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HOUSEHOLD CONSUMPTION AND INDEBTEDNESS: ARE THERE DISPARITIES BETWEEN GENDERS, RURAL–URBAN AREAS, AND AMONG INCOME GROUPS?

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ABSTRACT. Recently, household debt has been steadily increasing across the globe. Household consumption is an essential factor in household debt, along with households' characteristics, such as their location, the gender of the household head, and their income group. Therefore, this research investigates the disparities in the impacts of households' characteristics on their indebtedness and consumption. The study utilizes the Household Expenditure and Income Survey conducted in 2019 by the Department of Statistics of Malaysia, which included a simple random sample of 4,730 households. A simultaneous equations model is the employed method of analysis, and the results reveal that the gender of the household head, residential areas, and income groups have differential effects on household consumption and indebtedness through predetermined variables. Specifically, results show that indebtedness has a negative effect on household consumption for the middle-income group (M40); savings are negatively associated with consumption for households living in rural areas and the M40 group. Furthermore, income is positively associated with consumption for rural households and when the household head is female. Finally, household size also has a positive effect on consumption.

JEL Classification: D12, E21, G51

Keywords: household indebtedness, household consumption, simultaneous equation model, household characteristics, microdata.

Introduction

Households are the backbone of the economy because they are essentially the drivers of domestic consumption. Hence, their financial soundness is essential for the country‘s financial stability (Mulkiaman & Mohammed, 2016). However, Malaysia has been experiencing a consistent annual increase in household debt, which makes it one of the countries with significant global exposure to household indebtedness. In its Financial Stability Review 2019, the Central Bank of Malaysia (2020) recorded that the ratio of overall household debt-to-GDP increased to 82.7 per cent by the end of 2019. It also documented that the household debt level in 2019 was 0.7 per cent higher than the 2018 level of 82 per cent. The household debt increased by 5.3 per cent, outpacing the nominal GDP growth of 4.4 per cent. Though household consumption is a vital source of economic growth, if the increase in consumption is primarily financed by household borrowing, households' failure to meet their financial obligations could hamper long-term growth (Khan et al., 2016).

Loans can help households smooth their consumption over their lifetime but consumption may be distorted when the level of household debt is too high (Lombardi et al., 2017). In Malaysia, commercial banks use the debt service ratio (DSR) to determine whether clients can afford the loan amount they have applied for. For example, this formula helps banks estimate how much borrowers can pay in monthly installments for a home loan. Banks can assess whether borrowers can afford a personal or household loan based on their monthly net income. Therefore, the DSR indicates the risk of household debt as changes in the cost of servicing household debt relative to income. Dafermos et al. (2018) stated that a higher DSR would harm the economy and the financial system. An increase in the DSR also makes households more vulnerable to negative income or interest rate shocks that further destabilize household balance sheets and negatively affect financial institutions as well as the financial system.

Based on the experiences of some countries during the global financial crisis, the risk of a financial crisis and economic instability significantly increases as household debt levels rise. From one perspective, rising household debt levels lead to an expansion of consumption, helping to stimulate the economy. Additionally, increased competition among lenders leads to an expansion of credit because lower borrowing costs result in easier access to credit facilities, leading to higher consumption (Prinsloo, 2002). However, the increase in household debt means that consumption may be more sensitive to changes, as seen in micro-based studies on household characteristics such as income groups, gender of the household head, rural and urban locations, and expectations, among others.

The influence of indebtedness on consumption may vary depending on consumer expenditure type and household characteristics (Kim & Hwang, 2016). In other words, highly indebted households may be more vulnerable in terms of consumer spending compared to low-indebted or non-indebted households, and the adjustment in consumer spending for debtors in high-income groups (T20) is more significant than in low-income groups (B40). Household characteristics such as household size, education of the household head, and location are significant factors contributing to consumer spending in Malaysia, with household size being particularly significant. Consequently, this indirectly leads to different impacts on household debt (Ayyash & Sek, 2020). Additionally, household income is essential for understanding consumption behavior when controlling for absolute income levels and other household characteristics (Albayrak, 2020).

Given the extensively discussed impact of household debt on the economy, there is a critical need for microeconomic evidence on the behavior of indebted households. While some theoretical studies have relied on the amplifying effect of household debt to explain recent

macroeconomic developments, only few researchers have used microdata to examine how household characteristics affect indebtedness and consumption. Previous studies have been limited in their exploration of household characteristics. Most studies have only established models based on macro data without considering household characteristics. Household characteristics play a vital role in explaining the effects of consumption and indebtedness, an issue that has received less attention in the academic literature than it deserves. Micro-level information based on household characteristics is crucial for detecting any vulnerabilities caused by the rapid growth of household indebtedness and consumption.

Therefore, the aim of this study is to verify whether household characteristics (income group, gender of the household head, and location) moderate the effect of the debt service ratio, size, income, and savings on consumption, as well as the effect of total debt repayment installments, household consumption, income, and assets on indebtedness. The findings of this study contribute to a more nuanced understanding of the seriousness of rising household indebtedness and consumption levels in Malaysia, thus addressing some research gaps in this area. Using a large household dataset, this study employs simultaneous equation models to address potential endogeneity and incorporate households' characteristics in the empirical analysis. We contribute to the existing literature by providing evidence that, first, indebtedness has a negative effect on household consumption for the middle-income group (M40). Second, savings are negatively associated with consumption for households living in rural areas and the M40 group. Furthermore, income is positively associated with consumption for rural households and when the household head is female. Finally, we also found that household size has a positive effect on consumption.

The remainder of the discussion in this study is organized as follows. Section 1 provides a brief overview of the existing theoretical literature and empirical studies on household characteristics, indebtedness, and consumption. Section 2 describes the investigation process, the data used in the empirical analysis, and the model specifications. Section 3 discusses the empirical results generated to address the research questions outlined in this study. Finally, Section 4 concludes the study, offering recommendations and suggestions for future research.

1. Literature review

Household debt in the Malaysian economy has experienced a sharp rise over the past decade. Following the global financial crisis in 2008, which caused a recession in almost all economies due to the subprime crisis in the U.S., household debt in Malaysia continued to increase significantly, reaching levels comparable to those in the U.S. and other developed countries (OECD, 2015).

Households facing credit constraints or having limited savings may encounter challenges in maintaining stable consumption patterns when their income fluctuates. Thus, indebtedness can affect the response of consumption to income changes (Baker & Yannelis, 2017; Le Blanc & Lydon, 2020). Household indebtedness, particularly for those with high leverage ratios, becomes more vulnerable when housing equity is used as a potential borrowing source (de Roiste et al., 2021; Zhu et al., 2019). Additionally, fluctuations in wealth can also influence consumption smoothing. Wealth and income are critical factors affecting household debt, and their impact is generally negative. A study conducted by Mian, Straub, and Sufi (2020) employs survey data from the United States to illustrate this phenomenon. The findings revealed that individuals with lower wealth continuously borrow from those with higher wealth, leading to an increase in household debt among the former group.

Furthermore, Kovacs et al. (2018) examined the correlation between mortgage leverage and consumption during the 2008 financial crisis. They used a synthetic panel created from

various household Expenditure Survey and Wealth and Asset Survey data to investigate how debt interacts with income shocks. The findings indicate that households with high levels of mortgage leverage experienced a greater reduction in consumer spending during the financial crisis, with young households driving this effect. More recently, Fasianos and Lydon (2022) explored the relationship between the debt position of UK households and their response to changes in income and wealth regarding nondurable consumption. They developed a unique measure of nondurable consumption that allowed them to track individual households over an extended period from 1993 to 2017. The results indicate that households with debt made more significant adjustments in consumption in response to income decreases compared to income increases.

Previous studies have examined the relationship between household indebtedness and consumption, but they have provided mixed findings (Aziz, 2010; Cecchetti et al., 2011; Floden, 2014; Brown et al., 2012; Andersen et al., 2016). For example, Aziz (2010) used an autoregressive distributed lag (ARDL) model to test the nexus between household debt, consumption, and housing prices in Malaysia. They document a positive relationship between household consumption, house prices, and household debt. However, Andersen et al. (2016) reported a strong negative relationship between pre-crisis leverage and changes in non-residential consumption, depending on a range of other household characteristics in Denmark. More recently, Du Caju (2023) investigated this issue using the Belgian Household Finance and Consumption Survey dataset and reported a negative impact of household debt on consumption, even when there were no adverse effects on their assets. Their results imply that households tend to decrease their consumption not necessarily due to the overall sustainability of their debt but rather due to the daily manageability of their debt.

Furthermore, Tunc & Kilinc (2023) examined the effect of the household debt service burden on economic growth for a group of advanced countries in the short and medium run and documented adverse effects of the debt service burden on both unemployment and household consumption. When faced with an increase in the debt service burden, households must make adjustments in other aspects to align with their budget limitations. The findings suggest a significant reduction in consumption levels among households, leading to adverse consequences for economic output and employment.

Kusairi et al. (2019) explored the correlation between the labor market, household debt, and various economic indicators in Asia Pacific countries using macro panel data spanning the period from 1994 to 2016. In contrast to previous studies, the results of dynamic heterogeneous panel data analysis showed a long-term positive association between household debt and factors such as household consumption, housing price index, and the labor force. Additionally, they observed that public debt impacts private consumption in the short run, with no significant variation across countries.

From a household characteristics perspective, Karbkhao and Sapwarobol (2018) found that factors such as marital status, real estate and car ownership rates, and household income increased household debt. On the other hand, the age of the household and education were found to reduce debt. However, their study only covered the period before and after the government's first auto policy and did not take into account other economic factors.

In a study examining consumption patterns of male and female-headed households in Pakistan, Khan and Khalid (2012) found that the average monthly consumption for female-headed households was lower than that of male-headed households. Additionally, male-headed households generally had more debt than female-headed households.

Son and Choi (2015) utilized data from the Korea Labor and Income Panel Study (KLIPS) household-level survey spanning from 2000 to 2014 to investigate long-term household-level consumption behaviors across business cycles and macroeconomic shocks.

Their estimation for consumption levels based on sub-income groups revealed that the impact of the debt service ratio on consumption was more significant among higher-income groups, demonstrating nonlinear effects. Conversely, the estimated threshold ratio for households to start restricting their consumption was smaller in the low-income group. Similarly, Baker (2015) used high-frequency financial data to match 15,000 households' data and test whether household leverage had varying influences on the income and consumption of their employers from 2008 to 2013. The study found that highly leveraged households adjusted their expenditure much more than those with less leverage when faced with the same income shock.

Drawing on the dataset of the Household, Income and Labour Dynamics in Australia (HILDA) from 2001 to 2015, La Cava and Price (2017) demonstrated that debt levels were high and debt servicing was low relative to income and assets, leading to reduced growth of household spending relative to income. They also found that households with high debt levels were more sensitive to changes in income and home equity compared to households with low debt levels. Furthermore, a high level of debt was found to decrease household consumption and increase the likelihood of households facing borrowing restrictions or greater uncertainty during adverse shocks. Price et al. (2019), using panel data, examined the relationship between owner-occupied consumption and mortgage debt. Consistent with previous studies, they found that households typically reduced their spending when the level of outstanding mortgage debt was high, which is referred to as the debt overhang effect.

In a study conducted by Nakajima (2020) on a sample of Japanese households, the role of household debt heterogeneity on consumption was investigated. The findings revealed that the impact of debt burdens on consumption behavior differs significantly between pre-retirement middle-aged households and younger households. These distinctions are in line with the understanding that housing debt plays a crucial role in shaping consumption patterns. In the early stages of life, housing ownership is relatively uncommon among Japanese households, and their primary form of debt tends to be credit card loans. However, for middle-aged households ranging from their late 30s to early 60s, it is common for them to purchase houses and assume substantial debt burdens. This accumulation of debt appears to increase the sensitivity of their saving behavior to fluctuations in income.

2. Research methods and materials

2.1. Source of data and sample

This study utilizes secondary data from a survey conducted by the Department of Statistics Malaysia (DOSM) in 2019, which involved 4,730 Malaysian households. The sample for this study was selected using the simple random sampling (SRS) method and is based on the Household Expenditure and Income Survey 2019 in Malaysia. The following variables are used in this study: i) household consumption (the sum of household consumption expenditure and non-consumption expenditure (ringgit Malaysia (RM))); ii) household income (household income minus household income tax (RM)) and household savings (household income minus consumption of goods and services (RM)); iii) total debt repayment instalments (liabilities payable in the future, which include loans for the purchasing of real estate and financing consumption, such as car and household loans (RM)); iv) household size (the number of private households (persons)); v) assets (all new or used goods, such as vehicles (units)); vi) the debt service ratio (the total monthly commitment divided by the total gross income (ratio)); and vii) a set of household characteristics variables consisting primarily of household demographic information, collected through the surveys.

2.2. Method of analysis

The main objective of this research is to examine the potential disparities and moderating effects of household characteristics, specifically income groups, gender of the household head, and location, on various factors such as the debt service ratio, size, income, and savings concerning consumption. Additionally, the study aims to investigate the effect of total debt repayment instalments, household consumption, income, and assets on household indebtedness.

To achieve these objectives, the analysis of data in this study is conducted using the simultaneous equations model (SEM). The SEM allows for the examination of relationships among multiple variables and takes into account the interdependencies and potential endogeneity between them.

2.2.1. Simultaneous equation model

A simultaneous equations model (SEM) is a system of equations that express the relationships between a group of variables or describe their joint dependence. This model consists of multiple equations, with some variables being mutually or co-dependently related. The inclusion of household characteristics, such as income group, gender of the household head, and location, in this study is important because these factors play a crucial role in explaining the effects of consumption and indebtedness. Therefore, the equation below illustrates the use of the two-stage least squares (2SLS) method to address the simultaneous equations and their structural model and reduced form.

The structural equation shows the direct relationship between the variables. Two methods demonstrate the structural model of this study: i) the household consumption equation (HC) and ii) the debt service ratio equation (DSR). The endogenous variables are the HC and DSR, while the exogenous variables are the household income (Y) and household characteristics (HCH). In addition, the instrumental variables in the HC equation are liquid financial assets (LFA) and household size (SIZE), while the instrumental variables in the DSR equation are the total debt repayment instalments (TINS) and assets (AS). Both endogenous and instrumental variables are independent variables in the given equation. The formulas are presented as follows:

$$HC_i = \beta_0 + \beta_1 DSR_i + \beta_2 Y_i + \beta_3 LFA_i + \beta_4 SIZE_i + \beta_j \sum_{j=1}^{3} HCH_{ij} + \varepsilon_{1i} \quad (1)$$

$$DSR_i = \alpha_0 + \alpha_1 HC_i + \alpha_2 Y_i + \alpha_3 TINS_i + \alpha_4 AS_i + \alpha_j \sum_{j=1}^{3} HCH_{ij} + \varepsilon_{2i} \quad (2)$$

We extend the base equations (1) and (2) with interaction terms between the above explanatory variables and a set of household characteristics (HCH) dummy variables in this study. We predict that explanatory variables such as Y, LFA, SIZE, TINS, and AS will affect the dependent variable differently through different characteristics of the households. We also predict that household characteristics moderate the effect of Y, LFA, SIZE, TINS, and AS on the household consumption and debt service ratio. However, the gender of the household head and location moderate the effect of Y on the household consumption and debt service ratio, which does not include income groups. Therefore, the various interactions between the explanatory variables and the dummy variables are as below:

$$HC_i = \beta_0 + \beta_1 DSR_i + \beta_2 Y_i + \beta_3 LFA_i + \beta_4 SIZE_i + (\beta_z \sum_{z=1}^{n} HCH_{iz} \times DSR_i) + (\beta_k \sum_{k=1}^{n} HCH_{ik} \times Y_i) + (\beta_l \sum_{l=1}^{n} HCH_{il} \times LFA_i) + (\beta_m \sum_{m=1}^{n} HCH_{im} \times SIZE_i) + \varepsilon_{1i} \quad (3)$$

$$DSR_i = \alpha_0 + \alpha_1 HC_i + \alpha_2 Y_i + \alpha_3 TINS_i + \alpha_4 AS_i + (\alpha_z \sum_{z=1}^{n} HCH_{iz} \times HC_i) + (\alpha_k \sum_{k=1}^{n} HCH_{ik} \times Y_i) + (\alpha_l \sum_{l=1}^{n} HCH_{il} \times TINS_i) + (\alpha_m \sum_{m=1}^{n} HCH_{im} \times AS_i) + \varepsilon_{2i} \quad (4)$$

It is necessary to transform the variables in equations (3) and (4) into the natural-log form to make equations (5) and (6) estimable. In this study, we apply natural logarithms to the data distribution because some values are too large in some periods and too small in others and moreover, the data are measured in different units. This practice is in line with, among others, Apergis (2019) who studied the role of the debt service ratio as a leading indicator of household consumption by modifying the consumption equation so that income changes interact with a variable using the household consumption and debt service ratio. Therefore, we apply natural logarithms to all the variables, and the estimable form of the equation in this study is modelled as follows:

$$InHC_i = \beta_0 + \beta_1 InDSR_i + \beta_2 InY_i + \beta_3 InLFA_i + \beta_4 InSIZE_i + (\beta_z \sum_{z=1}^{n} HCH_{iz} \times InDSR_i) + (\beta_k \sum_{k=1}^{n} HCH_{ik} \times InY_i) + (\beta_l \sum_{l=1}^{n} HCH_{il} \times InLFA_i) + (\beta_m \sum_{m=1}^{n} HCH_{im} \times InSIZE_i) + \varepsilon_{1i} \quad (5)$$

$$InDSR_i = \alpha_0 + \alpha_1 InHC_i + \alpha_2 InY_i + \alpha_3 InTINS_i + \alpha_4 InAS_i + (\alpha_z \sum_{z=1}^{n} HCH_{iz} \times InHC_i) + (\alpha_k \sum_{k=1}^{n} HCH_{ik} \times InY_i) + (\alpha_l \sum_{l=1}^{n} HCH_{il} \times InTINS_i) + (\alpha_m \sum_{m=1}^{n} HCH_{im} \times InAS_i) + \varepsilon_{2i} \quad (6)$$

where all the variables are stated in the natural log form, and $\sum_{z=1}^{n} HCH_{iz}$, $\sum_{k=1}^{n} HCH_{ik}$, $\sum_{l=1}^{n} HCH_{il}$, $\sum_{m=1}^{n} HCH_{im}$ are a set of dummy variables representing the household characteristics, namely, income groups (i.e., B40, M40, T20), the gender of the household head, and the location (rural and urban). β and α are the parameters to be estimated, and the error terms ε_{1i} and ε_{2i} are assumed to have a normal distribution.

2.2.2. Reduced-form model

The reduced-form model expresses the endogenous variables only as a function of the exogenous variables. In other words, the endogenous variables appear on the left-hand side of the equation and exogenous variables appear on the right-hand side. Then, the model becomes:

$$lnHC_i = \pi_{10} + \pi_{11} lnLFA_i + \pi_{12} lnTINS_i + \pi_{13} lnSIZE_i + \pi_{14} lnAS_i + \pi_{15} lnY_i + \beta_j \sum_{j=1}^{3} HCH_{ij} + \mu_{1i} \quad (7)$$

$$lnDSR_i = \pi_{20} + \pi_{21} lnLFA_i + \pi_{22} lnTINS_i + \pi_{23} lnSIZE_i + \pi_{24} lnAS_i + \pi_{25} lnY_i + \alpha_j \sum_{j=1}^{3} HCH_{ij} + \mu_{2i} \quad (8)$$

3. Results and discussion

3.1. Empirical results

Table 1 shows that the interaction terms between household income, savings, size, total debt repayment instalments, assets, and household characteristics affect households' consumption and debt service ratio differently. Models 1 and 2 show the two-stage least square (2SLS) for the household consumption and debt service ratio equations.

Model 1 demonstrates different effects of the gender of the household head and location on consumption. However, the household income group does not have a statistically significant impact on households. Regarding the gender of the household head, female household heads have a smaller effect on consumption (0.075 per household, with a range of 0.185–0.110) compared to male household heads. Additionally, households living in rural areas have a larger impact on consumption (0.315 per household, obtained by adding 0.185 and 0.130) than households living in urban areas. In model 2, the influence of location on the debt service ratio is negatively significant at the 10 percent level. The result suggests that living in rural areas has a lesser adverse effect on the debt service ratio (-0.112, obtained by subtracting -0.151 and 0.039) compared to living in urban areas. Middle-income (M40) also has a statistically significant negative effect on the debt service ratio at the 1 percent level. This finding indicates that M40 has a stronger adverse impact on the debt service ratio (-0.356, obtained by subtracting -0.151 and -0.205) per household compared to upper-income (T20).

Regarding the interactions between predetermined and household characteristics dummy variables, results of model 1 indicates that the gender of the household head, location, and lower-income (B40) do not moderate the relationship between debt service ratios and household consumption as they are not statistically significant. The gender of the household head also does not show a statistically significant moderating effect on the relationship between household savings and household consumption. Similarly, the gender of the household head, location, and M40 do not have a moderating effect on the relationship between household size and household consumption as they are not statistically significant.

Table 1. Regression results of household consumption and debt service ratio models

VARIABLES	Model 1 (2SLS)		Model 2 (2SLS)	
	Coefficients	SD	Coefficients	SD's
LHC			-0.068***	(0.023)
LDSR	-0.054***	(0.008)		
LY	1.105***	(0.017)	-0.854***	(0.019)
LLFA	-0.262***	(0.007)		
LSIZE	0.006***	(0.002)		
LAS			0.012*	(0.007)
LTINS			0.931***	(0.004)
GENDER	-0.110**	(0.049)	0.021	(0.027)
LOCATION	0.130***	(0.038)	0.039*	(0.022)
B40	-0.105	(0.081)	-0.050	(0.046)
M40	0.068	(0.079)	-0.205***	(0.045)
GDSR	-0.001	(0.008)		
LCDSR	-0.003	(0.006)		
B4DSR	0.003	(0.009)		
M4DSR	-0.029***	(0.008)		
GY	0.039**	(0.017)	-0.003	(0.016)
LCY	-0.027**	(0.014)	-0.016	(0.013)
GLFA	-0.012	(0.009)		
LCLFA	-0.018***	(0.007)		
B4LFA	0.089***	(0.009)		
M4LFA	0.061***	(0.008)		
GS	0.001	(0.002)		
LCS	0.002	(0.002)		
B4S	-0.004*	(0.002)		
M4S	-0.001	(0.002)		
GHC			-0.010	(0.016)
LCHC			-0.002	(0.013)
B4HC			-0.022	(0.023)

M4HC			-0.031	(0.022)
GTINS			0.009**	(0.004)
LCTINS			0.011***	(0.003)
B4TINS			0.021***	(0.004)
M4TINS			0.011***	(0.004)
GAS			-0.006	(0.009)
LCAS			0.012*	(0.007)
B4AS			-0.015	(0.010)
M4AS			-0.008	(0.008)
Constant	0.185***	(0.061)	-0.151***	(0.037)
Overidentification test	0.1160		0.1052	
Observations	4,730		4,730	

Note:
Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Model 1: (DV - LHC), Two-Stage Least Square (2SLS)
Model 2: (DV - LDSR), Two-Stage Least Square (2SLS)

In contrast, M40 and T20 moderate the relationship between the debt service ratio and the household consumption at the 1 per cent level of significance. Regarding the interaction term between the debt service ratio and M40, we observe that the negative effect of the debt service ratio on household consumption amplifies, with further reduction of 0.083 percent per household (-0.054-0.029). Besides, the gender of the household head and location moderate the relationship between household income and household consumption at the 5 percent level of significance. The interaction between household income and the gender of the household head shows an additional effect of gender, whereby a female head of the household is associated with an increase in consumption by 1.144 percent per household (1.105+0.039). Furthermore, while household income and location positively influence household consumption, the economic effect of the interaction between both variables is lower for rural households, with a decrease in consumption by 0.103 percent (0.130-0.027).

We also find that location and income groups moderate the relationship between household savings and household consumption, and this result is significant at the 1 percent level. The interaction term between location and household savings, however, has a negative impact on consumption for rural households, with a decrease of 0.280 percent per household (-0.262-0.018). Moreover, the interaction between household savings and income groups shows that the influence of the income group is reduced, with B40 and M40 being associated with a decrease in consumption by 0.173 (-0.262+0.089) and 0.201 (-0.262+0.061) percent, respectively.

Additionally, B40 and T20 moderate the relationship between household size and household consumption at the 10 per cent level of significance. The interaction term between household size and B40 has a negligible positive effect on household consumption, which is an increase of 0.002 percent (0.006-0.004).

Next, we find that the gender of the household head, location, and income groups significantly moderates the relationship between total debt repayment instalments and the debt service ratio. The interaction term between total debt repayment and a female headed household show that the magnitude of the positive impact of total debt repayment on the debt service ratio increases significantly by 0.940 percent (0.931+0.009). Moreover, the positive effect of total debt repayment on the debt service ratio is 0.942 percent (0.931+0.011) larger for households living in rural areas, compared to those urban households. Besides, there is moderating effect of income groups on the relationship between total debt repayment and debt service ratio, whereby a 1 percent increase in debt repayment by B40 and M40 are associated with an increase

of 0.952 percent (0.931+0.021) and 0.942 percent (0.931+0.011) debt service ratio, respectively.

Additionally, location moderates the relationship between household assets and the debt service ratio. Regarding the interaction term between household assets and location, the positive impact of household assets on the debt service ratio among rural households is stronger, with an increase of 0.024 percent (0.012+0.012), than urban households.

As model 2 shows, we do not find that the gender of the household head and location moderate the relationship between households' income and their debt service ratio. Similar results are obtained in regard to our test of the moderating effect of the gender of the household head, location, and income group on the relationship between household consumption and the debt service ratio.

3.2. Discussion

Based on **Table 1**, the gender of the household head and location moderate the relationship between household income and household consumption. The interaction between household income and the gender of the household head shows an additional effect of a female headed household on household consumption. In addition, the interaction between household income and household location shows that household income results in lower household consumption in rural areas than in urban areas. According to the HIS and HES published by the Department of Statistics Malaysia (2020), household consumption was 1.6 times higher in urban areas than in rural areas in 2019. Besides, the mean household income in urban areas stood at RM8,635, which is 1.7 times higher than that in rural areas, RM5,004. Therefore, households living in urban areas are willing to spend more than households in rural areas because of their higher income level.

We find that location moderates the relationship between household savings and household consumption. Specifically, the negative impact of household savings on household consumption is greater in rural areas than in urban areas. Our result in this respect is consistent with Hua and Erreygers (2019) who analysed the determinants of Vietnamese households' saving behaviour and explored the possible heterogeneity of household saving propensities.

Income groups also moderate the relationship between household savings and household consumption. The interaction between household savings and income groups shows that the negative influence of household savings on consumption is reduced, with B40 having a smaller adverse effect than M40. A related study by Hamid et al. (2019) documents that B40 households exhibited significantly lower savings in both relative and absolute terms when compared to M40 and T20 households. In other words, when households in the M40 group save more, their consumption tends to decrease more compared to households in the B40 group. Therefore, household savings have a more significant negative influence on household consumption among the M40 income group compared to the B40 income group.

Additionally, we find that the positive effect of household size on household consumption is smaller for B40 and M40 income groups than for T20 group. This confirms the differential effect of income groups on the relationship between household size and consumption. Davis (2015) reports similar findings to ours. One plausible explanation is that household has constructed the list of goods and services on the basis of a consensus that reflects their needs.

Our analysis on the moderating effect of household characteristics on the determinants of household indebtedness also offers results that are consistent with predictions. First, we find that the gender of the household head moderates the relationship between the total debt repayment and the debt service ratio. In particular, the positive impact of the total debt

repayment on the debt service ratio is greater for female headed household than that for households with a male head. Melanie (2018) explored whether female headed households encounter more significant debt growth than male headed households during the pre-crisis credit expansion, and whether this debt endured beyond the crisis. The findings indicate that, during the credit expansion, female-headed households were primarily responsible for the substantial growth in mortgage debt among lower-income households. Prior to the crisis, younger female household heads demonstrated a greater increase in average educational debt compared to young male household heads. In contrast, Flores and Vieira (2014) found that women are less likely to be in debt than men.

Furthermore, location moderates the relationship between the total debt repayment instalments and the debt service ratio. In particular, the positive impact of the total debt repayment on the debt service ratio is greater in rural than in urban areas. Our finding in this regard is consistent with that reported in the 77th National Sample Survey (NSSO) (2019), where rural households have a higher percentage (35%) of indebted households or cash loan outstanding compared to urban households (22%). The analysis further highlights that rural households had the highest share of debt from informal credit sources (64.2%), surpassing the share from formal credit sources (35.8%). These observations suggest that rural households rely more on informal credit sources for their financial needs compared to formal credit sources.

Location also moderates the relationship between household assets and the debt service ratio. We show that the impact of household assets on the debt service ratio is greater for rural households than urban households. One reason is that house prices in urban areas are exorbitant compared to those in rural areas. Households living in urban areas are primarily renting and not willing to purchase houses. In contrast, house prices are lower in rural areas than in urban areas, and therefore households are more willing to own a a house.

Finally, we find that income groups moderate the relationship between total debt repayment instalments and the debt service ratio. The positive impact of total debt repayment on the debt service ratio is greater among B40 households than M40 and T20 groups. According to the Malaysian Statistics Department (2020), the B40 group allocated 25.6 per cent of their expenditure to housing loans. For M40 and T20, their expenditure in this component is only accounted for 22.8 per cent and 22.2 per cent, respectively. This indicates that the B40 and M40 groups have higher total debt repayment instalments than T20 households. Consistently, we observe that the negative effect of the debt service ratio on M40's household consumption is greater than that of T20 households.

4. Conclusions and recommendation

This paper investigates the disparities in the impacts of households' characteristics on indebtedness and consumption using microdata from Malaysia. The findings reveal that households' characteristics, including the gender of the household head, areas of residence, and income groups, play a moderating role and exhibit disparities in their effects on consumption and indebtedness. Specifically, the relationship between indebtedness and consumption varies between the M40 and T20 income groups. Additionally, the impact of savings on consumption differs across rural, urban, and income groups. The influence of income on consumption is moderated by the gender of the household head and rural and urban areas.

Furthermore, the impact of household size on consumption differs between the low-income group (B40) and T20. The study also highlights that the relationship between consumption and indebtedness differs between the M40 and T20 groups. Additionally, the relationship between total debt repayments and indebtedness varies across locations, income

groups, and between genders of household heads. Lastly, the relationship between assets and indebtedness exhibits variations between rural and urban areas.

This study contributes to the empirical literature by providing a microeconomic perspective on the consumption and indebtedness model while considering household characteristics. The simultaneous equation model estimations using household microdata support the link between household consumption and indebtedness. Future research could explore further disparities in the impacts of households' characteristics on indebtedness and consumption by considering additional factors such as age groups, education levels, and occupational status. The main limitation of this study lies in the availability of data in term of data period and limited demographic information on household characteristics. With a longer data period and incorporating more comprehensive demographic information, future research would be able provide deeper insights into the impact of household characteristics on indebtedness and consumption.

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