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Financial Vulnerability of Working Adults in Malaysia

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ABSTRACT

Given the high and rising household debt in Malaysia, the objective of this paper is to ascertain the characteristics of a financially vulnerable individual. Financial vulnerability is measured based on two indicators: the debt-to-income ratio and the level of emergency savings for income shock. The findings of this paper show that, in addition to socio-economic factors, other factors such as risk tolerance, savings portfolio, and individuals' objectives and subjective financial knowledge can significantly explain differences in the levels of individual financial vulnerability. Using ordered probit on primary data consisting of 854 working adults aged 18–60, it is found that gender, ethnicity, income, number of dependents, age and education can significantly explain differences in the levels of financial vulnerability. Furthermore, the findings highlight the importance of continuous efforts to provide financial education to improve personal financial management. The findings also confirm that risk takers are more likely to be financially vulnerable. However, individuals who diversify their savings channels to include stock and bond holdings instead of solely saving through bank deposits are less likely to be financially vulnerable.

KEY WORDS: Indebtedness, Financial fragility, Financial literacy, Emergency savings, Personal finance

JEL Classification: D14; D91

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Introduction

Household debt in Malaysia has been increasing rapidly in recent years, with the latest figure at RM940.4 billion (US$234 billion) or 87.9% of GDP in 2014 (Bank Negara Malaysia, 2015). This debt is the highest among its neighboring countries including Indonesia, Thailand, and Singapore. Furthermore, the debt service ratio of 44.2% indicates that approximately half of the households' monthly income is used to service debt payments. As Malaysia strives to become a high-income nation, the country is grappling with the serious problem of a growing number of bankruptcy cases, particularly among the young. Meikeng (2014) from The Star reported that the number of bankruptcy cases in Malaysia has increased consistently from 13,238 cases in 2007 to 21,987 cases in 2013. There was a significant 12% increase in bankruptcy cases from 2012 (19,575 cases) to 2013 (21,987 cases). Furthermore, Chow (2015) from Reuters also reported that there has been a significant increase in bankruptcies among those under 35 years old. According to the Department of Insolvency, a total of 24,953 people below the age of 35 had filed for bank-

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ruptcy since 2010 (Carvalho & Hamdan, 2015). In fact, approximately 47% of those between 18-35 years old are struggling financially and are living beyond their means, and 60 Malaysians are being declared bankrupt every day (Malaysian Digest, 2014).

High household debt can weaken private consumption spending particularly during an economic downturn. The problem can be exacerbated in a high interest environment as it will affect the debt repayment abilities of individuals and households. Furthermore, studies have found that a financial crisis that is preceded by large household debts will result in more severe downturns as highly indebted households and individuals will become credit unworthy as lenders tighten their loan offerings. For example, Mian and Sufi (2011) found that one of the key characteristics of the 2007/08 financial crisis in the United States was preceded by one of the largest increases in household debt in the country's history. Similarly, Chmelar (2013) also observed that household debt has a strong impact on the macroeconomic stability, the robustness of growth and the depth of the recessions. Furthermore, the high household debt to income ratio in Malaysia, which is 146 percent, is comparable to that of the U.S.A and the U.K. However, in contrast to high income nations and developed countries, the lower income levels in Malaysia raises the question of households' financial sustainability. Furthermore, while the United States and European countries share the same concern of high household debt in their respective countries, another point of concern in the issue of high household debt in Malaysia is the heterogeneity of its distribution and the direction of borrowing. Approximately 80% of household debt is by households earning higher than average income (greater than RM3,000 or US$ 748), and 46.5% is by households earning above RM5,000 (US$1,247) per month. Furthermore, the leverage ratio for households earning less than RM3,000 (US$748) ranges from 4.4 to a high of 9.6 times their annual income; many of these households obtained their loans from non-bank institutions that are outside the regulatory and supervisory purview of the central bank (Hussein, 2013). These statistics have attracted unwanted attention and raised concerns regarding the financial vulnerabilities of individuals and households in Malaysia.

Given the concerns about the increasing household debt, since 2010, the central bank of Malaysia has gradually implemented several micro-prudential measurements and introduced responsible financing guidelines for financial institutions. These new policies include changes such as raising the income eligibility requirements of credit card ownership, limiting the number of credit cards one can own, placing a ceiling on the credit limit of credit cards for cardholders with annual income less than RM36,000 (US$8977), and reducing the loan tenure for various loans (Bank Negara Malaysia, 2011a; 2011b). With the implementation of these policies, household debt moderated slightly in 2014 but remains at a high level.

The slowdown in the economy, the higher cost of living and the implementation of the Goods Service Tax (GST) in Malaysia on 1 April 2015 may adversely affect financially vulnerable individuals. The Credit Counseling and Debt Management Agency (AKPK), which was established in 2006 to help financially distressed individuals manage their debt, has cited poor financial management as the main factor for financially troubled individuals as this explains 22.7 percent of those who are enrolled in their debt management program (Malaysian Digest, 2014). More than 700,000 individuals have sought help from AKPK since its establishment; in 2015 alone, 135,000 individuals have approached AKPK to help them solve their financial problems (Credit Counseling and Debt Management Agency, 2016). As such, based on the aforementioned issues, the objective of this paper is to ascertain the characteristics of financially vulnerable individuals. This information is vital to ensure that effective educational campaigns for responsible financial management target the financially vulnerable group, and relevant intervention steps are taken to minimize the risk of bankruptcy among these individuals.

The remainder of this paper will be organized as follows: Section II provides the insights from the literature followed by a discussion on the data and model in section III. Section IV presents the descriptive analysis, while section V discusses the empirical results. The conclusion follows in section VI.

Insights from the Literature

In the existing studies, financial vulnerability or financial fragility is indicated by an inability to maintain expenses, an inability to confront unexpected expenses, and an indebtedness or a declining real household net wealth to disposable income ratio (Anderloni, Bacchoicchi, & Vandone, 2012; Clercq, van Tonder, & van Aardt, 2015; Disney, Bridges, & Gathergood, 2008; Jappelli, Pagano, & Di Maggio, 2008). In this paper, financial vulnerability is indicated not by a single measurement but is based on two indicators: the level of debt-to-income ratio and the level of emergency savings to cushion income shock. The former measures the extent of credit exposure, which reflects the existing vulnerability, while the latter measures the ability to cushion income shock, which reflects a potential vulnerability. This finding is particularly important given that nearly 50% of Malaysians' income is for debt repayment. Combining the two provides a more accurate reflection of an individual's overall financial vulnerability compared to using a single measurement, which is commonly used in existing studies on consumer indebtedness. A high debt-to-income ratio is susceptible to negative income shocks; in addition, if a consumer has weak financial preparedness for income shock, that consumer will be financially vulnerable.

The industry's rule of thumb for debt-to-income ratio is 30%, but the Credit Counselling and Debt Management Agency of Malaysia recommends the debt service ratio to be not more than 40%. Michelangeli and Pietrunti (2014) note that households with a debt-to-income ratio of above 30% are considered vulnerable. There are few studies on debt-to-income ratio per se, but studies of household indebtedness and financially constrained households are closest to it. Socio-economic factors such as income, age, education, home ownership, household structure, household net worth, financial portfolio, and regularity of income flows are widely considered in these studies, and various measurements are used to investigate the problem of indebtedness among individuals and households (Betti, Dourmashkin, Rossi, & Yin, 2007; Brunetti, Giardo, & Toricelli, 2016; Disney et al., 2008; Kempson, 2002). Generally, it is found that younger households, home ownership, lower income, and lower education increase the probability of financial indebtedness.

Emergency savings or emergency funds are commonly referred to as financial holdings that are available to cover living expenses without drastically altering the household's standard of living in the event of an income shock (Johnson & Widdows, 1985). There is debate on the adequate or minimum emergency funds that a household should have in the event of income disruption. The minimum adequacy is having funds equivalent to three months of living expenses; this is based on the average unemployment period of a worker (DeVaney, 1994; Garman & Forgue, 1997; Greninger, Hampton, Kitt, & Achacoso, 1996; Hanna & Wang, 1995). Greninger et al. (1996) found strong consensus among financial planners and educators that liquid assets for emergencies should equal a minimum of two and half to three months of living expenses. However, the rule of thumb is that consumers should hold liquid assets sufficient to cover three to six months of living expenses as this is regarded as the average period of unemployment; a laid-off worker will be re-employed in three to six months (Johnson & Widdows, 1985).

Age, years of education, marital status, ethnicity, number of dependents, and home ownership are commonly used socio-economic variables in the existing empirical studies on emergency fund holdings (inter alia, Bhargava & Lown, 2006; Chang, Hanna, & Fan, 1997; Chang & Huston, 1995; Chen & DeVaney, 2001; Hatcher, 2000; Worthington, 2004; 2005). In summary, these studies found that older households, those with higher income and educational levels, and larger household sizes are more likely to maintain emergency fund holdings.

In recent years, in addition to socio-economic factors, studies of consumer credit have included the role of financial knowledge on consumer credit. This inclusion follows from studies that have shown that financial knowledge promotes better financial decision making. For example, it has been found that those with greater financial knowledge are able to plan for retirement (Lusardi & Mitchell, 2007), participate in the stock market (Kimball & Shumway, 2006; van Rooij, Lusardi, & Alessie, 2007; Yoong, 2010), have better asset accumulation (Hilgert, Hogarth, & Beverly, 2003; Jappelli & Padula, 2011), and seek better financial service rates (Hastings & Tejeda-Ashton, 2008; Lusardi & Tufano, 2009). In terms of the effect of financial knowledge on consumer credit, Disney et al. (2008) reported that the majority of respondents have cited lack of financial literacy as a major cause of over-indebtedness. Conversely, Lusardi, and Mitchell (2009) have also added a subjective financial literacy measurement alongside the objective financial literacy measurement to investigate how it affects consumers' retirement planning. The subjective measurement of financial literacy was added to compare what consumers actually know with what they believe they know. Thus, it is important to determine if self-confidence plays as important a role as the actual level of financial literacy.

Risk aversion is also found to play a role in consumers' financial decisions such as retirement planning (van Rooij, Lusardi & Alessie, 2009), financial portfolio (Guiso & Jappelli, 2009) and level of unsecured debt (Brown, Garino, & Taylor, 2009). In the Malaysian context, there are several studies on financial strain, financial capability and in particular, financial well-being, of Malaysians, such as studies by Sabri, Masud, Karen, and Paim (2008), Delafrooz, Paim, Sabri, and Masud (2010) and Mokhtar, Husniyah, Sabri, and Abu Talib (2015) among others. However, there are limited studies that specifically examine the financial vulnerability of Malaysians. For example, in Sabri and Zakaria (2015), financial strain is measured in terms of individuals' emotional sentiments towards their financial situations such as their extent of worry regarding their ability to fulfill their financial commitments and regarding their availability of funds.

In this paper, in addition to considering socio-economic factors and financial knowledge to investigate the determinants of financial vulnerability among working adults in Malaysia, the model will include factors such as individuals' use of financial services and risk tolerance. The latter two factors are rarely incorporated into the models on consumer credit. Furthermore, by using two measurements of financial vulnerability that incorporate current and potential vulnerability, this paper is able to provide a more comprehensive indicator of financial vulnerability that has not been addressed in the existing studies.

Data and Model

Data

The dataset used in this study was obtained from a survey that was conducted in two locations (Penang and Klang Valley), which represent the Northern and Central commercial hubs of Peninsular Malaysia. Due to budgetary constraints, only two main commercial locations in Peninsular Malaysia were chosen, and only 900 respondents were canvassed. The two locations were also chosen because of the ease of access to financial services in these two locations. In other words, the targeted respondents were likely to be those with suitable access to financial services who were presented with various credit opportunities. The survey was conducted between January and March 2013. From the initial 900 respondents canvassed in the study, the final sample utilized responses from 854 respondents. Certain respondents were eliminated due to incomplete information. The respondents who participated in the survey are Malaysian working adults between the ages of 18 and 60 years old. A working adult is defined as an individual who works at least 30 hours a week. Convenience stratified sampling was used; the sample was stratified according to age bracket, ethnic group, and gender for both locations based on the Malaysian Labour Force Statictics of 2010 (Department of Statistics Malaysia, 2016) to reflect a better representation of the labor market in both selected locations. The respondents were solicited randomly in public places such as shopping malls, commercial areas, and offices. A face-to-face interview was conducted based on a prepared questionnaire. The data collected included information on respondents' financial status, financial knowledge, financial behavior and attitudes, and other socio-demographic characteristics.

Econometric Model: Ordered Probit

The dependent variable in this study is the level of financial vulnerability. The levels of financial vulnerability are defined as low, moderate, and high. Financial vulnerability is measured based on two indicators, debt-to-income ratio and funds sustainability in the event of income loss. For the debt-to-income ratio, an individual regarded as having a debt-to-income ratio within the recommended ratio of 30% or below will be accorded the value = 0 or 1 otherwise (Michelangeli & Pietrunti, 2014). Conversely, an individual who has adequate funds within the recommended level of emergency savings of at least three months or more is accorded the value 0 or 1 otherwise (Johnson & Widdows, 1985). Summing the two indicators provides the individual's level of financial vulnerability. In other words, the values of financial vulnerability range from 0 to 2 $(0 \le v \le 2)$, where v refers to the financial vulnerability score. For example, if an individual has a debt to income ratio of 30% and below but has emergency savings less than three months, the financial vulnerability score of the individual is equal to 1, thus putting the individual at the moderate level of financial vulnerability. Conversely, if an individual has a debt to income ratio above the recommended 30% and has less than three months' emergency savings funds, the individual's financial vulnerability score is equal to 2. Such an individual is categorized as highly vulnerable given that the individual has failed in both financial vulnerability indicators. Hence, it is clear that the dependent variable is categorical and ordinal with clear ordering. Thus, an ordered probit model is an appropriate statistical model to explain the variations in the levels of financial vulnerability among individuals (McCullaph, 1980; McKelvey & Zavoina, 1975). In general, the ordered probit is written as follows:

$$y^* = \beta' x + \varepsilon \quad (1)$$

where y^* is the latent and continuous measure of financial vulnerability levels coded as 0, 1, or 2; β' is the vector of estimated parameters, and x is the vector of explanatory variables; and ε is the error term $\varepsilon \sim N(0,1)$ with cumulative distribution denoted by $\Phi(\bullet)$ and density function denoted by $\varphi(\bullet)$.

The observed and coded discrete financial vulnerability level, *y*, is derived from the model as follows:

$$y^* = 0 \text{ (low) if } y^* < \mu_1 \quad (2)$$

$$y^* = 1 \text{ (moderate) if } \mu_1 < y^* < \mu_2 \quad (3)$$

$$y^* = 2 \text{ (high) if } y^* > \mu_2 \quad (4)$$

where μ_1 and μ_2 are threshold variables in the probit model. The threshold variables are unknown and determine the maximum likelihood estimation procedure for the ordered probit.

Variables

The explanatory variables can be broadly categorized into socio-economic factors, risk tolerance, financial knowledge and financial sophistication.

Gender, age, ethnicity, education, income, number of dependents, and home ownership constitute the socio-economic variables, while financial knowledge includes the objective and subjective financial knowledge assessment of the individuals.

Risk tolerance is measured in accordance with Hanna, Gutter, and Fan (2001), a study in which a respondent is asked if he will leave a current job that promises a guaranteed income for life for an equally desirable job with a 50-50 chance that it will double his after-tax income or that it will reduce his income by 'x%'. The respondent will be asked this question repeatedly with varying values of 'x' where x begins with 5%, 10%, 20%, 33%, and 50%. A person who is considered to have a high-risk tolerance is one who will not leave his current job if 'x' is 33% or above. In other words, for other values of 'x' below 33%, a high-risk individual will choose the new job over his current job.

The financial knowledge score is derived from the financial knowledge questions posed to the respondents. The financial knowledge questions are modified and conceptualized from various financial surveys. A total of six financial knowledge questions were asked; the concepts assessed include an understanding of inflation (Atkinson, McKay, Kempson, & Collard, 2006), interest compounding (Chen & Volpe, 1998; Lusardi & Tufano, 2009; Lusardi & Mitchell, 2009), cash flow management (Credit Counseling and Debt Management Agency of Malaysia, 2011), risk diversification (Lusardi, 2008), mutual funds (Lusardi, 2008), and the recommended debt repayments in relation to the income ratio (Credit Counseling and Debt Management Agency of Malaysia, 2011). The financial knowledge score reflects the number of correct answers. In addition to the objective assessment of the individual's financial knowledge through the six financial knowledge questions, the individual is also requested to self-assess his level of financial knowledge. This request is to distinguish between the objective and subjective financial knowledge indicators. Multicollinearity between the objective and subjective indicators of financial knowledge was eliminated, because the variable inflation factor (VIF) is found to be equal to 1.04, which is less than 10.

Respondent's financial sophistication is measured in terms of whether the respondent diversifies his savings portfolio. A respondent who saves beyond conventional bank deposits and includes investments in stocks, mutual funds or other forms of financial instruments is considered relatively more financially sophisticated and has a diversified financial portfolio.

Table 1. Selection of Variables

Variables	Description of Variable	Financial vulnerability			Total Sample	Expected signs
		Low	Moderate	High		
Binary variables (1= yes; 0 = otherwise)						
Gender	The respondent is a male	0.569 (0.496)	0.600 (0.491)	0.690 (0.464)	0.603 (0.490)	+
Chinese	The respondent is Chinese	0.435 (0.497)	0.267 (0.443)	0.264 (0.442)	0.322 (0.468)	#
Malay	The respondent is Malay	0.470 (0.500)	0.615 (0.487)	0.636 (0.483)	0.570 (0.495)	+
Indian	The respondent is Indian or others	0.095 (0.294)	0.118 (0.323)	0.101 (0.302)	0.108 (0.310)	+
Home	The respondent owns a house	0.622 (0.486)	0.443 (0.497)	0.682 (0.467)	0.539 (0.499)	+
Low income	The respondent's monthly personal income is below RM1,000	0.092 (0.289)	0.217 (0.412)	0.054 (0.227)	0.151 (0.358)	+
Low mid income	The respondent's monthly personal income is between RM1,001 – RM4,000	0.569 (0.496)	0.645 (0.479)	0.791 (0.408)	0.641 (0.480)	+
High mid income	The respondent's monthly personal income is between RM4,001-RM7,000	0.219 (0.414)	0.111 (0.314)	0.140 (0.347)	0.151 (0.358)	#
High income	The respondent's monthly personal income is above RM7,000	0.120 (0.326)	0.027 (0.163)	0.016 (0.124)	0.056 (0.230)	-
Tertiary	The respondent has tertiary education	0.445 (0.498)	0.296 (0.457)	0.279 (0.450)	0.343 (0.475)	-
Age1824	The respondent is aged between 18-24 years old	0.078 (0.268)	0.170 (0.376)	0.085 (0.280)	0.126 (0.333)	+
Age2529	The respondent is aged between 25-29 years old	0.127 (0.334)	0.183 (0.387)	0.178 (0.384)	0.164 (0.370)	+
Age 3039	The respondent is aged between 30-39 years old	0.314 (0.465)	0.312 (0.464)	0.450 (0.499)	0.334 (0.472)	+
Age 4049	The respondent is aged between 40-49 years old	0.261 (0.440)	0.222 (0.416)	0.225 (0.419)	0.235 (0.424)	#
Age 5060	The respondent is aged between 50-60 years old	0.219 (0.414)	0.113 (0.317)	0.062 (0.242)	0.141 (0.348)	-
Self-knowledge	The respondent thinks he/she has high financial knowledge	0.230 (0.421)	0.127 (0.333)	0.140 (0.348)	0.163 (0.369)	-
High risk	The respondent has high risk tolerance	0.102 (0.304)	0.120 (0.325)	0.171 (0.378)	0.122 (0.327)	+
Finst	The respondent diversifies his/her savings portfolio	0.558 (0.497)	0.416 (0.494)	0.419 (0.495)	0.464 (0.499)	-
Continuous variables						
Dependent	Number of dependents	2.149 (1.801)	1.980 (1.909)	2.395 (1.761)	2.098 (1.856)	+
Financial score	Financial knowledge score obtained (min=0; max=6)	2.707 (1.402)	2.321 (1.385)	2.450 (1.218)	2.478 (1.377)	-

Note: Std. deviation in parenthesis.
refers to reference group

Table 1. Selection of Variables

Variables	Coefficient estimates	Marginal effects on the probabilities of financial vulnerability		
		Low	Moderate	High
Gender	0.173**	-0.049**	0.046**	0.036**
	(0.080)	(0.023)	(0.021)	(0.036)
Malay	0.364***	-0.103***	0.096***	0.081***
	(0.094)	(0.032)	(0.028)	(0.019)
Indian	0.338**	-0.096**	0.088**	0.072**
	(0.138)	(0.041)	(0.037)	(0.054)
Dependents	0.049**	-0.014**	0.013**	0.012**
	(0.023)	(0.007)	(0.006)	(0.007)
Home	0.291***	-0.083***	0.076***	0.066***
	(0.098)	(0.028)	(0.025)	(0.023)
Low income	0.839***	-0.238***	0.220***	0.180**
	(0.248)	(0.040)	(0.039)	(0.033)
Low mid income	0.903***	-0.256***	0.237***	0.190**
	(0.227)	(0.033)	(0.032)	(0.029)
High mid income	0.647***	-0.184***	0.170***	0.124***
	(0.233)	(0.046)	(0.044)	(0.034)
Tertiary	-0.226**	0.064*	-0.059*	-0.038*
	(0.101)	(0.035)	(0.031)	(0.020)
Age1824	0.401***	-0.114**	0.105***	0.085***
	(0.148)	(0.045)	(0.040)	(0.058)
Age2529	0.420***	-0.119***	0.110***	0.098***
	(0.146)	(0.044)	(0.040)	(0.060)
Age 3039	-0.121	-0.074**	0.069**	0.051**
	(0.110)	(0.033)	(0.030)	(0.039)
Age 5060	-0.489***	0.139***	-0.128***	-0.101***
	(0.137)	(0.053)	(0.046)	(0.037)
Financial score	-0.068**	0.011**	-0.008**	-0.002**
	(0.031)	(0.021)	(0.014)	(0.005)
Self-knowledge	-0.227*	0.064*	-0.059*	-0.044**
	(0.117)	(0.037)	(0.034)	(0.023)
High risk	0.259**	-0.007**	0.068*	0.052**
	(0.130)	(0.039)	(0.036)	(0.031)
Finst	-0.163*	0.046*	-0.042*	-0.034*
	(0.087)	(0.027)	(0.025)	(0.030)
LR stats: 121.96 (prob > chi2 =0.000)				
Pseudo R2: 0.720				
Log-likelihood: -785.42				
Wald test: 113.80 (prob >chi2=0.000)				

Note: *, ** and *** denotes 10%, 5% and 1% significance. Robust standard error in parenthesis.

Descriptive Analysis

Table 1 provides a summary of statistics of the survey respondents. Among the 854 respondents, the majority are moderately vulnerable financially (442; 51.7%); 129 (15.2%) are highly vulnerable financially, and 283 (33.1%) are considered to have low financial vulnerability. From a cursory analysis, males are generally more financially vulnerable than females. While males comprise 60.3% of the total sample, 69% of those who are highly vulnerable are male; in addition, only 56.9% of those who have low vulnerability are males. Chinese and Malay respondents comprise 32.2% and 57% of the total sample, respectively. However, only 26.4% of those who are highly vulnerable are Chinese, while 63.6% are Malay. This finding suggests differences in the levels of financial vulnerability among different ethnic groups. Furthermore, the summary statistics show that higher income reduces financial vulnerability, whereas 33.9% of those with low financial vulnerability are of high middle income and are high income individuals; however, 79.1% of those who are highly vulnerable are from the low middle income group. The low middle income group comprise 64.1% of the total respondents in the sample. Tertiary education appears to reduce the likelihood of financial vulnerability, whereas only 27.9% of those who are highly vulnerable have tertiary education. The average knowledge score for the total sample is 2.478; the average knowledge score for those who are highly vulnerable (2.450) is slightly lower, while the average knowledge score for those who have low vulnerability (2.707) is slightly higher than the overall total sample's average score. Furthermore, those who have high confidence in their financial knowledge comprise 23% of those who have low financial vulnerability compared to those who have high financial vulnerability (14%). This finding suggests that financial literacy and self-confidence in financial knowledge put individuals in a better position financially. Conversely, 17.1% of those who are highly vulnerable have a high risk tolerance, while only 10.2% of those who have low financial vulnerability have a high risk tolerance. Finally, 46.4% of the total sample's respondents diversify their savings portfolio beyond savings deposits; they comprise 55.8% of those who have low financial vulnerability, while 41.9% of those who are highly financially vulnerable diversify their savings portfolio.

Results Analysis

The log likelihood value for the model is -785.420, and the likelihood ratio chi-square statistic is 121.96 (prob>chi2=0.000); however, the Wald test chi-square statistics of 113.80 (prob>chi2=0.000) shows that the parameters in the model are jointly significant. Furthermore, the model has an overall predictability accuracy of 57.91%. To test whether the parallel assumption is violated, an ordered probit and generalized ordered probit regression were conducted. Under the parallel assumption, it is assumed that the correlation between the independent and dependent variables do not change with the categories of the dependent variables. If the parallel assumption test fails, the generalized ordered probit model should be used instead. It was found that the ordered probit model has a lower Akaike information criterion (AIC=1582.337) and higher Bayesian information criterion (BIC=1753.292) than the generalized ordered probit model (AIC:1608.839 and BIC:1699.066). This finding suggests that the ordered probit model is an appropriate model to use.

Table 2 presents the estimates of the ordered probit (column 2) and the marginal effects of the explanatory variables on the levels of financial vulnerability (columns 3–5). The ordered probit enables the identification of significant variables that are associated with different levels of financial vulnerability. A higher coefficient estimate (column 2) indicates a higher probability of being in the highest category of financial vulnerability (high financial vulnerability), while the converse is true for a lower coefficient estimate. The effects of the changes in explanatory variables on the probability of membership in the intermediate group (moderate financial vulnerability) cannot be inferred from the estimates of the ordered probit. As such, the discussion of the empirical results focuses on the marginal effects of the explanatory variables on the respective levels of financial vulnerability.

It is found that all socio-economic factors can significantly explain the varying level of financial vulnerability among working adults. Males are more likely to be in the category of having moderate or high financial vulnerability than females. Males are more likely to be the principal loan holder for more loans than females as they are generally socialized to be the breadwinner of the family in the Asian context (Lim, Teo, & Loo, 2003). Consequently, males will have higher debt-to-income ratios than females. The higher financial vulnerability of males than females could also be because women are more budget conscious than men, as found in Lim et al. (2003). The result supports the findings by the Department of Insolvency in Malaysia, in which the number of bankruptcy cases for men are approximately two times higher than for women. For example, in 2012, there are 13,613 bankruptcy cases reported by males compared to 5,962 bankruptcy cases reported by females. However, generally, females are found to have lower financial literacy and are weaker financially, particularly for the elderly (Hung, Yoong, & Brown, 2012; Lusardi & Tufano, 2009).

In a multi-ethnic country such as Malaysia, differences in ethnicity are found to have a significant effect on the varying disparities of financial vulnerability among different ethnic groups. The results indicate that Malays and Indians are more likely to have moderate or high financial vulnerability than the Chinese. For example, being Malay increases the probability of having moderate or high financial vulnerability by 9.6% and 8.1%, respectively, compared to being Chinese, which decreases the probability of having low financial vulnerability by 10.3%. Ethnic differences are evident in the management of personal finances; this is consistent with existing studies that show that Malays are more likely to experience credit card debt (Loke, Yen, & Tan, 2013), and Malays represent a higher number of bankruptcy cases. For example, according to the Department of Insolvency, in 2012, Malays comprise 48.41% of the bankruptcy cases filed.

It is found that greater financial responsibility puts a strain on an individual's financial vulnerability. Respondents who have a higher number of dependents and home ownership are more likely to be moderately or highly vulnerable financially. This finding is consistent with McCarthy (2011) and Kempson (2002) who found that those with young children, establishing a home and a higher number of children dependents are more likely to use credit heavily and tend to be in arrears. Furthermore, Brunetti et al. (2016) found that home ownership increases financial fragility.

Income levels have a significant effect on the financial vulnerability of individuals. Using high income (those earning above RM7,000 or USD1,746 a month) as the reference category, the results show that the lower income groups are financially more vulnerable. There are greater differences between the low income and low mid income with the high-income earners. For example, the probability that low income and low mid income earners have lower financial vulnerability than high income earners decreases by 23.8% and 25.6%, respectively, while the probability that high mid income earners have lower financial vulnerability than high income earners decreases by only 18.4%.

Education helps to reduce financial vulnerability. The results suggest that having tertiary education increases the probability of having low financial vulnerability and reduces the probability of having moderate and high financial vulnerability compared to an individual without tertiary education. Education has consistently been found to have positive effects on personal financial management (Anderloni et al., 2012; McCarthy, 2011).

Those aged between 40 to 49 years old were used as the reference group in the analysis on the significance of age on financial vulnerability. There are significant age differences for all age groups. It is found that those below 40 years old (age 18-24 years old, age 25-29 years old and age 30-39 years old) are all more likely to be more financially vulnerable compared than those between 40 to 49 years old. Conversely, those aged between 50 to 60 years old are less likely to be financially vulnerable. The findings appear to reflect the current Malaysian scenario in which there are higher bankruptcy cases reported for those aged 35 years old and below (Carvalho & Hamdan, 2015). McCarthy (2011) also found that the probability of being in financial distress increases with age to a maximum of the late 30s, after which the age effect decreases rapidly. The finding supports the life cycle hypothesis (Ando & Modigliani, 1963), in which younger working adults will tend to have lower incomes and may not have accumulated adequate assets that could be converted to liquid funds easily, making them more susceptible to income shock. Furthermore, younger working adults are likely to finance their current consumption with debt with the expectation that the debts could be repaid when their income increases in the future. Conversely, those who are older may have accumulated more savings and repaid their loans, resulting in a lower debt service ratio.

It is evident that both objective and subjective indicators of financial knowledge have a significant effect on the level of financial vulnerability. Lusardi and Mitchell (2009) who used both objective and subjective indicators of financial knowledge also found that higher financial literacy and higher self confidence in financial knowledge increase the likelihood of retirement planning. This finding highlights the importance of financial education. Financial education will equip individuals with the basic financial knowledge and boost an individual's self-confidence in addressing financial decisions.

Holding other factors constant, an individual who has a higher risk tolerance is more likely to be financially vulnerable. The results show that an individual with a high risk tolerance has a reduced probability of having low financial vulnerability of 0.7% but has an increased probability of having high financial vulnerability of 5.2%. In the existing studies on the role of risk aversion in financial decisions, it is found that those with high risk aversion have higher levels of unsecured debt (Brown et al., 2009), while Guiso and Jappelli (2009) found that those with higher risk aversion are more likely to hold risky assets and demand higher insurance coverage. Conversely, an individual who diversifies his savings portfolio beyond savings deposits is found to reduce the probability of being moderately highly vulnerable financially. Holdings of other financial instruments such as bonds and stocks appears to provide individuals with a better cushion for the availability of funds in times of emergency than those who put their savings in savings deposits only. This finding is consistent with Bhargava and Lown (2006) and Huston and Chang (1997), who found that households that are willing to take financial risks are more likely to have adequate emergency fund holdings than households that are not willing to take any financial risk.

Conclusion

This paper presents an analysis of the significance of socio-economic factors, financial knowledge, risk attitude and financial sophistication in explaining the varying levels of the financial vulnerability of working adults in Malaysia. The debt-to-income ratio and the levels of emergency savings for income shock were used to determine the overall level of financial vulnerability as the former provides the current vulnerability and the borrowing constraints of an individual, while the latter provides an indication of the potential vulnerability of the individual. In other words, the use of two measurements has provided a more holistic indicator of the financial vulnerability of an individual.

The significant age effects and ethnic differences in explaining the varying levels of financial vulnerability reflect the current bankruptcy situation in the country. Furthermore, the higher financial vulnerability of those below 40 years old are also corroborated by McCarthy's (2011) study on financial distress in the U.K and Ireland. The result that younger people tend to be more financially vulnerable is of concern as financial problems at a young age can be costly and can adversely affect an individual's lifetime financial welfare. Hence, the effort of the central bank in promoting financial education in schools and the incorporation of financial education in the school curriculum at the primary school level should be lauded and continued. As ethnicity effects are significant, a multi-lingual financial education program should be continued, and additional financial education programs could be added and expanded to target the areas with majority Malay communities. Furthermore, cultural differences could be considered and adopted to enhance the effectiveness and delivery of the financial education programs.

The financial vulnerability of low income earners requires attention. As noted by Hussein (2013), many of the low-income earners have high leverage and obtain their credit from non-bank institutions, which are outside the regulatory scope of the central bank. A "one size fits all" financial education program is clearly not suitable as the challenges confronted by low-income earners may be very different from other income groups, particularly given their lower access to financial services. Furthermore, while income poses a financial constraint on individuals, it is essential that individuals must be educated on the importance of living within their means and having a responsible financial attitude. Although the micro-prudential regulation introduced by Bank Negara Malaysia is to mitigate the issue of rising household debt, it may have made it more difficult for low income earners to gain access to credit opportunities from banking institutions. Hence, this finding is something that the authorities should examine further.

The significant positive role of education and financial education in reducing financial vulnerability is proven in this study as in other existing studies. Hence, there should be continuous effort to provide financial education to consumers to ensure that they are better equipped and more confident to address their personal finances. However, it is also important to consider the individual's appetite for risk when designing financial education modules such that consumers are alerted to possible temptations and traps. Furthermore, as the results show that diversifying one's savings portfolio is helpful in reducing financial vulnerability, consumers should be advised to diversify their savings to generate wealth. Therefore, consumers must be educated appropriately on the risk and return characteristics of different financial instruments.

Overall, the findings highlight and confirm several observations with regard to the household debt situation in the country. This paper is also one of the first to econometrically analyze the determinants of financial vulnerability of working adults that encompasses all active working age groups in Malaysia. However, for future study, more emphasis should be accorded to behavioral characteristics given that many recent studies have shown that cognitive biases can significantly affect an individual's financial decisions. Behavioral factors such as self-control and time preference could be added into the model. Unfortunately, in this paper, only a variable that proxies for individual's appetite for risk is introduced in the model; the remainder of the model focuses more on establishing socio-economic factors and financial knowledge in determining the financial vulnerability of individuals.

There are several limitations in this study. The study does not encompass all of Malaysia as it is limited to two main commercial hubs in the Peninsular Malaysia, namely, the Central and Northern regions. A nationwide study could be conducted to obtain a more representative finding of the status of financial vulnerability among Malaysians. Furthermore, future research could obtain information on the employment status of respondents regarding whether the respondent has a permanent contract or is a fixed-term contract staff as this may have an impact on respondents' financial vulnerability.

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