

Lead Article

Dispersion of Household Debt and Its Macroeconomic Implications: Evidence from South Korea

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This study establishes the stylized facts on economic inequality using KLIPS (Korean Labor & Income Panel Study) of 2001-2015 and presents empirical evidence on their macroeconomic implications. Firstly, we find that inequalities of after-tax disposable income and consumption have not increased in 2000s, contradicting public belief. However, dispersion of household debt by income group has steadily widened in 2000s as high-income group leads a run-up of household debt while low-income group faces more limited access to financial markets. Secondly, in addition to the widening debt dispersion, usages of debt are very different depending on income levels. Using fixed effects panel regressions and panel VARs, we find that high-income group tends to borrow in order to invest in real estate assets or buy houses even with reducing non-housing consumption. Meanwhile, low-income group seems to borrow for consumption, not for investment. Based on our finding, we discuss the role of widening debt dispersion in terms of macroeconomic instability and persistent economic inequality.

JEL Classification: D1, D31, E21

Keywords: Economic inequality, Debt dispersion, Asset prices, Household debt

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We thank two anonymous referees for valuable input on an earlier version. We also thank David Berger, Kozo Ueda, Claudio Borio, Xuehui Han, and other participants at 2015 Bank of Korea-Yonsei University Joint Conference, Asian Development Bank Workshop, 2017 Korea Labor Institute Working Paper Workshop for helpful suggestions and comments. This research was partially supported by the Graduate School of Yonsei University Research Scholarship Grants in 2017. All remaining errors are ours. The usual disclaimer applies.

Received: 31 August 2017, Received in revised form: 22 January 2018, Accepted: 27 February 2018

I. Introduction

Economic inequality is unquestionably an important and popular topic of public discourse these days and large academic literature is devoted to issues of inequality accordingly. Different from previous studies that focus mainly on inequality of wealth, income, and consumption, our study will add to existing academic literature by focusing on the importance of relative indebtedness. We empirically investigate the macroeconomic implications of widening household debt dispersion by income group observed in South Korea since 2001.

While our main focus is on the role of household debts in explaining the trends in economic inequality and delivering its macroeconomic implications, we start our discussion by establishing the empirical facts on economic inequality from 2001 to 2015 using KLIPS (Korean Labor & Income Panel Study).¹⁾ We examine inequality of income, consumption, wealth, and household debt. We use various measures of inequality such as 90/10 ratio, Gini coefficient, relative shares by income quintile and poverty rate. We also compare relative shares of expenditure on luxuries to expenditure on necessities for high- and low-income groups, a method proposed by Aguiar and Bils (2015). Contrary to public belief, it is hard to tell that South Korea experiences increasing inequality of (after-tax) disposable income and consumption in 2000s. Inequality of wealth by income quintile has been aggravated until 2007 and has improved since then. Nonetheless, a different story unfolds when it comes to debt dispersion or relative indebtedness by income group. We find that the relative shares of household debt by income quintile diverge in the 2000s. The share of debt incurred by high-income group has been increasing while that of low-income group has been declining fast, suggesting more unequal access to financial service.²⁾

Observing the widening dispersion of household debt, we empirically examine

1) Stock variables such as asset holdings are available from 2001 to 2015 in KLIPS, while flow variables such as consumption are available from 2001 to 2014. More detailed explanation on why we use KLIPS and how we define variables will follow.

2) It is possible to explain this pattern either by a supply-side story or by a demand-side story. More discussion will be provided below.

what makes a household incur more debt by using fixed effects (FE) logit analysis. We find that high-income group tends to incur more debt from the previous year when it increases non-financial asset holdings and reduces non-housing consumption and financial asset holding while low-income group's incurring debt is not statistically associated with changes in non-financial asset holdings.³⁾ To further investigate the cross-sectional differences depending on income levels, we use FE panel regression and find that indebtedness is negatively associated with high-income group's consumption while it is positively associated or not statistically associated with low-income group's consumption. A positive relationship between debt and real estate asset holding is more pronounced in high-income group. To further investigate the dynamic relationship among key variables, we adopt a panel VAR (Vector Autoregression) technique and our impulse response analysis shows that non-housing consumption decreases and non-financial asset holding increases in responses to a positive shock to household debt and this pattern is found only in high-income group. While our empirical analysis is based on reduced form equations, the *cross-sectional* differences depending on income level suggest a causal interpretation on the relationship among debt, consumption, and non-financial asset holdings: high-income group tends to borrow in order to invest in non-financial assets while low-income group tends to borrow to consume or make a living. In addition, high income group with higher indebtedness reduces consumption, suggesting debt overhang effect.

Lastly, we perform a counterfactual analysis to see the role of asset prices in accounting for the recent trends in wealth inequality. We impute local house prices, holding the non-financial asset holdings constant at the year of 2008. Our question is what would have happened to the trend of wealthy inequality after 2008. While it is an incomplete analysis because of data limitation, it finds that the recent improvement (or at least non-deterioration) in wealth inequality is mirrored in the recent pattern of declining or stagnant housing prices.⁴⁾ Our argument on the role of asset prices is consistent with the finding of Wolff (2017).

3) We interchangeably use the terms of non-financial assets, real estate assets, and illiquid assets hereafter.

4) Since KLIPS reports the value of asset holding and does not report the quantity and price of assets separately, our analysis does not provide a complete picture on the role of asset prices. We discuss our methodology below.

He shows that the inequality of net worth went up sharply when asset prices plunged between 2007 and 2010.

We discuss the macroeconomic implications of our empirical finding in several respects. Firstly, if high-income group incurs debt to the extent that increased debt burden reduces consumption and low-income group incurs debt to sustain consumption, increase in debt dispersion by income group may make consumption inequality seemingly improved at least in the short run. Secondly, the recent improvement in wealth inequality by income groups seems to be a product of stagnant asset prices and can be reversed easily when asset prices start to rise given high-income group's disproportionate investment in non-financial assets, made possible by increased debt dispersion. Our empirical finding strongly suggests that relative indebtedness by income group needs to be taken into account when understanding the trends in inequality of wealth and consumption. Third, what would be the long-run outcome if high-income group borrows and invest in lucrative assets and low-income group borrows to sustain consumption? We discuss a possible link between debt dispersion and income and consumption inequality in the long run. While some level of consumption can be sustained in the short run by incurring more debt, it would aggravate income and consumption inequality in the long run. However, more research is needed to examine exact mechanisms of how debt dispersion and income/consumption inequality interact. We think that our finding is the first step to shed light on the link of debt dispersion with income and consumption inequality.

Our study is distinct in two respects, at least. Firstly, while previous studies focus mainly on inequality of income and wealth, we focus on the change in relative indebtedness by income level and its implications. Secondly, we attempt to examine more than the bilateral relationship between debt and consumption, or debt and housing. In order to consider the relationship among debt, consumption, and housing together, we adopt various panel regression specifications including panel VAR. By doing so, we find very different dynamics between consumption, debt, and housing for high-income and low-income groups and discuss their macroeconomic implications.

One caveat is that our findings are based solely on KLIPS. If one uses other databases such as Household Survey Data (HIES), administered by Korean National Statistical Office, the Survey of Household Finances and Living Conditions (HFLC), and tax data used by Kim and Kim (2015), the result may vary. In this regard, we briefly explain the differences among these databases in section II.1 below. If more research based on these databases is added over time, we expect a more comprehensive picture of trends in economic inequality in South Korea. We believe that our work, based on KLIPS, partially serves this purpose.

The rest of the paper is structured as follows: Section II explains our dataset and presents evidence on inequality in terms of income, consumption, wealth and debt using various measures. And evidence on household balance sheet composition follows. Section III presents our hypothesis on different usages of household debt by income level and provides supporting evidence using panel data analysis. A counterfactual analysis on the role of housing prices will follow. We discuss the macroeconomic implications of our finding. Section IV concludes with summary and future research agenda.

II. Data and Stylized Facts

1. Data

We use KLIPS (Korean Labor & Income Panel Study) for our analysis. It is a yearly panel data starting from 1998. It reports individual- and household-level adult (aged 15 and over) information from the 7 metropolitan areas and urban areas in 8 provinces. The KLIPS sample is an equal probability sample and was designated to yield 5,000 households each year.⁵⁾

We limit the sample period as 2001-2015 since there are many changes in the definitions of variables in KLIPS in early years, especially before 2000. We restrict the age from 25 to 65. We drop the observations whose disposable income and consumption are zero and whose debt are reported as negative. Households whose

5) For more information on KLIPS, refer to the website (http://www.kli.re.kr/klips_eng/index.do).

DSR (Debt Service Ratio: ratio of debt service to disposable income) is larger than 3 is also dropped. If necessary, we winsorize the key variables at top 1% and bottom 99% not to allow the possible outliers to drive the results.

Note that, for income and consumption items, the survey questions are “how much did you earn last year?” and “how much did you consume last year?” Since the survey is conducted from April to September, it is not clear whether these annual income and consumption reflect those of the current year's or last year's. It is typical for studies that use KLIPS to regard the annual ones as last year's. We follow this tradition. In this regard, while the sample period ends in 2015, we have the data of income and consumption until 2014. For stock variables such as debt and total assets, the sample period ends in 2015.

We include single-person households for our analysis. It is because the share of this group has been increasing recently. The share increases from 10.7% in 2001 to 22.0% in 2014.⁶⁾ Another reason is that it may underestimate the degree of inequality without this group. We confirm that, without single-person households, inequality of income and consumption declines.

For our measure of consumption we closely follow the definition in Meyer and Sullivan (2013). Our measure of consumption is total expenditure subtracted by housing outlays, debt service payment, expenditure on education and non-consumption expenditure.⁷⁾ For our measure of income, we use after-tax disposable income, including subsidies and transfers.⁸⁾

Finally, to minimize the effect of family size, we apply the equivalence elasticity of 0.5 to key variables such as income, consumption, net worth, and assets if necessary.⁹⁾ For example, we divide household disposable income by square root of family size. Note that there is no strong consensus on how to adjust family size. While the equivalence elasticity of 0.5 is used in OECD, even its document says

6) Song (2015) reports the share of single-person households based on Population and Housing Census. The share is 23.3% in 2010, which is a little larger than the share from KLIPS in 2010, 20.4%.

7) Expenditure on education can be regarded as investment, rather than consumption. We also check if our results are sensitive to the inclusion of education expenditure and find that the results are similar.

8) We use two kinds of disposable income, with or without subtracting interest expense on the debt outstanding. The main result does not depend on which definition to use. We report our result based on disposable income from which interest expense is subtracted.

9) We find that applying the equivalence elasticity does not affect the main result much.

“there is no accepted method for determining equivalence scales, and no equivalence scale is recommended by the OECD.”¹⁰⁾ However, we use this measure for comparability because it is widely used in government agencies including Statistics Korea. To make sure if the choice of equivalence measure affects our main result, we also perform our main analysis without applying it and find that the main result is not affected.

One caveat on our empirical facts presented below is that all these results are based on KLIPS. There are other datasets used to investigate income and consumption distribution in South Korea such as Household Income and Expenditure Survey (HIES), administered by Statistics Korea (national statistics agency), Survey of Household Finances and Living Conditions (HFLC), conducted jointly by Statistics Korea and the Bank of Korea, and tax data related to income and inheritance. HIES has a long history, started in 1963, and is a monthly survey while it is announced quarterly. HFLC, started in 2012, collects information from 20,000 households and is known to report the most detailed information on household finance.¹¹⁾

According to Hong (2015), KLIPS has more low-income and high-income households than HIES while HFLC has more low-income and high-income households than KLIPS. It is important to note that KLIPS sits between HIES and HFLC in terms of income dispersion and interpret our findings accordingly. ¹²⁾ Tax data can provide a more reliable individual-level information. However, since it includes economically non-active population, it may over-estimate the degree of inequality.

Differences in terms of target groups and sampling methods may result in different results across databases. For example, in contrast to our finding, Jeong

10) See the website (<http://www.oecd.org/els/soc/IDD-ToR.pdf>).

11) Survey of Household Finances and Living Conditions (HFLC) was initially called Survey of Household Wealth, started in 2006 on a 5-year basis. In 2010, it was extended as a joint survey among Statistics Korea (household assets), the Financial Supervisory Service (household credit) and the Bank of Korea (household panel survey). In 2012, the survey under the new name of Survey of Household Finances and Living Conditions was firstly carried out.

12) Hong (2015) provides a nice summary on differences among three frequently used databases in many aspects. If one use a well-chosen weighting scheme that considers the omission of economically non-active population and the possibility of over-(or under-)representation of a specific group, one can still obtain the similar results across three databases.

(2017) reports increased income inequality after 2010. Jeong (2017) considers labor income of non-agricultural establishments with more than 10 employees during the period of 1980-2015 with excluding self-owned businesses and the unemployed, while we use urban-area household-level after-tax disposable income including subsidies and transfers. Beside different sampling methods between KLIPS and HFLC, this discrepancy partly result from different definition of income used and redistributive fiscal policy. According to OECD (2016a), which uses HIES, Gini coefficients from 2011 are 0.311, 0.307, 0.302, 0.302, and 0.295, implying that income inequality has not widened. Meanwhile, Hong (2017) corrects under-coverage of high-income group in HIES using tax data and shows that the actual Gini coefficient increases by 10-18%. All these suggest that one needs to clearly understand how a dataset under investigation is constructed and interpret with caution.

While it is meaningful to examine the trends in economic inequality using datasets of KLIPS, HIES, and HFLC and compare the results, it is out of scope for our research questions posed here. For our purpose, we need to use a dataset that tracks down the same households and a panel data whose time span is sufficiently long. HIES is a repeated cross-sectional survey that does not track down the same households and HFLC is panel dataset with only 5-year sample period available. It is why we use KLIPS that is a panel dataset with relatively long sample period.

Table 1 presents the summary of key variables of five quintiles measured by real disposable income during 2001-2014. Net worth is defined as (non-financial asset + financial asset - household debt). Table 1 shows that high income earners tend to be younger, better-educated, and homeowners. And this group earns higher disposable income, owns higher holdings of total assets, financial and non-financial assets. And this group incurs more debts, too.¹³⁾

13) We also make the same table by five quintiles measured by net worth (not reported here). We find that richer people in terms of net worth tend to be older, better-educated, and homeowners. Like high income earners, richer people earns higher disposable income, owns higher holdings of total assets, financial and non-financial assets. And this group incurs more debts, too.

〈Table 1〉

Summary Statistics, by Income Quintile

	Age	Family Size	Education (year)	Homeowner (1 = owner)	Disposable Income	Total Assets	Non-Financial Assets	Financial Assets	Debt	Net Worth
Bottom 20% (mean)	65.09	2.14	6.78	0.56	936	7,617	7,066	551	933	6,684
(median)	68	2	6	1	763	2,769	2,321	0	0	2,215
Next 20%	51.56	3.1	10.42	0.54	2,088	11,192	10,265	927	1,571	9,622
	50	3	12	1	1,969	5,149	4,635	55	0	3,708
Middle 20%	47.81	3.32	11.5	0.59	3,000	14,263	12,903	1,360	1,839	12,424
	47	4	12	1	2,869	8,393	7,417	464	0	6,550
Next 20%	47.59	3.24	12.32	0.63	3,941	18,952	16,847	2,106	2,287	16,665
	47	3	12	1	3,743	12,358	10,348	941	0	10,299
Top 20%	46.65	3.3	13.98	0.67	6,692	37,147	32,293	4,854	3,396	33,751
	46	4	14	1	5,718	22,148	18,538	2,060	0	19,280

Note: This table provides a summary statistics of variables related to heads of households and their balance sheets, by income quintile. Income quintile is determined by percentiles of average real disposable income during the period of 2001-2013. 0.5 of equivalence elasticity is applied to adjust for the effect of family size. The sample period is 2001-2014. Only exception is income variable, which is available from 2001-2013. The sample is based on the household heads whose ages are above 24. All income and balance sheet variables are real. A unit of value is 10,000 won (equivalent to \$8.47 based on the exchange rate of KRW/USD 1,180 as of 2016/5/28). Income, assets, debt and net worth are in Korean won.

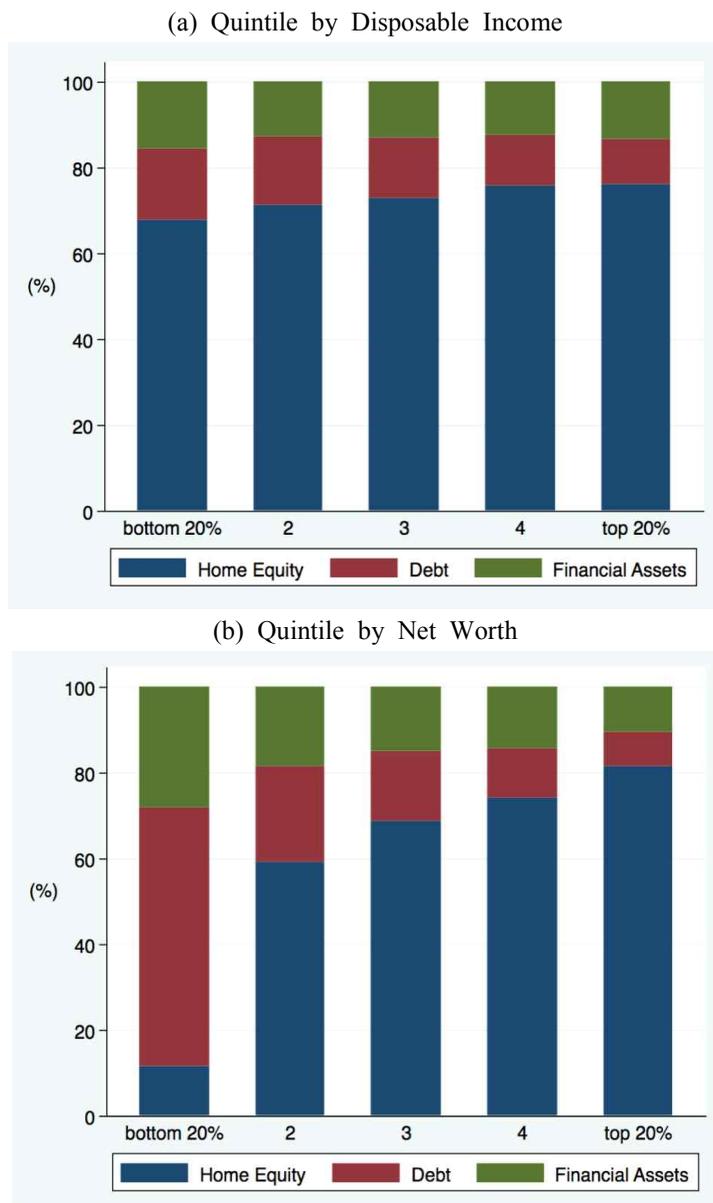
Source: author's calculation based on KLIPS

Now we turn to household balance sheets. Figure 1 shows household portfolio composition by households' net worth and income quintile. Net worth is defined as total assets minus total debts of households. Figure 1 displays the compositions of household balance sheets of five quintiles by disposable income and net worth. We define home equity as housing, other illiquid assets, and jeonse deposit minus total debts, since KLIPS does not report the mortgage debt separately.¹⁴⁾ The most prominent characteristic is that household wealth is highly concentrated on illiquid assets such as housing and real estate. Regardless of income level, panel (a) shows that the share of financial assets is less than 20%.¹⁵⁾ Panel (b) shows that even the richest 20% group concentrates more than 90% of their wealth on housing and other illiquid assets, holding only 5.7% of their wealth on financial assets. Note that the fraction of financial assets on balance sheets increases as we move from top 20% to bottom 20% group. This pattern is in stark contrast to that of other countries, such as U.S. and Japan. According to Mian and Sufi (2014a), the poorest 20% group had \$4 of home equity for every \$1 of other assets in 2007 and the richest 20% were exactly the opposite, with \$1 of home equity for every \$4 of other assets, like money-market funds, stocks, and bonds. That is, the fraction of financial assets increases from 20% for the poorest to 80% for the richest in U.S. Another characteristic is that leverage increases as we move from the richest to the poorest, which is consistent with an observation in U.S.

14) Jeonse is a term unique to South Korea that refers to the way apartments are leased. Instead of paying monthly rent, a renter will make a lump-sum deposit, which is typically 50-80% of the market value. Typical contract lasts for two years and is renewable. It is known that the necessary conditions for jeonse system to exist include (expectation of) rising house prices, underdeveloped financial market, and high interest rates. Including jeonse deposit in financial asset category does not affect the main conclusion of this paper.

15) This number might seem too extreme. But, according to the national balance sheet provided by the Bank of Korea and Statistics Korea, real estate assets, including land and buildings, accounted for almost 90% of national wealth. The statistics of national balance sheet is available at the Bank of Korea Economic Statistics System (<http://ecos.bok.or.kr>).

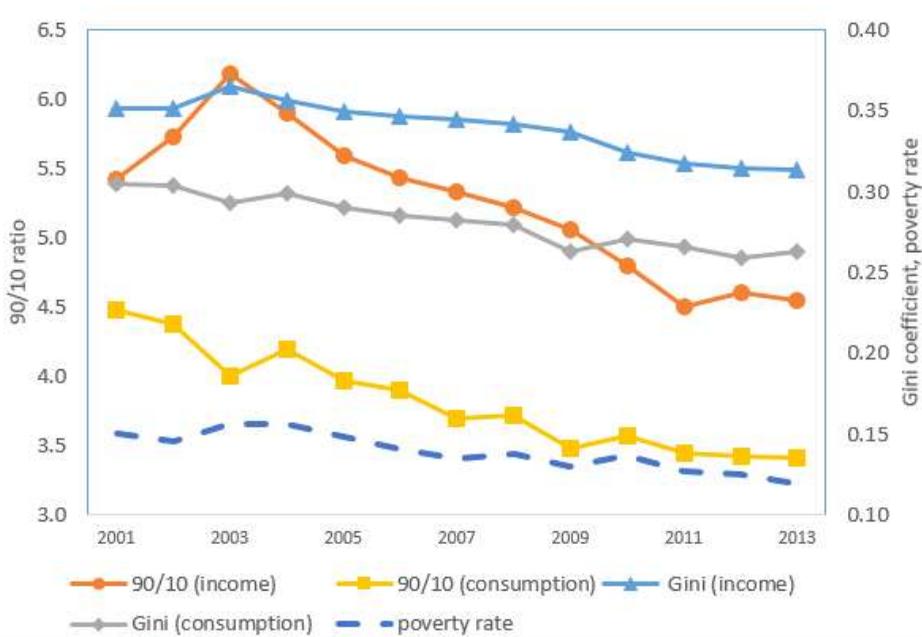
〈Figure 1〉 Portfolio Composition, by Disposable Income and Net Worth, 2001–2014



Note: This figure shows the household balance sheets by quintiles based on disposable income and net worth. Since KLIPS does not report the mortgage debt separately, home equity is defined as housing and other illiquid assets minus total debts. The sample is based on the household heads whose ages between 24 and 65. All variables are winsorized at 1% and 99%.

Source: Author's calculation based on KLIPS.

〈Figure 2〉 Income and Consumption Inequality, 2001–2014

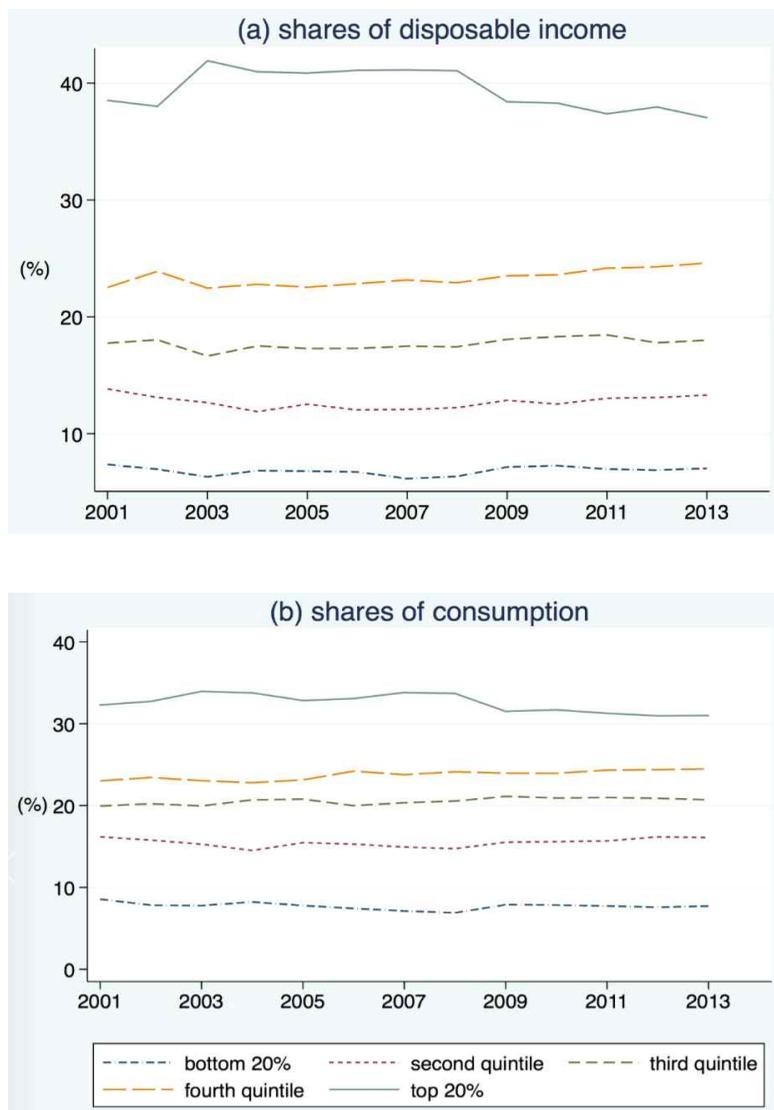


Note: This figure shows the indexes of consumption and income equality: 90/10 ratios, Gini coefficients, and poverty rate. Income is after-tax disposable income, which includes transfers and subsidies. Consumption is defined as total expenditure, subtracted by housing outlays, debt service payments, and non-consumption expenditure. All variables are winsorized at 1% and 99% level. 0.5 of equivalence elasticity is applied to adjust for the effect of family size. See text for more details.

2. Inequality of Income and Consumption, 2001–2014

We now document the stylized facts on income and consumption inequality. Figure 2 shows 90/10 ratios and Gini coefficients of income and consumption during the period of 2001-2014. It also presents the time-series of poverty rate, showing the share of people whose income is lower than the half of median income. The 90/10 ratios of income and consumption are clearly in a downward trend. In 2001, top 10% income group earns 5.5 times more than low 10% income group. However, it earns less than 4.5 times in 2014. A similar pattern, though it is weaker, emerges for consumption. Compared to 2001, Top 10% income group consumes less in 2013 in terms of low 10% income group's consumption level. In terms of Gini coefficients, both income and consumption inequality are not aggravated for 2001-2014.

〈Figure 3〉 Shares of Income and Consumption, by Income Quintile



Note: This figures show the relative shares of household after-tax disposable income and consumption held by each income quintile over time. Income quintile is determined by percentiles of average real disposable income for the period of 2001-2013. 0.5 of equivalence elasticity is applied to adjust for the effect of family size. Consumption is defined as total expenditure, subtracted by housing outlays, debt service payments, and non-consumption expenditure. Income and consumption variables are winsorized at 1% and 99% level. See text for more details.

In fact, they have improved by a small margin. For example, Gini coefficient of income improves from 0.38 in 2001 and 0.32 in 2014.¹⁶⁾ Gini coefficient of consumption has been stable around 0.3. Another measure of income disparity is the poverty rate. Figure 3 also shows that its time-series is quite stable around 0.15 for the sample period.

We also check the relative shares of disposable income and consumption by income quintile for 2001-2014. While there is a small change in the share of top 20% income group during the global financial crisis, panel (a) in figure 3 shows that the relative shares of disposable income are rather stable in 2000s. In average, top 20% income group earns more than 37% of total disposable income while bottom 20% income group earns less than 10%. However, note that the share of top 20% income group is in a mild decline after 2008. Panel (b) in figure 3 shows that the relative shares of consumption are also stable in 2000s. While there are small disruptions around 2003 and 2008, top 20% income group consumes around 32% of total consumption during the sample period.¹⁷⁾ Comparing panel (a) and (b) in figure 3, consumption inequality is less severe than income inequality. For example, the relative share of consumption by bottom 20% is a little less than 10% during the sample period, higher than the relative share of income, which is around 8%.¹⁸⁾

We also calculate the relative shares of top income earners, as shown in figure 4.¹⁹⁾ From 2001 to 2014, the relative shares of top 1%, 5%, and 10% in terms of disposable income are not fluctuating much and they are declining.²⁰⁾ While not reported here, we also examine the share of “the middle class” whose income is between 0.75 and 2 times the median, following the definition and convention explained in OECD (2016b). In terms of total income, disposable income, and labor income, respectively, those shares are stable and fluctuating around 0.54-0.55 in 2000s.

16) Won (2015) reports Gini coefficient of income using HFCL dataset. The Gini coefficient is relatively stable around 0.36 for the period of 2012-2014. According to HIES, Gini coefficient has been around 0.31 for the period of 2006-2013. These numbers are close to the one we obtain from KLIPS.

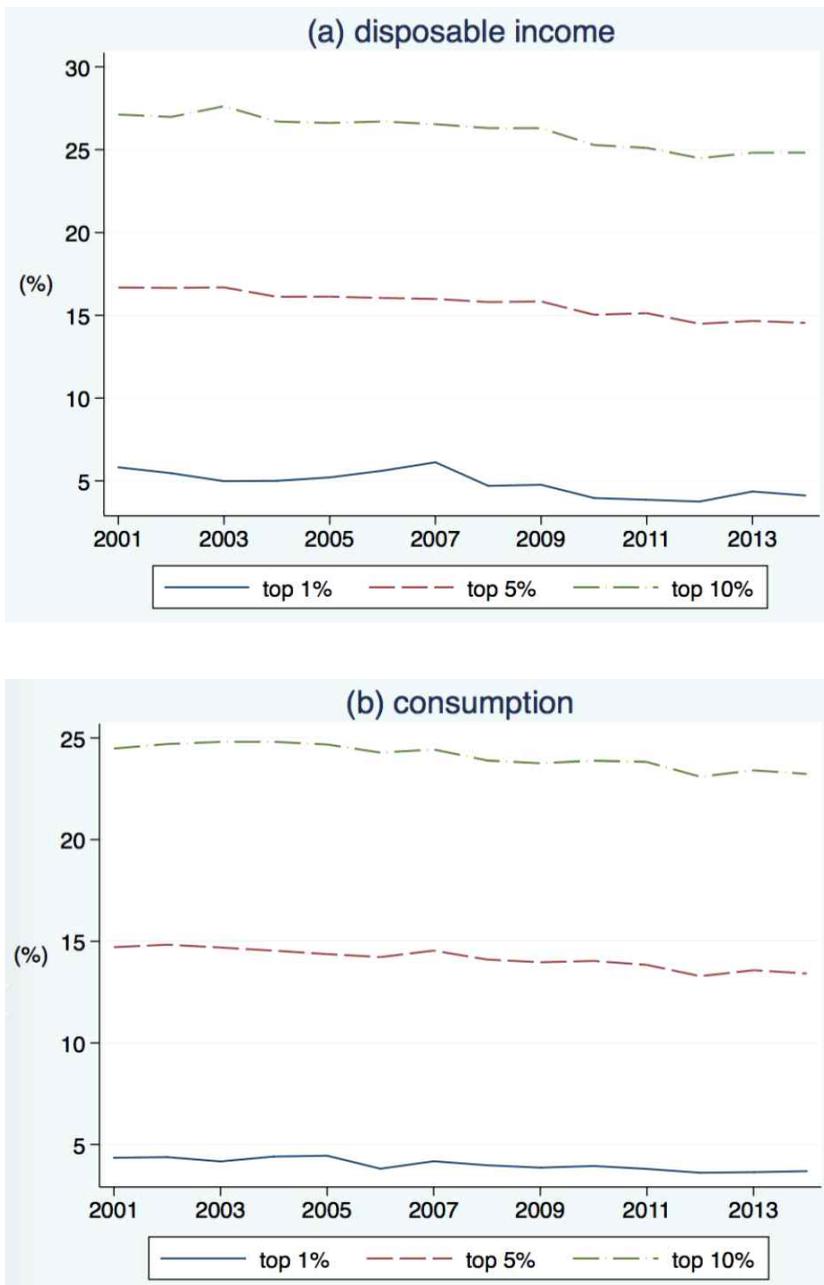
17) South Korea experienced “credit card crisis” in 2003. A period of massive credit card lending and higher consumption was followed by a bust inflicting the economy at least for two years, 2003 and 2004.

18) See Sung (2011) for redistribution effects of tax and fiscal policy in South Korea.

19) The World Wealth and Income Database (<http://www.wid.world>) provides and updates the relative shares of top income earners of various countries.

20) Using income tax data, Kim and Kim (2015) reports that the relative income shares of top 1%, and 10% are 12.3% and 43.8%, respectively.

<Figure 4> Shares of Top 1%, 5%, and 10%



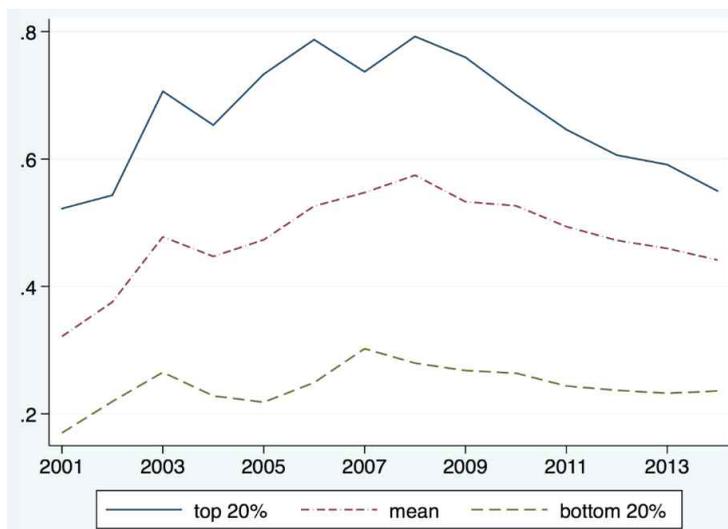
Note: This figure shows the shares of disposable income and consumption (net of non-consumption expenditure) held by top 1%, 5%, and 10% during the period of 2001-2014.

It is well known that income and consumption data suffer from measurement error problems. A recent study by Aguiar and Bils (2015) suggests a way to measure inequality that is relatively free from measurement errors. They exploit the relative expenditure of high- and low-income households on luxuries versus necessities. This double differencing through goods and income levels corrects for measurement error that can vary over time. They regard entertainment expenditure as luxury consumption and food expenditure as necessity consumption. They find that, using this method, consumption inequality is more severe than estimated by direct responses on expenditures. We follow their method to see if there is any different pattern from those in 90/10 ratio, Gini coefficients, and relative shares of income and consumption. For expenditure on luxuries, we use two measures. One is expenditure on private education and the other is entertainment expenditure following Aguiar and Bils (2015). Figure 5 shows the ratio of private education expenditure to food expenditure. The relative expenditure on private education of top 20% income group increases until 2008 and starts to decline since then. While the same measure of bottom 20% income group also starts to decline, the time-series of top 20% group declines more steeply. The same pattern emerges for the case of entertainment expenditure. From 2008 to 2013, the ratio of entertainment expenditure to food expenditure declines from 0.37 to 0.28 for top 20% income group, while the ratio of bottom 20% group from 0.11 to 0.10.²¹⁾ This result is far from increasing consumption inequality. Since the financial crisis, even top 20% income group reduces consumption of ‘luxury good’ relative to consumption of basic necessities.²²⁾

21) Since there is a discontinuity in entertainment expenditure between 2007 and 2008 in KLIPS, we restrict the sample period to 2008-2013 for the case of entertainment expenditure.

22) We strongly believe that this result can be partly driven by the counter-cyclical effect of business cycles on inequality. Krueger et al. (2010) and Bonhomme and Hospido (2016) discuss the declining inequality in 2000s in relation to business cycles. They argue that inequality tend to decline in economic downturns. While decomposing this effect from the general trends in inequality is an important research topic, it is not a main topic of our paper.

〈Figure 5〉 The Ratio of Private Education Expenditure to Food Expenditure: High-income and Low-income Households



Note: This figure depicts the ratios of spending on private education to food at home for high- and low-income households, following the idea of Aguiar and Bills (2015).

Source: author's calculation based on KLIPS.

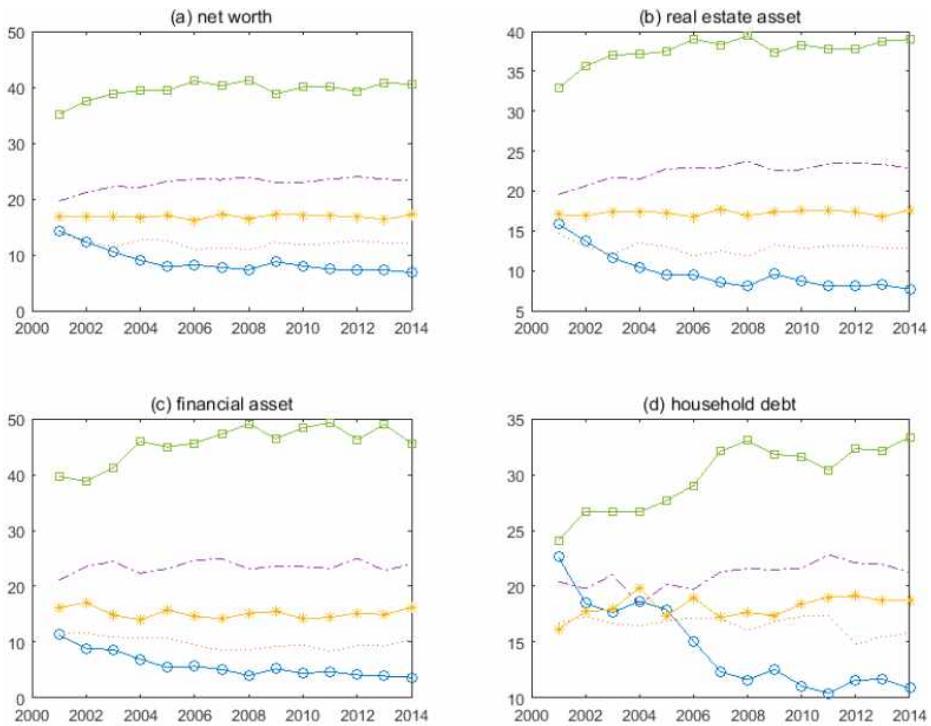
Our finding on South Korea is in stark contrast to the recent U.S. experiences. ²³⁾ Meyer and Sullivan (2013) document that income inequality increases between 2001 and 2011, while consumption inequality slightly declines in the recent decade. In addition, research by Krueger and Perri (2006), Heathcote et al. (2010) shows that income inequality is not mirrored in consumption inequality in recent decades.²⁴⁾ Krueger and Perri (2006) show that much of divergence between income and consumption inequality is due to different trend in within-group

23) As to the experiences of advanced economies, refer to the *Review of Economic Dynamics* special issue of January 2010 for studies of inequality in U.S., Canada, United Kingdom, Germany, Italy, Spain, and Sweden.

24) Note that we use Gini coefficient, poverty rate, 90/10 ratio, relative shares of income and consumption by income quintile, relative income shares of top income earners (top 1%, 5%, and 10%), and ratio of luxury good expenditure to expenditure on necessities to measure the degrees of income and consumption inequality. Meyer and Sullivan (2013) use 90/10 ratios and real changes in income and consumption at 5, 10, 25, 50, 75, 90 percentiles based on 2001-2012 waves of Current Population Survey (CPS) and 2000-2011 waves of the Consumer Expenditure Survey (CES). Krueger and Perri (2006) use Gini coefficients, ratios of 90/10 and 50/10, and variances of logs based on the CES. Heathcote et al. (2010) use variances of logs and 50/10 ratio for income and variances of logs, Gini coefficients, ratios of 50/10 and 90/50 for consumption based on CPS, the Panel Study of Income Dynamics, the CES, and the Survey of Consumer Finances.

inequality, which has increased significantly for income, but little for consumption n.²⁵) For the case of South Korea, there is no evidence for worsening income and consumption inequality. Moreover, applying a method of Aguiar and Bills (2015) suggests that even the consumption of top 20% income earners seems to be hit by deterioration in overall economic activities after the onset of the financial crisis in 2008.

〈Figure 6〉 Shares of Net Worth and Nonfinancial Asset, by Income Quintile



Note: This figures show the relative shares of net worth (wealth), nonfinancial asset, financial asset, and debt held by each income group over time. The lines with square marker, asterisk, and circle denote the shares of top 20%, middle, and bottom 20% income group, respectively.

Source: author's calculation based on KLIPS.

25) However, recent studies by Aguiar and Bills (2015) and Attanasio et al. (2015) argue that the rise in consumption inequality has been fairly similar to the rise in income inequality. Attanasio et al. (2015) show that consumption inequality of the U.S. during the period of 1980-2010 has increased by nearly the same amount as income inequality. According to Fisher et al. (2013), the trends in income and consumption inequality broadly move in tandem between 1985 and 2006, but they diverge during the Great Recession with consumption inequality decreasing and income inequality increasing.

3. Inequality of Wealth and Debt Dispersion, 2001–2014

We now turn our focus on inequality of wealth and household debt. We have seen that the relative shares of disposable income and consumption by income quintile are relatively stable in figure 3. Wealth is defined as net worth, which is (non-financial asset + financial asset - household debt). Non-financial asset includes land, buildings, housing, and rental deposit for jeonse. Panel (a) in figure 6 shows that inequality of wealth by income quintile has been increasing from 2001 to 2008, and then not increasing from 2008.²⁶⁾ Since net worth, our measure of wealth, consists of three variables (non-financial asset, financial asset, and debt), panel (b), (c), and (d) in figure 6 give a clue on what happened to wealth inequality. It seems that the share of non-financial asset held by top 20% group (panel (b) in figure 6) closely tracks down the share of net worth of top 20% group in panel (a). Table 6 shows that the ratio of non-financial asset to total asset is quite high at 86.9% ($=32,293/37,147$). Considering the high share of non-financial asset and similar patterns in non-financial asset and net worth, it seems that non-financial asset plays a key role in explaining the changes in wealth inequality. We delve into this issue below.

Panel (d) in figure 6 shows the trend of dispersion in incurring household debt. The relative share of household debt held by top 20% income group has risen from 24% in 2001 to 34% in 2014, while the share by bottom 20% income group has fallen from 23% to 11% during the same period.²⁷⁾ The share by fourth quintile (the next top 20% group) increases by 1%p and share by the second quintile declines by 1%p.

In principle, the debt dispersion, shown in panel (d) in figure 6, can be explained by both demand- and supply-side story. For example, if income prospect of low-income group has improved for the decade and they demand less for credit, credit demand of low-income group has declined and thus the debt share of bottom 20% or 40% income group has declined. And a supply-side story goes like this,

26) If we include older people whose age is above 65 and do not winsorize, the inequality of wealth actually declines after 2008.

27) If we do not winsorize, the share by top 20% group has risen from 25% to 37% while the share by bottom 20% group has fallen from 16% to 8%.

for example: since income prospect or collateral of low-income group has been deteriorating, financial institutions reduced credit supply to this group. If this supply-side story is closer to what really happened during 2001-2014, low-income group would face more limited access to financial markets, making the situation worse. Low income group, facing severe borrowing constraints, would turn to non-bank financial institutions and pay higher interest rates. Considering the long economic slump following the global financial crisis, we prefer the supply-side story. In the following discussion, we provide empirical evidence that high-income group tends to incur more debts to buy real estate assets, but low-income group tends to incur debt to compensate for their lower income. That is, high-income group uses debt for investment while low-income group uses debt for consumption to make a living. To deduce a causal interpretation, we focus on the cross-sectional differences to see how differently debts are used by each income group.

III. Main Analysis

In this section, we attempt to answer the following questions: (1) who incurs household debt? (2) how differently household debts are used by income quintile? (3) how debt, consumption, and real estate holdings dynamically interact? and (4) why has wealth inequality by income quintile declined after 2008? We use the techniques of fixed effects (FE) logit analysis, FE panel regression, and panel VAR. Our panel regression results suggest that high income earners borrow to invest in non-financial assets while low income earners borrow to consume. In addition, high-income group with increased debt tends to reduce non-housing consumption. Our panel VAR analysis confirms that, for high-income group, an increase in debt result in reduced consumption and increased real estate holdings. And our counterfactual analysis provides strong evidence that a recent decline in wealth held by top 20% income group is not caused by a deliberate redistribution policy, but mostly by a decline in asset prices (mainly house prices). We discuss the macroeconomic implications of our finding.

1. Who Incurs Household Debt and Why?

As figure 6 clearly shows, debt dispersion by income group has widened and a run-up in household debt in 2000s is led by high-income group. A question naturally arises: what kinds of households bear more debt? To characterize those households, we consider discrete choice models with fixed effects (FE). The advantage of this methodology is to include the unobserved household-specific fixed effects, which are allowed to be correlated with other covariates, reducing the possibility of omitted variable bias.

The dependent variable, $y_{i,t}$, is a categorical variable that takes a value of one if debt of household i at time t increases since the previous year ($\Delta D_{i,t} \equiv D_{i,t} - D_{i,t-1} > 0$). For example, $y_{i,2007} = 1$ means that household i increases its debt between 2006 and 2007. We estimate the following equation:

$$\Pr(y_{i,t} = 1 | x_{i,t}, \alpha_i) = x_{i,t} \beta + \alpha_i + u_{i,t} \quad (1)$$

More specifically, we are interested in the roles of real estate asset, financial asset, non-housing consumption, and disposable income in accounting for probability of incurring more debt. That is,

$$\begin{aligned} \Pr(\Delta D_{i,t} > 0 | x_{i,t}, \alpha_i) = & \beta_1 \Delta \ln(\text{non-financial asset}) \\ & + \beta_2 \Delta \ln(\text{non-housing consumption}) \\ & + \beta_3 \Delta \ln(\text{financial asset}) \\ & + \beta_4 \Delta \ln(\text{disposable income}) \\ & + (\text{other control variables}) + \alpha_i + u_{i,t} \end{aligned}$$

The signs of β 's can go either direction. However, we can provide some plausible stories about the signs. A positive β_1 implies that a household incurs more debt when it increases its real estate asset holdings. A negative β_2 implies that a household reduces its non-housing consumption with incurring more debt, suggesting the debt overhang effect. If we have $\beta_1 > 0$ and $\beta_3 < 0$ together, a household is more like to purchase real estate asset with incurring debt and selling financial asset. A positive β_4 implies that a household incur more debt when additional income is supported. For other control variables, we include age, gender

dummy, and education year of household head, family size, dummies for Seoul and metropolitan area, yearly fixed effects.

<Table 2> Fixed Effects Logit, by Income Quintile

Sample Period: 2001-2014				
	(1) All	(2) Top 20%	(3) Middle 20%	(4) Bottom 20%
$\Delta \ln(\text{non-financial asset})$	0.377** (12.96)	0.555** (10.12)	0.222** (3.94)	0.085 (0.82)
$\Delta \ln(\text{non-housing consumption})$	-0.240** (-3.91)	-0.231** (-2.12)	-0.357** (-2.52)	-0.009 (-0.04)
$\Delta \ln(\text{financial asset})$	-0.160** (-10.89)	-0.136** (-5.08)	-0.201** (-5.97)	-0.188** (-3.40)
$\Delta \ln(\text{disposable income})$	0.255** (7.83)	0.209** (3.51)	0.224** (3.03)	0.187* (1.94)
<i>N</i>	15,169	5,005	3,136	865
Number of Households	2,477	704	526	205
Sample Period: 2008-2014				
$\Delta \ln(\text{non-financial asset})$	0.481** (9.39)	0.691** (7.54)	0.473** (3.84)	0.328 (1.21)
$\Delta \ln(\text{non-housing consumption})$	-0.390** (-4.03)	-0.524** (-3.14)	-0.209 (-0.93)	-0.215 (-0.50)
$\Delta \ln(\text{financial asset})$	-0.147** (-6.43)	-0.131** (-3.27)	-0.196** (-3.44)	-0.177 (-1.60)
$\Delta \ln(\text{disposable income})$	0.246** (4.74)	0.205** (2.35)	0.236* (1.73)	0.028 (0.15)
<i>N</i>	6,158	2,132	1,230	300
Number of Households	1,465	463	300	85

Note: This table shows the regression results of equation (1) for the periods of 2001-2014 and 2008-2014. All regression equations include other control variables (see the main text), yearly time fixed effects, and constants. All variables are real. Coefficients with ** are statistically significantly different from 0 at the 5% level; those with * are statistically significantly different from 0 at the 10% level.

Table 2 displays the result of estimating equation (1).²⁸⁾ When we consider the whole sample period of 2001-2014, column (1) says that, when a household incurs more debt, it increases its holdings of real estate asset, lowers the holdings of financial asset and reduces its non-housing consumption. Column (2) shows that incurring more debt by high income group is more closely associated with an increase in real estate assets and a reduction in consumption. However, as column (4) shows, incurring more debt is not associated with changes in real estate asset holdings of low-income group. In addition, the sign of β_2 of low-income group is not statistically significant. Note that it opens the possibility that debt can be used to make up for low consumption. These patterns are more pronounced during the sample period of 2008-2014. The magnitudes of β_1 and β_2 of top 20% income group become larger from 0.555 to 0.691 and from -0.231 to -0.524, respectively. That is, the link between debt and real estate asset becomes tighter and the effect of debt overhang becomes stronger since 2008. And this pattern is observed only for top 20% income group.

We also examine if our finding is driven by the increase in jeonse deposit or the increasing debt by self-owned businesses.²⁹⁾ Note that we categorize jeonse deposit into non-financial assets due to its illiquidity. As jeonse deposit increases, a high-income jeonse resident may cover the increased jeonse deposit by incurring debt, selling financial assets, and reducing non-housing consumption, which is consistent with the result of column (2) in table 2. We test this possibility in two ways. Firstly, we include jeonse resident dummy, which takes a value of one if a household resides as jeonse at time t , as intercept and variables interacted with key explanatory variables and re-estimate. Secondly, we estimate the same specification without jeonse residents. Both confirm that the results in table 2 are not driven by jeonse residents' reaction to increased jeonse deposit.

28) We do not report the estimates as odd ratios, $\exp(\hat{\beta})$, because covariates of our interest are mostly continuous. Moreover, the presence of fixed effects, α_i , makes the calculation of marginal effects impractical. Given these, it is more meaningful to see whether the signs of the statistically significant estimates are positive or negative.

29) See, for example, news articles of “Worry at new high household debt” (<http://koreajoongangdaily.joins.com/news/article/article.aspx?aid=3008378>) and “Rising Debt From Mom-and-Pop Businesses Adds to Korea’s Woes” (<https://www.bloomberg.com/news/articles/2016-10-23/rising-debt-from-mom-and-pop-businesses-adds-to-korea-s-woes>).

As of 2015, South Korea ranks second highest at 8.0% for the number of self-employed people among OECD countries.³⁰⁾ During the sample period of 2001-2014 in KLIPS, the share of self-employed business and employer is 8.4%.³¹⁾ What if early retirees that used to earn relatively high income use debt and financial asset to start self-owned businesses? If this is the case, then we may observe the similar patterns observed in table 2. To check this possibility, we take the same approach for the case of jeonse. We include the dummy of self-owned businesses as intercept and interaction variables in the regression equation or estimate without the category of self-owned businesses. We confirm that our main result is not driven by self-owned businesses.

2. Purposes of Incurring Debt: Cross-Sectional Differences

A. Evidence from FE Panel Regressions

How does incurring debt affect consumption? Economic theory suggests that a rational consumer in a frictionless economy would smooth consumption using debt or financial instrument, whose role is to transfer consumption over time and across states. And, in a standard model of lifetime consumption and saving, one borrows only when a positive productivity (or income) shock is expected. However, myopia and financial frictions such as borrowing constraint will prevent one from fully smoothing out consumption. In real world, the effect of debt on consumption would be different depending on the motives of borrowing. What if a consumer borrows a sizable amount of money to buy a house? What if one borrows to compensate for lower income? If a consumer is under borrowing constraint or fails to fully predict future income prospect, this leads to non-zero correlation between consumption and debt.

30) See the related statistics at <https://data.oecd.org/entrepreneur/self-employed-with-employees.htm>.

31) We think that the part of non-paid family workers, whose share is 30.7%, might be categorized as owners or partners of self-employed businesses. But we do not have more detailed data.

〈Table 3〉 Correlation Coefficients between Household Debt, Consumption, and Non-financial Asset Holdings.

		2001-2014	2008-2014
		Correlation (95% confidence interval)	Correlation (95% confidence interval)
<i>Corr(D,RE)</i>	Top 20%	0.332* (0.307, 0.356)	0.285* (0.250, 0.319)
	Middle 20%	0.198* (0.172, 0.224)	0.231* (0.196, 0.266)
	Bottom 20%	0.079* (0.045, 0.113)	0.092* (0.043, 0.141)
<i>Corr(D,C)</i>	Top 20%	0.009 (-0.018, 0.037)	-0.043* (-0.081, -0.005)
	Middle 20%	-0.022 (-0.049, 0.005)	-0.053* (-0.090, -0.016)
	Bottom 20%	0.059* (0.025, 0.093)	0.080* (0.031, 0.129)

Note: This table presents correlation coefficients between household debt level (D), nonfinancial asset holdings (RE), and consumption (C). The numbers in parentheses are 95% confidence interval. Correlation coefficients with * denotes the numbers who are statistically different from zero at the 5% significance level.

Source: author's calculation based on KLIPS.

Before going into a more formal regression analysis, we calculate the correlation coefficients between consumption (C), debt (D), and real estate asset holdings (RE) by income group. Table 3 shows the result. For the period of 2001-2014, correlation coefficient between household debt and real estate holdings for high-income group is far higher at 0.332, compared to 0.079 for low-income group. It suggests that high-income households that holds larger amount of real estate assets tend to incur more debts. And the link between debt and non-financial asset holdings is very weak for low-income group. Also note that the correlation coefficients decline monotonically from high-income group to low-income group.³²⁾ Table 3 also shows the correlation coefficients between debt and consumption by

32) We confirms that this pattern holds for income quintiles. We do not report it for brevity.

income level. For top 20% and middle 20% income group, the relation between consumption and household debt does not exist. The correlation coefficients are statistically zero. However, the coefficient for bottom 20% income group is statistically positive. Interestingly, correlation between debt and consumption becomes negative for top 20% and middle 20% group after 2008, while it still remains positive for bottom 20% income group. One conjecture to explain this pattern of correlation coefficients is that purpose of borrowing would be different depending on income levels: high-income group tends to borrow in order to purchase real estate assets and low-income group tends to borrow in order to make a living. And, as high-income group has borrowed too much for their repayment capability and overall economic conditions have deteriorated after 2008, high-income group might have reduced their consumption. That is, high-income group might suffer from debt-overhang problem.

It is reasonable to think that correlation coefficient is a crude measure in our context because many variables correlated with debt, consumption, and non-financial asset holdings are involved. To address this, we perform a more formal analysis to see if our conjecture from correlation coefficients are correct. We estimate the following panel regression equation:

$$\ln C_{i,t} = \alpha + \beta_1 DSR_{i,t} + \beta_2 \ln Y_{i,t} + \beta_3 \ln FA_{i,t} + \beta_4 \ln RE_{i,t} + \gamma X_{i,t} + \sum_{t=2002}^{2014} \gamma_t D_t + \alpha_i + u, \quad (2)$$

where $C_{i,t}$ is real total expenditure, subtracted by housing outlays, debt service payments, and non-consumption expenditure of household i at year t , $DSR_{i,t}$ is the debt service ratio, defined as interest and principal payment divided by disposable income. $Y_{i,t}$ is real disposable income including transfer and subsidies. $FA_{i,t}$ and $RE_{i,t}$ are holdings of financial assets and real estate assets, respectively. X includes other control variables such as a household head's education, age, squared age, gender, and shares of those who are enrolled in primary, secondary, and higher education institutions. D_t is a yearly time dummy, which takes a value of one in year t . It is very important to control for time fixed effect because

incorporating it explain away any trends or jumps common to all households each year. α_i captures the unobserved heterogeneity across households. We restrict the sample to those who have non-zero household debts.

Our main focus is on β_1 in equation (2). We would like β_1 to capture the effect of debt on consumption, regardless of whether debt suppresses consumption or encourages consumption. To measure the level of indebtedness, popular measures are LTV (loan-to-value) ratio, DTI (debt-to-income) ratio, and DSR (Debt Service Ratio). Our preferred measure is DSR since it is a suitable measure of how much of debt burden is actually imposed on *current* consumption. If one incurs sizable amount of debt with deferred payment option and does not behave based on PIH (Permanent Income Hypothesis) theory, higher LTV and DTI ratios will not impose any direct restrictions on current consumption. In this regard, the definition of consumption is also important. We need to use a measure of consumption or expenditure which can be affected by debt burden and, at the same, which are under the household's discretion. For this purpose, our definition of consumption is total household expenditure subtracted by housing outlays, non-consumption expenditure, and debt service payment. Different from Meyer and Sullivan (2013), we include expenditure on public and private education because these items are subject to changes depending on a household's economic situations and debt exposure.³³⁾

One caveat is that we do not intend to use equation (2) as a rigorous specification for consumption function. If we do, then equation (2) would include interest rates, variance of consumption growth, and other variables to consider the effects of intertemporal substitution, precautionary saving, habit formation, etc.³⁴⁾³⁵⁾ Instead, we focus on the different estimates of β_1 by income groups and examine

33) We also check the result when education expenditure is subtracted from consumption. We find that our regression result is robust to this change in the definition of consumption.

34) In the canonical model with marginal utility of $u'(C_t) = C_t^{-\gamma}\theta_t$ and some approximations, the Euler equation can be written as:

$$E_t \Delta \ln C_{t+1} \approx \frac{1}{\gamma}(r_{t+1} + \ln \beta) + \frac{1}{\gamma} \Delta \ln \theta_t + \frac{1}{2} \gamma \text{Var}_t(\Delta \ln C_{t+1})$$

where θ corresponds to variables that might affect marginal utility (typically, demographic variables), r is the interest rate, and $\text{Var}_t(\Delta \ln C_{t+1})$ is the conditional variance of consumption growth. If we want to test the habit formation, the lagged dependent variable will be added. If one is interested in liquidity constraints, the current income will be added.

35) Note that the effect of interest rates, which are common to all household at each time t , will be absorbed by time fixed effects.

what we can infer from the different β_1 estimates for each income group. That is, the reason for adding explanatory variables in addition to *DSR* is for more accurately estimating the relationship between consumption and *DSR*, not estimating the consumption function as a whole.

Our hypothesis is that the estimate of β_1 is negative for high-income group, suggesting that this group borrows overly to purchase non-financial assets and this over-borrowing suppresses this group's consumption. Meanwhile, if we expect that low-income group borrows to make up for their lower income, the estimate of β_1 will be zero or positive. Even if the estimate of β_1 for low-income group is zero, we cannot rule out the possibility of their using debt for consumption. If low-income group deliberately use debt to smooth consumption fully, the estimate would be close to zero.

Table 4 presents the result of fixed effects panel estimation.³⁶⁾ The estimates of β_1 for top 20% income group and next 20% group are negative and statistically significant, while the estimates for bottom 20% income group and next 20% group are positive and statistically significant. Our result shows that the consumption *level* of a household with high debt burden is relatively lower in high-income group while it is relatively higher in low-income group. How can we interpret this pattern? In addition to higher correlation between debt and real estate holdings in table 3, panel (b) in figure 6, and panel (b) in figure 1, we interpret these cross-sectional differences in terms of consumption sensitivity to debt burden as a causal relationship: high-income group borrows to invest even to the extent that debt burden suppresses consumption while low-income group borrows to consume.³⁷⁾

36) Hausman test statistics strongly prefers fixed effects model to random effects model.

37) Based on the specifications used in Andersen et al. (2014), Son and Choi (2015) find that negative effects of the 2008 crisis shock on consumptions are more significant and greater in the households with higher LTV (loan to value) ratios before the 2008 crisis, which is in line with our finding. There are many papers to examine the effect of household debt on consumption or output using aggregate data. See Cecchetti and Kharroubi (2012), Arcand et al. (2015), Mian et al. (2015), Courne de and Denk (2015), and Lombardi et al. (2017). Kang (2017) estimates the flow and stock effect of debt on consumption using the aggregate data of South Korea. In his study, he defines the effect of household debt growth rate on real consumption (or output) growth as 'flow' effect and the effect of (household debt/potential GDP) as 'stock' effect. All these find that an excessive level of household debt is detrimental to real economy.

〈Table 4〉 Consumption and DSR, by Income Quintile

Dependent Variable: ln(non-housing consumption), 2001-2014					
	Top 20%		Middle20%		Bottom 20%
DSR	-0.014*	-0.172**	-0.005**	-0.014**	0.046**
	(-1.76)	(-2.79)	(-3.89)	(2.44)	(3.83)
ln(disposable income)	0.336**	0.274**	0.369**	0.373**	0.332**
	(12.02)	(11.22)	(8.98)	(10.36)	(7.61)
ln(financial asset)	0.014	0.001	0.012	0.013	0.013
	(1.53)	(0.15)	(1.06)	(1.16)	(0.87)
ln(non-financial asset)	-0.021	0.003	-0.003	0.001	-0.016
	(-1.02)	(0.28)	(-0.17)	(0.03)	(-0.63)
R^2	0.176	0.203	0.225	0.229	0.185
N	3,857	3,462	2,943	2,586	1,629
Number of Households	984	946	862	847	684
Dependent Variable: ln(non-housing consumption), 2008-2014					
	Top 20%		Middle20%		Bottom 20%
DSR	-0.012**	-0.036	0.025	0.032**	0.034**
	(-2.57)	(-0.47)	(1.34)	(2.85)	(3.12)
ln(disposable income)	0.254**	0.252**	0.347**	0.376**	0.271**
	(6.40)	(7.29)	(6.14)	(8.02)	(2.95)
ln(financial asset)	0.011	0.001	0.023	0.023	0.009
	(0.81)	(0.08)	(1.48)	(1.38)	(0.47)
ln(non-financial asset)	-0.108**	-0.010	-0.004	0.018	-0.001
	(-3.23)	(-0.49)	(-0.15)	(0.86)	(-0.03)
R^2	0.105	0.126	0.149	0.184	0.112
N	2,227	2,006	1,669	1,429	775
Number of Households	788	731	659	611	393

Note: This table shows the regression results of equation (2) for 2001-2014 and 2008-2014 based on households with non-zero debt. All regression equations include other control variables (see the main text) and yearly time fixed effects. All specifications include a constant (not reported here). The numbers in parentheses are robust standard errors. * and ** denote the 10% and 5% level, respectively.

This is why we observe the different signs of β_1 estimates. While we are open to alternative hypothesis to explain this cross-section differences, we think that the hypothesis we present is a major candidate to explain our empirical findings and is also aligned well with economic intuition. The same pattern emerges when we estimate for the period of 2008-2013. The estimate of β_1 for high-income group is negative and that of low-income group is positive. And both are statistically significant. In the following section, we use panel VAR techniques, which are more suitable to capture the dynamics and feedbacks of endogenous variables.

B. Evidence from Panel Vector Autoregression

Our previous fixed effects regression shows that the relationships between debt, non-financial asset and consumption are different depending on income levels. In this section, we use panel VAR techniques to examine the dynamic relationship among debt, consumption, and real estate holdings.

Our econometric model takes the following reduced form:

$$X_{i,t} = \Gamma(L)X_{i,t} + \alpha_i + u_{i,t}, \quad (3)$$

where $X_{i,t}$ is a vector of variables, $\Gamma(L)$ is a matrix polynomial in the lag operator with $\Gamma(L) = \Gamma_1 L^1 + \dots + \Gamma_p L^p$, α_i is a vector of household-specific effects and $u_{i,t}$ is a vector of idiosyncratic errors. Before estimation, we need to decide the lag order p , a list of variables to be included in $X_{i,t}$, and the order of variables in $X_{i,t}$. Firstly, we set $p = 1$ using Bayesian and Hannan-Quinn information criteria. The variables we use include logs of household debt (D), real estate asset (RE), and non-housing consumption (C).³⁸⁾ We use both level terms and differenced terms, $X_{i,t} = [\ln D_{i,t}, \ln RE_{i,t}, \ln C_{i,t}]$ and $X_{i,t} = [\Delta \ln D_{i,t}, \Delta \ln RE_{i,t}, \Delta \ln C_{i,t}]$. It is because the typical tests of unit root in panel data require that panels are strongly balanced, but our panel data is not strongly balanced. Deciding the order of variables in $X_{i,t}$ is not easy because all the variables are closely inter-related. We estimate the model by changing the orders and confirm that the order does not affect our

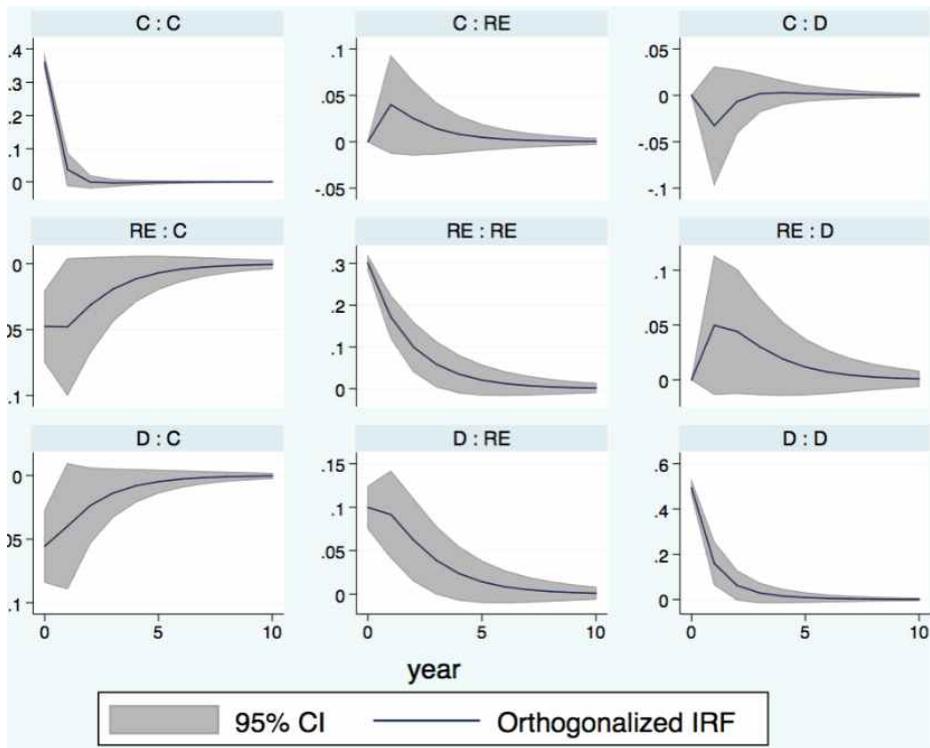
38) We also estimate four-variable panel VAR with including net worth (NW) and find that including NW does not change our result much.

main result much. As it is well known that, in a dynamic panel, the fixed-effects estimator is not consistent because fixed effects are correlated with the regressors due to lags of the dependent variables. We use the forward mean differencing (the Helmert procedure).

Figure 7 shows the impulse responses functions for top 20% income group in case of $X_{i,t} = [\ln D_{i,t}, \ln RE_{i,t}, \ln C_{i,t}]$.³⁹⁾ Impulse responses are normalized to a 1% increase of household debt (D), real estate asset (RE), and non-housing consumption (C). We are interested in the responses of consumption and real estate asset when there is an orthogonal shock to debt. Row 3 and column 1 shows the

<Figure 7>

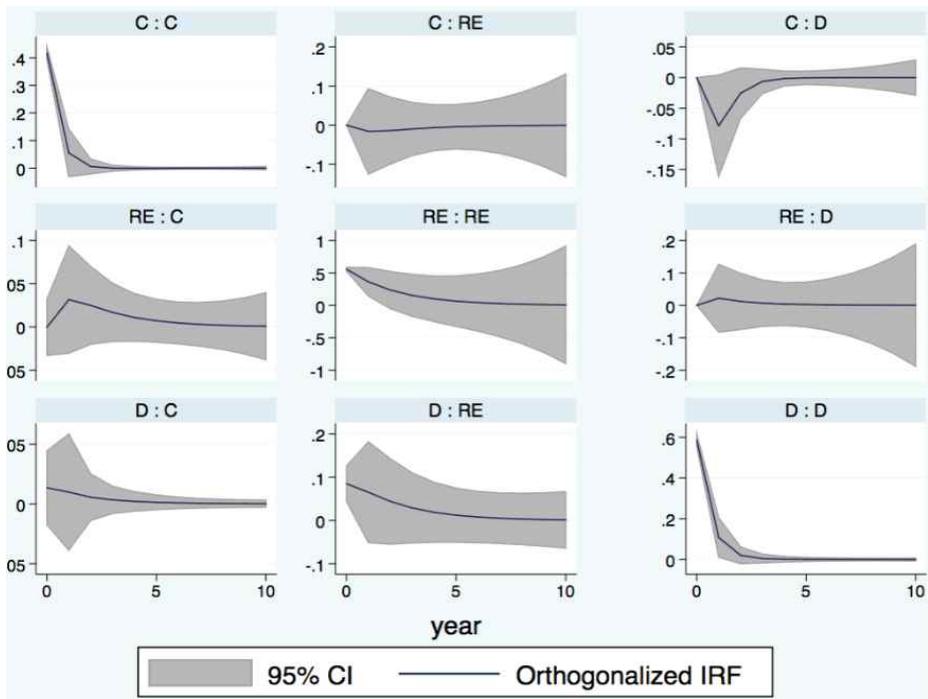
Impulse Response Analysis



Note: This figure shows the impulse responses based on 3-variable panel VAR. Three variables are logs of household debt (D), real asset holding (RE), and consumption (C) of top 20% income group and the sample period is 2001:I-2014:4. All variables are real. The 95% confidence intervals are drawn using Gaussian approximation.

39) We use *pvar* command in Stata. Refer to Love and Zicchino (2015) for more detail.

〈Figure 8〉 Impulse Response Analysis



Note: This figure shows the impulse responses based on 3-variable panel VAR. Three variables are logs of household debt (*D*), real asset holding (*RE*), and consumption (*C*) of bottom 20% income group and the sample period is 2001:1-2014:4. All variables are real. The 95% confidence intervals are drawn using Gaussian approximation.

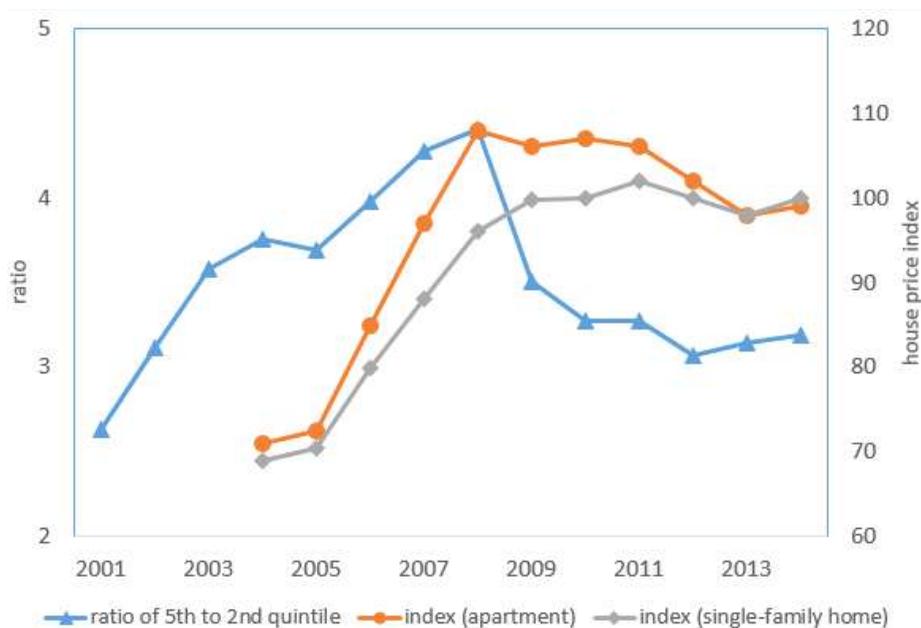
response of consumption to an increase in debt. Row 3 and column 2 shows that of real estate asset. For high-income group, an increase in debt is associated with lower consumption and higher real estate asset holdings. Meanwhile, the impulse responses of bottom 20% income group are different, as shown in figure 8. A negative response of consumption to an orthogonal shock to debt is not found and the positive relationship between debt and real estate holding is almost non-existent. Evidence from panel VAR technique adds support to our previous finding.

3. Why Is Wealth Inequality in Decline?: A Role of House Prices

We have seen that inequality of wealth (net worth) and non-financial asset holdings has not been aggravated since 2008. In addition, figure 9 displays the

ratio of net worth held by the fifth and the second quintile of the income distribution, another measure of inequality.⁴⁰⁾ It shows that wealth inequality increases until 2008 and then declines from 2008. We overlay the time-series of house price index. We use the price index of Korea Appraisal Board, which is based on repeat-sales method and available from 2006.⁴¹⁾ This index better reflects the actual prices in the market. Figure 9 shows that the trend of wealth inequality is similar to that of house price index, especially apartment price index. It is because the value of apartments in our sample takes a large share of total value of housing and wealth. The share of apartment value to total housing value from 2006 to 2015 amounts to 63.6%.⁴²⁾ Figure 10 shows sales price index of houses

(Figure 9) Inequality and House Prices



Note: This figure shows the ratio of net worth held by the fifth and the second quintile of the income distribution, along with house price index from Korea Appraisal Board.

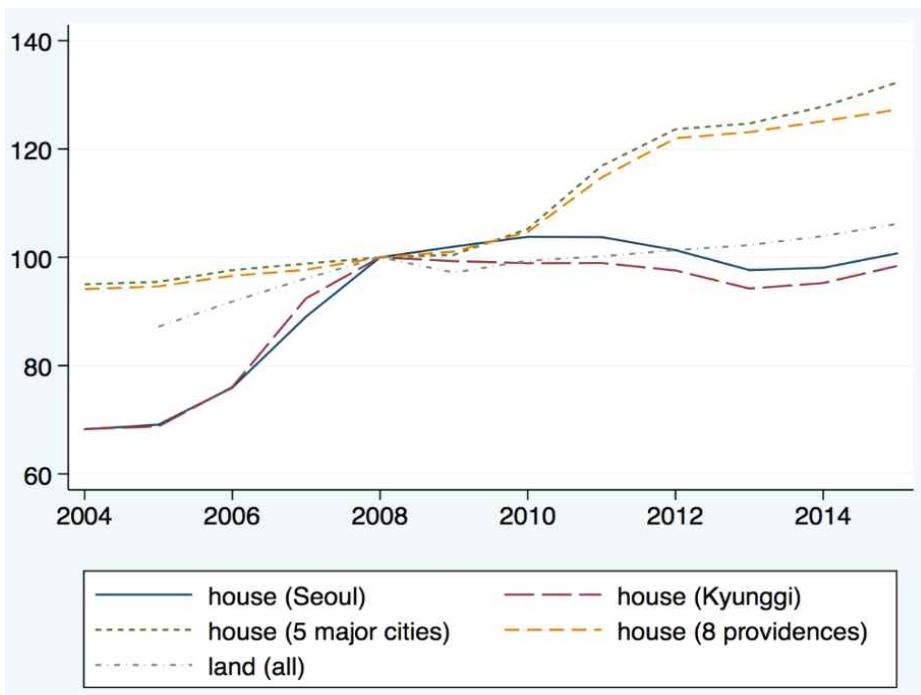
40) Following Domanski et al. (2016), we use the second quintile instead of the first quintile. It is because households in the first quintile often hold negative net worth.

41) The data is available from the website (http://www.r-one.co.kr/rone/resis/statistics/statisticsViewer.do?menuId=TSPIA_41100)

42) Table 1 shows that homeownership of the fifth quintile (top 20%) is 67% while that of the second quintile is 54%. Moreover, the share of those who are both homeowner and apartment residents is 69% for the fifth quintile and the same statistics is only 38% for the second quintile.

of 4 areas and land price index from 2005 to 2015.⁴³⁾ We set the basis year as 2008.⁴⁴⁾ Figure 10 shows that, while house prices in local areas other than Gyeonggi (including Incheon) has risen from 2008, house prices in Seoul and Gyeonggi area and land price have been stagnant since 2008. Since the total housing value in Seoul and Gyeonggi area takes up 70.4% of total housing value, we expect that stagnant house prices in those areas would affect the trends in non-financial assets and wealth, given high concentration of wealth on non-financial assets in South Korea.

<Figure 10> House and Land Price Index



Note: This figure shows the house and land price index from 2005 to 2015. ‘House’ includes all types of residence (single-family home, apartments, etc.). Gyeonggi area includes Incheon. 5 major cities includes Busan, Daegu, Daejeon, Gwangju, and Ulsan. The baseline year is 2008 (2008=100).

Source: Korea Appraisal Board.

43) Time-series of house prices and jeonse deposits are available for 19 areas.

44) We do not display index for jeonse deposits because sales prices and jeonse deposits are highly correlated. For example, the correlation coefficient between sales price and jeonse deposit is 0.91 and the correlation coefficient for apartment is 0.92.

Taking one step further, we perform a counterfactual analysis to see the role of house prices in accounting for the recent trend in wealth inequality. The value of non-financial assets of household i at time t is given by:

$$\begin{aligned} NFA_{i,t} &= (\text{value of house}) + (\text{value of other real estate assets}) \quad (4) \\ &= V_{i,t}^{house} + V_{i,t}^{other} \\ &= \sum_j P_{i,j,t}^{house} Q_{i,j,t}^{house} + \sum_j P_{i,j,t}^{other} Q_{i,j,t}^{other}, \end{aligned}$$

where j denotes asset j . Then, we define the counterfactual value of non-financial asset by holding the quantity fixed at $t=2008$. For example, the counterfactual value of $t=2009$ is given by

$$NFA_{i,t=2009} = \sum_j P_{i,j,2009}^{house} Q_{i,j,2008}^{house} + \sum_j P_{i,j,2009}^{other} Q_{i,j,2008}^{other} \quad (5)$$

Unfortunately, KLIPS reports only $V_{i,t}^{house}$ and $V_{i,t}^{other}$, not $P_{i,j,t}$ and $Q_{i,j,t}$ separately. Instead of equation (5), we apply price index PI :

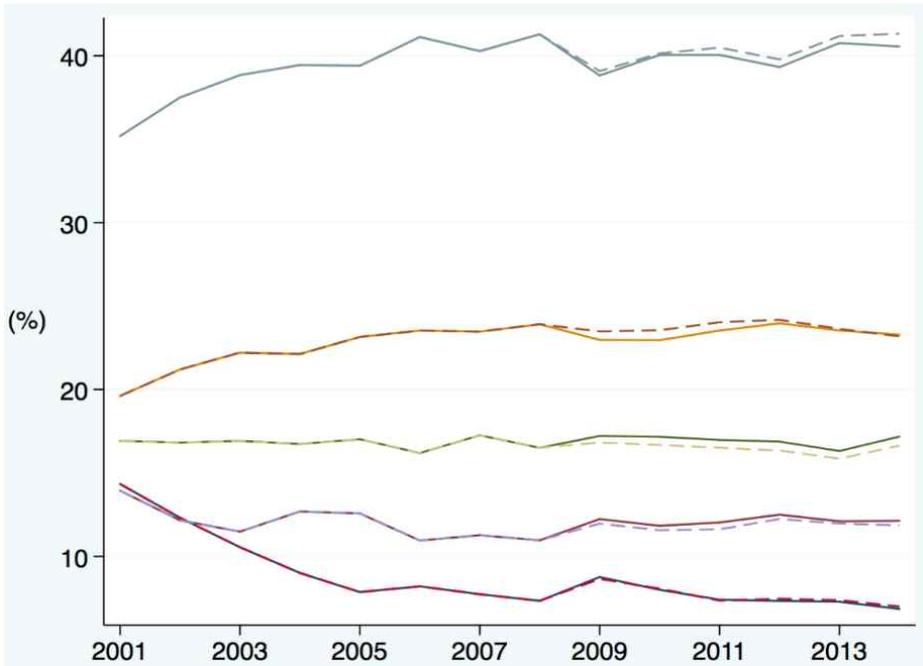
$$NFA_{i,t=2009} = \Pi_{2009}^k V_{i,2008}^{house} + \Pi_{2009}^k V_{i,2008}^{other} \quad (6)$$

where k denotes the types of non-financial assets such as apartments and multi-unit houses. Another problem is that, if a household owns various types of other non-financial assets (for example, one owns both land and buildings), KLIPS reports only the total value. Thus, it is hard to apply different price index to each asset categories. In this regard, we only consider the effect of house prices for homeowners. While our counterfactual analysis is not a complete one, it can still be a valid experiment since the total value of houses by homeowners from 2008 to 2015 ($V_{i,t}^{house}$ of homeowners from 2008 to 2015) accounts for 63.1% of total value of non-financial assets during the same period ($NFA_{i,t}$ of all households from 2008 to 2015) and 78.3% for the case of homeowners ($NFA_{i,t}$ of homeowners from 2008 to 2015).

We recalculate the value of non-financial asset in the following way: (1) identify the homeowners in 4 areas (Seoul, Gyeonggi, 5 major cities, and 8 providences)

(2) set 2008 as basis year and apply the sales price index from 2009 to 2015.⁴⁵⁾ We implicitly make two assumption. Firstly, portfolio composition is independent of macroeconomic and financial conditions. Secondly, we apply the same index to the value of other non-financial assets (other than housing) held by owners. Figure 11 shows our result. Solid lines are the shares of net worth held by each income quintile, which is identical to the ones in panel (a) of figure 6. Dashed lines are the shares from the counterfactual analysis. They track down very closely the actual shares, highlighting the role of asset prices (especially apartment price).

<Figure 11> Counterfactual Analysis: the Role of House Prices



Note: This figure shows the shares of net worth held by each income quintile. Solid lines are the shares of net worth held by each income quintile, which is identical to the ones in panel (a) of figure 6. Dashed lines are the shares from the counterfactual analysis. The order is top 20% group on the top, and then for the next 20% group subsequently and so on.

45) We also try the jeonse deposit index together and the result does not change much.

While our analysis is far from a complete counterfactual analysis because of data limitation, it suggests the role of house prices in accounting for the recent trend in wealth inequality.⁴⁶⁾ Wolff (2017) presents empirical evidence for the role of asset prices in explaining trends in equality. Using U.S. data, he shows that, when asset prices plunged between 2007 and 2010, median wealth plummeted by 44 percent and the inequality of net worth went up sharply after almost two decades of little movement. And he shows that these patterns are largely traceable to the high leverage of middle class families and the high share of home in their portfolio. His finding is consistent with our argument for the role of asset prices. One major difference is that South Korea has not experienced a sharp fall in asset prices and their rebound.

4. Discussion

Despite the constantly increasing household debt in South Korea, there has been an argument that high level of debts in South Korea is not a major threat to the macroeconomy because those debts are incurred by relatively high-income group.⁴⁷⁾ Our empirical finding casts doubt on this line of argument in several respects. Given our empirical finding that high level of debt by high-income group not only suppresses consumption but also results in unequal holdings of non-financial assets, changes in asset prices can make economic inequality more persistent over generations and make the economy more vulnerable to external shocks. We discuss a possible link between dispersion of debt, consumption, income, and wealth and a source of macroeconomic instability related to household debt.

A. Links between Dispersion of Debt, Inequalities of Wealth, and Income

What happens to economic inequality if investment in non-financial assets made

46) However, since this analysis is based on many assumptions due to data limitation, one needs to interpret this result with caution.

47) According to the Bank of Korea, the shares of household debt incurred by groups of top 40% income and net worth are 69.9% and 60.8%, respectively. These numbers are from the Bank of Korea report submitted to a special committee in the National Assembly, which took place on 6 April 2017. See the minute in the following link: <http://log.gov3.org/view.php?confnum=047126>

possible by leverage turns out to be successful? Given that high-income group incurs debt to buy those assets, it would aggravate not only the economic inequality of the current generation but also that of the next generations, making inequality more persistent.

According to Piketty (2000), persistent inequality over generations can result from various channels: family transmission of wealth, family transmission of ability, imperfect capital market, local segregation and others. In our context, family transmission of wealth and imperfect capital market are important factors. For example, if high-income group's investment by leverage were successful, this group would become higher-income group. It results in unequal consumption and investment in human capital. And lower income in the future or of next generation would lead to more limited access to credit markets. Unequal access to credit markets leads to debt dispersion widening, and it also leads to income inequality, starting off a vicious cycle of debt and income inequality.⁴⁸⁾

There are many theoretical and empirical studies supporting this logic of persistent inequality. Using a quantitative, general equilibrium, overlapping-generations model in which parents and children are linked by accidental and voluntary bequests and by earnings ability, DeNardi (2004) shows that an economy can reach an equilibrium in which the distribution of wealth is much more concentrated than that of labour earnings and the richest households hold onto large amounts of wealth. Galor (2011) emphasizes that unequal investment in human capital may result in low economic growth and unequal distribution of income. According to Corak (2013), an emerging body of evidence suggests that more inequality of incomes in the current generation will make family background more important in determining the adult outcomes of young people. That is, higher inequality skews human capital investment and opportunities and lowers intergenerational mobility. In a cross-country context, countries with greater inequality of incomes also tends to be countries with lower intergenerational mobility, implying that a greater fraction of economic advantage and disadvantage

48) As to the direction of income inequality to the accumulating household debt, Iacoviello (2008) shows, while business cycle fluctuations can account for the short-run changes in household debt, its prolonged rise of the 1980s and the 1990s can be quantitatively explained only by the concurrent increase in income inequality.

is passed on between parents and their children. This relationship is often called “The Great Gatsby Curve,” first coined by Alan Krueger.⁴⁹⁾

As a long-run implication, our empirical evidence suggests a possible link between debt dispersion and income/wealth/consumption inequality. We show that the recent trend in wealth inequality may result mostly from the stagnant asset prices. Given high concentration of household wealth in non-financial assets, widening debt dispersion and different usages of household debt, increases in asset prices in the future may easily reverse the recent trend in wealth inequality through the disproportionate holdings of non-financial assets. This will in turn make economic inequality more persistent.

B. “Wealthy Hand-to-Mouth” Households and a Source of Macroeconomic Instability

Incurring debt and disproportionately investing in illiquid assets such as real estate can be very dangerous even for high-income group. Kaplan and Violante (2014) introduce a new terminology of “wealthy hand-to-mouth (HtM)” households. While the term itself might be new, the concept is familiar, especially in South Korea. It refers to the households that hold little or no liquid wealth, despite owning sizable amounts of illiquid assets that carry a transaction cost such as housing, real estate, or retirement accounts. That is, they rigorously define and identify the group, so called “house-poor,” which has been widely used in South Korea. The “house-poor” in South Korea refers to households who bought houses with excessive debts and thus have little cash-in-hand or liquid assets, maintaining low level of consumption relative to income. Applying the methodology of Blundell et al. (2008), Kaplan and Violante (2014) show that wealthy HtM households exhibit higher marginal propensity to consume out of a transitory shock and argue that macroeconomic modelling needs to pay attention to this group because they have consumption responses that are similar to those of poor HtM households, yet they share demographic characteristics and portfolio compositions

49) This term is used for the first time in Alan Krueger's speech, “The Rise and Consequences of Inequality,” to the Center for American Progress on January 12, 2012, when he was the Chairman of the Council of Economic Advisors.

that resemble that of the non-HtM households, who are considered non-credit-constrained.⁵⁰⁾

Following Kaplan and Violante (2014), Park (2017) calculates the share of wealthy and poor HtM households in South Korea. He finds that the share of wealthy HtM households is close to 30% while that of poor HtM households is around 10% during the period of 2001-2012. The share of wealthy HtM households is higher than the case of U.S., where the shares of U.S. are close to 20% and 10% during the period of 1989-2010.⁵¹⁾ Park (2017) also finds that high-income group with relative larger amount of household debt exhibits higher marginal propensity to consume in response to temporary shocks. Thus, high-income group, along with HtM households, might be a source of instability and household debt problem may impose a threat to macroeconomic stability of South Korea.⁵²⁾

What policy implication does this result shed light on? The fact that high-income group, who bears more debt and leads a run-up in debt in 2000s, exhibits larger consumption response to temporary shocks, suggest that this group would lay down a route to macroeconomic instability when external shocks such as US monetary policy normalization and a possible China's recession hit the economy.⁵³⁾ In a worse situation, in which external shocks are too large to be managed with liquid assets, households might start selling illiquid assets, which would ignite a vicious cycle of fire sales. The macroprudential supervisory

50) Lusardi et al. (2011) use a similar concept, “financially fragile” households. Their definition is an household that would not be able to come up with \$2,000 in 30 days. Based on a survey, they document that a quarter of U.S. households are reported as “financially fragile.”

51) According to Kaplan and Violante (2014), the shares of wealthy HtM households in other countries such as U.K., Canada, Australia, Germany, France, Italy, and Spain are far lower than 30%.

52) According to Park (2017), the age profiles of wealthy and poor HtM households are very different to the case of U.S., where the share of poor HtM households starts declining from 20s and the share of wealthy HtM households drops from around 55. In contrast, for the case of South Korea, the share of poor HtM households is rather stable around 10% from mid 20s to 70s. For the share of wealthy HtM households, it shows rather a steep slope from mid 30s to mid 40s, reflecting that a majority of households consider buying homes around these ages, becomes stable until 60, and then peaks up a little after retirement age. Being in the status of wealthy HtM households even after retirement raises another problem because they have limited sources of additional income. Regarding the relationship between aging and income inequality, see Lee (2014) and Hong and Jun (2013).

53) Mian et al. (2013) document how a shock on household net worth during the financial crisis leads to a drop in private consumption. And Mian and Sufi (2014b) clearly demonstrate how local shocks are transmitted to other areas, reducing the employment even in areas that were not subject to local shocks such as a sharp decline in housing prices.

authority should recognize this possible source of instability and pay close attention to an appropriate execution of macroprudential tools that consider the heterogeneity of various groups.

IV. Conclusion

Using KLIPS for the period of 2001-2015, we find a widening gap for obtaining credit between high- and low-income group, while income and consumption inequality have not been aggravated in 2000s. In addition, we provide empirical evidence that high-income group borrows to invest while low-income group borrows to consume.

Our empirical evidence suggests a strong caution against the argument that the problem of household debt in South Korea is not a major threat to the real economy because a majority of debt is borne by high-income group. There are several channels. At least in the short run, we find that high-income group suppresses non-housing consumption, which is detrimental to aggregate demand. In addition, based on the concept of “wealthy hand-to-mouth” households or “house-poor,” high-income group with high indebtedness and concentration on illiquid assets may exhibit higher marginal propensity to temporary shocks. In the long run, we discuss possible links between inequalities of income, consumption, and wealth and the role of relative indebtedness. If combined with rising asset prices, unequal access to credit and different purpose of incurring debt will make economic inequality more persistent across generations.

While our empirical analysis shows that the relationships between debt, consumption, and real estate assets are different depending on income level, we only suggest possible links between debt, income, and consumption inequality. More detailed information on the compositions of household portfolios and their outcomes over longer horizon will shed light on the link. More research toward this direction is warranted.

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한국의 소득분위별 가계부채 분포의 확산과 거시경제적 함의

박기영* · 김수현**

본 연구에서는 2001~2015년 간 한국노동패널조사(KLIPS) 자료를 활용하여 경제적 불평등도에 대한 경험적 사실들을 정립하고 이에 대한 거시경제적 함의를 도출하였다. 첫째, 널리 알려진 바와는 달리 2000년대 이후 세후 소득과 소비 불평등은 크게 악화되지 않았다. 그러나 고소득 계층을 중심으로 가계부채가 크게 증가한 반면 저소득층의 신용시장 접근성은 더욱 악화되면서, 소득분위별 가계부채 분포는 더욱 확산되었다. 둘째, 부채의 용도도 소득계층에 따라 상이하게 나타난다. 고정효과를 감안한 패널회귀모형과 패널 VAR(panel VAR) 모형으로 분석한 결과, 고소득계층은 비거주 소비지출을 감소시키면서까지 부채를 이용하여 부동산 또는 주택에 투자하였다. 반면 저소득층의 부채는 부족한 소비재원을 충당하는 목적으로 사용되었다. 실증분석 결과에 기반하여 부채의 분포 확산과 상이한 용도가 거시경제의 안정성을 저해하고 장기적으로 경제적 불평등을 악화시킬 수 있는 경로에 대해 논의하였다.

JEL Classification: D1, D31, E21

핵심 주제어: 경제적 불평등, 가계부채, 소득분위별 부채 분포, 자산가격

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