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The Economic Effect of the Basic Pension and National Health Insurance

– A Social Accounting Matrix Approach

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I Introduction

I Introduction

Korea's Basic Old Age Pension was replaced with the Basic Pension in July 2014, but the old-age poverty rate remains high and much of the population does not benefit from the National Pension. Korea may have achieved astonishing economic growth over the last few decades, but its old-age poverty rate (48.6 percent in 2011) far exceeds the OECD average of 10.9 percent. The Basic Pension, moreover, remains unlinked with other old-age protection schemes such as the National Pension, which, still in its early stages, has large coverage gaps and provides only a modest income replacement rate. It is thus critical to keep track of, and analyze the income protection effect of the Basic Pension and the economic effect of increasing Basic Pension benefits in order to increase the fiscal sustainability of the basic pension system and alleviate old-age poverty.

Based on our recognition of these issues, we analyze, in Chapter III, how the payout of basic pension benefits to elderly households would serve to increase the outputs of various sectors and industries and contribute to increasing incomes for all groups and classes across the economy. The assumptions underlying our analysis are that: (a) elderly households will spend

their pension income in a manner characteristic of elderly citizens, and (b) the old-age pension will help reduce income inequality among elderly households. Our objective is to analyze and verify, in an objective and empirical manner, how the basic pension would improve the standard of living for the elderly and thereby contribute to the national economy at large.

Before proceeding with our analysis, we need first to discuss briefly the methodology of the Social Accounting Matrix (SAM). We use the SAM to estimate and measure the production-inducing and income-generating effects of the basic old-age pension on the national economy, as well as how the pension redistributes income, as measured by the Gini coefficient. Our analysis provides basic information with which policymakers can estimate the micro-level impact of the basic pension policy on old-age poverty.

The National Health Insurance (NHI) scheme is one of the four major social insurances in Korea, and claims, by far, the most government spending of all social insurances (KRW 53 trillion as of 2015). According to the Social Security Fiscal Projections of March 2015, NHI spending is expected to grow rapidly to reach between KRW 694 trillion and KRW 1,099 trillion by 2050. Such rapid growth of NHI spending calls for analyses of the NHI policy effects and measures to ensure their fiscal sustainability. However, the need to find a proper methodology for gauging and analyzing the policy effects of the NHI is

more urgent. In an attempt to go beyond the simplistic cost-effect analysis of the NHI, we apply the SAM in this study to analyze the micro- and macro-level ripple effects of the NHI on the rest of the national economy. More specifically, we focus on identifying the production-inducing effect of households' health insurance spending on hospitals and other providers of medical care and services.

To this end, in Chapter IV, we survey the current status of the NHI in Korea. Afterward, we analyze the economic effects of increasing NHI spending on production and income.

II Methodology of Analysis

1. Social Accounting Matrix (SAM)
2. Creating a macro SAM
3. Creating bridge matrices for micro SAMs

Ⅱ Methodology of Analysis[1]

1. Social Accounting Matrix (SAM)

In this study, we use the SAM methodology to analyze the socioeconomic effect of the Basic Pension (BP) and National Health Insurance (NHI). The SAM, often understood as an expanded version of the input-output tables, is created by combining the data from the input-output tables and the National Accounts. SAMs are used to indicate the relationship between the value added and expenditures of a given country or region (Ko et al., 2014, 100). Generally, depending on the purpose of the research, macro SAMs can be multiplied by bridge matrices in order to divide accounts at the micro-level. The result is called the Micro Social Accounting Matrix, which conveys quantitative information on transactions between groups (Ko et al., 2014, 100). Bridge matrices based on raw micro-data have various applications. The resulting SAM clarifies the correlations between revenue and expenditure in various sectors of a given society and economy (Ko et al., 2014, 100).

1) The brief overview of the SAM methodology provided in this section is intended to facilitate the reader's understanding, and consists mainly of excerpts from Chapter 4, Section 1, of Ko et al. (2014).

2. Creating a macro SAM

Table 1 shows an example of a macro SAM. It consists of correlations between revenue and expenditure across nine items, including production activities, commodities, and labor (Ko et al., 2014, 158-189).

〈Table 1〉 Structure of Macro SAM

Expenditures / Receipts	Activities	② Commodities	③ Labor[1]	④ Capital[1]	⑤ Households	⑥ Firm	⑦ Government	⑧ Capital accounts	⑨ Rest of the world (ROW)	Totals
Activities		Domestic sales							Exports	Total output
Commodities	Intermediate demand				Household consumption		Government consumption	Investment		Total demand
Labor	Labor compensation								ROW to labor compensation	Labor outlay
④ Capital	Operating surplus								ROW to property income	Capital outlay
⑤ Households			Labor income	Distributed profits		Transfers	Transfers		ROW transfers to household	Household income
⑥ Firm				Non-distributed profits	Transfers		Transfers		ROW transfers to firms	Enterprise income
⑦ Government	Product taxes	Tariffs			Income taxes	Corporate taxes			ROW transfers to government	Government Income
⑧ Capital accounts[2]	Depreciation				Household savings	Firm savings	Government savings		Row to net capital transfers	Total savings
⑨ Rest of the world (ROW)		Imports	Labor income to ROW	Property income to ROW	Household transfers to ROW	Firm transfers to ROW	Government transfers to ROW	Foreign savings		Foreign exchange payment
Totals	Total input (production cost)	Total supply	Labor outlay	Capital outlay	Household expenditures	Firm expenditures	Government expenditures	Total investment	Foreign exchange receipt	

Source: Ko et al. (2014), 159.

3. Creating bridge matrices for micro SAMs

In order to create a micro SAM using the control total of a macro SAM, we need a bridge matrix that connects the two matrices (Ko et al., 2014, 174).

Table 2 provides an example of diverse bridge matrices that can be created. If our goal is to analyze the distribution of income by income quintile, we need information on the income transfers among economic actors, which is not found in the input-output tables alone. We thus need to insert the data on income transfers as a separate bridge matrix (Ko et al., 2014, 174).

〈Table 2〉 Bridge Matrix

Expenditures / Receipts	Activities	Commodities	Households	Government	Capital accounts	Rest of the world
Activities		Domestic sales				Exports
Commodities	Intermediate demand		Household consumption	Government consumption	Investment	
Labor	Labor compensation					
Capital	Operating surplus					
Government	Product taxes	Tariffs				
Capital accounts	Depreciation					
Rest of the world		Imports				

Source: Ko et al. (2014), 176.

〈Table 3〉 Separation of Production Activities and Commodities Account

1. Agriculture, forestry and fishery products	12. Electronic and electrical equipment	23. Finance and insurance services
2. Mining and quarrying products	13. Precision instruments	24. Real estate and leasing
3. Food and beverages	14. Transportation equipment	25. Professional, scientific, and technological services
4. Textile and leather products	15. Other manufactured and toll processed goods	26. Business support services
5. Wood, paper, and printing	16. Electricity, gas, and steam	27. Public administration and national defense
6. Petroleum and coal products	17. Water supply, waste, and recycling services	28. Education services
7. Chemical products	18. Construction	29. Medicine and healthcare
8. Non-metallic mineral products	19. Wholesale and retail services	30. Social insurance services
9. Basic metal products	20. Transportation services	31. Social welfare services
10. Fabricated metal products	21. Restaurant and accommodation services	32. Culture and other services
11. Machinery and equipment	22. Information, communications, and broadcasting services	

Source: Ko et al. (2014), 177.

For household-sector items in the macro SAM that needed to be broken down into micro-level items, we used the raw micro-data of the Survey of Household Finances and Living Conditions (SHFLC) and Household Surveys (HS) to divide households into two groups (i.e., elderly and non-elderly), and further divide each group of households into 10 income deciles.

〈Table 4〉 Micro Breakdown of the Household Sector

Exp. / Rev.	Labor	Capital	Households	Firm	Government	Rest of the world
Commodities			Household consumption			
Households	Labor income	Distributed profits		Transfers	Transfers	ROW transfers to household
Firm			Transfers			
Government			Income taxes			
Capital accounts			Household savings			
Rest of the world			Household transfers to ROW			

Source: Ko et al. (2014), 178.

Household revenue is broken down according to the system of categories used in the SHFLC, while household expenditure is categorized according to the system used in the HS.

"Assets" represent the sum of "financial", "real", and "other real" assets included in the raw micro-data of the 2014 SHFLC. The specific assets included under each of the three asset types are listed in Table 5 below.

〈Table 5〉 Types of Assets in the Micro Breakdown of the Household Revenue Vector

Item	Financial assets	Real assets	Other real assets
Household assets	Savings deposits, installment savings (savings with free deposits and withdrawals, installment savings funds, savings and guaranteed-cost insurance policies), deposit savings and funds, stocks and bonds, premiums, other savings, lease deposits on current housing	One's home (detached houses, apartment units, row housing, household units in multi-household buildings, etc.), real estate other than one's home, lease deposits and intermediate payments on mortgages or house prices.	Cars and other assets (facilities and inventories of business owners, construction and farming equipment, animals and plants, golf memberships, resort memberships, jewelry, antiques and artworks, expensive durables, intellectual property rights, etc.)

Source: Won and Chang (2015), 11.

〈Table 6〉 Bridge Matrix for Household Revenue Vector

Income distribution by household type and asset type			Wages (earned income) à assets	Shared profits (property income)	Business-to-household transfers (non-current income)	Government-to-household transfers (transfer income)	Overseas-to-household current transfers (annual income)
⑤ Households	Elderly households	1st decile	0.0042	0.0035	0.0073	0.0014	0.0009
		2nd decile	0.009	0.0064	0.0099	0.0063	0.0085
		3rd decile	0.0159	0.0015	0.0107	0.0008	0.0142
		4th decile	0.0241	0.0176	0.0099	0.0016	0.019
		5th decile	0.0279	0.0145	0.017	0.0049	0.0233
		6th decile	0.034	0.0204	0.0216	0.0108	0.0276
		7th decile	0.0416	0.0409	0.0258	0.0106	0.0328
		8th decile	0.0516	0.0238	0.0237	0.0237	0.039
		9th decile	0.0639	0.0324	0.0344	0.0299	0.0482
		10th decile	0.0991	0.0834	0.11	0.0482	0.0737
	Non-elderly Households	1st decile	0.0129	0.0114	0.0294	0.0068	0.0093
		2nd decile	0.0246	0.023	0.0338	0.0254	0.0229
		3rd decile	0.0292	0.0219	0.0352	0.0229	0.0431
		4th decile	0.0448	0.057	0.0439	0.0663	0.0519
		5th decile	0.051	0.0681	0.0559	0.0905	0.0605
		6th decile	0.0596	0.063	0.0637	0.1034	0.0772
		7th decile	0.0702	0.0987	0.0759	0.1117	0.0866
		8th decile	0.0842	0.0783	0.0723	0.1365	0.0977
		9th decile	0.1015	0.103	0.1055	0.1211	0.1144
		10th decile	0.1507	0.2312	0.2141	0.1772	0.1492
Total			1	1	1	1	1

Source: Won and Chang (2015), 12.

〈Table 7〉 Items in Household Sectors Other Than Household Consumption

	Household-to-business transfers (non-consumption expenditure)	Income taxes (annual income)	Household savings (savings amount)	Private transfers overseas (household expenditure)
Items	Annual loan interest and payments, secured loans (balances), lease deposits, securities investments, repaid debts, business capital, wedding capital, medical expenses, education expenses, living expenses, savings deposits/insurance policies held as loan securities	Income taxes	Installment savings (savings with free deposits and withdrawals, installment savings funds, savings and guaranteed-cost insurance policies), deposit savings (savings and funds), stocks and bonds, and others (futures and options)	Private transfer income

Source: Won and Chang (2015), 13.

〈Table 8〉 Bridge Matrix of Sectors Except Household Consumption

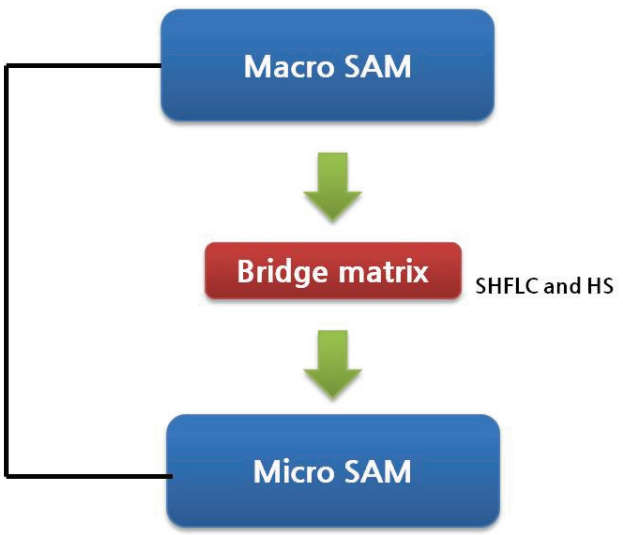
Asset type \ Expenditure item			Household-to-business transfers (non-consumption expenditure)	Income taxes (current income)	Household savings (savings amount)	Private transfers overseas (household expenditure)
⑤ Households	Elderly households	1st decile	0.0003	0.0000	0.0017	0.0002
		2nd decile	0.0055	0.0003	0.0049	0.0063
		3rd decile	0.0102	0.0012	0.0084	0.0122
		4th decile	0.0159	0.0025	0.0156	0.0173
		5th decile	0.0222	0.0042	0.024	0.0213
		6th decile	0.0251	0.0061	0.0328	0.0251
		7th decile	0.0321	0.0088	0.0429	0.03
		8th decile	0.0431	0.0135	0.0576	0.0362
		9th decile	0.054	0.0219	0.0813	0.0441
		10th decile	0.0916	0.0727	0.1154	0.064
	Non-elderly households	1st decile	0.0254	0.0005	0.0027	0.0067
		2nd decile	0.0333	0.0088	0.0079	0.0152
		3rd decile	0.0404	0.0197	0.0134	0.0235
		4th decile	0.0488	0.0319	0.025	0.054
		5th decile	0.0583	0.0439	0.0384	0.0856
		6th decile	0.0626	0.0595	0.0524	0.0909
		7th decile	0.0732	0.0792	0.0686	0.0978
		8th decile	0.0896	0.1048	0.0921	0.1065
		9th decile	0.106	0.1508	0.13	0.1175
		10th decile	0.1623	0.37	0.1847	0.1454
Total			1	1	1	1

Note: The columns and rows have been modified for ease of writing.
Source: Won and Chang

4. Creating micro SAMs

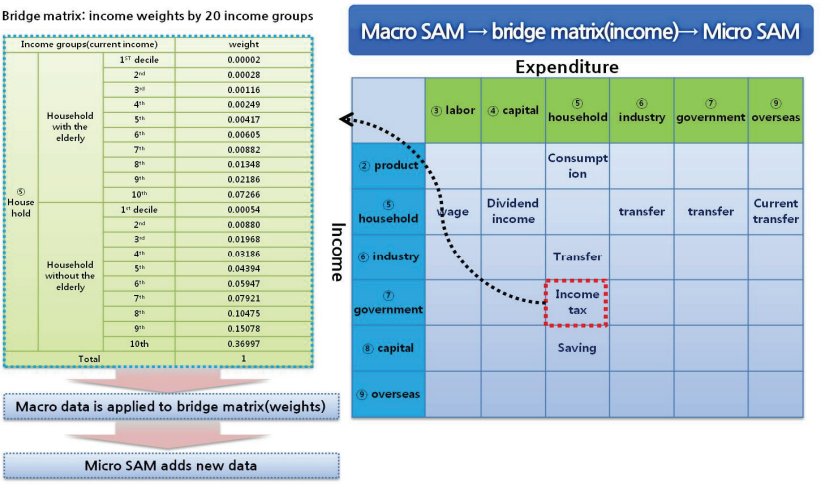
For our analysis, we created a SAM with 90 columns and 90 rows, with the household revenue and consumption items included in the bridge matrix (Won and Chang, 2015, 13).

[Figure 1] SAM Construction Flow Chart



Source: Won and Chang (2015), 13.

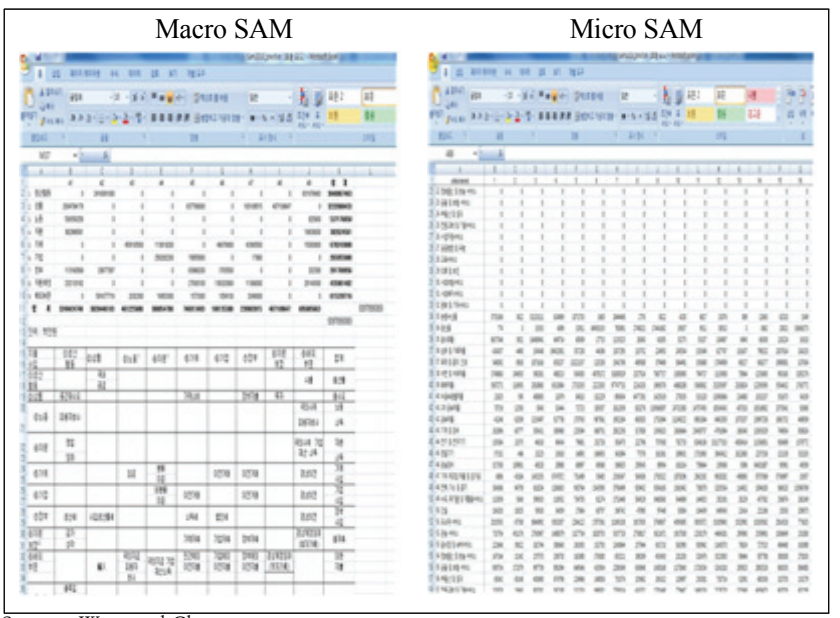
[Figure 2] Process of Creating Micro SAMs: Household Revenue Taxes



Note: Ko et al(2014), KIHASA

Source: Won and Chang

[Figure 3] Macro and Micro SAMs



Source: Won and Chang

5. Creating multiplier matrices

The purpose of this study is to analyze the production-inducing and income-generating effects of the BP and NHI, a task that requires the creation of multiplier matrices. Multiplier matrices indicate the quantitative ripple effects of exogenous changes. The creation of these matrices thus requires the identification of endogenous and exogenous variables (Ko et al., 2014, 109).

A multiplier analysis of the effect of the BP and NHI reveals only the quantitative, fragmentary, and fixed aspects of the ripple effects, rather than providing an in-depth explanation as to why such effects would occur (Ko et al., 2014, 109). The analysis, however, is capable of showing the ripple effects of changes in social security expenditure on all industries of a given economy. A multiplier matrix consists of the following.

If we divide an n-number of endogenous accounts into three categories, i.e., production factors, institutions, and production, we may express the multiplier matrix of our SAM, M_n, using A_n as follows (Ko et al., 2014, 110).

As Equation 3-1 shows, we may express the endogenous accounts as the average expenditure tendency matrix of each sector and each input unit, and convert them into the multiplier matrix of the SAM. Here, x represents the total sum of all exogenous expenditures.

$$y_n = A_n y_n + x = (I - A)^{-1} x = M_n x \quad \cdots\cdots\cdots\cdots\cdots\cdots \quad (1)$$

Where, $A_3 = \begin{pmatrix} O & O & A_{13} \\ A_{21} & A_{22} & O \\ O & A_{32} & A_{33} \end{pmatrix}$

y_n: endogenous accounts, A_n: partition matrix indicating the "average expenditure tendency" of each sector, x: unit input

Here, the total income effect is expressed as $M_n = (I - A_n)^{-1}$, which indicates how each change in the exogenous inputs would affect the endogenous variables (Ko et al., 2014, 112).

III

Basic Pension (BP)

1. Underlying assumptions: fiscal streamlining and tax financing
2. Economic ripple effects of fiscal streamlining
3. Economic ripple effects of tax financing
4. Income redistribution effect of the BP
5. Conclusion

III Basic Pension (BP)[2]

1. Underlying assumptions: fiscal streamlining and tax financing

A. Financing the BP through fiscal streamlining

We posited two different scenarios for the financing of the BP in the future. The first scenario involves fiscal streamlining —namely, reducing government spending on other programs and policies in order to finance the BP. The rates for the decreases in government spending on other programs and policies were obtained in reference to the government spending rates used for each sector in the micro SAMs (Won and Chang, 2015, 14).

2) For more details on the background of our analysis, the current status of the BP, the findings of the fiscal streamlining analysis, and the income redistribution effect of the pension, see Won and Chang (2015).

〈Table 9〉 Fiscal Streamlining: Reducing Government Spending on Other Sectors

(Units: KRW 1 million, %)

Sector	Government spending	Proportion of government spending by industry	Margin of decrease in funding for BP	Balance of government spending for BP
49. Water supply, waste, and recycling services	683,147	0.37	37,636.63	645,510.37
50. Construction	0	0.00	0.00	0.00
51. Wholesale and retail services	0	0.00	0.00	0.00
52. Transportation services	0	0.00	0.00	0.00
53. Restaurant and accommodation services	1,698,040	0.93	93,550.14	1,604,489.86
54. Information, communications, and broadcasting services	0	0.00	0.00	0.00
55. Finance and insurance services	0	0.00	0.00	0.00
56. Real estate and leasing	0	0.00	0.00	0.00
57. Professional, scientific, and technological services	0	0.00	0.00	0.00
58. Business support services	0	0.00	0.00	0.00
59. Public administration and national defense	90,826,543	49.60	5,003,908.01	85,822,634.99
60. Education services	39,789,259	21.73	2,192,110.21	37,597,148.79
61. Medicine and healthcare	42,713,487	23.33	2,353,214.74	40,360,272.26
62. Social insurance services	2,237,659	1.22	123,279.38	2,114,379.62
63. Social welfare services	3,436,051	1.88	189,302.41	3,246,748.59
64. Culture and other services	1,724,329	0.94	94,998.48	1,629,330.52
Total	183,108,515	100	10,088,000	-10,088,000

Note: The total amount of BP payouts is KRW 10.088 trillion, which was the BP budget for 2015.

Source: Won and Chang (2015), 14.

B. Tax financing for the BP

The second scenario involves increasing taxes to finance the BP. In this scenario, households would reduce their expenditure on and consumption of commodities while paying higher income taxes (household-to-government transfers). We

assume that household consumption expenditure would decrease at the predefined rate assigned to each household quantile, in proportion to the increase in their income tax burdens. In other words, in this sub-scenario, we increase the income tax imposed on each of the 20 deciles of households according to the given income tax rates, and assume that households would consume and spend less in proportion to the given household consumption expenditure rates. In our SAM, this would lead to decreases in the expenditure of the household account as well as in "household consumption" on the commodities revenue account, and increases in the expenditure of the household account as well as in "income tax" on the government revenue account. The amount by which income tax would be increased (or the amount by which household consumption would be decreased) is KRW 10.088 trillion, which was the BP budget for 2015.

〈Table 10〉 Additional Tax Burden for the BP: Increasing Income Taxes

(Units: KRW 1 million, KRW 1 billion)

Household revenue decile		To increase			To decrease			BP financing	Additional financing for BP
		Income taxes	Income tax ratio	Margin of increase	Household consumption	Household consumption expenditure ratio	Margin of decrease		
Elderly households	1	1,103.7	0.00002	0.174	2,396,595.95	0.00376	37.907		37.907
	2	18,083.9	0.00028	2.852	2,632,974.19	0.00413	41.646		41.646
	3	73,894.6	0.00116	11.654	2,720,880.03	0.00427	43.037		43.037
	4	159,562.8	0.00249	25.164	2,711,650.24	0.00425	42.891		42.891
	5	266,981.1	0.00417	42.105	3,143,222.74	0.00493	49.717		49.717
	6	387,004.0	0.00605	61.034	3,603,598.57	0.00565	56.999		56.999
	7	564,236.6	0.00882	88.985	4,290,072.56	0.00673	67.857		67.857
	8	862,087.4	0.01348	135.958	5,040,741.37	0.00790	79.730		79.730
	9	1,398,551.3	0.02186	220.563	6,222,059.70	0.00976	98.415		98.415
	10	4,648,008.7	0.07266	733.029	10,525,563.21	0.01650	166.485		166.485
Non-elderly households	1	34,230.4	0.00054	5.398	34,232,897.45	0.05367	541.467	10,088	541.467
	2	563,018.2	0.00880	88.793	40,349,260.08	0.06326	638.211		638.211
	3	1,259,118.9	0.01968	198.573	44,098,880.38	0.06914	697.519		697.519
	4	2,038,269.6	0.03186	321.452	48,103,211.21	0.07542	760.856		760.856
	5	2,810,683.1	0.04394	443.268	52,093,570.04	0.08168	823.973		823.973
	6	3,804,052.1	0.05947	599.931	59,161,365.44	0.09276	935.765		935.765
	7	5,066,609.4	0.07921	799.046	63,896,536.93	0.10018	1010.662		1010.662
	8	6,700,445.8	0.10475	1,056.716	70,442,276.01	0.11045	1114.197		1114.197
	9	9,644,936.0	0.15078	1,521.086	80,131,778.89	0.12564	1267.458		1267.458
	10	23,665,322.6	0.36997	3,732.218	101,990,957.99	0.15991	1613.208		1613.208
Total		63,966,200.3	1	10,088	637,788,093	1	10,088		10,088

Note: The income tax and household consumption ratios are based upon the current income and household consumption expenditure ratios found in the 2014 SHFLC.

Source: Won and Chang

〈Table 11〉 BP Payout Scenarios

Household decile		Public transfer income (KRW 1,000)	Bridge matrix	Macro SAM control total (KRW 1 million)	Public transfer income before BP payout (KRW 1 million)	BP payout (KRW 1 million)	Public transfer income after BP payout (KRW 1 million)	Post-BP payout public transfer income ratio
Elderly households	1	86,715	0.0203	43,360,500	880,921.76	1,440,000	2,322,064.62	0.0434
	2	107,681	0.0252		1,093,911.50	1,440,000	2,535,054.36	0.0474
	3	84,040	0.0197		853,746.93	1,440,000	2,294,889.78	0.0429
	4	87,348	0.0205		887,352.29	1,440,000	2,328,495.15	0.0436
	5	101,731	0.0238		1,033,466.55	1,440,000	2,474,609.40	0.0463
	6	126,614	0.0297		1,286,248.37	1,440,000	2,727,391.23	0.0510
	7	125,956	0.0295		1,279,563.87	1,440,000	2,720,706.73	0.0509
	8	181,798	0.0426		1,846,852.50	-	1,846,852.50	0.0346
	9	208,292	0.0488		2,116,000.18	-	2,116,000.18	0.0396
	10	286,344	0.0671		2,908,916.11	-	2,908,916.11	0.0544
Non-elderly households	1	285,216	0.0668		2,897,456.97	-	2,897,456.97	0.0542
	2	189,548	0.0444		1,925,583.32	-	1,925,583.32	0.0360
	3	178,767	0.0419		1,816,061.12	-	1,816,061.12	0.0340
	4	201,969	0.0473		2,051,765.98	-	2,051,765.98	0.0384
	5	215,393	0.0505		2,188,137.93	-	2,188,137.93	0.0409
	6	270,633	0.0634		2,749,310.95	-	2,749,310.95	0.0514
	7	263,488	0.0617		2,676,726.21	-	2,676,726.21	0.0501
	8	347,940	0.0815		3,534,658.56	-	3,534,658.56	0.0661
	9	388,896	0.0911		3,950,723.05	-	3,950,723.05	0.0739
	10	529,894	0.1241		5,383,095.84	-	5,383,095.84	0.1007
Total		4,268,263	1		43,360,500	10,088,000	53,448,500	1

Source: Won and Chang

2. Economic ripple effects of fiscal streamlining

Our analysis shows that fiscal streamlining for financing the BP would cause the production inducement coefficients to decrease in 32 industries once the BP benefits are paid out. It also had a diminishing effect on the income generation coefficient. However, fiscal streamlining had different effects on income generation in each industry for elderly and non-elderly households. For a more detailed analysis, see Won and Chang (2015).

3. Economic ripple effects of tax financing

A. Production inducement

In our analysis, tax financing for the BP led to a decline in the production inducement coefficients of almost all industries once the BP benefits were paid out, with the exception of the food and beverage industry (3), in which the coefficient increased slightly (from 3.4341 to 3.4376). It should be noted that, while both fiscal streamlining and tax financing exerted diminishing effects on the production inducement coefficients, the margins of decrease were significantly smaller in the case of the latter. In other words, in terms of economic growth, reducing government spending on other programs could lead to opportunity costs greater than the increase in tax burdens. Of the two possible ways to finance the BP, increasing tax burdens would result in lower opportunity costs in terms of economic growth. If economic growth is the main objective, however, it may be unwise to finance the BP by increasing the tax burdens on households and industries.

〈Table 12〉 Production-Inducing Effects of Tax Financing for the BP

	1	2	28	29	30	31	32	Average
Before BP payout	2.7491	2.7312	3.0929	3.0890	3.3388	3.2986	3.0569	3.0028
After BP payout	2.7011	2.6859	2.9809	2.9831	3.2211	3.1887	3.0172	2.9565
Change (%)	-1.75	-1.66	3.62	-3.43	-3.52	-3.33	-1.30	-1.54

〈Table 13〉 Production-Inducing Effects of Tax Financing (Increasing Income Taxes) and BP Payouts on 32 Industries

Industry	1	2	28	29	30	31	32	Average
1. Agriculture, forestry and fishery products	1.3367	0.0391	0.0658	0.0594	0.0685	0.1067	0.0582	0.1062
2. Mining and quarrying products	0.0018	1.1766	0.0025	0.0022	0.0021	0.0032	0.0024	0.0406
3. Food and beverages	0.2358	0.0646	0.1113	0.0856	0.1153	0.1828	0.1050	0.1336
4. Textile and leather products	0.0315	0.0270	0.0415	0.0372	0.0553	0.0596	0.0420	0.0812
5. Wood, paper, and printing	0.0344	0.0198	0.0415	0.0303	0.0483	0.0381	0.0395	0.0865
6. Petroleum and coal products	0.0514	0.0763	0.0528	0.0523	0.0500	0.0606	0.0501	0.0934
7. Chemical products	0.1251	0.0793	0.0666	0.2799	0.0743	0.0797	0.1080	0.1559
8. Non-metallic mineral products	0.0052	0.0049	0.0071	0.0062	0.0074	0.0077	0.0085	0.0572
9. Basic metal products	0.0129	0.0228	0.0158	0.0177	0.0178	0.0198	0.0276	0.1074
27. Public administration and national defense	0.0033	0.0021	1.1551	0.0025	0.0023	0.0027	0.0029	0.0024
28. Education services	0.0414	0.0473	0.0651	1.2357	0.0621	0.0810	0.0668	0.0568
29. Medicine and healthcare	0.0225	0.0237	0.0322	0.0389	1.1929	0.0364	0.0370	0.0280
30. Social insurance services	0.0000	0.0000	0.0000	0.0000	0.0000	1.1577	0.0000	0.0000
31. Social welfare services	0.0089	0.0101	0.0134	0.0166	0.0131	0.0168	1.1739	0.0119
32. Culture and other services	0.0488	0.0571	0.0873	0.0947	0.0863	0.1031	0.0876	1.2646
Total	2.7011	2.6859	2.6688	2.9809	2.9831	3.2211	3.1887	3.0172

Note: Industries 3 to 27 have been omitted.

B. Income-generating effects

The income-generating effect also decreased across all industries in the tax financing scenario. The effect of tax financing on the production activities sector with respect to each household revenue decile was similar to that of fiscal streamlining, but showed relatively greater margins of decrease. In other words, increasing income taxes and reducing household consumption expenditures caused greater losses to the income-generating effect across all industries than did fiscal streamlining. This contrasts with the pattern noted with respect to the production-inducing effect. Policymakers intent on maintaining or increasing household revenue would therefore incur lower opportunity costs by opting for fiscal streamlining instead of tax financing.

〈Table 14〉 Income-Generating Effects of Tax Financing for the BP

	1	2	26	27	28	29	30	31	32	Average
Before BP payout	0.6358	0.7221	1.0357	0.8858	1.0862	0.8624	1.1089	0.9151	0.7613	0.7250
After BP payout	0.6092	0.6864	0.9917	0.8331	1.0272	0.8306	1.0611	0.8742	0.7297	0.6884
Change (%)	-4.18	-4.95	-4.25	-5.95	-5.43	-3.69	-4.31	-4.47	-4.16	-5.05

〈Table 15〉 Income-Generating Effects of Tax Financing (Increasing Income Taxes) and BP Payouts on 32 Industries

Households income decile	1	2	26	27	28	29	30	31	32
67. Elderly households in decile 1	0.0079	0.0079	0.0110	0.0086	0.0110	0.0093	0.0112	0.0093	0.0084
68. Elderly households in decile 2	0.0101	0.0105	0.0153	0.0125	0.0155	0.0129	0.0159	0.0132	0.0116
69. Elderly households in decile 3	0.0112	0.0127	0.0202	0.0173	0.0211	0.0168	0.0219	0.0180	0.0148
70. Elderly households in decile 4	0.0164	0.0184	0.0288	0.0245	0.0299	0.0241	0.0311	0.0255	0.0213
71. Elderly households in decile 5	0.0177	0.0202	0.0321	0.0276	0.0339	0.0268	0.0353	0.0286	0.0236
72. Elderly households in decile 6	0.0194	0.0228	0.0374	0.0325	0.0396	0.0310	0.0417	0.0337	0.0272
73. Elderly households in decile 7	0.0259	0.0295	0.0469	0.0401	0.0492	0.0390	0.0509	0.0414	0.0344
74. Elderly households in decile 8	0.0249	0.0305	0.0515	0.0447	0.0539	0.0431	0.0584	0.0468	0.0373
75. Elderly households in decile 9	0.0314	0.0382	0.0642	0.0556	0.0665	0.0537	0.0707	0.0583	0.0466
76. Elderly households in decile 10	0.0668	0.0721	0.1098	0.0897	0.1080	0.0928	0.1151	0.0961	0.0823
77. Non-elderly households in decile 1	0.0126	0.0124	0.0162	0.0124	0.0158	0.0137	0.0160	0.0135	0.0124
78. Non-elderly households in decile 2	0.0160	0.0165	0.0221	0.0176	0.0222	0.0187	0.0225	0.0188	0.0167
79. Non-elderly households in decile 3	0.0182	0.0204	0.0289	0.0241	0.0301	0.0242	0.0306	0.0253	0.0212
80. Non-elderly households in decile 4	0.0263	0.0291	0.0408	0.0338	0.0423	0.0342	0.0430	0.0356	0.0301
81. Non-elderly households in decile 5	0.0285	0.0322	0.0450	0.0377	0.0470	0.0377	0.0478	0.0395	0.0330
82. Non-elderly households in decile 6	0.0312	0.0364	0.0513	0.0437	0.0542	0.0429	0.0552	0.0455	0.0374
83. Non-elderly households in decile 7	0.0421	0.0474	0.0639	0.0535	0.0667	0.0535	0.0678	0.0561	0.0469
84. Non-elderly households in decile 8	0.0402	0.0488	0.0715	0.0618	0.0764	0.0595	0.0780	0.0640	0.0515
85. Non-elderly households in decile 9	0.0519	0.0626	0.0876	0.0756	0.0935	0.0730	0.0954	0.0783	0.0632
86. Non-elderly households in decile 10	0.1103	0.1178	0.1472	0.1197	0.1504	0.1238	0.1526	0.1267	0.1097
Total	0.6092	0.6864	0.9917	0.8331	1.0272	0.8306	1.0611	0.8742	0.7297

Note: Industries 3 to 25 have been omitted.

4. Income redistribution effect of the BP

For our analysis of the BP's income redistribution, we estimated and evaluated the Gini coefficients of the disposable income of elderly households with respect to three time periods, i.e., the first half of 2014, before BP benefits were paid out; the latter half of 2014, when the payout of BP benefits began; and 2015, during which time BP benefits continued to be paid out. As pension benefits are paid regularly in fixed amounts and constitute a form of transfer income, the Gini coefficients of the disposable income of pension-receiving households appeared to be a good measure of the income redistribution effect of the pension (Won and Chang, 2015, 25).

Our analysis shows that the BP benefits did in fact change the amounts of disposable income earned by elderly households and reduced the Gini coefficient. Pension benefits, in other words, have an empirically proven effect on income redistribution. For more on this analysis, see Won and Chang (2015).

〈Table 16〉 Gini Coefficients Before and After BP Payouts

Period	Gini coefficient
First half of 2014 (before BP payouts began)	0.4944
July to December, 2014 (when BP payouts began)	0.4322
2015 (during which time BP payouts continued to be made)	0.4067

Source: Won and Chang (2015), 27.

5. Conclusion

In an effort to empirically verify the production-inducing and income-generating effects of the BP, this study posited two different scenarios for financing the BP—fiscal streamlining and tax financing—and conducted analyses for both.

The fiscal streamlining analysis showed slight decreases in both production-inducing and income-generating effects across 32 industries.

The tax financing scenario displayed slight variations. While the production-inducing effect of the BP under this scenario decreased in almost all industries when BP payout began, the production-inducing effect on the food and beverage industry (3) increased marginally. Moreover, the margins of these decreases were smaller than those of the fiscal streamlining scenario.

Likewise, tax financing also led to decreases in the income-generating effects of industries when BP payout began, but showed greater margins of decrease than was the case with the fiscal streamlining scenario. This is because the increases in income taxes, coupled with decreases in consumption expenditure, would reduce the income-generating effects on households in the tax financing scenario.

There are a number of policy implications to note with respect to these findings. Most importantly, as fiscal streamlining and tax financing could have different results with respect to production inducement and income generation, policymakers

will need to choose carefully between the two, depending on which goal they seek to accomplish.

It should be said that reducing government spending on other programs, rather than raising taxes, would incur greater opportunity costs in terms of economic growth. However, the case is reversed with respect to generating income. If the more urgent goal is to increase household revenue, fiscal streamlining would mean smaller losses than tax financing in terms of opportunity costs.

IV National Health Insurance (NHI)

1. Scenarios for analysis
2. NHI expenditure and revenue: current status and outlook
3. Creating a SAM for analysis
4. Analysis results
5. Conclusion

IV National Health Insurance (NHI)

1. Scenarios for analysis

There are two different scenarios underlying our analysis of the economic ripple effects of the NHI. The first envisions the spending on NHI increasing by 10 percent, or KRW 4.3915 trillion, from the budget for 2014, which was KRW 43.9155 trillion, while the second involves NHI spending increasing by KRW 10.088 trillion, which was the budget for the BP in 2015. NHI spending includes both insurance benefit payouts and administrative expenses. Given the nature of the methodology used in this study, however, we assume that any increase in NHI spending would lead to an increase in the revenue of the household expenditure-commodities ("29. Medicine and healthcare") of our SAM. In addition, we assume that the consumption expenditures of working-age (non-elderly) households in other sectors would decrease, while the consumption expenditures of all households in the medicine and healthcare industries would increase.

〈Table 17〉 NHI Spending Scenarios for SAM Analysis

Scenario	Description
Assumptions	- Increases in NHI spending are tied to increases in the revenue of household expenditure-commodities ("29. Medicine and healthcare").
Scenario 1	- NHI spending increases by 10 percent from its 2014 level. - Consumption expenditures of working-age (non-elderly) households in other sectors decrease, while consumption expenditures of all households in the "29. Medicine and healthcare" industries increase.
Scenario 2	- NHI spending increases by KRW 10.0881 trillion, which was the budget for the BP in 2015. - Consumption expenditures of working-age (non-elderly) households in other sectors decrease, while consumption expenditures of all households in the "29. Medicine and healthcare" industries increase.

2. NHI expenditure and revenue: current status and outlook

〈Table 18〉 NHI Expenditures and Revenue by Year (2009 to 2013)

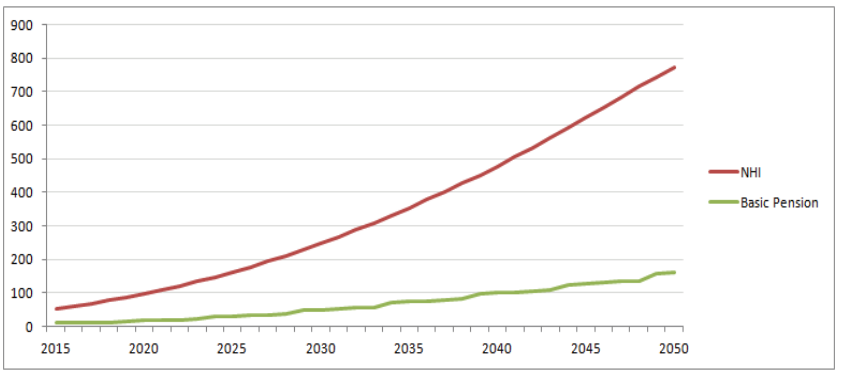
(Unit: KRW 100 million)

Year		2009	2010	2011	2012	2013
NHI revenue	Total (A)	315,004	339,489	387,611	424,737	472,059
	Premiums	261,661	284,577	329,221	363,900	390,319
	Government subsidies subtotal	46,828	48,561	50,283	53,432	57,994
	Fiscal insurance subsidies	36,566	37,930	40,715	43,359	48,007
	Fiscal management subsidies	0	0	0	0	-
	Tobacco allowance	10,262	10,631	9,568	10,073	9,986
	Subtotal	6,515	6,351	8,106	7,405	23,746
NHI expenditure	Total (B)	311,892	349,263	372,587	391,520	412,653
	Insurance benefits	300,409	337,493	358,302	375,813	396,743
	Actual insurance benefits	300,409	337,493	358,302	375,813	396,743
	Recuperation benefits	292,285	328,284	347,828	364,123	384,398
	Actual recuperation benefits	292,285	328,284	347,828	364,123	384,398
	Funeral service expenses	1	0	0	0	-
	Reimbursed out-of-pocket expenses	6	2	1	1	1

Year		2009	2010	2011	2012	2013
	Health promotion expenses	7,088	8,014	8,808	9,585	9,968
	Pregnancy and maternal care expenses	1,029	1,192	1,664	2,104	2,376
	Administrative expenses	6,597	6,751	6,112	6,144	6,309
	Misc. (total)	4,886	5,019	8,173	9,563	9,601
	Business expenses	1,342	1,504	941	988	1,052
	Building maintenance expenses	180	190	222	244	266
	Other organizations' contributions	1,646	2,121	1,786	1,896	2,274
	Other	1,718	1,205	5,225	6,435	6,009

Source: NHIS, NHI Statistics, for each year.

[Figure 4] NHI Expenditure and BP Projections (until 2050)



Source : KIHASA

3. Creating a SAM for analysis

A. Processing raw micro-data to create a bridge matrix

Our empirical analysis first requires the construction of SAMs according to the given scenarios. In both of our scenarios, we assume that NHI expenditures would increase, owing mostly to

decreases in the consumption expenditures of non-elderly households in sectors other than the medical and healthcare industries. We also assume that such decreases would be offset by the increases in all households' consumption expenditures in the medical and healthcare industries. Having assumed that increases and decreases in household consumption expenditures would occur according to the sector-by-sector ratios of consumption expenditures, we needed to identify the respective ratios of the sectors in the elderly and non-elderly household consumption expenditures of our SAM. We used the raw micro-data of the HS to estimate the ratios of sectors in elderly and non-elderly household consumption expenditures by income decile. As Ko et al. (2014) confirm, this process of identifying household consumption expenditures in relation to the input-output tables is crucial, because there is no way of ascertaining such expenditures directly. See Tables 3-19 and 3-20 below for the ratios of elderly and non-elderly household consumption expenditures across 32 industries.

B. Using the bridge matrix to create micro SAMs

Having estimated the industry-by-industry distribution of the consumption expenditures of elderly and non-elderly households by income decile, we created a 32x20 bridge matrix. By multiplying these ratios by the household expenditure-commodities revenue (household consumption) control total of our SAM, we

obtain a 32x20 micro SAM for household consumption.

C. Underlying conditions for analysis

1) Increases in NHI expenditures lead to decreases in the expenditures of working-age households in other sectors and industries.

We posited no exogenous sources for the 10-percent increase in NHI spending, and assumed that such an increase would be possible only by endogenous means, with working-age (non-elderly) households reducing their consumption expenditures in other industries in order to compensate for the increasing cost of the NHI. We estimated the extent to which working-age households' consumption expenditures in 31 industries, excluding the medical and healthcare industries, would decrease by multiplying the sector-by-sector ratios of household consumption expenditures by the KRW 4.3915 trillion increase in NHI spending. We also estimated the decreases in working-age households' consumption expenditures by income decile and industry by calculating the respective ratios of income deciles and industries in working-age households' consumption expenditures. Adding up these decreases would amount to KRW 4.3915 trillion, which is the 10-percent NHI expenditure by which it would increase.

2) Increases in NHI spending increase all households' consumption expenditures in the medical and healthcare industries.

Having estimated the decreases in working-age households' consumption expenditures in other industries, we needed to estimate the distribution of increases in all households' consumption expenditures, amounting to 10 percent of the NHI expenditure in 2014, in the medical and healthcare industries. To this end, we focused on a 1x20 matrix, representing the medical and healthcare industries, in our micro SAM. We then applied the given ratio of the medical and healthcare industries to elderly and non-elderly households' consumption expenditures (Table 3-26).

4. Analysis results

A. Increasing NHI expenditure by KRW 4.3915 trillion

In our first scenario, increasing the NHI expenditure by 10 percent (KRW 4.3915 trillion) from its 2014 level, resulted in a significant increase in the production-inducing effect on the medical and healthcare industries (3.0890 to 3.1627) and marginal decreases in the production-inducing effect on the other 31 industries. As multiple previous studies, including Ko et al. (2014), confirm, the production-inducing effect on the medical

and healthcare industries is neither large nor trivial, so changes in the production-inducing effect on households and other industries would not be significant. The production-inducing effect tends to be significant with respect to the real estate and leasing industries (24) and wholesale and retail service industries (19), and marginal with respect to public administration and national defense (27) and the mining and quarrying products industry (2). This effect on the medical and healthcare industries is somewhere between these extremes.

The decreases in the production-inducing effect on all industries caused the increase in NHI expenditure were far less than those caused by the increases in the BP, mainly because the amounts of money put in and taken out of the matrix under the NHI are smaller than those under the BP and no direct subsidies were provided to households. As already confirmed by numerous previous studies, direct input into households rather than industries would have a better income-redistributing effect by generating income rather than inducing production. Direct input into industries, by contrast, would have a greater production-inducing effect and thereby contribute to economic growth.

Increasing NHI premiums would lead to certain increases in the production-inducing effect on the medical and healthcare industries, but decreases, albeit trivial ones, in the production-inducing effect on all other industries due to the de-

crease in consumption expenditure (revenue). Absent decreases in the consumption expenditure (revenue) of other sectors, such as tax revenue, the overall effects of increasing NHI expenditure may manifest in different ways.

〈Table 19〉 Production-Inducing Effect of Increasing NHI Expenditure by 10 Percent

Industry	1	2	3	4	5	6	7	8	9
Before	2.7491	2.7312	3.4341	3.2922	3.4363	1.6541	3.0702	2.8828	3.2655
After	2.7445	2.7277	3.4311	3.2885	3.4330	1.6523	3.0662	2.8797	3.2611
Change (%)	-0.17	-0.13	-0.09	-0.11	-0.10	-0.11	-0.13	-0.11	-0.14
Industry	10	11	27	28	29	30	31	32	Average
Before	3.0868	3.0926	2.7776	3.0929	3.0890	3.3388	3.2986	3.0569	3.0028
After	3.0828	3.0818	2.7732	3.0888	3.1627	3.3355	3.2957	3.0538	2.9995
Change (%)	-0.13	-0.35	-0.16	-0.13	2.39	-0.10	-0.09	0.10	-0.11

〈Table 20〉 Industry-by-Industry Production-Inducing Effect of Increasing NHI by 10 Percent

	1	2	3	4	5	6	7	8	9	10	11
1	1.3643	0.0399	0.4942	0.0570	0.0874	0.0080	0.0455	0.0321	0.0295	0.0354	0.0345
2	0.0018	1.2014	0.0019	0.0022	0.0025	0.0283	0.0045	0.0058	0.0094	0.0031	0.0022
3	0.2407	0.0660	1.5154	0.0785	0.0752	0.0132	0.0585	0.0527	0.0496	0.0587	0.0577
4	0.0317	0.0272	0.0299	1.5522	0.0422	0.0058	0.0289	0.0256	0.0230	0.0282	0.0261
5	0.0345	0.0199	0.0594	0.0430	1.7198	0.0062	0.0295	0.0376	0.0207	0.0290	0.0238
6	0.0517	0.0768	0.0477	0.0485	0.0551	1.2375	0.1506	0.0812	0.0782	0.0500	0.0408
7	0.1253	0.0795	0.1170	0.1978	0.1711	0.0368	1.7584	0.1215	0.0658	0.1189	0.0974
8	0.0052	0.0049	0.0117	0.0058	0.0087	0.0024	0.0104	1.3946	0.0213	0.0115	0.0127
9	0.0129	0.0229	0.0176	0.0231	0.0202	0.0085	0.0316	0.0437	1.9502	0.3201	0.1815
10	0.0161	0.0372	0.0354	0.0333	0.0252	0.0168	0.0304	0.0428	0.0379	1.3866	0.1341
11	0.0135	0.0249	0.0153	0.0188	0.0200	0.0107	0.0256	0.0252	0.0240	0.0429	1.3947
12	0.0328	0.0432	0.0350	0.0383	0.0410	0.0119	0.0317	0.0397	0.0390	0.0476	0.1302
13	0.0036	0.0037	0.0037	0.0038	0.0041	0.0018	0.0043	0.0046	0.0042	0.0051	0.0138
14	0.0299	0.0603	0.0284	0.0266	0.0315	0.0075	0.0224	0.0334	0.0231	0.0272	0.0325
15	0.0180	0.0293	0.0375	0.1624	0.0490	0.0048	0.0307	0.0327	0.0347	0.0467	0.0528
16	0.0491	0.0788	0.0592	0.0835	0.0997	0.0298	0.0730	0.0824	0.1149	0.0796	0.0599
17	0.0136	0.0126	0.0195	0.0159	0.0489	0.0038	0.0244	0.0312	0.0582	0.0276	0.0169
18	0.0065	0.0081	0.0063	0.0059	0.0065	0.0019	0.0054	0.0059	0.0051	0.0053	0.0057
19	0.1566	0.1239	0.2586	0.2340	0.2161	0.0451	0.1704	0.1624	0.1310	0.1701	0.1782
20	0.0657	0.1796	0.1033	0.0920	0.1157	0.0359	0.0849	0.1458	0.0879	0.0847	0.0801

	1	2	3	4	5	6	7	8	9	10	11
21	0.0559	0.0684	0.0609	0.0665	0.0713	0.0142	0.0535	0.0562	0.0525	0.0598	0.0599
22	0.0552	0.0610	0.0676	0.0686	0.0726	0.0189	0.0545	0.0597	0.0539	0.0595	0.0609
23	0.1039	0.1487	0.1128	0.1161	0.1279	0.0264	0.0902	0.1025	0.0912	0.1057	0.1074
24	0.0861	0.1162	0.0991	0.1104	0.1095	0.0224	0.0794	0.0853	0.0769	0.0900	0.0897
25	0.0236	0.0273	0.0369	0.0382	0.0381	0.0157	0.0386	0.0352	0.0391	0.0353	0.0408
26	0.0200	0.0246	0.0276	0.0332	0.0310	0.0090	0.0244	0.0250	0.0325	0.0269	0.0232
27	0.0034	0.0022	0.0025	0.0019	0.0022	0.0004	0.0015	0.0018	0.0014	0.0017	0.0017
28	0.0418	0.0477	0.0427	0.0450	0.0480	0.0099	0.0352	0.0376	0.0361	0.0433	0.0424
29	0.0228	0.0240	0.0228	0.0225	0.0241	0.0046	0.0176	0.0190	0.0175	0.0218	0.0212
30	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
31	0.0090	0.0102	0.0090	0.0094	0.0100	0.0019	0.0074	0.0079	0.0075	0.0091	0.0089
32	0.0493	0.0576	0.0520	0.0540	0.0583	0.0121	0.0429	0.0488	0.0449	0.0513	0.0499
Total	2.7445	2.7277	3.4311	3.2885	3.4330	1.6523	3.0662	2.8797	3.2611	3.0828	3.0818

〈Table 21〉 Industry-by-Industry Production-Inducing Effect of Increasing NHI by 10 Percent (Omitted)

	27	28	29	30	31	32
1	0.0533	0.0682	0.0620	0.0709	0.1102	0.0595
2	0.0017	0.0026	0.0023	0.0022	0.0033	0.0024
3	0.0896	0.1153	0.0894	0.1194	0.1890	0.1073
4	0.0372	0.0430	0.0388	0.0572	0.0616	0.0423
5	0.0289	0.0430	0.0317	0.0500	0.0394	0.0397
6	0.0387	0.0548	0.0547	0.0518	0.0626	0.0505
7	0.0558	0.0691	0.2961	0.0769	0.0823	0.1083
8	0.0073	0.0074	0.0065	0.0077	0.0080	0.0085
9	0.0175	0.0164	0.0186	0.0184	0.0204	0.0277
10	0.0269	0.0208	0.0192	0.0241	0.0285	0.0361
11	0.0170	0.0143	0.0140	0.0150	0.0166	0.0307
12	0.0511	0.0654	0.0496	0.0692	0.0744	0.0899
13	0.0065	0.0098	0.0179	0.0059	0.0133	0.0065
14	0.0424	0.0422	0.0371	0.0483	0.0415	0.0862
15	0.0219	0.0418	0.0242	0.0322	0.0404	0.0381
16	0.0671	0.1122	0.0835	0.0847	0.1549	0.1010
17	0.0199	0.0225	0.0332	0.0414	0.0308	0.0194
18	0.0314	0.0128	0.0083	0.0179	0.0146	0.0083
19	0.1383	0.1745	0.2066	0.1841	0.1823	0.1709
20	0.0682	0.0727	0.0679	0.0933	0.0849	0.0666

	27	28	29	30	31	32
21	0.0943	0.1351	0.0835	0.1472	0.1227	0.1079
22	0.1010	0.1124	0.0796	0.1719	0.1115	0.1014
23	0.1367	0.1525	0.1524	0.1848	0.1526	0.1481
24	0.1402	0.1672	0.1575	0.2033	0.1607	0.1349
25	0.0343	0.0378	0.0340	0.0513	0.0377	0.0369
26	0.0402	0.0369	0.0301	0.0592	0.0375	0.0438
27	1.2003	0.0026	0.0025	0.0028	0.0030	0.0025
28	0.0676	1.2805	0.0661	0.0839	0.0690	0.0576
29	0.0334	0.0403	1.2892	0.0377	0.0382	0.0284
30	0.0000	0.0000	0.0000	1.1989	0.0000	0.0000
31	0.0139	0.0172	0.0141	0.0173	1.2134	0.0120
32	0.0905	0.0979	0.0919	0.1065	0.0903	1.2803
Total	2.7732	3.0888	3.1627	3.3355	3.2957	3.0538

B. Increasing NHI expenditure by KRW 10.088 trillion

In the second scenario, in which the NHI expenditure is increased by KRW 10.088 trillion, which was the BP budget for 2015, working-age households' consumption expenditure in all industries except the medical and healthcare industries again decreases, while all households' consumption expenditure in the medical and healthcare industries increases. Note that the rates of decrease and increase are the same, and that the only difference from the first scenario is the amount by which the overall NHI expenditure increases. The goal of the second scenario analysis is to forecast how financing the BP and NHI separately would affect Korea's economy at large.

Our analysis shows that, in the second scenario, the increase in NHI expenditure causes the production-inducing effect on almost all industries to decline, and at a significant margin in the case of the food and beverage industry (3) (3.4341 to 3.2774). On the contrary, the production-inducing effect on the medical and healthcare industries rises significantly (3.0890 to 3.2319), and the margins of change in the production-inducing effect differ from industry to industry. The margin of decrease in the amount of working-age households' consumption expenditure on social insurance and welfare services, which take up large proportions of working-age households' consumption expenditure in general, was relatively small.

〈Table 22〉 Production-Inducing Effect of Increasing NHI Expenditure by BP Budget

Industry	1	2	3	4	5	6	7	8	9
Before	2.7491	2.7312	3.4341	3.2922	3.4363	1.6541	3.0702	2.8828	3.2655
After	2.6625	2.6815	3.2774	3.1739	3.3646	1.6063	2.9990	2.8424	3.2221
Change (%)	-3.15	-1.82	-4.56	-3.59	-2.09	-2.89	-2.32	-1.40	-1.33
Industry	10	11	27	28	29	30	31	32	Average
Before	3.0868	3.0926	2.7776	3.0929	3.0890	3.3388	3.2986	3.0569	3.0028
After	3.0367	3.0265	2.7318	3.0119	3.2319	3.3022	3.2512	2.9867	2.948
Change (%)	-1.62	-2.14	-1.65	-2.62	4.63	-1.10	-1.44	-2.30	-1.82

〈Table 23〉 Comparison of Production-Inducing Effects of the BP and NHI (Increased by Same Amount)

Industry	1	2	3	4	5	6	7	8	9
Before increase	2.7491	2.7312	3.4341	3.2922	3.4363	1.6541	3.0702	2.8828	3.2655
BP (fiscal streamlining)	2.6353	2.6204	3.3537	3.1796	3.3222	1.6000	2.9735	2.7906	3.1634
BP (tax financing)	2.7011	2.6859	3.4376	3.2590	3.4052	1.6400	3.0478	2.8603	3.2425
NHI	2.6625	2.6815	3.2774	3.1739	3.3646	1.6063	2.9990	2.8424	3.2221
Industry	10	11	27	28	29	30	31	32	Average
Before increase	2.7491	2.7312	3.4341	3.2922	3.4363	1.6541	3.0702	2.8828	3.2655
BP (fiscal streamlining)	2.9892	2.9952	2.6037	2.9082	2.9103	3.1426	3.1109	2.9436	2.8844
BP (tax financing)	3.0639	3.0700	2.6688	2.9809	2.9831	3.2211	3.1887	3.0172	2.9565
NHI	3.0367	3.0265	2.7318	3.0119	3.2319	3.3022	3.2512	2.9867	2.948

Note that increasing the BP and NHI expenditures by the same amount through fiscal streamlining (i.e., reducing government spending on other programs) results in the largest decreases in the production-inducing effect. Tax financing for the increased BP expenditure and fiscal streamlining for the increased NHI expenditure, on the other hand, led to smaller decreases in the production-inducing effect. In other words, in-

creasing spending on industries rather than households would be the more efficient way of increasing the production-inducing effect. Increasing the NHI expenditure calls for decreases in households' consumption expenditures in all industries except the medical and healthcare industries, and by a relatively greater margin in the social insurance (30) and social welfare (31) service industries. Yet the margins by which the production-inducing effect decreased due to the increase in NHI spending are relatively small, most likely due to the offsetting effect of the significant increases in households' consumption expenditures in the medical and healthcare industries (29).

〈Table 24〉 Production-Inducing Effect by Industry When NHI Expenditure Is Increased (by BP Budget of 2015)

	1	2	3	4	5	6	7	8	9	10	11
1	1.3235	0.0392	0.4721	0.0551	0.0857	0.0078	0.0445	0.0316	0.0292	0.0349	0.0339
2	0.0017	1.1811	0.0018	0.0021	0.0025	0.0275	0.0044	0.0057	0.0093	0.0031	0.0022
3	0.2335	0.0648	1.4475	0.0758	0.0737	0.0128	0.0572	0.0520	0.0490	0.0578	0.0566
4	0.0308	0.0267	0.0285	1.4981	0.0414	0.0057	0.0283	0.0253	0.0228	0.0278	0.0256
5	0.0335	0.0196	0.0568	0.0415	1.6855	0.0060	0.0288	0.0371	0.0205	0.0285	0.0234
6	0.0502	0.0755	0.0456	0.0468	0.0540	1.2030	0.1473	0.0801	0.0773	0.0492	0.0401
7	0.1216	0.0781	0.1118	0.1909	0.1677	0.0357	1.7199	0.1199	0.0650	0.1172	0.0957
8	0.0051	0.0048	0.0112	0.0056	0.0085	0.0023	0.0101	1.3765	0.0210	0.0113	0.0125
9	0.0125	0.0225	0.0168	0.0223	0.0198	0.0083	0.0309	0.0431	1.9269	0.3153	0.1783
10	0.0156	0.0366	0.0338	0.0322	0.0247	0.0163	0.0298	0.0423	0.0375	1.3658	0.1317
11	0.0131	0.0244	0.0146	0.0182	0.0196	0.0104	0.0250	0.0249	0.0237	0.0423	1.3697
12	0.0319	0.0425	0.0334	0.0370	0.0402	0.0116	0.0310	0.0392	0.0385	0.0469	0.1279
13	0.0035	0.0036	0.0035	0.0036	0.0041	0.0018	0.0042	0.0045	0.0041	0.0050	0.0135
14	0.0290	0.0593	0.0271	0.0257	0.0309	0.0073	0.0219	0.0330	0.0228	0.0268	0.0319
15	0.0175	0.0288	0.0358	0.1568	0.0480	0.0047	0.0300	0.0323	0.0343	0.0460	0.0519
16	0.0476	0.0775	0.0566	0.0806	0.0977	0.0290	0.0714	0.0813	0.1135	0.0784	0.0588
17	0.0132	0.0124	0.0186	0.0154	0.0479	0.0037	0.0238	0.0308	0.0575	0.0272	0.0166
18	0.0063	0.0080	0.0060	0.0057	0.0064	0.0018	0.0052	0.0059	0.0051	0.0052	0.0056
19	0.1519	0.1218	0.2470	0.2259	0.2118	0.0438	0.1667	0.1603	0.1294	0.1676	0.1750
20	0.0637	0.1765	0.0986	0.0888	0.1133	0.0349	0.0830	0.1440	0.0868	0.0834	0.0787

	1	2	3	4	5	6	7	8	9	10	11
21	0.0543	0.0673	0.0582	0.0642	0.0699	0.0138	0.0523	0.0555	0.0518	0.0589	0.0589
22	0.0536	0.0600	0.0646	0.0662	0.0711	0.0183	0.0533	0.0589	0.0533	0.0586	0.0598
23	0.1008	0.1462	0.1077	0.1121	0.1254	0.0256	0.0882	0.1012	0.0901	0.1042	0.1055
24	0.0835	0.1142	0.0947	0.1066	0.1073	0.0218	0.0777	0.0842	0.0760	0.0887	0.0881
25	0.0229	0.0268	0.0352	0.0369	0.0373	0.0153	0.0378	0.0347	0.0386	0.0347	0.0400
26	0.0194	0.0241	0.0264	0.0320	0.0304	0.0087	0.0238	0.0247	0.0321	0.0265	0.0228
27	0.0033	0.0021	0.0024	0.0018	0.0022	0.0004	0.0015	0.0018	0.0014	0.0017	0.0017
28	0.0406	0.0469	0.0408	0.0434	0.0471	0.0096	0.0344	0.0371	0.0356	0.0427	0.0417
29	0.0221	0.0236	0.0218	0.0217	0.0236	0.0045	0.0172	0.0188	0.0173	0.0215	0.0208
30	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
31	0.0088	0.0100	0.0086	0.0091	0.0098	0.0019	0.0072	0.0078	0.0075	0.0090	0.0087
32	0.0478	0.0566	0.0497	0.0521	0.0571	0.0117	0.0420	0.0481	0.0444	0.0505	0.0490
Total	2.6625	2.6815	3.2774	3.1739	3.3646	1.6063	2.9990	2.8424	3.2221	3.0367	3.0265

〈Table 25〉 Production-Inducing Effect by Industry When NHI Expenditure Is Increased (by BP Budget of 2015) (Omitted)

	27	28	29	30	31	32
1	0.0525	0.0665	0.0633	0.0702	0.1088	0.0582
2	0.0017	0.0025	0.0023	0.0022	0.0032	0.0024
3	0.0882	0.1124	0.0913	0.1182	0.1864	0.1049
4	0.0366	0.0419	0.0397	0.0567	0.0607	0.0414
5	0.0285	0.0419	0.0324	0.0495	0.0389	0.0388
6	0.0381	0.0534	0.0559	0.0513	0.0618	0.0494
7	0.0550	0.0674	0.3026	0.0762	0.0812	0.1059
8	0.0072	0.0072	0.0066	0.0076	0.0079	0.0084
9	0.0172	0.0160	0.0190	0.0182	0.0202	0.0271
10	0.0265	0.0203	0.0196	0.0239	0.0281	0.0353
11	0.0167	0.0139	0.0143	0.0148	0.0164	0.0300
12	0.0504	0.0638	0.0507	0.0685	0.0734	0.0879
13	0.0064	0.0095	0.0183	0.0059	0.0131	0.0063
14	0.0417	0.0412	0.0379	0.0478	0.0409	0.0843
15	0.0216	0.0408	0.0247	0.0319	0.0399	0.0372
16	0.0661	0.1094	0.0853	0.0838	0.1528	0.0988
17	0.0196	0.0219	0.0339	0.0410	0.0304	0.0190
18	0.0310	0.0125	0.0085	0.0177	0.0144	0.0081
19	0.1363	0.1701	0.2112	0.1823	0.1799	0.1672
20	0.0672	0.0709	0.0694	0.0924	0.0837	0.0652

	27	28	29	30	31	32
21	0.0928	0.1317	0.0853	0.1457	0.1211	0.1056
22	0.0995	0.1096	0.0814	0.1701	0.1100	0.0992
23	0.1347	0.1487	0.1557	0.1830	0.1505	0.1449
24	0.1381	0.1630	0.1610	0.2013	0.1586	0.1320
25	0.0338	0.0368	0.0347	0.0508	0.0372	0.0361
26	0.0396	0.0359	0.0308	0.0586	0.0370	0.0429
27	1.1824	0.0025	0.0025	0.0028	0.0029	0.0024
28	0.0666	1.2486	0.0676	0.0831	0.0681	0.0563
29	0.0329	0.0393	1.3174	0.0373	0.0377	0.0278
30	0.0000	0.0000	0.0000	1.1869	0.0000	0.0000
31	0.0137	0.0168	0.0144	0.0171	1.1971	0.0118
32	0.0892	0.0955	0.0939	0.1055	0.0891	1.2522
Total	2.7318	3.0119	3.2319	3.3022	3.2512	2.9867

5. Conclusion

In this section, we attempted to conduct an analysis of the possible economic effects of increasing the NHI expenditure, not by positing an exogenous variable, but by assuming endogenous changes—that increases in the NHI expenditure would be offset by decreases in working-age households' consumption expenditures in other industries, coupled with increases in all households' consumption expenditure in the medical and healthcare industries. Our analysis reveals that increasing the NHI expenditure would lead to a slight decrease in the production-inducing effect on all industries, except for the medical and healthcare industries.

The demographic changes underway in Korea are expected to result in radical increases in the NHI expenditure in the coming years. Moreover, increasing NHI premiums would have a diminishing effect on production across all industries and sectors of the Korean economy, and could possibly lead to declining economic growth rates.

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