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Income-led Growth and Wage Inequality in the Korean Economy (1980-2013): A VAR /VECM Approach

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Abstract

In this paper, I test the relationship between economic growth and income distribution in the Korean economy. In recent years, a widening gap between wage-earners and income distribution has become an important issue in the Korean economy. Thus, the VAR/VEC framework, which takes account of the historical pattern of wage inequality in Korea, is used to investigate a complicated effect of income distribution on economic growth in recent decades. In this paper, I identify the cointegrating vectors to establish the long-term relationship between the variables and the use of the impulse responses of each variable for investigating the short-term effects of each exogenous shock using the VAR approach. This study suggests that the income-led growth perspective will not inspire research about the Korean economy if the income-led growth perspective should not be enough to account for Korea's wage inequality.

KEYWORDS: *Korean economy, income-led growth, wage inequality*

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소득 주도 성장과 임금불평등: 한국경제 (1980-2013)

김덕민

<국문요약>

이 논문은 최근 우리 사회의 첨예한 논쟁을 야기하고 있는 소득주도 성장에 대한 경험적 연구를 수행하고 있다. 소득주도성장이 소득분배와 경제성장 간의 관계를 확인하는 것이기는 하지만, 한국경제의 최근 몇 십년 간의 상황은 보다 복잡한 쟁점을 제기하고 있다. 특히 임금소득자 간의 불평등의 확대는 소득분배 상의 또 다른 측면을 보여주고 있는 것이기도 하다. 따라서 이 논문에서는 우리 경제의 장단기적 상황을 고루 살펴보기 위해 VECM/VAR 모형을 사용하여 1980 년부터 2013 년까지의 한국경제를 살펴보았다. 이 논문에서 임금불평등의 확대는 실질임금을 저하시킬 뿐만 아니라 노동생산성을 감소시켜 한국경제의 성장에 악영향을 미치며, 단기적으로도 임금불평등의 확대는 자영업자 비율을 상승시켜, 노동생산성을 저하시킴으로써 경제에 악영향을 미친다. 만약 임금불평등의 줄이려는 노력이 동반되지 않는다면, 소득주도 성장의 메커니즘은 작동하지 않는다.

주요어: *한국경제, 소득주도성장, 임금불평등*

Ⅰ. Introduction

Since the global financial crisis of 2008 and the global economy's slow recovery, questions have been raised about mainstream economic models. In particular, it has been argued that the problems associated with income distribution have not been addressed in mainstream economics (Rajan 2010; Stiglitz 2014). In recent years, there has been a perception that income inequality increased during the neoliberal period and has adversely affected economic growth (OECD 2014; Ostry, Loungani, and Furceri 2016). However, some theorists have pointed to wage-led growth theory as a trend that incorporates income distribution into economic growth from the post-Keynesian or Kaleckian tradition. The wage-led growth theory attempts to combine the improvement of income inequality favourable to labor between capital and labor — which worsened before and after the contemporary crisis — and economic growth into a single framework. To support this, many empirical studies have been conducted (Blecker 2016), and new models are being developed continuously. The wage-led growth theory seems to be integrating them into policy packages (Lavoie and Stockhammer 2012).

However, the wage-led growth theory does not fully account for growing inequality among wage-earners in recent years due to its focus on the rise and fall of total wage share, which is the pattern of functional distribution in an economy. Many empirical studies have been conducted about the meaning of wage inequality and income inequality (Piketty and Saez 2003, 2006; Duménil and Lévy 2010, 2014; Mohun 2014). For example, Duménil and Lévy (2010) noted that neoliberalism is defined as the occurrence of a new upper-level capital owner and managerial alliance and wage income concentration in the higher-level managerial class. Moreover, there is a growing body of literature examining the implications of these empirical studies on Kaleckian or post-Keynesian and Marxist economic theory (Dutt 2016; Palley 2015; Ryoo 2016; Vasudevan 2016). Palley (2016) introduced the upper class of wage-earners who account for the recent evolution of wage inequality into wage-led growth studies and investigated the effect of their existence on regime character —that is, whether an economy is wage- or profit-led. In this paper, I identify the empirical implications of the change in wage inequality as well as functional income distribution (capital–labor income share) for economic growth in the context of the wage-led growth theory.

Some empirical studies based on the wage-led growth perspective evaluated the Korean economy as one of the strong wage-led regimes among developing countries (Onaran and Stockhammer 2005; Onaran and Galanis 2014; Stockhammer and Lavoie 2012). In one of the studies, it was found that the wage-led character of Korea in the 1990s had been "a counterexample to the orthodox structural adjustment programs" (Onaran and Stockhammer 2005, 66-67). However, one of the most important

issues that the Korean economy has recently faced is the expansion of wage inequality (Hong 2015, 2017). Thus, it can be expected that this recent aspect of income distribution is closely related to the strong wage-led growth regime, as suggested by the above empirical studies.

Kalecian growth theory has been translated into the income-led growth policy in South Korea. The administration of President Moon Jae-in elected in 2017 following the impeachment of former President Park Geun-hye presents a new slogan, its income-led growth policy, "which will attempt to spur economic growth through boosts in households' incomes and the demand generated by greater spending power" (Park E-j 2017). The income in their slogan refers to that of workers and self-employed people. In particular, the Moon administration seems to have received some inspiration from the theoretical and empirical studies on the wage-led growth within the Kaleckian tradition mentioned above (Park H-k 2017). Therefore, this study will illustrate the macroeconomic trends of the Korean economy and allow us to measure the potential future success or failure of the Moon administration.

Concerning a short-term relationship among the variables in the Korean economy, the self-employment rate should be taken account into in this study. Although the leading sectors of Korea (e.g., the semi-conductor, automobile, and mobile-phone industries) achieve high performance in the global economy, the rest of the economy, notably the self-employed sector, remains vulnerable. While the manufacturing sector in the Korean economy has achieved a remarkable result in terms of productivity, other sectors have not achieved comparable results. Especially difficult have been the experiences of individuals who lost their jobs in the manufacturing sector and then entered the service sector as self-employed (Eichengreen, Perkins, and Shin 2012, 105-134). This fact involves a *deepening heterogeneity* of the country's economy, which would be a destabilizing force of the macroeconomy in conjunction with Korea's increased wage inequality.

To estimate the relationship between income distribution and economic growth in the Korean economy, two representative time series analysis methods are implemented: the Johansen cointegration or Vector Error Correction Model (VECM) and the Generalized Impulse Response Function (GIRF) analysis using VAR. Whilst the former captures long-term relationships between economic growth, wage share, and the development of wage inequality over the reference period, 1980-2013, the latter examines transitory feedback mechanisms between the variables, including the self-employment rate of the country.

I argue that it is necessary to consider wage inequality in South Korea fully, and that the link between distribution and economic growth can be seriously undermined in related policies if it is not

fully considered. Thus, discussion of wage-led growth should be presented as a package that encompasses more comprehensive studies.

Ⅱ. Economic Growth and Income Distribution: Korea (1980-2013)

Section II discusses economic growth, income distribution and income inequality based on Korean economic data. Subsection IIa explains the data used in this analysis. The data are mostly collected from the national accounts of the Bank of Korea, Statistics Korea, and the employment statistical yearbook of the Ministry of Employment and Labor. Subsection IIb is devoted to the estimation of the long-term relationship between income distribution and economic growth in the Korean economy. Two models are featured: the 1980–2013 model on the real GDP, real wage and labor productivity, and the 1980–2013 model with the self-employment rate. In Subsection IIc, an estimation of the short-term relationship with the 1980–2013 model using VAR and GIRF analysis is presented.

IIa. Models and Data

The relationship between income distribution and economic growth is estimated primarily in terms of the relationship between wage share and capital accumulation rate or demand level. In the traditional Kaleckian analytic framework, wage share is divided into contribution to consumption and contribution to investment (or, additionally, contribution to net exports); however, the contribution of wage share or other variables to macroeconomic demand can be directly captured in an aggregative approach (Blecker 2016, 376-377). In this study, the main economic variables of the Korean economy are considered as follows:

$$rgdp = f(\omega) \tag{1}$$

where $rgdp$ is real GDP, and ω refers to wage share.

Figure 1 shows trends of various types of wage share between 1975 and 2013 in the Korean economy. Because the National Account in South Korea considers all incomes of the non-corporate sector to constitute an operating surplus, an assumption with regard to the income distribution profile in the non-corporate sector is needed. In this figure, *ws1* refers to the wage share that is calculated based on the National Account, in which the distributional profile of the self-employment sector is not taken into account. If one can exclude all incomes in the self-employment sector by estimating the wage share, *ws2* that has almost the same trend as the wage share of the manufacturing sector, *ws (manu)*, can be obtained. This assumption suggests that all sectors in the economy have a similar distributional profile.

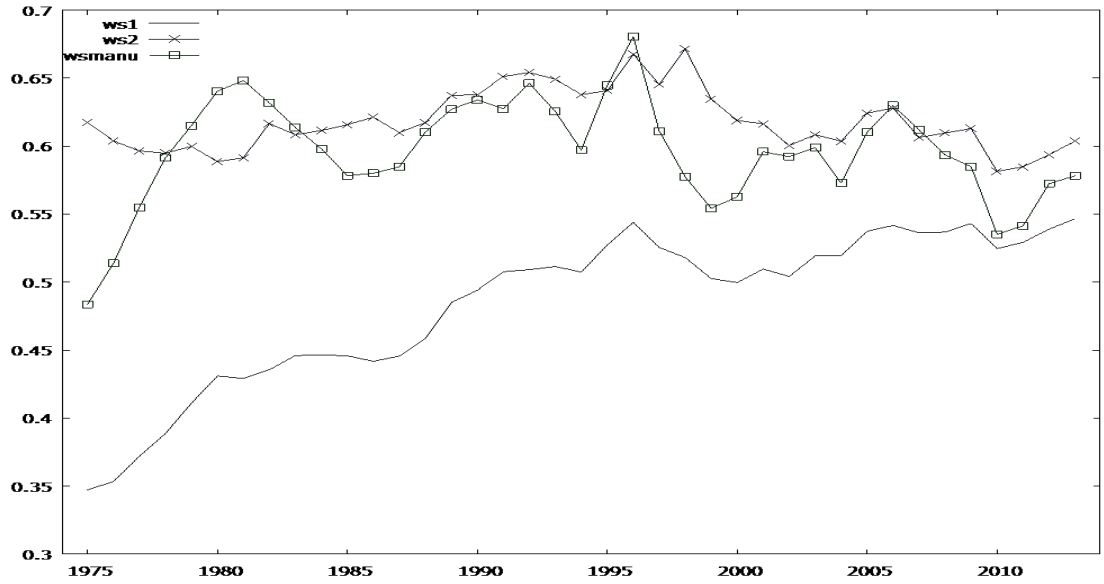

Figure 1. Shares of Wages in Total Income: Korea (1975-2013, Yearly)

Wage share comprises two components: real wage and labor productivity. Thus, for investigating the effect of purchasing power and productivity on economic growth, wage share under the above assumption regarding the distribution, namely *ws2*, decomposes into real wage and labor productivity. Equation (1) is transformed as follows:

$$red=f(rw, lp, ineq, self) \quad (1)$$

where *rw*, *ineq*, and *lp* refer to real wage, labor productivity, and wage inequality, respectively, and *self* is the self-employment rate in the Korean economy. Wage inequality refers to a gap between the share of the top 10% of wage-earners in total wage and the wage share of the 0-90 fractile.

A dramatic increase in wage inequality may be important for the study of wage-led growth. As

shown in Figure 2, the fact that a gap exists between the top 10% of wage-earners' wage share and earners with lower percentages of the wage share indicates the validity of the trend of wage shares for the entire economy.

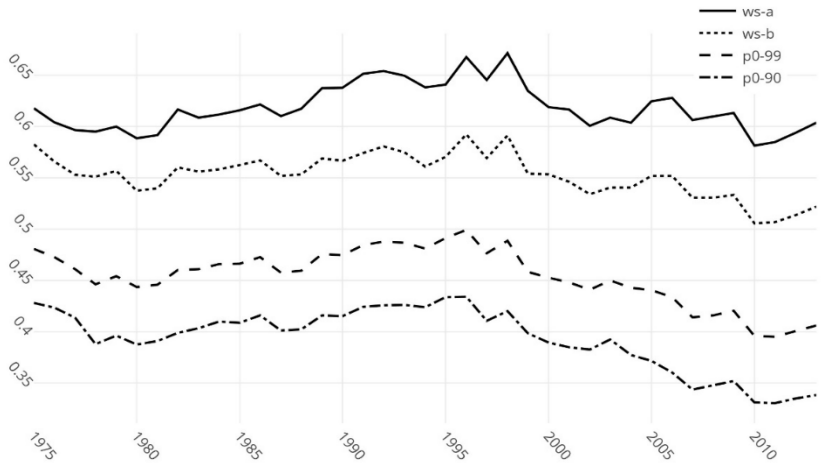

Figure 2. Shares of Wages in Total Income: Korea Corporate Sector (1975-2013, Yearly)

Figure 2 shows wage shares in Korea's corporate sector; *wsa* and *wsb* refer to the ratio of labor compensation and the ratio of wages and salaries to the total income of the corporate sector, respectively. According to this analysis, *wsa* vacillated by approximately 60%, while *wsb* trended downward after the 1997 crisis. These trends are the result of a gap between the two variables that corresponds with an increase in employers' social contributions between the two variables. The differences between *wsb* and *p0-99* (0-99 income fractile) and *wsb* and *p0-90* (0-90 income fractile) refer to the top 1% share and the top 10% share in total wages, respectively. These fractiles increase significantly after the 1997 crisis, which is consistent with other studies concerning neoliberal income trends (Duménil and Lévy 2011, 49-50). The dramatic upward trend of the top 10% income share and even the top 1%, which constitutes one of the most striking features in neoliberal income trends, appeared only after the 1997 crisis.

Because of the relatively high rate of self-employment in Korea, the transition of wage share in the Korean economy must be treated with caution. Among these variables, *self* will be taken into account in a short-term relationship using VAR.

First, when four variables — *rgdp, rw, lp*, and *ineq* — are examined in long-term relationships, these four variables can be treated within a system using VECM because the variables are all I (1) variables with the unit roots. Furthermore, a VAR system captures a short-term endogenous relationship between variables. All variables are collected from the Bank of Korea, Statistics Korea, the employment statistical yearbook of the Ministry of Employment and Labor, and the OECD. Among these variables, wage inequality is estimated from the Income Statement in National Account and Hong 2015. However, since these are annual data, the number of observations is small. Consequently, the data used in the actual estimations are displaced with quarterly data generated using a linear interpolation method (See Appendix A for details).

Both VECM and VAR models contain an exogenous variable to reflect a structural change of the Korean economy. The Asian foreign exchange crisis of 1997 is the most severe economic recession in the country. T refers to time. The dummy variable (*D*) as an exogenous variable is defined as follows:

T< 1997q4, D=0

Otherwise, D=1

IIb. Cointegration and VECM: Long-term Relationships

If economic variables are cointegrated, they maintain a certain relationship in the long term despite short-term gaps among stationary economic variables. If all variables behave like the process of I (1) and there is a linear combination among them that becomes an I (0) process, the variables are cointegrated. Thus, unit root tests for the variables are needed — namely, the Augmented Dickey-Fuller (ADF) test and the Phillips-Perron (PP) test. This is a necessary step for investigating cointegration. In this study, I test all variables with intercept and trend. The results of two tests are reported in Table 1.

Table 1. ADF and PP Test on Unit Roots for All Variables

	ADF		PP	
	Level	1st difference	Level	1st difference
rgdp	-1.3058	-4.1413	-0.1377	-3.8172
	(0.8820)	(0.0072)	(0.9937)	(0.0186)
ineq	-3.5124	-3.6053	-2.3531	-3.7837
	(0.0423)	(0.0333)	(0.4023)	(0.0204)
rw	-1.8399	-4.9885	-1.1279	-4.9891
	(0.6797)	(0.0004)	(0.9939)	(0.0004)
lp	-1.4706	-5.1495	-0.0298	-4.8426
	(0.8346)	(0.0002)	(0.9955)	(0.0007)
self	-2.6819	-2.6047	-1.7466	-3.7432
	(0.2459)	(0.2791)	(0.7248)	(0.0229)

ADF and PP test statistics with p-values for all variables are reported. The variables, *rgdp*, *rw*, and *lp* are in log levels.

As shown in Table 1, all variables employed in this study are non-stationary according to the PP test. Therefore, cointegration among the variables can be captured using the VECM method.

The lag selection process is the second step for the cointegration test. The lag lengths are selected by using a VAR process of the undifferentiated variables. According to the LR and FPE (Final Prediction Error) and AIC (Akaike Information Criterion), I chose lag 6 as the lag length specification of the system.

Table 2. Cointegration Rank Tests Including the Dummy Variable (Lag 6, Linear Deterministic Trend and Intercept in Cointegrating Equations)

	1980-2013 model
Trace	2
Max-Eig	1

For the 1980-2013 model, the trace and the max-eigenvalue tests indicate two cointegrating relations and one cointegrating relation, respectively, as shown in Table 2 (see Appendix B for details). First, according to the result of the max-eigenvalue test, one cointegrating equation between the variables will be estimated. Second, two cointegrating relationship will be explored by imposing restriction to capture long-term effects of other variable on real wage over the reference period in S. Korea.

Table 3. The Identified Cointegrating Vectors for the 1980-2013 Model (One Cointegrating Equation)

Cointegration Eq.						
CointEq1	*rgdp (-1)*	*Ineq (-1)*	*rw (-1)*	*lp(-1)*	*T*	*C*
	1	0.02***	-0.33***	-1.36***	0.00	-1.58
		(0.00)	(0.10)	(0.21)	(0.00)	

Standard errors in ( ). * indicate significance at 1%. The error correction part is omitted from this table.**

Table 3 indicates the estimation results of the system with one cointegrating relationship between the four variables. According to these results, the following equations can be obtained for the long-term:

$$rgdp = -0.02\ ineq + 0.33\ rw + 1.36lp - 0.001T + 1.58 \qquad (3)$$

Equation 3 demonstrates that a rise in real wages will increase real GDP in the long term. This suggests the long-term, wage-led nature of the Korean economy, as outlined in other studies (Onaran and Stockhammer 2005; Lavoie and Stockhammer 2012; Onaran and Galanis 2014). However, it also

shows that the rise in wage inequality has a long-term negative effect on real GDP.

The trace test in Table 2 shows that there are two cointegrating relations between the variables over the reference period. As shown in Table 3, we identify the wage-led character of the Korean economy, that is, a positive long-term relationship between real wage and real GDP. Based on the result of the trace test in Table 2, we will investigate an impact of wage inequality on the wage-led nature of the Korean economy.

Table 4. The Identified Cointegrating Vectors for the 1980-2013 Model (Two Cointegrating Equations)

Cointegration Eq.						
LR test for binding restrictions (rank=2)						
Chi-square (1) 0.52						
Probability 0.46						
CointEq1	*rgdp (-1)*	*ineq (-1)*	*rw (-1)*	*lp(-1)*	*T*	*C*
	1	0	-1.20***	0	-0.00***	-3.16
			(0.04)		(0.00)	
CointEq2	0	0.02***	1	-1.57***	0.00***	1.83
		(0.00)		(0.10)	(0.00)	

Standard errors in ( ). * indicate significance at 1%. The error correction part is omitted from this table**

As shown in Table 4, the first cointegrating vector (CoinEq1) indicates the wage-led nature of the Korean economy; however, the second cointegrating vector (CoinEq2) is constructed to observe the impacts of wage inequality and labor productivity on real wage. Based on the above report, we can obtain the following equations for the long term:

$$rgdp = 1.20\, rw + 0.004T + 3.16 \quad (4)$$

$$rw = -0.02ineq + 1.57lp - 0.006T + 1.83 \quad (5)$$

Equation 4 shows that real wage has a positive relationship to real GDP. Even in this strategy, the long-term relationship between real wage and real GDP can be identified. Equation 5 indicates that the rise in inequality can decrease real wage and the rise in labor productivity is associated with an increase in real wage in the long term. In sum, the rise in wage inequality causes a decrease in real wage and thus undermines the nature of the wage-led economy. These findings suggest that increased wage inequality hurts the level and sustainability of economic growth in the Korean economy.

IIc. Short-term Relationship: A VAR Approach

The emphasis on wage-led growth in the Moon administration's income-led growth agenda suggests that real wage could be a policy instrument to boost demand. Thus, we should investigate the effect of a short-term variation of real wage on the Korean economy. As noted above, this short-term model contains a change in the rate of self-employment, because, on the one hand, the fluctuation of the rate of self-employment could affect real wage in the labor market or a new labor discipline (e.g., flexibility). Some relaxations of layoff standards that could give rise to a short-term variation of the rate of self-employment rate may in turn affect the growth of inequality.

In this section, the symmetrical effects of each exogenous shock on each variable within a system set up by VAR are investigated. As shown in Table 1, all variables are I (1) according to the PP test. The VAR method can be implemented. Basically, the impulse response analysis shows different results depending on the ordering of each variable. We used the Generalized Impulse Response Function (GIRF) developed from Pesaran and Shin (1998). This can be done through the ordering trick, which places the i-th variable in the first order when we get the impulse response function for the i-th variable. In addition, this VAR model contains the dummy variable as an exogenous variable, which is the same as the one in the above cointegrating vectors.

Figures 3 and 4 show the effects of one standard deviation innovation of each variable. The figures include two standard error bands and are a report of generalized impulse responses. For example, the first row in Figure 3 indicates short-term effects of other variables on real GDP in the Korean economy over the reference period; however, the first column in Figure 3 demonstrates short-term effects of real GDP on other variables. The variables were arranged in order of real GDP, wage inequality, real wage, labor productivity, and the rate of self-employment from Figures 3 to 4. As shown in the long-term relationship, a rise in wage inequality is associated with a decrease in real GDP even in the short term, and productivity shock leads to an increase in real GDP. Real wage shock is significant in both long-term and short-term relationships. A rise in the rate of self-employment decreases real GDP.

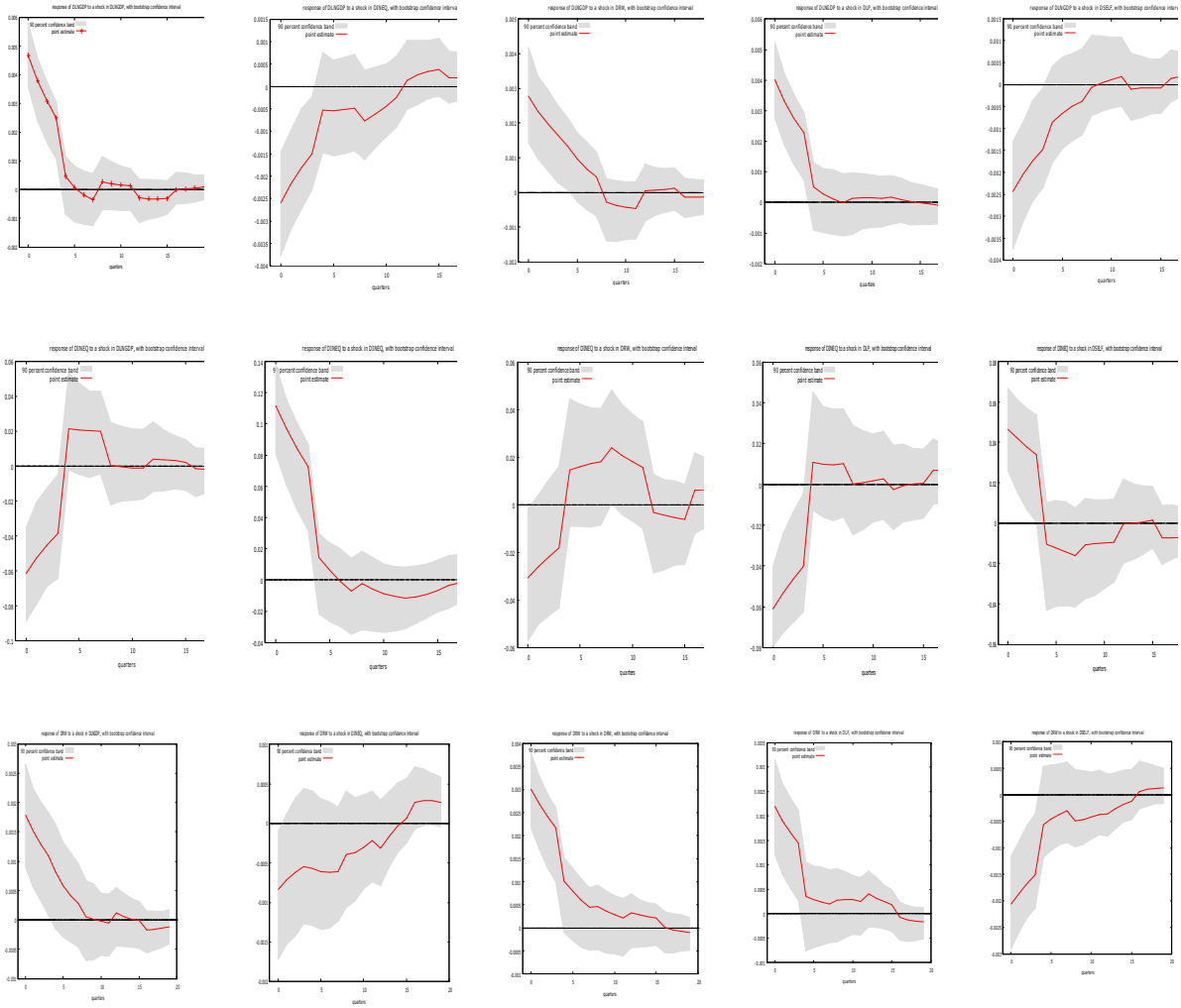

Figure 3. Generalized Impulse Responses of Real GDP, Wage Inequality, and Real Wages (See Detailed Information in Subsection Ⅱc)

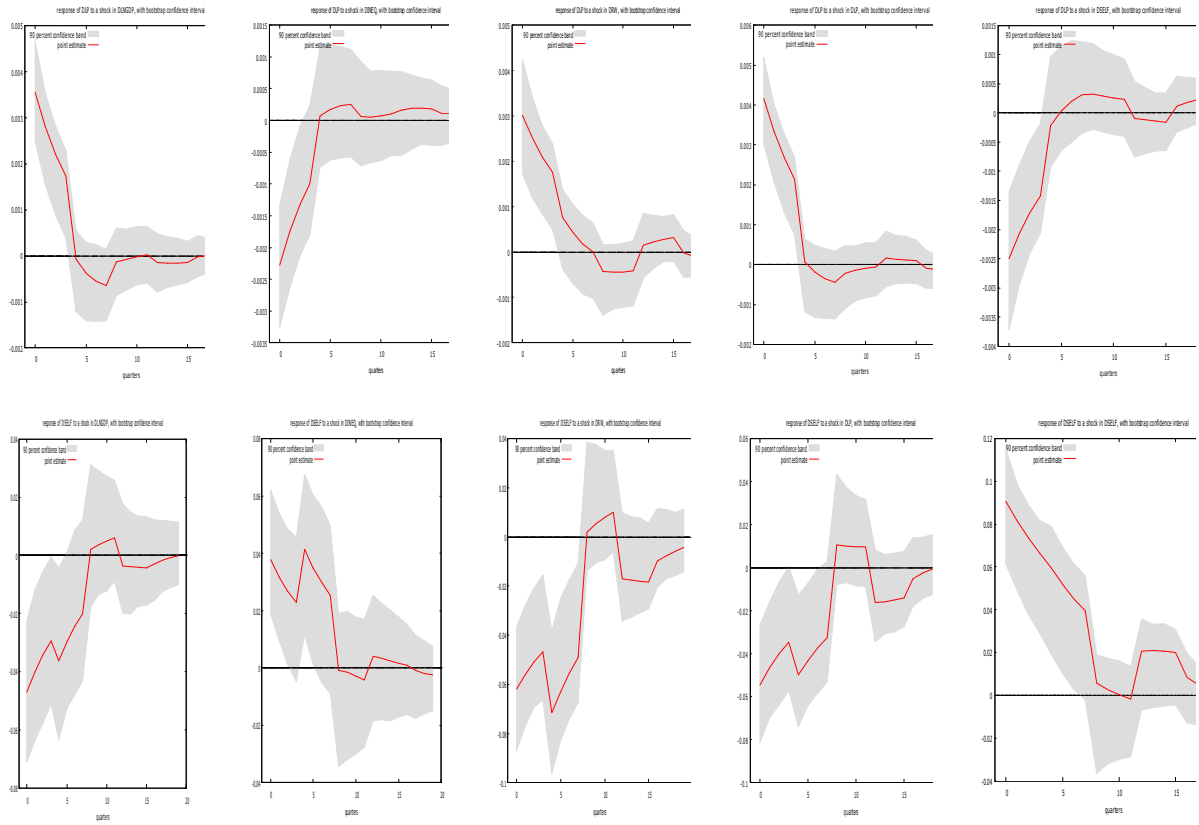

Figure 4. Generalized Impulse Responses of Labor Productivity and the Rate of Self-employment (See Detailed Information in Subsection Ⅱc)

Following a rise in wage inequality and the self-employment rate, labor productivity decreases; however, a change in real wages is associated with a positive response of labor productivity in the short term, and vice versa. Above all, the relationship between wage inequality and real wages is worth noting. Even in the short term, they have a negative interrelationship such that a rise in wage inequality decreases real wages (the purchasing power of the economy as whole), and vice versa. If a policy-maker tries to stimulate demand by raising real wages or boosting the purchasing power of the economy as whole, the economy's wage inequality should be an essential consideration not only in the long term but in the short term. In other words, a strategy for wage-led growth that does not take inequality into account is very likely to fail in the Korean economy

Lastly, in the short term, the rate of self-employment has a positive relationship with wage inequality; a rise in self-employment decreases labor productivity and vice versa. A rise in the purchasing power of the top 10% of wage-earners immediately increases wage inequality, has a

negative impact on economic growth, and leads to an increased rate of self-employment. Ultimately, there may be an imperfect link between wage-led growth strategies that results from wage inequality in the Korean economy.

Ⅲ. Concluding Remarks: Policy and Theoretical Implications

In this short study, I can identify the wage-led growth regime in the Korean economy because, in the 1980-2013 VEC model, the long-term relationship of real wages with economic growth is statistically significant. Also, there is a long-term negative relationship between wage inequality and real GDP. That is, a rise in the wage share of the top 10% of wage-earners has a negative impact on the Korean economy's growth.

Moreover, increasing wage inequality undermines the potential of Korea's economic growth in terms of labor productivity. Increased wage inequality causes an increase in the rate of self-employment that leads to a lower level of labor productivity in our short-term analysis. Therefore, wage inequality is an important link that explains how the economic situation will be unstable not only in the long term but also in the short term. In terms of the relation between real GDP and distribution both in the long term and in the short term, the trajectory and the variations of wage inequality may be crucial factors for explaining Korea's economic situation.

The short-term dynamics among those variables suggest much more important issues for policy implementation. Wage-led growth theory suggests that decisions of policy-makers that stimulate consumption or investment demand by raising the purchasing power of labor leads to higher levels of economic activity. This assumes that exogenous real-wage shock may increase the real GDP; however, in the Korean economy, inequality shock leads to a decrease in real wages in the short term, which increases the rate of self-employment. This trend, which also raises the rate of self-employment in the Korean economy, is associated with expanding the heterogeneity of the economy. In the Korean economy, thus, its policy prerequisite is to consider wage-earning inequality. Otherwise, the growth or recovery strategy favourable to labor will face policy resistance.

This study suggests that a more comprehensive empirical investigation of wage-led growth theory in terms of income distribution is needed because, in recent decades, the relationship between income distribution and macroeconomic performance has become more complicated, as shown in this study, although wage-led growth literature is more deeply involved in the challenge to revive the discussion of the relationship between income distribution and economic growth.

Appendix A. Data: Sources and Construction

Real GDP: log level, the annual real GDP, Bank of Korea, http://ecos.bok.or.kr

Wage inequality: %, the share of the top 10% of wage-earners' total wages and salaries, http://ecos.bok.or.kr, Hong (2015)

Real wage: 1997q4=100, log level, the real wage decomposed from wage share, assuming the same distributional profile with other sectors, http://ecos.bok.or.kr

Labor productivity: 1997q4=100, log level, labor productivity of the economy as a whole, NNI deflated by the average labor time reported by Ministry of Employment and Labor in South Korea (http://www.moel.go.kr/) and the economically active population reported by Statistics Korea (http://kostat.go.kr)

The rate of self-employment: %, OECD (https://data.oecd.org/emp/self-employment-rate.htm)

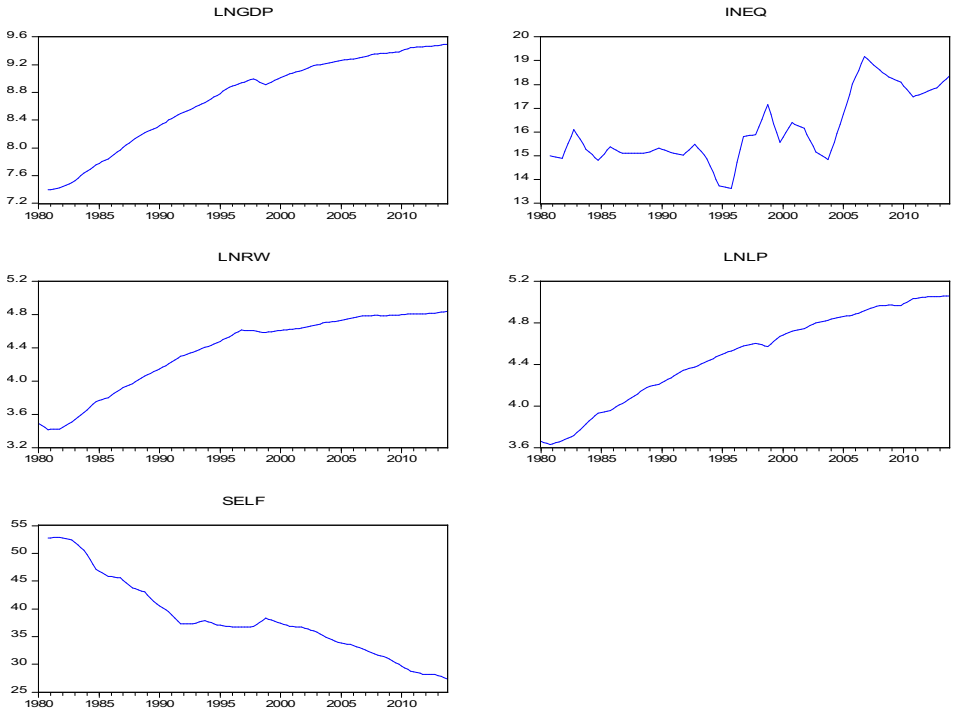

Figure A1. The Variables: *ineq, lngdp, lnlp, lnrw, SELF* (Korea, 1980-2013,Yearly)

Appendix B. Results of Cointegration Tests

Table B1. The Cointegration Test for the 1980-2013 Model (Lag 6, Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.289077	87.18391	63.87610	0.0002
At most 1 *	0.143312	44.19381	42.91525	0.0370
At most 2	0.122060	24.70393	25.87211	0.0694
At most 3	0.063762	8.301602	12.51798	0.2280

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level

*** denotes rejection of the hypothesis at the 0.05 level**

****MacKinnon-Haug-Michelis (1999) p-values**

Table B2. The Cointegration Test for the 1980-2013 Model (Lag 6, Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.289077	42.99010	32.11832	0.0016
At most 1	0.143312	19.48988	25.82321	0.2736
At most 2	0.122060	16.40233	19.38704	0.1289
At most 3	0.063762	8.301602	12.51798	0.2280

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level

*** denotes rejection of the hypothesis at the 0.05 level**

****MacKinnon-Haug-Michelis (1999) p-values**

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