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Domestic demand under Neoliberalism: the US and Korean Economy

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Abstract

This article explores long-term relationships between macroeconomic trajectories and wage inequality under neoliberalism in the US and S. Korea. The evolution of consumer debt during the neoliberal period is also considered in this study. Both countries suffered from economic crises such as the global crisis of 2008 or the Asian financial crisis in 1997-8. To capture these structural changes in both countries, we use some unit root tests with structural changes and a cointegration test with a single structural break. In this study, we found long-term patterns between domestic demand, wage inequality, and consumer debt that much of literature on neoliberalism has expected: a positive long-term relationship between consumption, wage inequality, and consumer debt; a negative long-term relationship between investment, wage inequality, consumer debt; however, if taking the structural changes in both countries, the result is quite different from the expectations in both countries.

Keywords: *Domestic Demand, Wage inequality, Structural changes, Neoliberalism, Korean Economy, US economy*.

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신자유주의와 국내수요: 한국과 미국 비교

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국문요약

이 논문에서 우리는 1980년대 이후 확대된 금융화 과정과 불평등의 확대를 신자유주의라고 부르면서, 이러한 신자유주의의 과정이 미국경제와 한국경제의 국내수요(소비와 투자)에 어떤 영향을 미쳤는지 살펴본다. 미국경제에서 1980년대 이후의 신자유주의 과정이 국내수요 측면에서 보면, 소비를 확대하고 투자를 감소시켰다는 일반적 의견이 경험적으로 받아들일 수 있는 것인지 살펴보고, 1980년대 이후 한국경제의 과정과는 어떤 차이를 보이는지 알아본다. 단 우리는 2008년 금융위기와 1997년 동아시아 외환위기의 존재를 가정하여 구조적 변화를 포함한 단위근 검정과 공적분 검정을 실시하였다. 그리고 구조적 변화 전후로 구간을 설정하여 신자유주의와 국내수요와 장기적 관계를 검정하였다. 특히, 2008년 금융위기 이후로 미국경제와 한국경제 모두에서 소득 불평등의 증가는 국내수요를 감소시키며, 다만 가계부채의 증가는 미국에서 소비와는 여전히 정(+)의 관계를 갖고 있으며, 투자와는 음(-)의 관계를 갖는다. 한국에서 가계부채의 증가는 국내수요를 모두 위축시키고 있음을 확인하였다.

주제어: *한국경제, 미국경제, 신자유주의, 국내수요, 구조적 단절, 임금소득 불평등*

I. Introduction

This article aims to explore long-term relationship between macroeconomic trajectories such as consumption and investment, wage inequality, and consumer debt in the US and Korean economy. A sharp increase in the latter two elements since the 1980s is the well-known feature of the US economy. Also, those variables of the Korean economy have exhibited a similar pattern with those of the US economy, particularly since 1997. Despite the differences in timing concerning the structural changes between the US and Korean economy, this article tries to capture the long-term relationship between those variables in the two countries since the 1980s. Furthermore, this article will show the characteristics that appear in each period of those relationships, which may differ from the expected relationships in the existing literature, using the econometric method that can endogenously detect structural changes. Due to this analysis, this study could better illustrate the differences of the economic transformation processes between the two countries.

Over the past few decades, particularly in the US and Korean economies, there has been a widening gap in income distribution between the top income groups and the lower income groups. Also, a constant growth of consumer debt has been one of the important features in the two countries since the 1980s. This article studies long-term relationships between domestic demand and those similar patterns of consumer debt and wage inequality in the two countries since the 1980s. If we consider the periodization in this study, the effect of the rise in wage inequality and consumer debt on consumption in the two countries is ambiguous. After 2001 when we detected as a structural break, a rise in wage inequality decreases consumption in the US economy while it is positively associated with that during the previous period. In the case of the Korean economy, a rise in wage inequality or consumer debt has decreased consumption and investment in the nearly two decades since the 2000s. In this study, thus, we argue that it is necessary to consider the structural breaks of the variables and the cointegration relationship for this study.

Duménil and Lévy (2011) argue that this evolution of inequality in the US economy is associated with the quest for high income based on financialization and globalization under neoliberalism. In both countries, rising inequality among wage earners accounts for a significant portion of the distributional gaps. Within the Marxist framework of the social classes, moreover, the increase in wage inequality indicates that a new intermediate class, the managerial class, is rapidly emerging among the traditional social classes— the bourgeoisie and the working class— in capitalist societies (Duménil and Lévy 2011). Despite the recent rise of the managerial class, its emergence and development have a much longer story throughout the historical transformation of capitalism, but it is worth noting their achievement relating to income distribution during the neoliberal period (Duménil and Lévy 2011; Mohun 2006, 2016; Tavani and Vasudevan 2014; Vasudevan 2016).

During the post-war period, “workers not in power, the capitalist classes were contained, imply the enhanced role and autonomy conferred on the managerial classes” (Duménil and Lévy 2011: 78). The managerial classes enjoyed relative autonomy from the capitalist owners “with a considerable share of the profits retained within corporations for the purpose of investment” (Duménil and Lévy 2010: 79). Those classes in the Korean economy have held a critical position in the country’s economic development (Kim 2011) because the state-led developmental strategy was an indispensable element of the country’s economic development

(Woo 1991) and they took a leading role in the neoliberal turn of the country (Pirie 2008). The talent selected through qualifying excellence exams (Kim 1987) not only set up a plan for national development but also accomplished outstanding achievements in international competition as managers of large corporations represented by chaebols. These qualified persons were considered to have various privileges and became regarded as a social class in Korea. Obviously, the achievements of this group, in terms of income distribution, have been prominent compared to other countries (Hong 2015).

From an international perspective, the achievements of the top income groups in the Korean economy are even more prominent. Figure 1 shows the top 1% income shares of four countries. Compared to France and Japan, the pace of increase of the top 1% after the 1997 crisis has been remarkable, and it could be compared with that of the US economy. However, the 90-99 group was ranked highest among all other countries in terms of performance. Additionally, after the neoliberal shift around 1980, the income shares of the two income groups came to resemble similar groups in other countries, which made the performance of the 90-99 income group particularly dramatic (See Figures 1 and 2).

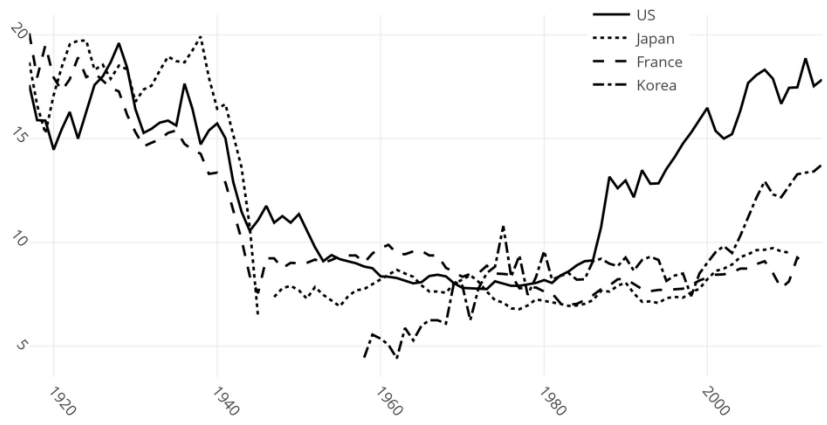

Figure. 1. Top 1% income share: US, Japan, France, and Korea. Source: World Income Database www.wid.world, Hong (2015a): https://sites.google.com/site/hminki00/

In the early 1980s, capital became a viable force in the market again (Piketty and Zucman 2014). Under the financial hegemony, the capitalist owners reasserted their interests, and the relative autonomy of the managerial class from the capitalist class was largely undermined. However, the managerial class survived and strengthened their power and incomes in the neoliberal transition of both the US and Korea. A new alliance between top executives in the managerial class and capitalist owners has come to represent the social order of the new age (Duménil and Lévy 2011). In the Korean economy as well as the US economy, the upper classes of managers in both the public and private sphere are constantly changing despite the dismantling previous economic or developmental strategies. The practices of the managerial class in both countries since the 1980s have become increasingly favorable to the interests of the financial sector and the extremely open capital markets (Duménil and Lévy 2011; Glyn

2006; Lazonic and Sullivan 2000; Pirie 2008; Vasudevan 2016).

The decreasing pace of capital accumulation has constituted one of the popular characteristics of the evolution of the composition of aggregate demand in many countries during the neoliberal period, although there was an investment boom of the 1990s in some countries like the US and Korea. In the US economy, moreover, an increase in the ratio of consumption to GDP can be observed coupled with the falling rate of investment since 1980. This consumption-led growth regime, whose features are the slowdown in accumulation and the upward trend of the consumption to GDP ratio, accompanied a dramatic increase in household debt in the US (Duménil & Lévy 2011: 146-151; Dos Santos 2015: 665). Vasudevan (2016) argued that an increase in the share of capitalist owners and managerial class under the dominance of finance, represented by deregulation, companies' favorable shift toward finance, and globalization during the neoliberal period, led to a slowing of capital accumulation and an increase in the ratio of consumer debt to GDP. These have been the persistent trends of the US economy throughout neoliberalism.

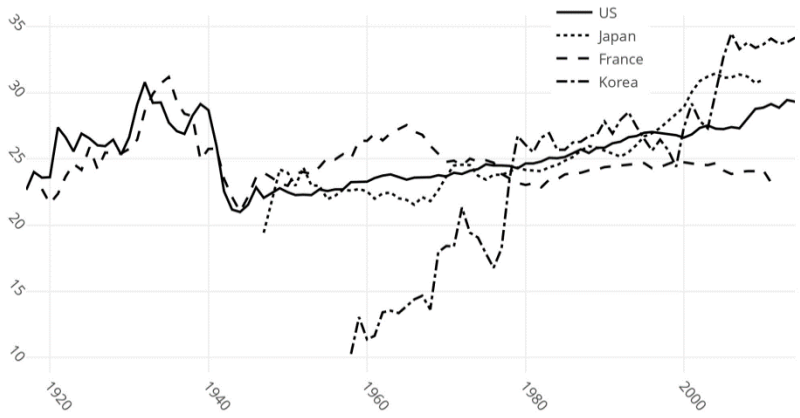

Figure 1. Income share of the 90-99 fractile: US, Japan, France, and Korea. Source: World Income Database www.wid.world, Hong (2015a): https://sites.google.com/site/hminki00

Indeed, the declining trend of capital accumulation in the Korean economy can be observed starting from the Asian financial crisis of 1997-1998, which was one of the most severe economic crises in the country's history. However, the significance of consumption in the demand composition of the Korean economy since 1980 would be questionable because there was a long, sharp decline in consumption relative to the GDP in the first half of the 1980s. Contrary to the trends in the US economy, it is difficult to extract a consistent trend comparing the pace of capital accumulation and the ratio of consumption to the domestic demand during the neoliberal transition in the Korean economy. This difficulty is thought to be related to Korea's long, painful transition to neoliberalism, because the neoliberal shift in the country entailed the disintegration of its past developmental strategy linked to the strong authoritarian

state.

This study seeks to establish a possible long-term relationship between rising wage inequality, which was one of the important results of the new alliance between the capitalist owners and the upper managerial class, and the macroeconomic trends since 1980 in the US and Korean economies. For this reason, I considered the wage share of the top 10% wage earners without separating wage trends of higher income groups, which are more dependent on capital income. In the US economy, "the incomes of executives, managers, supervisors, and financial professionals can account for 60% of the increase in the share of national income going to the top percentile of the income distribution between 1979 and 2005" (Bakija, et al., 2012: 27); however, in this study, I considered a wider range of the managerial and clerical classes at the top 10% of wage earners. In the case of the Korean economy, the proportion of managers and professionals in the highest income group – for instance, the top 1% income group – is higher. In the lower income bracket of the top income group in the Korean economy – for instance, the top 1-5% income group – the proportion of clerical workers, in particular, those in the law and financial fields, increases (Hong, 2015). Thus, "rising wage inequality in recent decades reflects the rising claims of the top managerial-professional class" (Vasudevan 2016: 400).

In this study, I try to capture possible regime changes related to consumption trends and the pace of accumulation in both countries. For example, in the US economy, the financial crisis of 2008 may be a breaking point in the relationship between wage inequality and macroeconomic trends. Similarly, the Asian financial crisis in 1997-8 may be that of the Korean economy. There may also be other hidden potential breaks in both countries. All data series in this study are very likely to include break points during the observation period. Therefore, to capture the structural breaks in the data, I employ the Zivot-Andrews test for the unit root in a single break in a series. Perron (1989) suggests that standard unit root tests, such as the ADF (Augmented Dickey-Fuller) test, tend to fail in cases of data series with structural breaks. Zivot and Andrews (1992) argue that, "selecting the break exogenously could lead to an over-rejection of the unit root hypothesis" (Narayan 2005). The Zivot-Andrews test provides information about an endogenously estimated breakpoint in the data. Moreover, this study applies the unit root test with two endogenous structural breaks suggested by Lumsdaine and Papell (1997) to each variable if necessary.

Second, to estimate the long-term relationship between wage equality and macroeconomic trends in the US and Korean economy, I use the Autoregressive Distributed Lags (ARDL) model. Beyond the above unit root tests with a structural break on one data series, the Gregory and Hansen (1996) test provides information about a structural break in a cointegration test. The Gregory-Hansen test proposes three models of the structural change: Level, trend, and regime shift. I take the regime shift framework of the Gregory-Hansen test into account for this study. If one finds a breakpoint in data or a cointegration equation and then estimates a cointegration equation for each period based on the structural break test, the estimations cannot help to avoid a reduced sample size problem, even if the amount of data has been increased via monthly or quarterly data. However, the ARDL framework makes it possible to overcome the small sample problem, because the ARDL cointegration technique is robust and consistent compared to other cointegration techniques, such as Engel and Granger's (1987) or Johansen's (1988) methods (Pesaran and Shin 1999; Haug 2002; Narayan and Smyth 2005). Moreover, It can be selected for this study even if the unit root tests with or

without the structural breaks are not consistent because I (1), I (0), and the combination of both orders are allowed in the ARDL technique (Pesaran 1999; Pesaran et al. 2001; Narayan 2005).

Ⅱ. Model Specification, Data, and Methodology

To examine relationships between inequality and macroeconomic trends in the US and Korean economies, the models take the following forms.

$$cons_t = \beta_{10} + \beta_{11} WI_t + \beta_{12} CD_t + \varepsilon_{1t} \quad (1)$$

$$inv_t = \beta_{20} + \beta_{21} WI_t + \beta_{22} CD_t + \varepsilon_{2t} \quad (2)$$

The dependent variables, *cons* and *inv*, refer to the ratio of consumption to GDP and the rate of capital accumulation in the nonfinancial firms in both countries. The *WI* is the share of the top 10% wage earners, excluding capital gains and incomes in both countries. The *CD* is the ratio of households and nonprofit organizations' debt (market instruments) to GDP, which is used to capture the increase in consumer credit under financial deregulation during the neoliberal period in both countries. I tried to estimate long-term effects of two independent variables on the pace of capital accumulation and the consumption composition of GDP in both countries; thus, I chose an estimation of every single equation based on the ARDL technique.

Previous studies on neoliberalism expected the positive coefficients of independent variables in model 1 and the negative coefficients of independent variables in model 2 to be the popular characteristics of the neoliberal period, particularly in the US. In other words, the evolution of the alliance between the capitalist owners and the managerial class is expected to decrease the pace of capital accumulation and increase the consumption ratio to GDP, meaning that domestic consumption demand of the economies is constrained by inequality and the proliferation of financial instruments for consumption. These aspects are what the "consumption-led growth" (Dos Santos 2015) and "inequality-constrained growth regime" (Vasudevan 2016) describe.

The long-term relationships in models 1 and 2 were estimated using quarterly time series data for the period from 1980-2015, because this study aims to capture the long-term relationship within the neoliberal period from 1980. The start date, however, may be controversial in Korea because, in the 1980s, Korea was subjected to a military dictatorship and still maintained the state-led development strategy in many aspects (Pirie 2008; Lee 2010). The quarterly data series had to be applied to this study because very few observations can be obtained if taking structural breaks in both countries into account. Second, some quarterly data series, such as net capital stocks and net investment in the nonfinancial sector in both countries, are produced via the cubic spline interpolation method. The data on net capital stocks and net investment in both countries are from and the fixed assets table of BEA (Bureau of Economic Analysis) the flow of funds table published by the FED in the US and are obtained from the national balance sheet and national accounts of the Bank of Korea in Korea, respectively. The data on wage inequality in both countries, which is transformed into the quarterly data through interpolation matched to an annual average value in this study, can be

obtained in the World Wealth and Income Database (WID) and Hong (2015). Other quarterly data comes directly from the NIPA and the flow of funds table in the US and the national account and the flow of funds table in Korea, respectively, while the data on consumers and non-profit organizations' debt in the Korean economy was adjusted using the Census X-12 approach.

For the unit root test for each variable, I used the two traditional unit root tests: The Augmented Dickey-Fuller test and the Phillips-Perron test. In addition, the Zivot-Andrews test for one structural break provides information about the unit roots of each variable if they have one endogenous structural break. Because the traditional unit root tests tend to report ambiguous results for variables with a structural break, a bias that cannot reject the null hypothesis (Perron, 1989; Gregory and Hansen 1996), the Zivot-Andrews procedure, is necessary. This study selects two models allowing for a change in intercept and both the intercept and slope (Narayan 2005) suggested by Zivot and Andrews (1992).

The Gregory-Hansen test conducts the test of cointegration in the presence of structural breaks. The null hypothesis of this test is no cointegration when the cointegration relation includes the regime change, such as a change in the intercept alone and coefficient changes or both (Gregory and Hansen, 1996). Among the models suggested by Gregory and Hansen (1996), I chose the regime shift (C/S) model for the cointegrating relationship between wage inequality, consumer debt, and macroeconomic trends in the US and Korean economies. Gregory and Hansen (1996) propose statistics, the ADF, Z_{α}, and Z_t, and their critical values at each significant level – 10%, 5%, and 1%. Moreover, the procedure of Gregory and Hansen (1996) detects an unknown date of the structural break in the long-term relationship. Ultimately, the ARDL technique is applied to each period corresponding to the structural breakpoint estimated by the Gregory-Hansen procedure. The model specification is based on the lag selection criterion, such as Akaike Information Criterion (AIC), the serial correlation LM test, and the Ramsey test. For a lack of space, the Durbin-Watson statistics are presented instead of the results of the serial correlation LM test. Moreover, the stability test of CUSUM square test is needed because the structural break in this study refers to changes in slope coefficients (Turner 2010).

Ⅲ. Empirical Results

1. The US Economy (1980-2014)

Consumption

The ARDL technique does not require the pre-test for unit roots. However, the Gregory-Hansen (G-H) test is validated in I (1) of all variables (Gregory and Hansen, 1996; Narayan, 2005). Table 1 reports the results of the traditional unit root tests —the Augmented Dickey-Fuller (ADF) test and the Phillips-Perron (PP) test. Model A and Model B in Table1 refer to the unit root test model including intercept and the one with both intercept and trend, respectively. Most variables employed in this study are nonstationary, but the ratio of consumption to GDP (cons), and wage inequality (WI) are stationary at the significant 5% level if the model includes both intercept and trend (Model B). However, one of the variables, WI, is I (1) according to PP test.

Table 1 Augmented Dickey-Fuller test (ADF) and Phillips-Perron test (PP) for unit roots (US economy, 1980-2015)

	cons		inv		WI		CD	
	Model A	Model B	Model A	Model B	Model A	Model B	Model A	Model B
ADF	-1.31	-3.84**	-2.30	-2.26	-1.22	-3.75**	-1.83	-2.03
PP	-1.26	-3.69**	-2.75	-2.52	-1.05	-3.10	-1.17	-0.77

** Indicates significance at 5%.

Table 2 Zivot-Andrews test for unit roots (US economy: 1980-2015, maxlag=13)

	cons		inv		WI		CD	
	Model A	Model B	Model A	Model B	Model A	Model B	Model A	Model B
t-stat	-4.06	-4.40	-3.57	-3.45	-4.22	-4.37	-3.77	-3.60
B/P	2011:2	2000:3	1996:2	2008:1	1996:2	1997:4	2001:3	1989:2

Critical values		
Significance level	Model A	Model B
1%	-5.34	-5.57
5%	-4.93	-5.08
10%	-4.58	-4.82

B/P in the table refers to the breakpoints calculated from the tests.

The results in Table 2 are slightly different from those of the traditional unit root tests in Table 1. All variables employed in this study are non-stationary according to the Zivot-Andrews test with one structural break. Because the Gregory-Hansen test can be applied to the series with the I (1) process, the test can be conducted to find an endogenous structural break at an unknown date.

Table 3 Gregory-Hansen test for cointegration (US economy)

	ADF*	B/P	Z_α*	B/P	Z_t*	B/P
Model 1 (1980-2015)	-4.43	2005:3	-30.49	2001:1	-4.23	2001:1
Model 2 (1980-2015)	-5.04	1997:2	-18.50	1996:1	-3.15	2008:4
Critical values						
Significance level	ADF*, Z_t*		Z_α*			
5%	-5.50		-58.33			
10%	-5.23		-52.58			

B/P in the table refers to the breakpoints calculated from the tests.

As shown in Table 3, the Gregory-Hansen test for the regime shift (C/S) tests fails to reject the null hypothesis of no cointegration in models 1 and 2. The cointegrating relationship for the 1980-2015 period in the models does not hold, and the endogenous structural breaks suggested in the tests need to be taken into account. Thus, I constructed cointegration models around the estimated breakpoints by the Gregory-Hansen test. Note that the breakpoints estimated by the Gregory-Hansen test are somewhat different from the Zivot-Andrews test results that target one variable.

The cointegrating test for the model 1 was conducted around Q3 of 2001 out of the results endogenously estimated by the Gregory-Hansen test (See Table 3), which is the reference date suggested by Z_α and Z_t statistics. The ARDL bound test "involves the comparison of the F-statistics against the critical values" (Narayan, 2005), which are for specific sample sizes.

Table 4 Cointegration test (Model 1 for the US economy, K=2)

ARDL bound test for cointegration						
Calculated *F* statistic						
Period	N	*F*				
1980:1-2000:4/ARDL (3,4,1)	79	7.05				
2001:1-2014:4/ARDL (1,2,5)	50	12.49				
Critical value bounds of the F-statistic						
	5% [I(0)/I(1)]	10% [I(0)/I(1)]				
N=80, K=2	3.94/5.04	3.26/4.24				
N=50, K=2	4.07/5.19	3.33/4.31				
Gregory-Hansen test for cointegration						
	ADF*	B/P	Z_α*	B/P	Z_t*	B/P
1980:1-2000:4	-6.07***	1986:4	-41.75	1983:3	-5.27*	1983:3
2001:1-2014:4	-6.47***	2010:3	-48.24	2010:3	-6.54***	2010:3

N: The number of observations K: The number of regressors. * and *** indicate significance at 10% and 1%, respectively.

Table 4 reports the results of the bound test for cointegration of the model 1 for 1980:1-2000:4 and 2001:1-2014:4 periods. Because Narayan (2005) provides the critical values for the test corresponding to the observation numbers ranging from 30 to 80, the calculated F-statistic of the model 1 should be compared with the critical values suitable for the number of observations and regressors. The lag specification of model 1 for 1980:1-2000:4 is ARDL (3,4,1) selected based on the AIC criterion. The calculated F-statistic of model 1 for 1980:1-2000:4 is higher than the upper bound for critical value of 5.04 at the 5% level. This result suggests that the null of no cointegration can be rejected. Similarly, the F-statistic of model for 2001:1-2014:4 [ARDL (1,2,5)] is much greater than the critical value of 5.09 at the 5% level. Thus, the variables in model 1 for 2001:1-2014:4 are cointegrated. Moreover, the results of the Gregory-Hansen test in Table 4 protect the cointegrating relationship of each model from the intervention of possible breakpoints. These results from the Gregory-Hansen test support those from the bounds tests for two periods.

Table 5 Long-term relationships for each period (US economy: 1980-2014)

	US			
	cons		inv	
	1980:1-2000:4	2001:1-2014:4	1980:1-2007:4	2008:1-2014:4
WI	0.022	−0.047**	−0.083	−0.040
CD	0.053**	0.011*	−0.009	−0.109***

. ** and *** indicate significance at 5% and 1%, respectively.

Table 5 reports the estimation results of the long-term coefficients. For the period 1980:1-2001:4, as much of the literature on the US economy under neoliberalism has expected, the long-term coefficients of wage inequality and household debt are positive. In other words, the increase in wage equality and household debt in the US economy contributed to an upward trend in the ratio of consumption to GDP during the period 1980:1-2000:4. However, for the period 2001:1-2014:4, including the 2001 crisis and the Financial Crisis in 2008, the coefficient of wage inequality is negative. That is, the increase in wage inequality has led to a decrease in the share of consumption in the GDP since the 2000s. The sequential crises in the US economy may disrupt the consumption pattern of the country under neoliberalism. The coefficients of the error correction term in Table A1 are statistically significant at the 1% level with a negative sign for each period. These results support the existence of the long-term relationships between the variables.

Investment

During the neoliberal period, the negative coefficients of model 2 mean that the effects of neoliberalism are associated with a decrease in investment. As shown in Table 3, model 2 for the 1980-2015 period is expected to have a breakpoint according to the Gregory-Hansen test. However, one of the results of the Zivot-Andrews test referred to 2008:1 as the breakpoint of the slope and intercept of the pace of capital accumulation in the US economy. The Gregory-Hansen test for 1980:1-2007:4 proposes -6.98 and -5.43 of the t-stat for the ADF procedure and Z_t-stat; these statistics are significant at the 5% and 10% levels, respectively. Thus, the no long-term level relationship with a breakpoint can be rejected.

Table 6 Cointegration test (Model 2 for the US economy, 1980:1-2014:4)

ARDL bound test for cointegration		
Calculated *F* statistic		
Period	N	*F*
1980:1-2007:4 /ARDL (12,5,0)	97	4.66
2008:1-2014:4/ARDL (5,1,4)	23	9.47
Critical value bounds of the F-statistic		
	5% [I(0)/I(1)]	10% [I(0)/I(1)]
K=2[1)]	3.10/3.87	2.63/3.35
N=30, K=2	3.53/4.42	2.91/3.69

N: The number of observations K: The number of regressors

* and *** indicate significance at 10% and 1%, respectively.

1) Case Ⅱ. Restricted intercept and no trend; Pesaran, Shin, and Smith (2001)

Table 5 and Table 6 reports the result of the cointegration test for 1980:1-2007:4 and 2008:1-2014:4. These results are consistent with the expectations concerning the neoliberal pattern. The long-term relationship between wage inequality, consumer debt, and the pace of capital accumulation is negative over the observation period. Since the 2008 crisis, the constancy of the parameters of model 2 for 2008:1-2014:4 is supported by the CUSUM square test; however, that of model 2 for 2009:1-2014:4 according to the result of the Gregory-Hansen test failed to be maintained (See Figure B4 and Figure B6 in Appendix).

Cointegration tests for the annual data series

The cointegration tests for the annual data provide information about the long-term relationship between domestic demand, wage inequality, and consumer debt for the entire observation period, 1980-2014, in the US economy.

Table 7 Cointegration test (US economy, 1980-2014)

ARDL bound test for cointegration			
Calculated *F* statistic			
Model/Period	N		*F*
Model1/1980-2014 ARDL(4,4,0)	31		8.83
Model2/1980-2014 ARDL(4,4,2)	31		3.88
Critical value bounds of the F-statistic			
	5% [I(0)/I(1)]		10% [I(0)/I(1)]
N=30, K=2	3.53/4.42		2.91/3.69
Estimated long-run coefficients			
	β_{10}	β_{11}	β_{12}
Model1/ARDL(4,4,0)	0.4729***	0.4356***	0.0133
	(0.0143)	(0.0534	(0.0138)
	β_{20}	β_{21}	β_{22}
Model2/ARDL(4,4,2)	0.0568	-0.0044	-0.0327
	(0.0403)	(0.1749)	(0.0484)

N: The number of observations K: The number of regressors

*** indicates significance at 1%.

Table 7 shows the results of the long-term cointegration tests for the annual data. As mentioned above, model 1 is constructed to observe the relationship between consumption, wage inequality, and consumer debt in the long term, and model 2 contributes to the estimation of a long-term relationship between the rate of capital accumulation and other variables. Each result of ARDL bound tests and the error correction models for each model (Table A3 in Appendix) support the existence of a long-term relationship between the variables. The lag specification of model 2 was selected based on the Hannan-Quinn Criterion. That model fulfills the criterion, and thus, the null hypothesis of no levels relationship can be rejected at the significant level 10%. The results of the estimation of model 1 are consistent with the expected ones during the neoliberal period. A high level of wage inequality and consumer debt was positively associated with consumption during the period. As mentioned above, the previous estimations for model 2 using the quarterly data have also indicated that the relationship between the rate of capital accumulation and wage inequality may vary for each period and lag specification. This ambiguous effect of inequality on the pace of capital accumulation before the 2008 crisis may result from the investment boom of the 1990s in the US economy.

2. Korea (1980-2014)

Consumption

Even after 1980, the Korean economy maintained a lot of its old development strategies, for example, the industrial policies set by the state, state-owned banks, and strong national support for selected companies, *Chaebol*, which are the comprehensive effect of the former elements. From 1980-1997, there have been many deregulations to boost globalization and financialization. In short, at that time, there was a trend to dismantle the existing development strategy and the economic structure that it still depended on. I tried to capture the effect of the mixture on domestic demand. Moreover, I investigated whether the radicalization of the neoliberal reform since 1997 allowed the Korean economy to settle into neoliberalism.

Table 8 Augmented Dickey-Fuller test (ADF) and Phillips-Perron test (PP) for unit roots (Korean economy, 1980:1-2015:4)

	cons		inv		WI		CD	
	Model A	Model B	Model A	Model B	Model A	Model B	Model A	Model B
ADF	-2.27	-2.03	-1.07	-2.74	-0.01	-2.26	-0.81	-3.37*
PP	-2.29	-2.08	-1.94	-2.78	-0.27	-2.05	-0.76	-2.96

*, **, *** indicate significance at 10%, 5%, 1%, respectively.

Table 9 Zivot-Andrews test for unit roots (Korean economy: 1980:1-2015:4, maxlag=13)

	cons		inv		WI		CD	
	Model A	Model B	Model A	Model B	Model A	Model B	Model A	Model B
t-stats	-3.17	-3.48	-3.72	-4.08	-4.06	-4.16	-6.67***	-6.48***
B/P	1998:2	1989:1	1997:2	1997:1	2003:2	1992:2	1998:2	1998:2

Critical values		
Significance level	Model A	Model B
1%	-5.34	-5.57
5%	-4.93	-5.08
10%	-4.58	-4.82

*** indicates significance at 1%.

As shown in Table 8, most of the variables employed in the study of the Korean economy have I (1) at the significant level 5%. However, the Korean economy's consumer debt cannot reject

the null if taking a breakpoint into account (Table 9). The Lumsdaine-Papell test, which is a unit root test with two endogenous breakpoints, provides a contradictory result regarding the unit roots of the variable. I conduct Lumsdaine and Papell's CC model of the structural trend and intercept changes for the unit root test (Lumsdaine and Papell, 1997; Ben-David, et al., 2003; Narayan, 2006), which is the same as Model B for the unit roots in this paper. To conserve space, only results for t-statistics of the existence of the unit root are reported here. The AIC is the criterion of the selected optimal lag.

Table 10 Lumsdaine-Papell test for unit roots (Model CC, Korean economy, 1980:1-2014:4, maxlag=13)

	cons	inv	WI	CD
α	-0.24	-0.02	-0.16	-0.40**
t-stats	-5.46	-5.96	-5.02	-7.20
Optimal lag	10	13	13	10
B/P	1985:4/1998:1	1992:3/2003:2	1993:2/2005:4	1984:2/1998:2

*, **, *** indicate significance at 10%, 5%, 1%, respectively. The critical values, from Lumsdaine and Papell (1997, Table 3), are -7.34 (1%), -6.82 (5%), and -6.49 (10%).

Consumer debt is still stationary in the Lumsdaine-Papell unit root test with two break points at the significant 5% level; the other three variables are non-stationary, I (1) (Table 10). Therefore, the Gregory-Hansen test for the Korean economy cannot be conducted for the entire observation period, 1980:1-2014:4, and an endogenous systemic breakpoint cannot be estimated for the period. However, the breakpoints for the ARDL bound tests are selected by choosing the closest approximate points between the results of the two different tests. For example, the breakpoint of model 1 for the US economy was 2000:1 out of the Gregory-Hansen test breakpoints, which is the closest point out of the result of the Zivot-Andrews test breakpoints. This result is also true of the estimation relating to the rate of capital accumulation. Thus, the breakpoint of consumption, 1989:1, and the breakpoint of investment, 1997:1, estimated by the Zivot-Andrews test, are the reference date of estimations for each period.

Table 11 Cointegration test (Model 1 for the Korean economy, 1980:1-2014:4)

ARDL bound test for cointegration		
Calculated *F* statistic		
Period	N	*F*
1980:1-1989:1 ARDL(5,1,0)	34	6.90
1989:2-2014:4 ARDL(1,0,4)	106	8.12
Critical value bounds of the F-statistic		
	5% [I(0)/I(1)]	10% [I(0)/I(1)]
N=30, K=2[1)]	4.53/5.41	3.77/4.53
K=2[2)]	3.88/4.61	3.38/4.02

Estimated long-run coefficients

	β_{11}	β_{12}	T
ARDL(5,1,0)	0.2483	0.8807***	-0.0091***
	(0.2738)	(0.2841)	(0.0014)
ARDL(1,0,4)	-0.2021	-0.6576***	0.0030***
	(0.1451)	(0.1072)	(0.0004)

N: The number of observations K: The number of regressors

*** indicates significance at 10%, 5%, and 1%, respectively.

1) Case Ⅳ Unrestricted intercept and restricted trend; Narayan (2005)

2) Case Ⅳ. Unrestricted intercept and restricted trend; Pesaran, Shin, and Smith (2001)

Table 11 reports the results of the cointegrating bound test of model 1 for the Korean economy. The breakpoint, 1989:1, was estimated by model B of the Zivot-Andrews test. These models included time trends, T, in the cointegrating relations, because the time trends make the model more statistically significant. Each independent variable of the ARDL (5,1,0) has a long-term positive relationship with consumption in the Korean economy. In the ARDL (1,0,4), a long-term negative relationship between consumer debt and consumption is predicted. The former relationship represents the popular neoliberal pattern between inequality, consumer debt, and consumption; however, the latter differs from the pattern significantly. That is, a high level of consumer debt led to a decrease in the ratio of consumption to GDP during that period. Despite all these results, the impact of the 1997 Asian crisis cannot be ignored. Another breakpoint of the ratio of consumption of the Korean economy estimated by the Lumsdaine-Papell test is 1998:1, as shown in Table 10.

Table 12 Cointegration test (Model 1 for the Korean economy, 1989:1-2014:4)

ARDL bound test for cointegration				
Calculated *F* statistic				
Period		N	*F*	
1989:2-1997:4 ARDL(1,4,0)		30	4.71	
1998:1-2014:4 ARDL(1,0,4)		68	7.01	
Critical value bounds of the F-statistic				
	5% [I(0)/I(1)]		10% [I(0)/I(1)]	
N=65, K=2[1)]	4.12/4.90		3.53/4.20	
Estimated long-run coefficients				
	β_{10}	β_{11}	β_{12}	T
ARDL(1,4,0)	0.5491***	-0.5514**	0.2237***	
	(0.0737)	(0.2242)	(0.0605)	
ARDL(1,0,4)		-0.2159	-0.6884***	0.0032***
		(0.1995)	(0.1791)	(0.0009)

N: The number of observations K: The number of regressors

, and * indicate significance at 10%, 5%, and 1%, respectively.

1) Case Ⅳ Unrestricted intercept and restricted trend; Narayan (2005)

Table 12 indicates the estimates of model 1 for 1989:1-2014:4; the breakpoints is 1998:1, as estimated by the Lumsdaine-Papell test. Before the 1997 crisis, the pattern was quite distinct from the estimation results of model 1 for 1980:1-1989:1. A high level of consumer debt was positively associated with an increase in the consumption ratio; however, the rise in inequality decreases the share of consumption in the Korean economy. Since 1997, all explanatory variables in model 1 for the Korean economy have a long-term negative relationship with consumption. This result is very interesting, because "the financial crisis in 1997 was a watershed moment for full-blown neoliberalism in Korea's economy" (Lee, 2010: 11). In other words, in terms of the pattern of consumption in neoliberalism, the Korean economy did not resemble that of the US economy. The rise in inequality and consumer debt known as the popular characteristics of neoliberalism caused a decrease in the ratio of consumption to GDP in the Korean economy since 1997. The CUSUM square tests of these two models for each period, 1989:2-1997:4 and 1998:1-2014:4, indicate that the estimation results are within the 95% confidence band; the parameters stability is fulfilled contrary to the ARDL for 1989:2-2014:4 (See Figures B10, B11, and B12). It is worth noting the two contradictory trends of

inequality and consumer debt with the consumption ratio for 1989:2-1997:4. The positive effect of consumer debt on the consumption share is in accordance with the result of the ARDL for 1980:1-1989:2. However, during that period, increased inequality led to a decrease in the consumption ratio. Above all, it should be kept in mind that wage inequality in the Korean economy declined in the mid-1990s due to the strong resistance of workers, despite an upward trend in the consumption ratio (See Figure C2 in Appendix).

Investment

As shown in Figure C2 in Appendix, the rate of capital accumulation in the Korean economy trends downward over the reference period. In particular, the pace of capital accumulation stagnated following exceptionally high levels before the 1997 crisis. The table below illustrates the estimated long-term relationships between the pace of capital accumulation and the specific patterns of neoliberalism, that is, an increase in wage inequality and in consumer debt in the Korean economy since 1980.

Table 13 Cointegration test (Model 2 for the Korean economy, 1980:1-2014:4)

ARDL bound test for cointegration		
Calculated *F* statistic		
Period	N	*F*
1980:1-1997:1 ARDL(8,0,8)	61	6.08
1997:2-2014:4 ARDL(4,6,3) [1]	65	5.34
Critical value bounds of the F-statistic		
	5% [I(0)/I(1)]	10% [I(0)/I(1)]
N=60, K=2	4.00/5.05	3.27/4.26
N=65, K=2 [1]	4.01/5.08	3.30/4.25

Estimated long-run coefficients

	β_{20}	β_{21}	β_{22}
ARDL (8,0,8)	1.0963	-4.1795	-0.0154
	(0.8062)	(3.3617)	(0.1740)
ARDL (4,6,3)		-0.0194	-0.0896**
		(0.1459)	(0.0425)

N: The number of observations K: The number of regressors

1) Case Ⅲ. Unrestricted intercept and no trend; Narayan (2005).

** Indicates significance at 5%.

It is very difficult to capture a cointegrating relationship for 1997:2-2014:4 in the Korean economy. The coefficient signs of the wage inequality were positive in some specific periods. However, in those periods, the F-statistics was lower than the upper bound critical value, and thus, the cointegrating relationship cannot be captured.

The CUSUM square test for the ARDL (4,6,3) model for 1997:2-2014:4 does not support the parameter constancy of the model over the entire observation period, and there was a structural break between 2008 and 2010. However, it is difficult to see it as a fundamental and persistent structural break because, in the following periods, the test shows the results within the confidence intervals. The estimation results of the model for 1997:2-2014:4 are the same as those of the US economy. Even after the 1997 Asian Crisis, the pace of capital accumulation in the Korean economy has a negative relationship with wage inequality and consumer debt. Thus, the massive increase in wage inequality and consumer debt during that period led to a decline in investment in the Korean economy.

Cointegration tests for the annual data series

Table 14 indicates the results of the cointegrating bound test providing overall information about the long-term pattern between the variables in the Korean economy from 1980 through 2014. As shown in Table 14, the effect of inequality and consumer debt on consumption and investment are consistent with the expected neoliberal patterns. An increase in inequality and consumer debt increases the ratio of consumption to GDP; a slower pace of capital accumulation is associated with a rise in inequality and consumer debt in the Korean economy. As for the case of model 2 and the annual data, not only is model 2 without the dummy variable statistically insignificant, but also it loses the constancy of the parameters according to the CUSUM tests.

Table 14 Cointegration test (Korean economy, 1980-2014)

ARDL bound test for cointegration			
Calculated *F* statistic			
Model/Period	N		*F*
Model1/1980-2014 ARDL(1,5,3)	31		4.88
Model2/1980-2014 ARDL(2,0,0)[1)]	31		5.08
Critical value bounds of the F-statistic			
	5% [I(0)/I(1)]		10% [I(0)/I(1)]
N=30, K=2	3.53/4.42		2.91/3.69
Estimated long-run coefficients			
	β_{10}	β_{21}	β_{22}
Model1/ARDL(4,4,0)	0.8035***	-1.5813*	0.2853
	(0.1631)	(0.8689)	(0.1649)
	β_{20}	β_{21}	β_{22}
Model2/ARDL(2,0,0)	0.0766***	-0.0778	-0.0013
	(0.0185)	(0.0778)	(0.0156)

N: The number of observations K: The number of regressors

*** Indicates significance at 1%.

1) This ARDL model includes a dummy variable, 0=year<1997, as the fixed regressor.

Ⅳ. Discussion and Conclusion

In both countries, the estimations of the annual data series indicated the expected signs of the neoliberal patterns of demand. A rise in wage inequality and consumer debt is positively associated with consumption and negatively associated with investment. If taking the breakpoints into account, however, what is interesting about this study is that the effects of wage inequality and consumer debt on the consumption ratio to GDP are different for each period.

Before the subsequent crises of the 2000s, the signs denoted the same as the expected relationships of neoliberal patterns. “Deficient accumulation rates are a basic component of the trajectory of the US economy, but these trends are not, alone, the cause of the crisis. Conversely, the rise of consumption, (…), is at the center of the mechanisms that led to the crisis” (Duménil and Lévy, 2011: 53). Furthermore, the upward trends of consumer debt and

wage inequality stimulated consumption in domestic aggregate demand and are negatively associated with investment demand. The unlimited profit-seeking of financial institutions and the deregulation during the neoliberal period allowed for the growth of tremendous consumer debt. The pursuit of high income, coupled with globalization, has brought tremendous benefits to top managers of financial institutions in the form of high wages (Duménil and Lévy, 2011). Since 2001, however, a high level of wage inequality has had a negative effect on the ratio of consumption in the long term, despite the positive relationship between consumer debt and the consumption ratio. Thus, the rise in wage inequality has decreased domestic demand in the US economy since the major crises in the 2000s. As shown in Figure C1 in Appendix, there has been a constant upward trend of wage inequality since those crises, whereas consumer debt peaked in 2008 and fell steadily. All these trends had a negative impact on domestic demand, and thus, the US economy had to rely on government spending to stop shrinking demand in the economy. In sum, neoliberal trends where a rise in inequality and consumer debt led to "overconsumption, paralleling under-accumulation" (Duménil and Lévy, 2011: 37) and resulted in a general contraction following the crises of the 2000s coupled with a decline in consumer debt that was at an unsustainable level in domestic demand.

Table 15 Long-term relationships for each period (Korean economy: 1980-2014)

	KOR				
	cons			inv	
	1980:1-1989:1	1989:2-1997:4	1998:1-2014:4	1980:1-1997:1	1997:2-2014:4
WI	+	–	–	–	–
CD	+	+	–	–	–

Table 15 indicates the estimation results of the cointegration bound tests for each period of the Korean economy. As for the ratio of consumption, wage inequality, and consumer debt wage positively associated with that ratio. This result is the same as that of the US economy before the 2000s. From the 1990s, the long-term relationship of the Korean economy became similar to the US economy since the crises. Even after the crisis in 1997, the ratio of consumption had a long-term negative relationship with wage inequality and consumer debt. Moreover, the upward trends of inequality and consumer debt were accompanied by the slowed pace of capital accumulation. Since 1997, when neoliberalism was supposed to be established in the country, the neoliberal patterns of wage inequality and consumer debt have stagnated the country's domestic demand. Thus, instead of traditionally restrained fiscal spending, this country had to depend on foreign demand, that is, the exports of the country. These results were interconnected with those of the US economy. The US trade deficit and overconsumption contributed to a dramatic increase in the export of the Korean economy coupled with the rapid growth of the Chinese economy. Moreover, these estimation results can be compared with the argument that grouped the countries like US and UK as the debt-led growth regime and China or Japan as the export-led growth regime (Stockhammer, 2013). Stockhammer (2013) argued that "increasing inequality leads potentially to a stagnation of demand, since lower income groups have higher consumption propensity" (Stockhammer, 2013: 950). However, rising inequality, if taking wage inequality and consumer debt into account, did not decrease

domestic demand consistently. In the estimations using the yearly data, a rise in wage inequality decreases investment but increases the ratio of consumption in the both countries. Nevertheless, the rise in wage inequality and consumer debt after the 2000s led to a decrease in domestic demand in the Korean economy. In the US economy, the rise in wage inequality after the 2000s decreased domestic demand, although consumer debt is still positively associated with consumption.

You can download the appendix here.

(https://drive.google.com/file/d/14dHzNcQFIVi0Gn5xjblorwbsTTvzVyHC/view?usp=sharing)

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