Korea and the World Economy
Vol. 23, No. 2 (August 2022) 91-106
http://doi.org.10.46665/kwe.2022.08.23.2.91

Accounting for the Effect of Household Debt on Economic Growth: The Role of Markup Dynamics*

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This paper investigates the effect of household debt on aggregate markup, and consequently real GDP by using the local projection method found in Jordà (2005). We show that markup dynamics play a contributing role in examining the effect of household debt on real GDP. Our main empirical results are as follows: (1) An increase in household debt is positively related with aggregate markup. (2) Household consumption decreases as markup rises. (3) With the positive association between markup and household debt, real GDP and household consumption decrease in response to positive household debt shock.

JEL Classification: E31, E51, G21, L11
Keywords: local projection, household debt, markup

1. INTRODUCTION

The rapid accumulation of household debt is widely viewed as a major risk to macroeconomic stability because an increase in household debt predicts the severity of a downturn across advanced economies (Glick and Lansing, 2010; IMF, 2012; Mian and Sufi, 2014; Mian et al., 2017). A high level of indebtedness can induce the macroeconomy to become more vulnerable to negative economic shocks than it otherwise would be. Therefore, a macroprudential policy that pre-emptively reduces financial risk is a significant policy tool for decelerating the accumulation pace of household debt growth. In this regard, it is crucial to understand exactly what the effect of household debt on macroeconomic fundamentals is.

This motivates us to study the effects of household debt on economic growth. How does household debt affect real GDP? To answer this question, we first pay attention to the effect of markup dynamics on household debt. With a negative relationship between markup and consumption, markup dynamics is a contributing factor in explaining the effect of household debt on real GDP.

* Received March 15, 2022. Accepted June 13.

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This paper utilizes panel data on markup, household debt, household consumption, and real GDP for 19 countries between 1980 and 2016. By using Jordà's local projection method, we present new findings on the effects of household debt on aggregate markup and real GDP. Our main empirical findings are as follows: (1) An increase in household debt is positively related to aggregate markup. (2) Household consumption decreases as markup rises. (3) With the positive association between markups household debt, real GDP and household consumption decrease in response to positive household debt shock.

Our empirical results imply that credit expansion to households amplifies a firm's market power.[1] Credit expansion to a household relaxes the household's budget constraints and hence raises consumers' purchasing power. A firm utilizes market power to set a higher markup to gain an additional profit from the consumer. Therefore, the consumption and welfare of households decreases due to higher markup.

Many studies present that the effect of household debt on real GDP is negative in the medium term (Mian et al., 2017; Cecchetti, Mohanty, and Zampoli, 2011; Hoeller, 2012; Park et al., 2018). As argued by Mian, Sufi, and Verner (2017), if credit supply shocks are driven by irrationally exuberant expectations of lenders ignoring downside risks, the accumulation of debt in high-risk sectors eventually brings about a reversal in investment sentiment and subsequent decline in growth. Cecchetti and Zampoli (2011) also suggest that excess private debt not only constrains financing capacity to smooth economic cycles but also causes large swings in asset prices, which tend to trigger recessions when the economy slows down. Sutherland and Hoeller (2012) examine the impact of household debt on economic stability in OECD economies. They find that private debt is not consistently related to gross domestic product (GDP) volatility, but household debt is positively associated with consumption volatility. Park et al. (2018) find that household debt accumulation is associated with higher output growth in the very short run, but lower output growth after 3 years in EME countries. Contrary to these studies, our empirical results suggest that markup dynamics plays a contributing role in explaining the effects of household debt on real GDP. With a positive association between markup and household debt, household consumption decreases in response to positive household debt shock, which then results in a decrease in real GDP.

Our paper is related to existing literature that examines the effect of household debt on consumption. A number of studies present a relationship between the higher accumulation of pre-crisis debt and lower consumption since the financial crisis of 2008. Dynan (2012) also documents that U.S. households with higher loan-to-value (LTV) ratio subsequently undergo larger declines in consumption (between 2007 and 2009); Baker (2018) presents that spending by highly indebted households becomes more sensitive to income fluctuations than other households in the U.S.. Mian et al. (2013) document that the drop in consumption after the financial crisis

1) The textbook definition of market power (e.g, Pindyck and Rubinfield [2013], and Goolsbee, Levitt, and Syverson [2016]) is that a firm has the ability to adjust the price over marginal cost.

was greater in areas that had higher LTV prior to the event. Andersen et al. (2014) also find similar evidence of a negative association between pre-crisis loan-to-value ratios and consumption during the financial crisis in Denmark. Our empirical findings are consistent with the above studies: an increase in household debt lowers household consumption. We emphasize the role of markup dynamics here through the transmission mechanism of household debt on consumption.

Additionally, our study is related to literature that investigates the relationship between household debt and markup. Firms have incentives to lower their markup in a market where demand is elastic, and households' indebtedness raises their elasticity of demand. Bellone et al. (2010) show that firms operating in more than one market can charge different prices according to the degree of household demand elasticity, and that they utilize market power to raise their revenue through higher markup when household demand is inelastic, or through lower prices when consumer demand is elastic. Other theoretical works have described the channels through which household indebtedness can induce consumption elasticities to repay interest payments.[2)] Consumer demand with higher indebtedness becomes elastic because indebted consumers need to readjust towards lower levels of debt. Empirically, Baker (2018) documents that elasticity of demand with respect to income becomes higher when households are highly indebted. On the other hand, firms raise markup in response to an increase in the demand of consumers who can relax their liquidity constraints by taking out a loan from a bank. Chiu et al. (2018) represent that high consumption by credit users induces the price level in a new monetarist model. In Wang (2016), firms certainly set different prices as buyers carry less money to trade with inflation. As buyers hold less money, imperfect competitive firms post a higher markup since the buyers' expenditure is not sensitive. Our empirical results are consistent with the positive association between household indebtedness and markup as in Chiu et al. (2018) and Wang (2016). Consumers hold less money in response to positive household debt shock, and then firms raise their markup and expand markup dispersion to gain additional profit.

2. DATA

We build a country-level unbalanced panel data set that includes annual household debt to GDP ratios and aggregate markups for 19 countries from 1980 to 2016.[3)] We summarize the countries and the years covered in Table 1. We describe the key variables measuring household and the

2) Eggertsson and Krumgam (2012) are among those to give theoretical evidence for debt-driven recessions in which some agents are forced to deleverage because of revisions in how much debt it is safe for agents to hold. Guerrieri and Lorenzoni (2017) present that constrained borrower are forced to reduce their indebtedness and unconstrained borrowers lower their consumption to save more as a buffer against future shocks.

3) The BIS dataset on credit to households is available for 34 countries, the country panel markup data of Loecker and Eeckhout (2021) is accessible for 42 countries covering the range from 1980 to 2016. We exclude the countries that have fewer than 19 observations.

Table 1 Summary of Countries

Country	Sample Period	Average Δd^{HH}	Std. dev. Δd^{HH}	Average $\Delta\mu$	Std. dev $\Delta\mu$
Argentina	1994-2016	0.09	0.86	1.53	9.75
Australia	1980-2016	2.37	2.56	1.27	6.07
Austria	1995-2016	0.42	1.15	1.02	6.86
Belgium	1980-2016	0.71	1.23	1.93	4.49
Canada	1980-2016	1.56	2.67	1.40	4.63
Colombia	1996-2016	0.49	1.45	0.81	21.27
Finland	1980-2016	1.06	2.24	1.10	5.85
France	1980-2016	0.96	1.16	1.22	2.95
Germany	1980-2016	0.18	1.86	0.67	2.89
Hong Kong	1990-2016	1.27	2.48	0.80	9.95
Japan	1980-2016	0.36	1.85	0.71	1.64
Korea, Rep.	1980-2016	1.96	2.32	1.85	7.76
New Zealand	1998-2016	2.47	2.55	0.89	9.50
Norway	1980-2016	1.65	3.55	1.71	9.74
Singapore	1991-2016	1.39	2.60	– 0.36	8.12
Thailand	1991-2016	1.78	3.14	0.43	7.89
Turkey	1986-2016	0.57	1.10	– 0.69	11.05
United Kingdom	1980-2016	1.54	2.31	1.62	3.69
United States	1980-2016	0.79	2.58	1.22	2.86

Notes: This table lists the 19 countries in the sample and the years covered in the main regressions. The columns show the average and standard deviations of the changes in household debt to GDP and log markups for each country.

years covered in Table 1. We describe the key variables measuring household debt (d^{HH}) and markups (μ).

The country panel markup data comes from Loecker and Eeckhout (2020).[4] Loecker and Eeckhout (2020) calculate the country-specific markup from the financial statements of over 70,000 firms in 134 countries between 1980 and 2016. Loecker and Eeckhout (2020) use the Worldscope dataset provided by Thomson Reuters. In Worldscope, the individual firms are likely to be large and mainly be publicly traded. According to Loecker et al. (2020), publicly

4) See Loecker and Eeckhout (2021) for more details. From Jan De Loecker's homepage, we find the markup dataset for 36 countries between 1980 and 2016 (https://sites.google.com/site/deloeckerjan/data-and-code).

traded firms account for nearly 40% of output, and Loecker and Eeckhout (2020) adapt Worldscope's financial statement data for all economies in the world.

Table 2 Summary of Statistics

	N	Mean	Median	Std. dev
d^{HH}(%)	456	52.06	53.45	23.73
μ	456	1.30	1.27	0.22
c^{HH}(%)	456	56.23	55.36	7.15
Δy(%)	455	2.99	2.93	3.12

Notes: Δ denotes change in one year. The variables y, d^{HH}, c^{HH}, and μ denote the log real GDP, household debt to GDP, household consumption, and log markup.

The level of household debt is measured with the household debt to GDP ratio, denoted as $d_{it}^{HH} = \frac{D_{it}^{HH}}{Y_{it}}$, where D_{it}^{HH} and Y_{it} are the average debt of households and GDP of country i in year t. Likewise, we denote the change in household debt from year $t-k$ to year t as $\Delta_k d_{it}^{HH}$. Following Mian et al. (2017), the household debt measures, D^{HH}, is defined as the outstanding levels of debt to households from the Bank for International Settlement (BIS) "Long series on total credit to the nonfinancial Sectors" database. The real GDP and household consumption to GDP (%) data come from the World Development Indicators (WDI) dataset in the World Bank. Following Mian et al. (2017), we use annual data in current and constant prices from the WDI on GDP and household consumption.

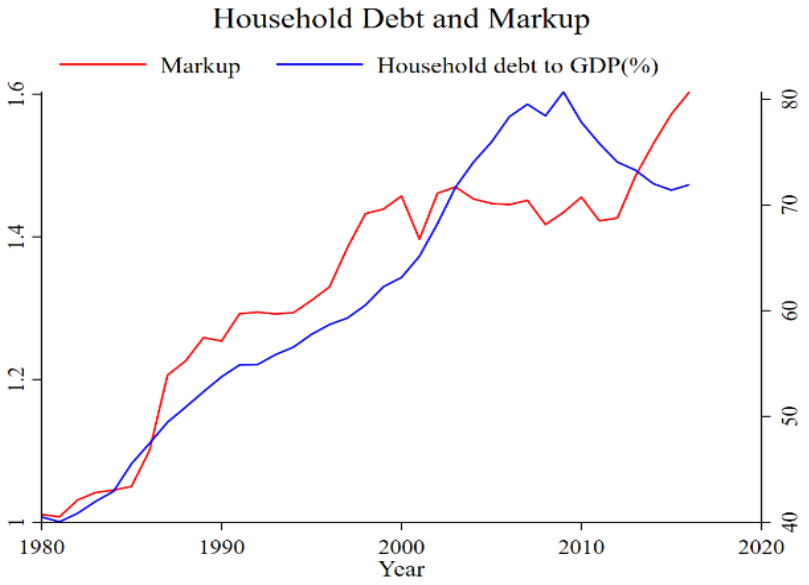
Table 2 shows summary statistics for the change in household debt to GDP (d^{HH}) and markups (μ), household consumption (c^{HH}), and real GDP (y). Table 2 shows that total household debt to GDP, d^{HH} records 52.06% on average. The aggregate markup, household's consumption to GDP, and the growth rate of real GDP are 1.30, 56.23%, and 2.99%, respectively.

Figure 1 illustrates the association between markups and household debt, supporting our main empirical findings. In Panel A of Figure 1, we show the evolution of household debt and markups by using the GDP-weighted of individual country. As shown the Panel A of Figure 1, household debt and markups show an upward trend and there is a positive association between them. Note that household debt decreases after 2009 due to the housing crash of the Great Recession. Similarly, Panel B of Figure 1 shows that the association between household debt and markups is positive.

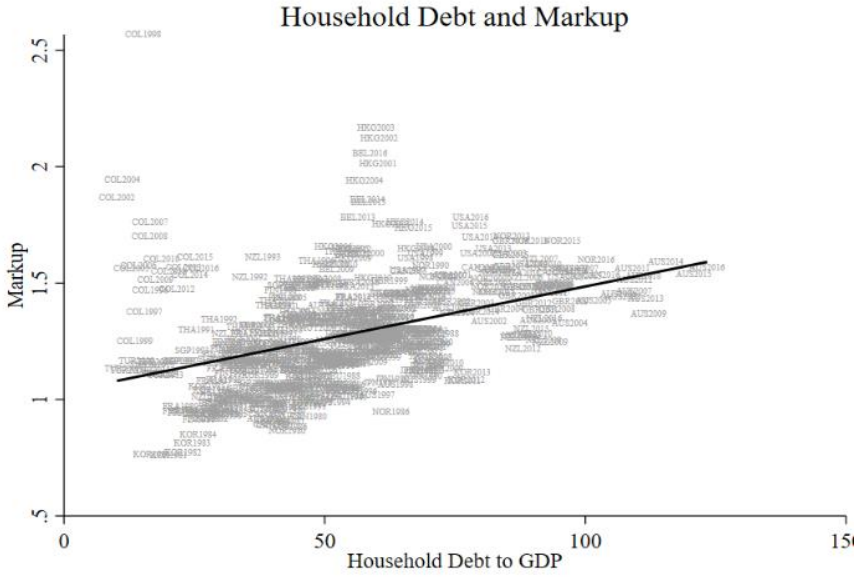
Additionally, we plot the country specific markups and household debt to GDP (%) in Figure 2. As shown the Figure 2, household debt relates positively to the markups in most countries except for Argentina, Columbia, Turkey, and the Netherlands.

Figure 1 Markup and Household Debt Series

(A) Household Debt and Markups Series



(B) Household Debt and Markups Scatter



Notes: Panel A in Figure 1 plots the evolution of markup and household debt to GDP (%). The markup and household debt to GDP are the GDP-weighted average of individual country markups in a given year. Panel B in Figure 1 shows the scatter plot between markup and household debt to GDP (%). Each point refers to year t.

Figure 2 Country Specific Markup

Notes: Each panel plots the evolution of aggregate markup and household debt to GDP(%). The red line stands for the aggregate markup. The blue line refers to household debt to GDP(%).

3. ECONOMETRIC SPECIFICATION

We study the response of aggregate markup, real GDP, and household consumption in response to household debt shock. To assess the effects of household debt shocks, we estimate impulse responses by employing Jordà (2005)'s local projections. Relative to a VAR, impulse responses from Jordà (2005)'s local projections are well suited for assessing the robustness of dynamic relations, as they have been found to be more robust against misspecification, easily allow for the inclusion of control variables, and allow for inference directly on the estimated impulse responses.[5] We estimated based on annual data, including a time trend as in Ramey (2016) and Mian et al. (2017). The local projection includes 4 variables: household debt to GDP ratio, log real GDP, log markup, and household consumption to GDP ratio.

The local projection impulse responses to household debt, real GDP, markups, and household consumption are given by the sequence of coefficients $\{\beta_{HH,j}^{h},\ \beta_{y,i},\ \beta_{\mu,j},\ \beta_{cHH,j}^{h}\}$ estimated from the following specification, for $h = 1, \cdots, 10$:

$$x_{it+h-1} = \alpha^{h} + X_{t-1}\mathrm{T}^{h} + \sum_{j=1}^{p} \beta_{HH,j}^{h}\, d_{it-j}^{HH} + \sum_{j=1}^{p} \beta_{y,j}\ y_{ut-j} + \sum_{j=1}^{p} \beta_{\mu,j}\ \mu_{it-j} + \sum_{j=1}^{p} \beta_{cHH,j}^{h}\, c_{it-j}^{HH} + \epsilon_{it+h-1}^{h}, \quad (1)$$

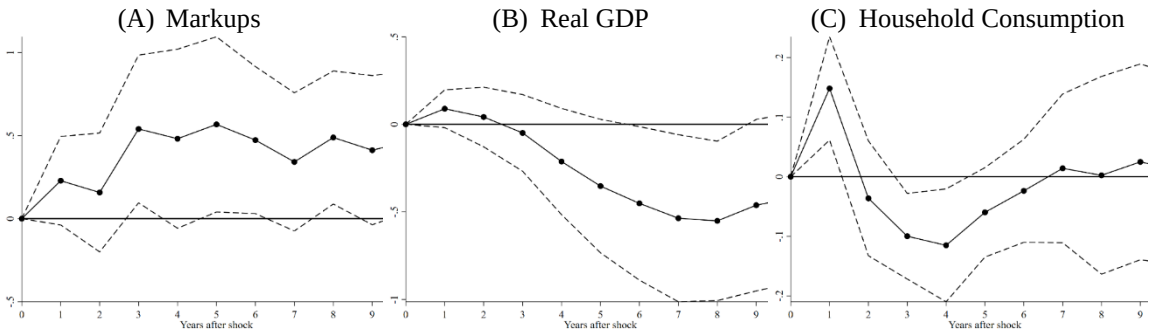
where household debt (d^{HH}) to GDP, x_t is our interest variable: the aggregate markup (μ_t), real GDP (y_t), and household consumption (c^{HH}). Based on the information criterion, we set $p = 2$.

4. EMPIRICAL RESULTS

This section shows the estimated impulse responses of aggregate markup, real GDP, and household consumption in response to household debt to GDP shock by using the country panel data covering the period between 1980 and 2016. Figure 3 represents the responses of aggregate markup, household consumption to GDP, and real GDP in response to 1% of the household debt to GDP shock (d^{HHD}) along with 90% confidence intervals which were computed using standard errors.

5) Nakamura and Steinsson (2018) document that the standard VAR models can be a significantly misspecified specification of the data generating process (DGP). This implies that all state variables in the economy be included in the VAR models to estimate the true VAR. If this is not the case, VAR can be misspecified and it can induce biased results in the impulse responses. On the other hand, Jorda (2005) argues that local projection method is robust against misspecification of the DGP. Because the local projection method imposes fewer restrictions, and this specification is to directly regress the variable of interest on the shock, controlling for some variables determined before the shock occurs.

Figure 3 Local Projection Impulse Responses: The Household Debt Shock



Notes: The figure presents impulse responses from Jordà (2005)'s local projection in levels with time trends. The responses of markup, household consumption, and real GDP to an increase in household debt to GDP of 1 percent are at horizons from 0 to 10 years. The dashed line represents 90% confidence intervals computed using standard errors.

The increase in household debt raises aggregate markup. Panel 1 of Figure 3 presents the response of aggregate markup to positive household debt to GDP shock. The estimate is statistically significant with a 90% confidence level at 3, 5, 6, 9, and 10 years after the household debt shock. Our empirical findings suggest that credit expansion relaxes a household's budget constraints and hence increases their purchasing power, which can affect a firm's market power in imperfectly competitive market environments. A firm adjusts their price in response to the amount of household spending. As borrowers can relax their budget constraints to purchase more goods and services, a firm can utilize its market power to optimally set markup for profit maximization. Therefore, a firm posts a higher markup. This implies that further theoretical and empirical analytical research is needed on the impact of credit services to households on markup.

Our empirical result is consistent with the positive association between household indebtedness and markup as in Chiu et al. (2018) and Wang (2016). Chiu et al. (2018) shows that high consumption driven by credit raises the price level by using a new monetarist model. Wang (2016) also documents that firms set different prices if buyers carry less money to trade with firms. As buyers carry less money to the market, firms post a higher markup. If indebted households hold less money in the market, then firms raise markup to gain an additional profit.

Panel B in Figure 3 shows that the response of GDP decreases in response to an increase of household debt. Initially, the real GDP increases until 2 years after a positive household debt shock, then decreases over time. The reversion is substantial. The estimates are statistically significant from 6 years to 8 years since household debt shock is within a 90% confidence interval. This result is clearly consistent with Mian et al. (2017). By using country panel data, Mian et al. (2017) empirically found that an increase of household debt lowers the growth of GDP in the long run. Many studies show that credit booms can distort resource allocation in such a manner that lowers longer-run output (Charles, Hurst, and Notowidigdo, 2015; Borio et al., 2016;

Gopinath et al., 2017). Cecchetti and Zampoli (2011) also suggest that excess private debt not only constrains the financing capacity to smooth economic cycles, but also causes large swings in asset prices, which tend to trigger recessions when the economy slows down. Sutherland and Hoeller (2012) examined the impact of the debt of different sectors, i.e., government, financial private sector, nonfinancial private sector, and households, on economic stability in OECD economies. They find that private debt is not consistently related to GDP volatility, but household debt is positively associated with consumption volatility. Cecchetti, Mohanty, and Zampolli (2011) examine the separate impact of public, corporate, and household debts on economic growth in OECD economies. They show that corporate and household debts are negatively correlation with per capital GDP growth rates. Park et al. (2018) find that household debt accumulation is associated with higher output growth in the very short run, but lower output growth after 3 years in EME countries.

Panel C in Figure 3 represents the impulse response for household consumption to positive household debt to GDP shock. Initially, household consumption increases statistically significantly in the first year after a positive household debt shock. On the other hand, household consumption decreases from 2 years to 6 years after the event. The estimates are statistically significant at 3 and 4 years since the positive household debt shock. In our empirical investigation, the decrease in consumption is closely related with the positive response of markup dynamics.

Several studies have found a negative relationship between high pre-crisis debt and consumption after the financial crisis of 2008. Mian et al. (2013) show that the drop in spending since the financial crisis was higher in areas that had higher LTV prior to the event. Dynan (2012) shows that U.S. households with higher LTV ratio spend less since the financial crisis. Baker (2018) also shows that consumption by highly indebted consumers was more sensitive to income fluctuations than in other households.

To further investigate the relationship between markup and household consumption, we turn to the estimation of single equation specifications such as the following:

$$\Delta_3 {c^{HH}}_{t+k} = \alpha + \beta_{HHD}\Delta_3 d_{t-1}^{HHD} + \beta_{\mu}\Delta_3\mu_{t-1} + u_{it+k} \text{ for } k = -1, 0, 1, 2, 3, \quad (2)$$

where $\Delta_3 c_{t-1}^{HH}$, $\Delta_3 d_{t-1}^{HHD}$, β_{HHD} and $\Delta_3\mu$ are the change in household consumption, household debt to GDP, and markup, respectively, from four quarters ago to last quarter. We fix the right-hand-side (RHS) variable to be the change in household debt and markup from four years to last year, and we vary three-year household consumption change on the left hand-side (LHS) from being contemporaneous to further into the future. For example, with $k = 4$, β_{HH} represents the effect of a rise in the household debt to GDP ratio from one quarter ago to last year on markup from next quarter to four years into the future.

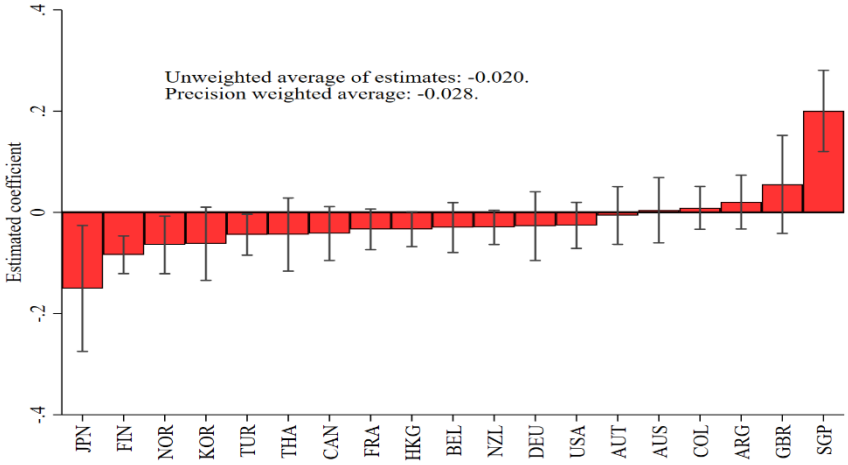
Table 3 Household Consumption, Markup and the Household Debt to GDP Ratio

Dependent Variable: $\Delta_3 c^{HH}{}_{t+k}, k = -1, 0, 1, 2, 3, 4$						
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta_3 d_{t-1}^{HHD}$	0.067* (0.024)	0.028 (0.26)	– 0.002 (0.932)	– 0.008 (0.780)	0.032 (0.237)	0.055 (0.0836)
$\Delta_3 \mu_{t-1}$	– 0.026* (0.038)	– 0.033** (0.005)	– 0.021* (0.049)	– 0.007 (0.616)	– 0.008 (0.619)	– 0.001 (0.993)
R^2	0.047	0.038	0.016	0.002	0.009	0.024
Obs.	533	514	495	476	457	438

Notes: This table presents results from estimating the following specification: $\Delta_3 c^{HH}{}_{t+k} = \alpha + \beta_{\text{HHD}} \Delta_3 d_{t-1}^{\text{HHD}} + \beta_y \Delta_3 y_{t-1} + \beta_\mu \Delta_3 \mu_{t-1} + u_{it+k}$ for $k = 0, 1, 2, 3, 4$. Each column gradually leads the left-hand-side variable by one quarter. R^2 values are reported. The p value in parentheses is dually clustered, and +, *, ** indicate significance at the 0.1, 0.05, 0.01 levels, respectively.

As Table 3 shows, the rise in markup over a three-year period is negatively related to household consumption. The results are statistically within 90% and 95% levels within $t + 1$. In the absence of competition, firms gain market power and set high price over marginal cost. Therefore, higher markups lower demand for consumers, which then results in a decrease of consumption. In Figure 4, we also report coefficients from estimating equation (2) individually for each country. The coefficient on the markups is negative for 13 of the 19 countries in our sample, and none of the country coefficients are significantly positive except for that of Singapore. The cross-country average of the estimates is –0.019 and the precision weighted average is –0.018. All these results support our conclusion: there is a negative relationship between markups and consumption.

Figure 4 Estimates of β_μ for Each Country



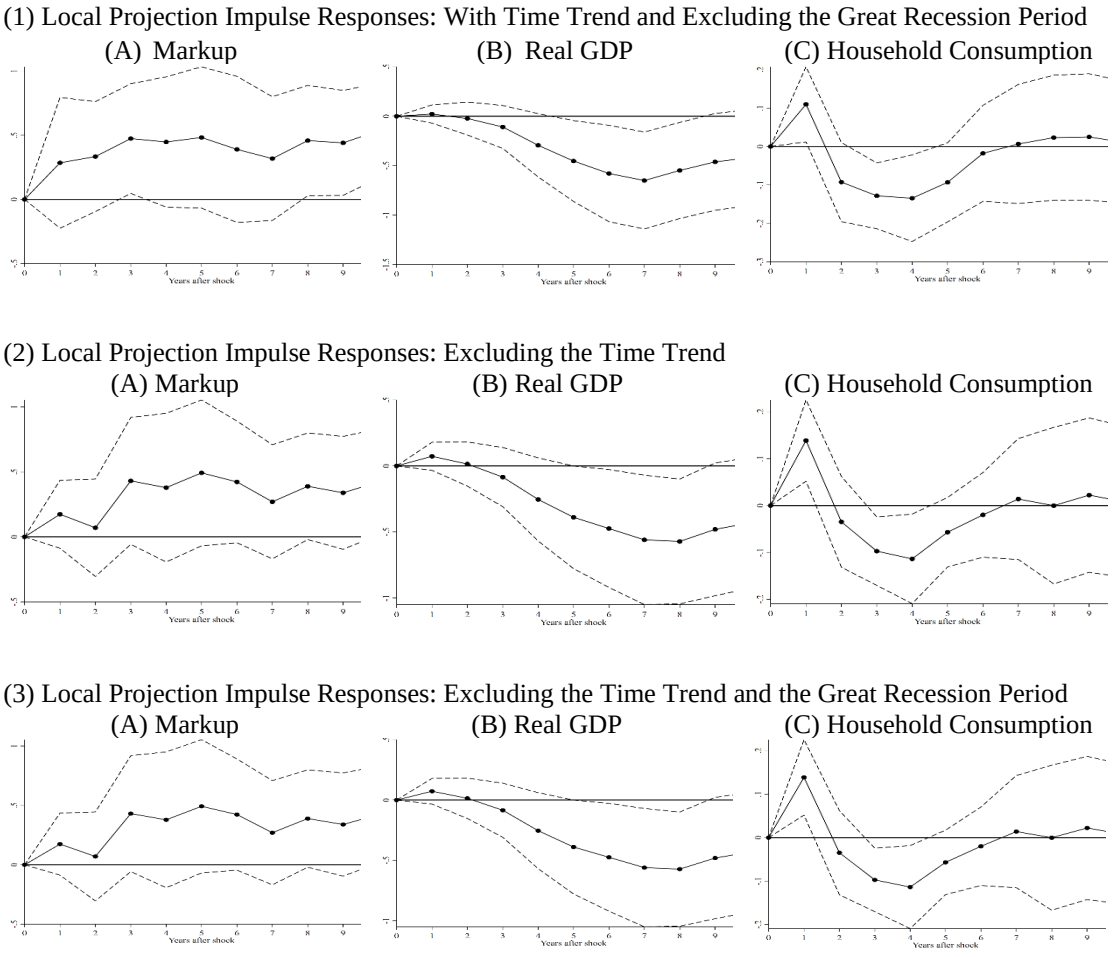
Notes: This figure plots β_μ from the time series regression, $\Delta_3 c^{HH}{}_t = \beta + \beta_\mu \Delta_3 \mu_{it-1} + \sum_{j=1}^{3} \gamma_j \Delta c^{HH}{}_{it} + \epsilon_{it}$, estimated separately for each i in the sample. Bands around the estimates represent 90% confidence intervals. The unweighted average of the estimates stands for the raw average of the coefficients in each country. The precision weighted average refers to the average weighted by the inverse of the squared standard error.

5. ROBUSTNESS

We conduct two robustness tests using Jorda's local projections: (1) exclusion of a time trend and (2) exclusion of the Great Recession. We exclude the period of the Great Recession since it was preceded by an unusual rise in household debt in advanced economies.

Panel (1) estimates the Jorda projections with the Great Recession period. Panels B and C exclude a time trend and exclude the Great Recession period, respectively. Excluding the Great Recession yields estimates similar to our baseline estimation. Excluding the time trend lowers the significance level of markup responses, while maintaining the significance level of real GDP and household consumption. Although the significance level of markup response decreases by excluding the time trend, the direction of responses remains.

Figure 5 Local Projection Impulse Responses



Notes: The figure presents impulse responses from Jordà (2005)'s local projection in levels. The responses of markup, household consumption, and real GDP to an increase in household debt to GDP of 1 percent are at horizons from 0 to 10 years. The dashed line represents 90% confidence intervals computed using standard errors.

We document that some estimates in our robustness test become less significant, and conventional significance levels such as the 90% level are hard to achieve. Nevertheless, the robust pattern of the effects of household debt shocks in these robustness test supports our baseline results.

6. CONCLUSION

This paper investigates the effect of household debt on markup and real GDP by using a local projection. We present that markup dynamics play a contributing role in examining the effect of household debt on real GDP. Our main empirical results are as follows: (1) An increase in household debt is positively related with aggregate markup. (2) Through the positive relationship of markup with household debt, positive household debt shock lowers real GDP because household consumption decreases with a higher markup. Our empirical results imply that the credit to household amplifies the firm's market power. Credit expansion to a household relaxes the household's budget constraints and hence raises a consumer's purchasing power. Firms exploit market power to set a higher price to gain an additional profit from the consumer. Then, the consumption and welfare of households decreases due to higher markup.

With respect to policy implications, our findings favor a macroprudential approach such as lowering the loan-to-value ratio to rein in indebtedness. In the absence of competition, monopolistic firm's lower consumer well-being and the demand for labor, as well as investment by setting high prices. Regarding the positive relationship between markup and credit expansion, managing excessive indebtedness contributes to stabilizing the financial sector and lowers firms' market power, resulting in enhanced social welfare.

APPENDIX

A.1 Single Equation Estimation

In this section, to investigate household debt on markup and real GDP, we try to estimate this relationship by using a single equation:

$$\Delta_3\mu_{t+k} = \alpha + \beta_{HHD}\Delta_3 d_{t-1}^{HHD} + \beta_y\Delta_3 y_{t-1} + u_{it+k} \text{ for } k = -1, 0, 1,$$

where $\Delta_3 c_{t-1}^{HH}$, $\Delta_3 d_{t-1}^{HHD}$ and $\Delta_3\mu$ are the change in household consumption, household debt to GDP, and markups, respectively, from four quarters ago to last quarter. As shown in A.2, the household debt to GDP ratio is positively correlated with markups. This result is similar to the dynamic relationship between household debt and markups in the local projection.

To study the effect of household debt on real GDP, we employ this single equation estimation:

$$\Delta_3 y_{t+k} = \alpha + \beta_{HHD}\Delta_3 d_{t-1}^{HHD} + \beta_\mu \Delta_3 \mu_{t-1} + u_{it+k} \text{ for } k = 0, 1, 2, 3.$$

As shown in A.2, the household debt to GDP ratio is negatively correlated with real GDP. As argued by Mian, Sufi, and Verner (2017), if credit supply shocks are driven by irrationally exuberant expectations of lenders ignoring downside risks, accumulation of debt in high-risk sectors eventually brings about a reversal in investment sentiment and subsequent decline in growth. Cecchetti, Mohanty, and Zampoli (2011) also suggest that excess private debt not only constrains financing capacity to smooth economic cycles, but also causes large swings in asset prices, which tend to trigger recessions when the economy slows down. Sutherland and Hoeller (2012) examine the impact of household debt on economic stability in OECD economies. They find that private debt is not consistently related to GDP volatility, but household debt is positively associated with consumption volatility. Park et al. (2018) find that household debt accumulation is associated with higher output growth in the very short run, but lower output growth after 3 years in EME countries.

Table A.2 Real GDP, Markups, and the Household Debt to GDP Ratio

Dependent Variable: $\Delta_3\mu_{t+k}, k = -1, 0, 1$			
	$\Delta_3\mu_{t-1}$ (1)	$\Delta_3\mu_t$ (2)	$\Delta_3\mu_{t+1}$ (3)
$\Delta_3 y_{t-1}$	0.158 (0.396)	0.0845 (0.650)	0.0463 (0.783)
$\Delta_3 d_{t-1}^{HHD}$	0.356** (0.001)	0.275 (0.123)	0.172 (0.432)
Country Fixed Effect	*yes*	*yes*	*yes*
R^2	0.0367	0.0201	0.00765
Obs	516	498	479

Notes: This table presents results from estimating the following specification: $\Delta_3\mu_{t+k} = \alpha + \beta_{HHD}\Delta_3 d_{t-1}^{HHD} + \beta_y \Delta_3 y_{t-1} + u_{it+k}$ for $k = 0, 1, 2, 3, 4$. Each column gradually leads the left-hand-side variable by one quarter. R^2 values are reported. The p value in parentheses is dually clustered, and *, **, *** indicate significance at the 0.1, 0.05, 0.01 levels, respectively.

Table A.3 Real GDP, Markup, and the Household Debt to GDP Ratio

Dependent Variable: $\Delta_3\mu_{t+k}, k = -1, 0, 1, 2, 3$					
	$\Delta_3\mu_{t-1}$ (1)	$\Delta_3\mu_t$ (2)	$\Delta_3\mu_{t+1}$ (3)	$\Delta_3\mu_{t+2}$ (4)	$\Delta_3\mu_{t+3}$ (5)
$\Delta_3 y_{t-1}$	0.113 (0.147)	-0.02 (0.791)	-0.144 (0.0643)	-0.282** (0.00056)	-0.255** (0.0012)
$\Delta_3 d_{t-1}^{HHD}$	0.0378 (0.406)	0.043 (0.279)	0.0454 (0.188)	-0.0061 (0.905)	-0.0106 (0.83)
Country Fixed Effect	*yes*	*yes*	*yes*	*yes*	*yes*
R^2	0.0209	0.00758	0.0239	0.0757	0.0647
Obs	516	498	480	444	426

Notes: This table presents results from estimating the following specification: $\Delta_3 y_{t+k} = \alpha + \beta_{HHD}\Delta_3 d_{t-1}^{HHD} + \beta_\mu \Delta_3 \mu_{t-1} + u_{it+k}$ for $k = 0, 1, 2, 3, 4$. Each column gradually leads the left-hand-side variable by one quarter. R^2 values are reported. The p value in parentheses is dually clustered, and *, **, *** indicate significance at the 0.1, 0.05, 0.01 levels, respectively.

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