study has the following limitations. First, by setting up and analyzing a model in which a certain percentage (10%) of mortgage repayments is allocated to a retirement pension account, cases with larger loan amounts receive relatively greater benefits. In the future operation of the actual program, additional discussions on more reasonable support methods, such as setting a cap on the

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amount allocated or allocating a fixed amount regardless of loan size, will be necessary. Secondly, the long-term estimates used in this study, such as mortgage interest rates and housing price growth rates, may differ from actual values, and the cohort effect is not reflected in the life expectancy estimates. It will be necessary to supplement the research findings through various simulation analyses in the future.

Despite these limitations, we can explain the advantages of the combined policy pension and mortgage finance model proposed in this study as follows.

First, by adding a pension account linked to mortgage financing to the existing multi-layered old-age income security system, the security and income stability of the system can be enhanced. Second, this approach can increase the level of retirement income security for young people by allocating a portion of the mortgage repayments to the consumer's pension account, helping to alleviate some of the anxiety about retirement income among young people. Reforming the old-age income security system, including public pensions, requires the agreement of young people, and addressing their concerns about future income is crucial for this agreement. Third, the introduction of pension accounts linked to mortgage financing may serve as an incentive for home purchases using long-term mortgage loans, potentially contributing to the stabilization of house prices in the long run and the revitalization of housing pensions (reverse mortgages). Fourth, this study complements the recent national pension reforms under discussion and is expected to contribute to building a stable multi-layered retirement income security system in Korea. Finally, this study will help raise academic interest in old-age income security for young adults and stimulate further research in this field.

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청년세대를 위한 모기지금융과 정책연금제도 결합모형

마승렬*

Abstract

국민연금의 개혁 논의와 기금고갈에 대한 우려로 공적연금에 대한 불신이 증가하고 있는 상황에서 청년계층의 노후연금을 지원해 줄 수 있는 보충연금제도의 구축이 필요하고, 동시에 높은 주택가격으로 인해 주택구입에 어려움을 겪고있는 청년계층에게 주택소유에 대한 접근성도 높여줄 수 있는 복합적인 지원방안이 필요하다. 본 연구는 이러한 목적을 달성하기 위한 하나의 방안으로서 청년계층의 주택소유와 노후소득을 동시에 지원하기 위한 모기지금융(전통모기지와 역모기지)과 정책연금제도의 결합모형을 제시하였다. 본 연구에서 제안한 모형은 청년계층에 대하여 저리로 주택구입자금을 대출 해주고 있는 현행의 정책금융제도와 유사한 정책 효과가 있지만 저리로 대출해 주는 지원방식 대신에 상환액의 일부금액을 청년계층을 위한 퇴직연금 계정에 적립케 하여 노후 생활자금으로 이용할 수 있도록 만드는 일종의 보조금 지급 프로그램이므로 단순히 저리로 주택구입자금을 지원해주는 경우에 비해 청년계층의 노후소득보장 측면에서 더 바람직한 정책방향이라 할 수 있다. 본 연구에서 제안한 모형은 모기지 대출금의 규모에 따라 전체 연금급여의 소득대체율을 최대 11.8%p 정도 높여줄 수 있는 것으로 평가되었다.

주제어: 국민연금, 청년계층, 보충연금, 모기지금융, 노후소득

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