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The difference in under-expenditure of the social welfare budget in Korea

Abstract: This research investigates the relationship between under-expenditure of the social welfare budget within a limited budget and the determinants that have an effect on them. Relationships and determinants between under-expenditure of the social welfare budget have generally received relatively little attention from academics. The aim of this article is to examine the differences in the under-expenditures of the social welfare budget in the Korea between 1965 and 2008. It is shown that public assistance and social service expenditures are not comparable with national insurance expenditure according to the Box-Jenkins' multi-variant ARIMA models. The appearance of them being commensurate is spurious because it is affected by political economic factors.

The research findings in this paper can contribute to the development of budgetary theory and budgetary politics. However some findings within in the ARIMA models were incapable of being interpreted within existing theories and conjecture such as those with a 9 year time lag, etc. Further studies are therefore required.

Key words: social welfare budget, multi-variant ARIMA model

Political and economic factors and the social welfare budget

Many political factors can be considered to affect the growth in government expenditure: leader's influence, legislators' activities, bureaucrats' behaviour (including not only budgetary officials' but also street level bureaucrats' perceptions and attitudes), interest groups' pressure or clients' influence as well as public opinion.

Their effects are diverse: Some are negative, while others are positive; sometimes they offset each other, and sometimes they reinforce each other. Though it is difficult to define their impacts in a word, it is generally assumed that an increase in social policy-related political activities will lead to an increase in the social welfare budget. Economic factors also affect social welfare budget decision making. For example, Gross Domestic Product (GDP), the Consumer Price Index (*ygd*) and the unemployment rate may all affect budget growth.

However quantitative research on the causal relationship between political economic factors and the social welfare budget is rare. Moreover, no attempt has been made to connect normative theories developed in the discipline of social work with empirical evidence. Topics such as the nature of need, the characteristics of clients, fundraising methods, eligibility criteria for social service, methods of service distribution, and the level of social service offered by government in the range of various social welfare initiatives have been lectured and discussed in the classroom, but have rarely been used to explain empirical research findings.

Factors that determine government expenditure can be explained through the theory of determinants and incrementalism (Nordhaus, 1975; Tufte, 1978; Monroe, 1983; Downs, 1960; Hibbs, 1978; Russett, 1982; Kingdon, 1984; Wildavsky & Davis, 1974). Nevertheless there remains an unexplained aspect. In particular, time lag and leverage of degree of factors have not been examined to date.

We can presume two contradictory assumptions about the impact of the economic factors on budget growth. One is that the increase in social expenditure is expected due to the improvement in the economic situation: Better economic conditions may bring about an increase in the amount of resources (e.g. budget growth due to the increase in general tax revenue) which can be used for more social services. Another is that the increase in social program expenditure is expected when the economic situation becomes worse: A worsening economic situation creates a greater need for government services, and this greater need may force the government to increase in social expenditure.

However does an improvement in economic conditions really bring about an increase in social expenditure due to the increase in the government's resource capacity? Or does the economic recession create a demand for services and do these increasing demands yield more social expenditures? Which opinion is right, and which is incorrect?

The answers to these questions are not simple because the impact of political and economic factors on social expenditure growth may vary according to the type of social welfare. Different degrees, directions and time-lags in those impacts can be explained in terms of the nature of each program.

In Korea social welfare can be broadly divided into three categories: public assistance, social insurance and social service programs. Their characteristics are quite different in terms of the nature of need, political sensitivity, funding methods, eligibility criteria, methods of service distribution, and the level of benefits provided.

Generally speaking the needs assumed in public assistance and social service programs are more variable than those in social insurance programs, because the former depends on variable economic situations while the latter depends mainly on non-economic situations which may be easily anticipated in advance: For example public assistance and social service needs occur when one's income decreases, while most of the social insurance needs appear when one becomes old enough to retire.

Public assistance and social service expenditure are less political than social insurance expenditure because welfare programs have fewer organised pressure groups than social insurance programs. The elderly are known to be one of the most powerful constituents, while the poor are the least powerful. Therefore electoral officials may have a tendency to consider the former more important than the latter in terms of their re-election, while the professionals including both government bureaucrats and street level workers think the latter is as important as the former, not only because public assistance and social service programs are as essential for their agency's survival as the social insurance programs, but also because they are normatively involved in both programs with a professional consciousness.

Public assistance and social service expenditure is normally funded by general tax revenue, while social insurance expenditure is funded by contributions (ear-marked taxes). The public assistance and social service fund might be directly affected by economic conditions. The economic situation leads to the increase or decrease in tax revenue

which is reflected in public assistance and social service expenditure. However, social insurance expenditure is based on “the self-supporting financing principle” (Myers, 1983, p. 4; O’Neill, 1979, p. 173). The social insurance fund is also affected by economic conditions such as income changes, but the economic impact on social insurance expenditure might be less than that on public assistance and social service expenditure.

The benefits of public assistance and social service funds are enjoyed by those who suffer from insufficient income, while the benefits of social insurance programs are enjoyed by all those who are eligible regardless of their income level.

Public assistance and social service benefits are distributed through means testing, while social insurance benefits are provided to those who are eligible without a means test. The level of social insurance payments are more easily predicted than those of welfare needs. Therefore public assistance and social service expenditures can be executed more flexibly than social insurance expenditure because the public assistance and social service payments can be controlled by a means test.

In general terms, the national minimum principle is applied to those who live on public assistance and social service benefits. This principle means that public assistance and social service benefits paid cannot be higher than the income of minimum wage earners. However this principle is not applied to social insurance beneficiaries. The level of social insurance payment is, for the most part, determined by one’s contributions and current standard of living.

Theoretical Debate and Hypothesis

The factors that determine government expenditure can be explained by way of the theory of determinants and incrementalism.

The theory of determinants can be classified into studies conducted by economists and political scientists. While economists develop theories based on verifications after presenting hypothesis that government expenditure is determined by external factors such as social economic phenomenon, political scientists would argue that political variables play an important or even more important role than social economic factors in determining government expenditure. Political scientists highlight the influence that political factors have on government expenditure such as the characteristics of parties, the election turnout and electoral competition, and they attempt to prove the hypothesis that “Political phenomenon is more important than economic phenomenon”¹ or that “Political phenomenon may not be more important than economic phenomenon, but it is still just as important.” Scholars that assert the political business cycle theory believe that the implementation of presidential or parliamentary elections greatly influences government expenditure in the previous or same year of the elections (Nordhaus, 1975; Tufte, 1978; Monroe, 1983). Downs (1960) also argued that politicians use public expenditure to maximize their votes, while others even claimed that the ruling ideology of the President, as

¹ Representative studies are Wagner’s Law. Wagner’s Law, I.e., *The proposition that government spending as a share of national income tends to grow in the course of economic development has become more or less a stylized fact in public finance* (Henrekson, M. 1993, p. 412).

the head of the administration, also greatly influences the government expenditure (Hibbs, 1978; Russett, 1982; Kingdon, 1984). Such theories of determinants help to explain the environmental variables that influence decisions surrounding government expenditure.

Incrementalism theory, namely that the most important factor in determining this year's government expenditure is the previous year's (t minus 1) government expenditure, applies the incrementalism presented by Wildavsky as a complementary or alternative decision-making measure on the budget. In contrast to the theory of determinants which focuses on environments outside the government, Wildavsky focused on procedural aspects within the government. Yet this theory was criticized as it did not consider this very environment, and Wildavsky and Davis, who modelled incrementalism for the first time, also acknowledged economic and political influence by saying that "The budget process is fundamentally incrementalistic, and it requires pressure of sudden change caused by extreme incidents to respond to the needs of the economy and society" (1974, p. 421).

Therefore, consideration of the theory of determinants (which cannot explain changes or trends) along with the incrementalism theory (which cannot explain environmental variables) may better explain the determining factors of government expenditures.

Song (1989a, 1989b & 1990) stated through his research that the United States' public assistance and social insurance expenditures are closely related to the economic situation, but are different from the direction of applicable variables. Therefore when GDP impacts upon budget execution, public assistance expenditure decreases while social insurance expenditure increases; and when the unemployment rate rises, public assistance expenditure increases while social insurance expenditure remains unchanged. This result identifies the reason to be the difference in the originating factor that requires the two expenditures. Public assistance expenditure is supplied through the general tax revenue, and it therefore increases in line with economic recession and when the number of people below the poverty line increases. On the other hand, social insurance expenditure applies the self-supporting financing principle and is rarely influenced by the economic situations as it is connected with clients above the age of 65. Yet as social insurance expenditure may slightly vary on the premise of life insurance, it may show an increasing trend during times of economic prosperity (Song G. W., 1990, pp. 439–453).

Song's studies (1989a, 1989b & 1990) analyse the factors that influence the United States federal budget, and it requires analysis on whether it is applicable for the Republic of Korea as well.

This study will analyze primarily on the aforementioned economic, political and administrative factors to identify their influences on under-expenditures of the social welfare budget.

Therefore, the hypothesis for this study analyses Song's research (1989a, 1989b & 1990) hypothesis that "Public assistance expenditure increases at a time of economic recession," "Social insurance expenditure increases at a time of economic prosperity" and "Political factors are more influential on social insurance expenditure than on public assistance expenditure." This study also plans to confirm through the aforementioned hypothesis verification whether the result displayed in the United States federal budget can be applied to the causes of social welfare expenditure in the Republic of Korea.

Furthermore, this study sets a hypothesis that “Public assistance expenditure has a ‘go-with relationship’ with social service expenditure” and validates it on whether social service expenditure, operated through resources identical to that of public assistance expenditure, shares the same characteristics with public assistance expenditure.

Hypotheses

1. Public assistance expenditure increases during economic recession.
2. Social insurance expenditure increases during economic prosperity.
3. Political factors have more influence on social insurance expenditure than on public assistance expenditure.
4. Public assistance expenditure has a ‘go-with relationship’ with social service expenditure.

Variables, Data Collection and Measurement

In order to examine the differences in the impacts of political and economic variables on expenditure growth between public assistance, social service and social insurance, three dependent variables were used namely expenditure for public assistance (*ypaex*), expenditure for social service (*ysiex*) and expenditure for social insurance programs (*ysiex*).

The budget outlay of “the public assistance programmes” for *ypaex*, “the social service programmes” for *yswsex* and that of “social insurance programmes” for *ysiex* were used and were collected from the *Fiscal Yearbook* during the period 1965 to 2008.

As a political variable the percentage of conservative lawmakers (*congr*) – which is measured by dividing the number of conservative party members in the National Assembly legislature into the total rate in *The annals of the Republic of Korea National Assembly from 1948 to 2008* – was used, and all elections (*ele*) whether they were presidential elections or parliamentary elections were included. Government reorganisation (*reorg*), which is measured by calculating the number of reorganisations within *The Ministry of Health and Welfare* was also used.

Economic situations can be indicated by GDP figures (*ygdp*), *ygdp* figures (*ygdp*), the economic growth rate (*erg*), the unemployment rate (*une*) and the IMF economic crisis (*IMF*). These indicators were originally considered in this paper as economic variables. However *ygdp* was eliminated because the bivariate correlations between them are so high that a multi-collinearity problem might occur. Instead, in order to remove the inflationary effect on budget expenditures (*ypaex*, *yswsex* and *ysiex*) and GDP (*ygdp*), they were manipulated in terms of the constant figure of 2005 by dividing them by *ygdp*.

All of the data already adjusted to the fiscal year were collected from *The Korean Statistical Information Service* (<http://kosis.kr>) and *The Bank of Korea Economic Statistics System* (<http://ecos.bok.or.kr>). The monthly data of one were transformed into yearly data adjusted to the fiscal year.

As a demographic factor, the population size (*pop*) collected from *The Korean Statistical Information Service* was also originally considered, but later eliminated because of

the same problem. Instead, GDP (*ygd*) and the expenditure amounts are divided by population, and are represented in terms of *per capita*.

Statistical Methods

The Box-Jenkins multivariate ARIMA modelling technique is used to examine the causal relationship between the three social expenditures and political economic variables. The reasons why the multi-variate ARIMA technique was chosen was: Firstly, dynamic models can be developed in an empirical way based on actual data to explain public assistance and social service expenditure growth because the ARIMA procedure can capture the impact of the lag structures of the variables. Secondly, by using the ARIMA approach we can get a more precise model without an auto-correlation problem, which is ordinarily assumed in the time series data, and which often becomes problematic when using the ordinary least square (OLS) regression method or other econometric methods. Thirdly, as a consequence, the model parameters are estimated with a high degree of reliability (See, McLeay, Hay, 1980, p. 271).

The procedures for building a multivariate ARIMA model are briefly summarized as follows: Firstly, univariate models are built for both dependent variable time series and independent variable time series.

Secondly, the cross-correlation functions (CCF) between the pre-whitened independent variable time series and the pre-whitened dependent variable time series are examined in order to find a transfer function component for the model.

Thirdly, based on the CCF information, a multivariate model is developed and analysed as follows: The parameter estimates for the transfer function components and noise components are examined in terms of their statistical adequacy. If some parameter estimates are clearly not statistically significant, the model parameters must be re-estimated, omitting the insignificant parameter estimates.

The residuals of the model are analyzed to find out whether (or not) they are auto-correlated, whether they are different than white noise, and whether they are independent of each input time series. If the residuals of the tentative model are not auto-correlated, not different than white noise, and independent of each input time series, then the model can be accepted. However, if one of these conditions is not met, other noise components or new transfer function components must be re-identified by reviewing the univariate models and CCF functions.

If the multivariate model is statistically significant and adequate, then we interpret the time lag structure in the model.

The basic form of multivariate model is as follows:

$$Y_1 = \theta_0 + \frac{\omega_1 B - \omega_2 B_2 \cdots}{-\delta_1(B) - \delta_2(B_2) \cdots} X_{it} + \frac{1 - \theta_1 B - \theta_2 B_2 \cdots}{1 - \phi_1(B) - \phi_2(B_2) \cdots} + a_t$$

where Y_t is an output time series, X_{it} is an input time series, θ_0 is a constant term, ω_i is a numerator, δ_i is denominator, θ_i is a moving average factor, ϕ_i is an autoregressive factor, B is a backward shift operator and a_t is a white noise term.

Findings and Discussions

1) Relationships between social welfare expenditures

After the complicated procedures of the multivariate ARIMA modelling, multivariate regression equations are acquired as follows.

Table 1 indicates that public assistance expenditure (*ypaex*) was affected by social insurance expenditure (*ysiex*). Table 2 is suggests that social insurance expenditure was affected by public assistance expenditure.

Table 1

Correlation of *ypaex* and *ysiex*

Lag	Covariance	Correlation	-1	9	8	7	6	5	4	3	2	1	0	1	2	3	4	5	6	7	8	9	1
0	29.943872	0.49761												*****									
1	5.278117	0.08771												**									
2	1.901455	0.03160												*									
3	-7.167715	-.11911												**									
4	-10.747463	-.17860												****									
5	-14.790169	-.24578												*****									
6	14.621745	0.24298												*****									
7	5.532110	0.09193												**									
8	12.023701	0.19981												****									
9	6.402280	0.10639												**									
10	-0.586623	-.00975																					

“.” marks two standard error, period(s) of differencing 1.

Conditional Least Squares Estimation

Parameter	Estimate	Standard Error	t Value	Pr > t	Lag	Variable	Shift
AR _{1,1}	-0.48103	0.14696	3.27	0.0022	1	<i>ypaex</i>	0
NUM ₁	0.40111	0.12798	3.13	0.0032	0	<i>ysiex</i>	0

Table 2

Correlation of *ysiex* and *ypaex*

Lag	Covariance	Correlation	-1	9	8	7	6	5	4	3	2	1	0	1	2	3	4	5	6	7	8	9	1
0	10.774880	0.17509												****									
1	21.452890	0.34861												*****									
2	9.420118	0.15308												***									
3	10.554224	0.17150												***									
4	-1.322635	-.02149																					
5	-0.476416	-.00774																					
6	-9.285217	-.15088												***									
7	-5.738560	-.09325												**									
8	-7.236606	-.11759												**									
9	-6.877037	-.11175												**									
10	6.234396	0.10131												**									

“.” marks two standard errors, period(s) of differencing 1

Conditional Least Squares Estimation

Parameter	Estimate	Standard Error	t Value	Pr > t	Lag	Variable	Shift
MA _{1,1}	-0.54893	0.17947	-3.06	0.0043	2	<i>ysiex</i>	0
NUM ₁	0.39676	0.12814	3.10	0.0039	0	<i>ypaex</i>	1

$$ypaex_t(1 - B) = 0.48ypaex_{t-1}(1 - B) + 0.40ysiex_t(1 - B) + a_t \tag{1}$$

$$ysiex_t(1 - B) = -0.10ypaex_{t-1}(1 - B) + 0.19ypaex_{t-2}(1 - B) + a_t \tag{2}$$

Equations (1) and (2) indicate that public assistance expenditure (*ypaex*) and social insurance expenditure (*ysiex*) were affected by one another. This equation can be interpreted as follows: this mathematical model shows that the yearly public assistance *per capita* is affected by last year’s increment of 40% in the social insurance expenditure *per capita*. And the increment of this year’s social insurance expenditure *per capita* can be explained in last year’s decrement of public assistance *per capita*. From this it might be deduced that the two expenditures have a positive effect on each other.

Tables 3 and 4 indicate that social service expenditure (*yswsex*) and social insurance expenditure (*ysiex*) were affected by one another.

Table 3

Correlation of *yswsex* and *ysiex*

Lag	Covariance	Correlation	-1	9	8	7	6	5	4	3	2	1	0	1	2	3	4	5	6	7	8	9	1
0	-9.196783	-.17226										***											
1	-10.408135	-.19495										****											
2	3.993212	0.07480										*											
3	12.596551	0.23594											*****										
4	-6.435792	-.12055										**											
5	-4.469971	-.08373										**											
6	-12.034622	-.22542										*****											
7	12.702420	0.23793											*****										
8	6.874996	0.12877											***										
9	18.125850	0.33951											*****										
10	9.446345	0.17694											****										

“.” marks two standard errors, period(s) of differencing 1

Conditional Least Squares Estimation

Parameter	Estimate	Standard Error	t Value	Pr > t	Lag	Variable	Shift
NUM ₁	0.47785	0.15488	3.09	0.0041	0	<i>ysiex</i>	9

Table 4

Correlation of *ysiex* and *yswsex*

Lag	Covariance	Correlation	-1	9	8	7	6	5	4	3	2	1	0	1	2	3	4	5	6	7	8	9	1
0	-8.384559	-.16086																					
1	16.047038	0.30786											***										
2	6.759465	0.12968											.	*****									
3	5.572953	0.10692											.	***									
4	15.577797	0.29886											.	**									
5	10.642271	0.20417											.	*****									
6	-0.970562	-.01862											.	****									
7	-21.648907	-.41533											.	.									
8	0.275119	0.00528											.	.									
9	-3.065028	-.05880											.	*									
10	-4.941684	-.09481											.	**									
11	-1.865691	-.03579											.	*									

“.” marks two standard errors, period(s) of differencing 1

Conditional Least Squares Estimation

Parameter	Estimate	Standard Error	t Value	Pr > t	Lag	Variable	Shift
MA _{1,1}	-0.62776	0.14029	-4.47	<0001	2	<i>ysiex</i>	0
NUM ₁	0.41241	0.18276	2.26	0.0310	0	<i>yswsex</i>	1
NUM _{1,1}	-0.50328	0.21174	-2.38	0.0236	3	<i>yswsex</i>	1
NUM _{1,2}	1.57884	0.26089	6.05	<0001	6	<i>yswsex</i>	1
DEN _{1,1}	-0.93329	0.14466	-6.45	<0001	1	<i>yswsex</i>	1

$$yswsex_t(1 - B) = 0.48ysiex_{t-9}(1 - B) + a_t \tag{3}$$

$$ysiex_t(1 - B) = \frac{(0.41 + 0.50B^3 - 1.58B^6)}{1 + 0.93B} yswsex_{t-1} + (1 + 0.63B^2)a_t \tag{4}$$

Equation (3) and (4) indicate that social insurance expenditure (*ysiex*) and social service expenditure (*yswsex*) were affected by one another. According to the empirical data, social insurance expenditure *per capita* of 9 years ago led to an increase in 48% of social service *per capita*. However, it is not known exactly why the increment of 9 years ago affects the figures in this year’s in budget. Furthermore social insurance expenditure *per capita* is affected by social service *per capita*. For example if last year’s *yswsex* increased by 1,000 won (unit of Korean currency), this year’s *siex* increment is 210 won (0.41/(1+0.93)). And four years ago if *swsex* increased by 1,000 won, this *siex* increment is 260 won (0.50/(1+0.93)). Seven years ago if *swsex* increased by 1,000, this year’s *siex* decrease was 819 (-1.58/(1+0.93)). In addition, the net impact that social service expenditure has affected social insurance expenditure is -0.34. In other words if social service expenditure increased by 1,000 won, social insurance expenditure decreased by 340 won.

Table 5 and equation (5) show that social service expenditure (*yswsex*) was affected by public assistance expenditure (*ypaex*).

Table 5

Correlation of *ypaex* and *yswsex*

Lag	Covariance	Correlation	-1	9	8	7	6	5	4	3	2	1	0	1	2	3	4	5	6	7	8	9	1
0	7.610050	0.19574												****									
1	0.093543	0.00241																					
2	-2.136894	-.05496									*												
3	3.885150	0.09993												**									
4	-0.585028	-.01505																					
5	13.064535	0.33604												*****									
6	7.451340	0.19166												****									
7	7.985364	0.20540												****									
8	-16.375104	-.42120									*****												
9	-1.192596	-.03068									*												
10	4.430718	0.11397												**									
11	1.248205	0.03211												*									

“.” marks two standard errors, period(s) of differencing 1

Conditional Least Squares Estimation

Parameter	Estimate	Standard Error	t Value	Pr > t	Lag	Variable	Shift
MA _{1,1}	-0.63722	0.14987	-4.25	0.0002	1	<i>ypaex</i>	0
NUM ₁	0.96984	0.15329	6.33	<0001	0	<i>yswsex</i>	5
NUM _{1,1}	1.05957	0.22829	4.64	<0001	3	<i>yswsex</i>	5

Table 6

Correlation of *yswsex* and *ypaex*

Lag	Covariance	Correlation	-1	9	8	7	6	5	4	3	2	1	0	1	2	3	4	5	6	7	8	9	1
0	8.014228	0.16789												***									
1	21.699813	0.45460												*****									
2	-4.277799	-.08962									**												
3	-1.973188	-.04134									*												
4	2.883179	0.06040												*									
5	-1.726857	-.03618									*												
6	-12.858826	-.26938									*****												
7	-6.088855	-.12756									***												
8	15.210673	0.31865												*****									
9	16.259840	0.34063												*****									
10	0.694810	0.01456																					

“.” marks two standard errors, period(s) of differencing 1

Conditional Least Squares Estimation

Parameter	Estimate	Standard Error	t Value	Pr > t	Lag	Variable	Shift
MA _{1,1}	-0.55269	0.15394	-3.59	0.0009	1	<i>yswsex</i>	0
NUM ₁	0.39399	0.01572	25.07	<.0001	0	<i>ypaex</i>	1

$$ypaex_t(1 - B) = 0.97yswsex_{t-5} - 1.06yswsex_{t-8} + (1 + 0.64B)a_t \tag{5}$$

$$yswsex_t = 0.39ypaex_{t-1} + (1 + 0.55B)a_t \tag{6}$$

According to equation (5), social service *per capita* has influenced on public assistance expenditure growth negatively. That is to say, this model shows that a 1,000 won increase in public assistance expenditure *per capita* led to a decrease of 9% (-0.08973) in social service *per capita*.

Table 6 and equation (6) show that public assistance expenditure (*ypaex*) was affected by social service expenditure (*yswsex*). According to this, public assistance expenditure was influenced in a positive way by the growth in social service *per capita*.

2) Determinants of the social welfare budget

What are the factors which determine the social welfare budget? After the complicated procedures of multivariate ARIMA modelling, multivariate regression equations are acquired as follows. Table 7 shows that social economic determinants impacted on public assistance expenditure (*ypaex*).

Table 7

The multivariate ARIMA modelling of public assistance expenditure and determinants

	Parameter	Estimate	Standard Error	t value	Pr > t	Lag	Variable	Shift
<i>ypaex</i> - <i>ygdp</i>	AR _{1,1}	0.57983	0.18285	3.17	0.0038	1	<i>ypaex</i>	0
	AR _{2,1}	0.76419	0.16842	4.54	0.0001	3	<i>ypaex</i>	0
	NUM ₁	-0.000602	0.0001367	-4.41	0.0001	0	<i>yygdp</i>	2
	NUM _{1,1}	-0.000439	0.0001429	-3.08	0.0048	2	<i>ygdp</i>	2
	NUM _{1,2}	0.0009951	0.0001739	5.72	<.0001	7	<i>ygdp</i>	2
	NUM _{1,3}	-0.000554	0.0002091	-2.65	0.0132	8	<i>ygdp</i>	2
<i>ypaex</i> - <i>egr</i>	AR _{1,1}	0.90189	0.08137	11.08	<.0001	1	<i>paex</i>	0
	NUM ₁	0.62605	0.24077	2.60	0.0141	0	<i>egr</i>	0
	NUM _{1,1}	0.71486	0.23534	3.04	0.0048	2	<i>egr</i>	0
	NUM _{1,2}	0.73259	0.21665	3.38	0.0020	9	<i>egr</i>	0
<i>ypaex</i> - <i>une</i>	AR _{1,1}	0.80289	0.11131	7.21	<.0001	1	<i>paex</i>	0
	NUM ₁	4.26005	0.81561	5.22	<.0001	0	<i>une</i>	2
	DEN _{1,1}	0.68730	0.18313	3.75	0.0007	7	<i>une</i>	2
<i>ypaex</i> - <i>IMF</i>	AR _{1,1}	0.75950	0.17921	4.24	0.0002	2	<i>paex</i>	0
	NUM ₁	9.15327	3.34555	2.74	0.0105	0	<i>IMF</i>	2
	NUM _{1,1}	-26.17533	3.34415	-7.83	<.0001	1	<i>IMF</i>	2
	NUM _{1,2}	-18.62817	3.34491	-5.57	<.0001	7	<i>IMF</i>	2
	NUM _{1,3}	-19.11670	5.15504	-3.71	0.0009	8	<i>IMF</i>	2
<i>ypaex</i> - <i>reorg</i>	NUM ₁	6.69789	2.19772	3.05	0.0041	0	<i>reorg</i>	1
	NUM _{1,1}	-9.00070	2.31660	-3.89	0.0004	1	<i>reorg</i>	1

$$ypaex_t(1 - B) = (-0.0006ygdpt_{t-2} + 0.00044ygdpt_{t-4} - 0.001ygdpt_{t-9} + 0.00055ygdpt_{t-10})(1 - B) + \frac{1}{(1 - 0.58B)(1 - 0.76B^3)} a_t \tag{7}$$

$$ypaex_t(1 - B) = (0.63 - 0.71B^2 - 0.73B^9)egr_t + \frac{1}{1 - 0.90B} - a_t \tag{8}$$

$$ypaex_t(1 - B) = \frac{426}{1 - 0.69B^7} une_{t-2}(1 - B) + \frac{1}{1 - 0.8B} a_t \tag{9}$$

$$ypaex_t(1 - B) = 9.15IMF_{t-2} + 26.18IMF_{t-3} + 18.63IMF_{t-9} + 19.12IMF_{t-10} + \frac{1}{1 - 0.76B^2} a_t \tag{10}$$

$$ypaex_t(1 - B) = 6.70reorg_{t-1} + 9.0reorg_{t-2} \tag{11}$$

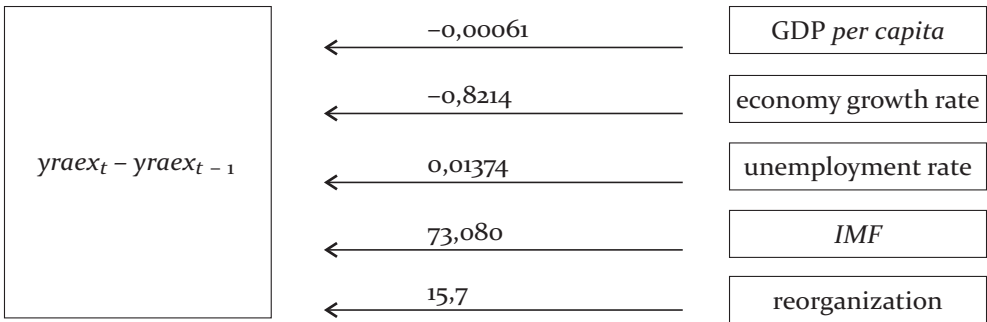


Figure 1. Determinants of public assistance expenditure

Equations (7) to (10) indicate that public assistance expenditure *per capita* growth was affected by the variables. This equation can be interpreted as follows (see, Fig. 1).

Firstly, the decrease in GDP and the economic growth rate, and the increase in the unemployment rate, *IMF* and reorganisation, affected the public assistance expenditure growth positively. That is to say, this model shows that a 1,000 won increase in GDP *per capita* in the year of implementing welfare programs led to a decrease of 0.61 won public assistance expenditure *per capita*, and that a 1% increase in the economic growth rate in the year of implementing welfare programs led to a decrease of 820 won public assistance expenditure *per capita*, and that a 73,000 won increase in public assistance expenditure *per capita* followed the *IMF*. Additionally a 13 won increase in public assistance expenditure *per capita* followed a 1% increase in the unemployment rate. It seems that the economic recession, as indicated by a decrease in GDP ($-0.00061ygdpt_t$) and an economic growth rate ($-0.8214egr_t$), an increase in the unemployment rate ($0.01374une_t$) and by the *IMF* ($73.080IMF_t$) in the model, creates more welfare needs which leads to expenditure growth.

This phenomenon seems to be connected with the relationship between economic conditions and general tax revenue. That is to say, a good economic situation results in a general tax revenue increase, which leads to welfare budget growth for the coming year.

This interpretation predicts that if the economic conditions of a certain year or previous year were good, then public assistance expenditure for the coming year will increase. When the budget is created, the expected revenue is considered as one of the important factors. Therefore budget officers set up the budget for the coming year, taking into account the revenue for the previous year, which was directly affected by GDP and economic growth of that year.

On the other hand, it is expected that an increase in unemployment rate in the year of budget compilation might lead to an increased demand for public assistance which might bring about the welfare budget growth for the coming year.

Secondly, the political variable also affected the public assistance expenditure growth. The equation (11) indicates that one change in terms of reorganisation was followed by a 15,700 won increase in public assistance expenditure.

The influence of the governmental reorganisation may be closely related in a positive way to the growth in the public assistance budget. However political factors, reorganisation excepted, are not found to affect public assistance expenditure.

Thirdly, the model simplified by disregarding time lags tells us that GDP and economic growth rate had a negative impact, unemployment rate and *IMF* a positive impact, and governmental reorganisation a positive impact on the increase in public assistance expenditure growth. This fact suggests that, with the exception of the governmental reorganisation's impact on the growth in public assistance expenditure, an increase or decrease in governmental revenue affected by the economic situation is a more important factor than the increase in demand for public assistance which is also affected by the economic situation.

Table 8

Multivariate ARIMA modelling of social insurance expenditure and determinants

	Parameter	Estimate	Standard Error	t Value	Pr > t	Lag	Variable	Shift
<i>ysisx - ygd</i>	AR _{1,1}	0.44962	0.16759	2.68	0.0116	1	<i>ysiex</i>	0
	NUM ₁	-0.0007878	0.0003209	-2.45	0.0199	0	<i>ygd</i>	3
	NUM _{1,1}	-0.0013670	0.0003455	-3.96	0.0004	6	<i>ygd</i>	3
<i>ysisx - egr</i>	AR _{1,1}	-0.58216	0.18192	-3.20	0.0027	6	<i>ysiex</i>	0
	NUM ₁	0.26920	0.11176	2.41	0.0207	0	<i>egr</i>	2
<i>ysisx - une</i>	MU	10.48159	3.69079	2.84	0.0078	0	<i>ysiex</i>	0
	AR _{1,1}	-0.63552	0.18545	-3.43	0.0017	6	<i>ysiex</i>	0
	NUM ₁	-1.99770	0.89902	-2.22	0.0335	0	<i>une</i>	9

$$ysiex_t(1 - B) = -0.0008ygd_{t-3}(1 - B) + 0.00137ygd_{t-9}(1 - B) + \frac{1}{1 - 0.44962B} a_t \quad (12)$$

$$ysiex_t(1 - B) = 0.27egr_{t-2} + \frac{1}{1 + 0.58B^6} a_t \quad (13)$$

$$ysiex_t(1 - B) = 17.14 - 0.63552ysiex_{t-6}(1 - B) - 1.9977une_{t-9} + a_t \quad (14)$$

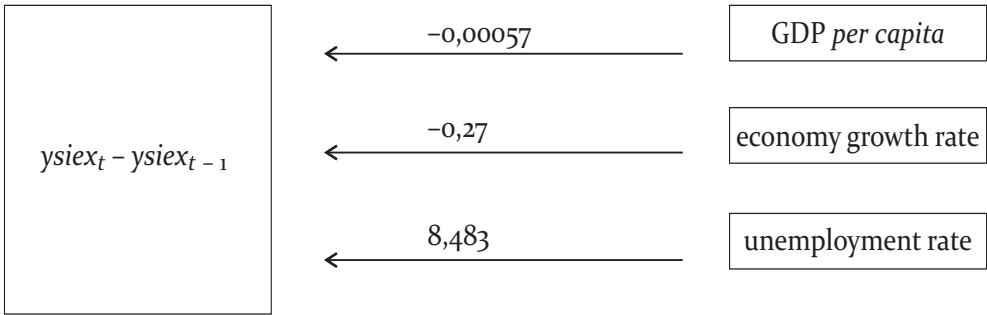


Figure 2. Determinants of social insurance expenditure

Equations from (12) to (14) show that social insurance expenditure growth was affected by the variables. This equation can be interpreted as follows (see Fig. 2): Firstly, the increase in GDP in the year of implementing the social insurance program and the increase in GDP both three and nine years ago positively impacted on the social insurance expenditure growth of a certain year.

Social insurance expenditure growth after a GDP increase in the year of budget execution is related to the level of social insurance benefit. Social insurance benefit is determined by the degree of individual contributions and the standard of living at a certain year. The level of social insurance benefit is not to protect the minimum standard of living, but is closely connected to GDP level at any given year. The relationship between GDP three years ago and the social insurance budget might be related to the business cycle. But whilst the nine year time lag is not yet revealed, it might also be related to the business cycle. Further study is needed.

The model shows the positive impact of GDP on social insurance expenditure. This fact alone accounts for the political sensitivity of the insurance budget. The nature of politics can be more easily detected in budget payment than in budget compilation, because clients of social insurance pay more attention to the insurance payments than to compiling the budget. Furthermore, in order to take more credits on social insurance benefit, it is better to be more prudent when compiling the insurance budget. The demand for insurance payments is a more important factor in increasing the social insurance expenditure than the opportunity to increase the insurance fund.

Secondly, the increase in the economic growth rate of the year when budgets were compiled (or the previous year before implementing the programs) positively affected social insurance expenditure growth. A 1% increase in the economic growth rate in the two previous years increased social insurance expenditure by 270 won. The increase in economic growth rate brought economic prosperity, which must have positively influenced social insurance expenditure.

Thirdly, the increase in the unemployment rate positively affected the social insurance expenditure growth. A 1% increase in the unemployment rate 9 years ago increased social insurance expenditure by 8,430 won. It can't be assumed that the increase in unemployment means doom and gloom for the economy. It might be suggested in the 9 year time lag that the increase in unemployment rate affected the increase of social insurance expenditure. However this cannot be assumed.

Fourthly, political factors are not found to affect social insurance expenditure in Korea, even though these same factors, including the election cycle, are found to affect social insurance expenditure in the U.S. The reason might be the nature of voters: most Korean voters, especially the elderly who are the recipients of social insurance, are indifferent to politics, while U.S. senior citizens give much more attention to politics and use their voting power in the election.

Table 9

Multivariate ARIMA modelling of social service expenditure and determinants

	Parameter	Estimate	Standard Error	t Value	Pr > t	Lag	Variable	Shift
ysesex – ygdP	AR _{1,1}	0.38183	0.22561	1.69	0.1009	4	yswsex	0
	NUM ₁	-0.0003374	0.0000664	-5.08	<.0001	0	ygdP	2
	NUM _{1,1}	-0.0004176	0.0000806	-5.18	<.0001	3	ygdP	2
	DEN _{1,1}	0.83439	0.09534	8.75	<.0001	8	ygdP	2
ysesex – egr	MU	8.22473	1.61261	5.10	<.0001	0	yswsex	0
	AR _{1,1}	-0.69929	0.21208	-3.30	0.0023	2	yswsex	0
	NUM ₁	-0.60510	0.14479	-4.18	0.0002	0	egr	0
	NUM _{1,1}	0.81257	0.21017	3.87	0.0005	3	egr	0
	NUM _{1,2}	0.47767	0.18736	2.55	0.0155	4	egr	0
	DEN _{1,1}	-1.09200	0.0035278	-309.54	<.0001	1	egr	0
ysesex – une	AR _{1,1}	0.49191	0.19982	2.46	0.0198	4	yswsex	0
	NUM ₁	2.93635	0.73162	4.01	0.0004	0	une	2
	NUM _{1,1}	-4.69924	0.92754	-5.07	<.0001	8	une	2
ysesex – IMF	NUM ₁	32.45300	5.25633	6.17	<.0001	0	IMF	11
ysesex – reorg	NUM ₁	4.21568	2.00375	2.10	0.0417	0	reorg	1
	DEN _{1,1}	0.66547	0.20438	3.26	0.0023	1	reorg	1

$$yswsex_t(1 - B) = \frac{0.0003}{1 - 0.83B^8} ygdP_{t-2} + \frac{0.00042B^3}{1 - 0.83B^8} ygdP_{t-2} + \frac{1}{1 - 0.38B^4} a_t \quad (15)$$

$$yswsex_t(1 - B) = (-0.605 - 0.813B^3 - 0.478B^4)egr_t + \frac{1}{1 + 0.70B^2} a_t \quad (16)$$

$$yswsex_t(1 - B) = (2.94 + 4.70B^8)une_{t-2}(1 - B) + \frac{1}{1 - 0.49B^4} a_t \quad (17)$$

$$yswsex_t(1 - B) = 32.453IMF_{t-11} + a_t \quad (18)$$

$$yswsex_t(1 - B) = \frac{4.22}{1 - 0.67B} reorg_{t-1} + a_t \quad (19)$$

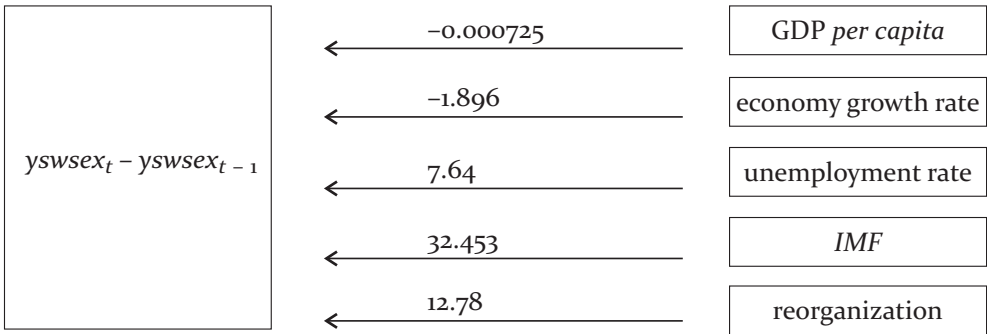


Figure 3. Determinants of social service expenditure

Equations (15) to (19) indicate that social service expenditure *per capita* growth was affected by the variables. This equation can be interpreted as follows (see, Fig. 3).

Firstly, the decrease in GDP and the economic growth rate, and the increase in the unemployment rate, *IMF* and reorganisation positively impacted upon social service expenditure growth. That is to say, this model shows that a 1,000 won increase in GDP *per capita* in the year of implementing welfare programs led to a decrease in 0.73 won social service expenditure *per capita*, and that a 1% increase in the economic growth rate in the year of implementing welfare programs led to a decrease of 1,896 won social service expenditure *per capita*. It also showed that a 7,640 won increase in social service expenditure *per capita* followed a 1% increase in the unemployment rate, and that a 32,453 won increase in social service expenditure *per capita* followed an *IMF* increase. It seems that the economic recession, as indicated by a decrease in GDP ($-0.000725ygdpt_i$) and the economic growth rate ($-1.896egr_i$), an increase in the unemployment rate ($7.64une_i$) and in the *IMF* ($32.453IMF_i$) in the model, creates more welfare needs which lead to an increase in expenditure.

Secondly, the political variable also equally affected the public assistance expenditure growth. Equation (19) tells us that one change in reorganisation was followed by a 12,780 won increase in social service expenditure.

This phenomenon seems the same for public assistant expenditure i.e. that public assistance and social service expenditures increased at the time of economic depression and decreased at the time of economic prosperity. The relationship between public assistance and social service budgets is found to be the ‘go-with relationship’, which means that both expenditures moved in the same direction almost simultaneously.

Implications of the research findings

The main purpose of this study has been to explore the relationships and determinants of the social welfare budget in the Korea. Research findings are summarized as follows.

Firstly, public assistance and social service expenditures show competitive nature in relation to social insurance expenditure, which is tested in the Box-Jenkins’s multivariate ARIMA models. The testing result shows that competitive relations are spurious, because economic variables intervened and had effects on both expenditures simultaneously.

Secondly, public assistance and social service expenditures increased at the time of economic depression and decreased at the time of economic prosperity, while social insurance expenditure increased at the time of economic prosperity and decreased at the time of economic depression. The relationship between public assistance and social service budgets is best described by the 'go-with relationship', which means both expenditures moved in the same direction almost simultaneously.

Thirdly, economic variables are found to be the most important factors to affect social welfare budgets. According to the economic situation, social welfare budgets – especially public assistance and social service budgets – change.

Fourthly, political factors (reorganisation excepted) are not found to affect social insurance expenditure in Korea, while the same factors, including the election cycle, are found to affect social insurance expenditure in the U.S. The reason might be the nature of voters – most Korean voters, especially the elderly who are the recipients of social insurance are largely indifferent to politics, while in the U.S. senior citizens pay much attention to politics and use their voting power in an election.

Fifthly, changes within governmental organisations, such as reorganising existing welfare bureaux or departments, or establishing new agencies, has an effect on the increase or the decrease in public assistance and social service expenditures.

This study contributes to both developments in budget theory and budget politics in so far as it attempted to combine budget theory with time-series models using empirical data. Indeed, the fact that the increase and decrease variation in budget by a variable such as either economic condition or governmental organisations is capable of prediction is of great significance.

However, some findings remain in the ARIMA models that could not be interpreted with existing theories and conjecture such as the 9 year time lag, etc. Further studies are required. Even with these reservations, this study is a challenging and provocative contribution to the study of determinants and relations of budget.

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Różnica w wydatkach niekwalifikowanych budżetu pomocy społecznej w Korei

Streszczenie

Przedmiotem badania jest relacja między wydatkami niekwalifikowanym budżetu pomocy społecznej w ramach ograniczonego budżetu Korei w okresie 1965–2008. W artykule wskazano, że pomoc publiczna i wydatki na usługi społeczne są nie do porównania z wydatkami ubezpieczenia narodowego zgodnie z wielowariantowymi modelami ARIMA Box-Jenkins. Ich obecność poddana współmierności jest fałszywa ze względu na wpływ czynników polityczno-gospodarczych. Rezultaty badania w tym artykule mogą wnieść wkład w rozwój teorii budżetowej i polityk budżetowych. Jednak niektóre rezultaty badań powstałych w oparciu o modele ARIMA mogły być nieadekwatne do poddania interpretacji w ramach istniejących teorii i formułują przypuszczenia takie jak te z dziewięcioletnim opóźnieniem, etc. W związku z tym dalsze badania są konieczne.

Słowa kluczowe: budżet pomocy społecznej, wielowariantowy model ARIMA

