Australian household debt and the macroeconomic environment

Journal:	*Journal of Economic Studies*
Manuscript ID	JES-10-2019-0460.R2
Manuscript Type:	Research Paper
Keywords:	household debt, secured debt, unsecured debt, monetary policy, VECM

1. Abstract

This paper aims to investigate the effect of labour market conditions and monetary policy on households' attitude towards debt in the Australian context. In doing so, household debt is categorised into housing, and consumer debt and the relationship is empirically tested through the use of a Vector Error Correction Model. Consumer debt is found to be highly dependent on consumption with employment income and unemployment having a statistically insignificant effect whilst monetary policy showing an inverse relation to consumer debt. The findings suggest that household consumption appears to be the primary determinant for consumer debt which then behaves as a wage substitute. In terms of housing debt, income and monetary policy positively affect households' decisions with consumption and unemployment having a negative impact on the level of housing debt. The empirical results suggest that housing debt behaves as a proxy for household investment.

JEL Classification: E21, E24, E52, G51

Keywords: household debt, secured debt, unsecured debt, monetary policy, VECM

2. Introduction

In theory, the credit system in the economy transforms surplus cash balances into loanable funds which then return in circulation as credit to households and businesses. Household debt is an important aspect of a modern economy, and it plays a significant role in households' financial wellbeing by affecting their consumption and investment decisions. Credit can serve as a consumption-smoothing mechanism by allowing households to finance their desirable consumption patterns across time. Also, it can allow for wealth accumulation by assisting households' access to assets such as housing.

Borrowing, however, requires prudent and moderate use as with higher indebtedness financial vulnerability also increases. Debt sustainability is conditioned on the borrower having both the capacity to service the debt repayments and the ability to pay out the debt in the future. Once debt becomes unsustainable both the borrower and lender are faced with substantial losses which, as recent international experience has shown, can pose a significant threat to the overall stability of the financial sector and, consequently, to the broader economy.

Notwithstanding the sustainability of household debt, the increase in the level of indebtedness in itself has significant macroeconomic implications and is also affected by developments at the macroeconomy level. As debt exposure rises, households become more sensitive to changes in income and the cost of borrowing. Therefore, unemployment and households' real income can have a significant effect on existing debt as they affect its serviceability and, ultimately, its sustainability. Furthermore, the increased level of debt and dependency of households on credit for the financing of their consumption and investment undermines their ability to refinance their debt in the future. The increased debt exposure raises concerns to lenders about the borrower's

ability to service the debt, therefore, the attached risk increases due to the higher probability of a default and the borrower's repeat use of credit.

Changes in the overall macroeconomic environment, including changes in monetary policy and labour market conditions, can have a significant effect on households' decisions concerning debt. For example, an expansionary monetary policy and buoyant labour market can potentially encourage households to save less and increase their debt exposure. Moreover, under the same conditions, asset prices can also increase which in turn can encourage further debt accumulation through the wealth effect channel. Similarly, a weak macroeconomic environment can adversely affect household debt sustainability, by affecting households' capacity to meet their debt repayments, which in turn can lead to highly problematic outcomes concerning the overall stability of the financial system. For example, a weak labour market could create an increased demand for consumer credit as households aim to maintain their intertemporal consumption patterns. The prolongment of those conditions, however, could reinforce demand for credit inexorably creating a vicious circle of debt accumulation. Therefore, future access to credit becomes vital for households that are dependent on credit for financing their consumption as a result of their low labour income and precarious employment.

Household debt in Australia has steadily been rising in the past thirty years. Traditionally, income, to a large extent, determines a household's capacity to borrow, however, the gradual removal of bank lending restraints since the mid-1980s, in conjunction with the advancements in technology and the increased competition in the financial sector, have facilitated the expansion in the supply of credit which in turn supported the rapid rise in household debt. The main driver for that trend seems to be Australian households' appetite for wealth accumulation in the form of housing assets.

More specifically, as evidenced in Table 1, household debt in Australia has more than doubled in the past three decades exceeding 190 per cent of households' income in June 2018 with more than two-thirds of the total household debt being attributable to housing debt. Undoubtedly, housing debt has been the main driver behind the observed increase, however, a closer investigation into the composition of household debt could potentially offer some useful insights. Specifically, when concerned with the financial wellbeing of Australian households and the risks associated with their debt exposure, a better understanding around their attitude towards debt, its drivers and dynamic, can allow for better informed policies in the area.

Table 1: Household and Housing Debt to Disposable Income

Year	Household Debt/Income Ratio	Housing Debt/Income Ratio	Housing Debt/ Household Debt	Household Payments/Income
Jun-1988	63.21%			7.01%
Jun-1993	73.91%	39.34%	53.22%	5.96%
Jun-1998	99.51%	58.69%	58.99%	6.31%
Jun-2003	136.45%	91.72%	67.22%	8.35%
Jun-2008	162.68%	113.40%	69.71%	13.09%
Jun-2013	164.90%	119.65%	72.56%	9.44%
Jun-2018	190.54%	140.72%	73.85%	9.08%

Source: ABS (2018), Cat no. 5232.0; RBA (2018), Household Finances - Selected ratios

The increased availability of credit in recent decades in conjunction with the strong performing housing market has allowed for overall debt levels to rise continuously. Even during the immediate post-GFC period, whilst a slowdown in the increasing trend can be observed, the overall debt-income ratio continued to grow uninterrupted. Similarly, the associated debt repayments and the burden they impose on household income have also been steadily increasing during the same period. This has raised concerns regarding the fragile financial state of households and their capacity to service the commitments deriving from their debt exposure in a sustainable manner. Given the RBA's loose monetary policy and historically low interest rates in the post-GFC period, we can assume that the relatively stable ratio of debt repayments to

household income reflects a drop in the disposable income of households associated with the overall economic slowdown.

Table 2: Main source of household income and wealth, proportion of households

Income source (proportion of total income)		Wealth (mean value in '000)	
Employee Income	61.2	Superannuation funds	213.70
Own business Income	4.3	Owner-occupied dwelling	500.6
Investment Income	4.1	Other property	180.4
Superannuation Income	5.6	Bank Accounts	55.5
Government Pensions and Allowances	22.8	Shares	31.7
Other	1.6	Other	223.3

Source: ABS (2018), Cat no. 6523.0; Household Income and Wealth

With income from employment being the main component of household income in Australia, the relation between wage-employment and household debt can offer valuable insights that can inform the design and priorities of policies around both the credit and labour market. Whilst households and individuals do not engage in the market for credit from similar starting positions as pre-existing wealth and endowments create a divergence between earned and overall income, it is safe to assume that the majority of households derive the majority of their income from paid employment. The importance of employment income is shown in Table 2 were more than 60 per cent of household income is derived from paid employment. Similarly, the main component of households' wealth is their superannuation fund which is a fund that mainly receives regular payments by an individual's employer to provide for that person's retirement.

This paper aims to empirically investigate the macroeconomic determinants of household debt in Australia using a selection of macroeconomic variables that include money supply, employee compensation, household consumption and the unemployment rate. Overall household debt is categorised into housing debt and personal debt in an attempt to identify possible differences in the drivers of the two debt types. Intuitively, housing debt due to its wealth accumulation aspect can be treated as an indication of households' investment decisions while personal debt is more

reflective of their consumption patterns. To the best of my knowledge, this study is the first to distinguish between personal and housing debt in Australia and empirically test their relationship to macroeconomic variables using a Vector Error Correction Model (VECM) framework.

The choice of the macroeconomic variables aims to capture how households' decisions towards debt are influenced by their employment income, consumption preferences as well as the broader economic environment in terms of monetary policy and labour market dynamics. With the majority of household income in Australia being derived from paid employment, I aim to investigate the possible nexus between the labour market wage outcomes and household debt. Furthermore, the inclusion of money supply aims to function as an indicator of the lenders' reaction to the credit demand and to capture the role of money in the credit market while also allowing us to evaluate the impact of monetary policy on household debt. This choice provides an alternative to the target cash rate set by the RBA, which serves as an indication of the cost of borrowing but ultimately aims to control the money supply.

The empirical results suggest that housing debt behaves in a manner consistent with the economic theory concerning investment decisions. Increased household income from employment has a positive effect on housing debt which also correlates negatively with consumption. Additionally, housing debt and money supply are characterised by a positive relationship implying that lenders respond positively to the demand for housing credit.

With respect to personal debt, the results suggest that employee compensation and unemployment have a statistically negligible effect on households' decision regarding consumer debt. Consumption, however, has a positive and statistically important effect suggesting that is not income that determines consumer debt but rather consumption preferences. This finding implies that consumption is autonomous and that a wage substitution dimension of households'

consumer debt exists. Future policy decisions can potentially benefit from these findings, and thus have their design become more effective. The effect of the money supply, which is found to be negative, suggests that the increased availability of credit is not directed towards consumption, in the form of increased personal debt.

Overall, the findings indicate that housing and consumer household debt behave and respond differently to the chosen set of macroeconomic variables. These findings help us evaluate the recent expansionary stance in Australia's monetary policy given the current economic environment and wage outcomes in the labour market. The RBA's decision to further lower interest rates, currently standing at a historic low of 75 base points (Reserve Bank of Australia, 2019), possibly will not stimulate consumption and economic activity to the desired extent; however, it can be expected to stabilize the housing market, through the housing debt mechanism. This suggests that further action is required, outside monetary policy interventions, in order for a sustainable growth rate to be maintained.

The rest of the paper is structured as follows. The next section will briefly review the existing literature. The following section will present the empirical model and discuss the findings whilst the last section concludes.

3. Literature Review

The demand for household debt is a combination of the household's disposable income, consumption and investment preferences. However, it is not only current income that affects households' attitude towards debt but also expectations regarding future income (Ando & Modigliani, 1963). Households adjust their current consumption vis a vis their expected lifetime income consequently, in periods of low income relative to their average lifetime income,

households will engage in borrowing in order to smooth out their lifetime consumption (Friedman, 1957).

The expectation regarding future income is, among other things, a function of the overall economic environment. When the economy records strong growth rates, which are associated with higher incomes and lower unemployment, we can expect that households will be more optimistic about their future economic condition thus more willing to take on debt. However, it is not only households that are optimistic but also financial institutions responsible for the provision of credit. This shared optimism between borrowers and lenders allows for the increased credit demand to be met with an increased appetite for risk thus resulting in an overall expansion of credit in the economy (Dabelle, 2004).

Moreover, the deregulation of the financial industry and subsequent growing competition in the financial sector resulted in less stringent application requirements from credit providers and allowed for higher credit limits to become available to borrowers. The combined effect of euphoria and competition reinforces the financial system's tendency to continuously meet the demand for credit by expanding the supply of loanable funds.

Households' current ability to borrow and their creditworthiness are essentially a condition of their income. Whilst their existing wealth can act as collateral, thus support their capacity to borrow it is income that ultimately determines their access to credit. Income, therefore, is one of the most important economic variables affecting a household's ability, willingness and, ultimately, need to access credit. This raises an important distinction between the demand for credit and the ability to access credit. Increased income, among other factors, allows for easier access to credit, however, does the level of available income affect the demand and use of credit and if so in what way?

Increased available income allows for higher savings and stronger cash flows; therefore, demand for credit and higher levels of indebtedness seem to be more relevant to higher-income strata. However, this proposition appears to be biased as it emphasises the investment aspect of credit demand. When household income increases the level of consumption relative to income diminishes thus allowing for surplus income to be directed towards savings and investment. The higher household income creates opportunities for investment which can potentially lead to increased future profits and accumulated wealth. Furthermore, higher-income households not only afford alternatives to consumption but also enjoy a greater variety of investment opportunities as well as access to specialist products associated with investment services. Overall, we would expect higher-income households to demand credit for investment purposes rather than consumption given that the importance of the latter diminishes whilst the opportunities for the former rise alongside income.

On the other hand, lower-income households with their high propensity for consumption and limited available income, are mainly faced with inelastic consumption patterns. Additionally, given their limited or non-existing financial assets, they are highly depended on employment income in order to finance their expenses. Therefore, a combination of declining or stagnating disposable household income with an increasing cost of living and limited employment opportunities poses a serious threat to the wellbeing of lower- and middle-income households. When faced with such circumstances, lower-income households struggle to preserve their relative standards of consumption resulting in the use of credit thus suggesting that debt could potentially be viewed as a substitute for wages.

Once we have distinguished the reasons for borrowing based on income, we will need to identify how those appear in the credit market. Household debt can be categorised into two types. The

first category, which as we have seen forms the main component of household debt, consists of housing debt. Generally, housing debt is seen as lower risk when compared to personal debt which is the second type of household debt. Personal debt mainly refers to personal loans, credit cards and auto loans; however, it is essential to recognise that an informal percentage of personal debt also exists consisting of loans from family and friends. Overall, for the purposes of our analysis, we can approximate investment via housing debt and consumption through consumer lending.

The current literature is dominated by studies that investigate the determinants of household debt for different economies using different econometric approaches applied to datasets consisting of various debt determinants covering different periods. Meng et al. (2013) explore the determinants of household debt in Australia by employing a VECM approach. They find that the booming housing market in conjunction with the overall favourable macroeconomic environment pushes household debt upwards. These findings reiterate the conclusions in Philbrick and Gustafsson (2010) who find that the debt-to-income ratio depends positively on house prices and negatively on interest rates. Overall, the optimistic expectations fueled by the strong economic growth in Australia appear to have a positive effect both on borrowers and lenders increasing the appetite for debt and willingness to lend. These findings provide support to the Financial Instability Hypothesis as developed by Minsky (1977) and raise concerns about the sustainability of Australian household debt (Keen, 2009).

Dabelle (2004) argues that increased household indebtedness, in itself, is not likely to be the cause of a negative economic shock. However, shocks in other areas of the economy that affect household income can be the primary source of an unfavourable macroeconomic outcome which would then be amplified by the implications on the serviceability of household debt. In that

respect, he stresses the role that the increased cost of debt servicing in conjunction with household income and overall debt exposure can have on the economy. Nieto (2007), when investigating the determinants of household debt in Spain finds that households tend to increase their debt exposure when faced with low unemployment, favourable loan terms and increased spending with respect to consumption plus residential investment.

Magri (2002), using household surveys for the case of Italy, finds that income and debt have a positive relationship. Specifically, the income effect is considered separately on housing and consumer debt. The findings suggest that income has a positive and significant effect on housing debt in the central part of the distribution whilst, for consumer debt, it appears to be important across a wider part of the distribution. Following a similar approach by separating household debt into housing and personal debt Nizar (2015), finds that GDP in the case of Malaysia can have a positive effect on both types of debts.

Khan, et al. (2016) examined the determinants of household debt for Malaysia using the autoregressive distributed lag modelling approach (ARDL) to data collected between 1999 and 2014. Their findings show that in the long run, an increase in income level, housing price and population would have a positive impact on mortgage debt while a rise in interest rates and cost of living would have the opposite effect. Furthermore, their findings support the idea that households use debt as a substitute for income to finance the rising consumption because of a higher living cost.

Similar findings can be found in Tudela and Young (2005) for the case of the United Kingdom as well as in Chrystal and Mizen (2001) who find that unsecured debt, consumption and broad money are interdependent in the case of UK households. When investigating the macroeconomic determinants of household debt in South Africa through the use of quantile regression analysis

Nomatye & Phiri (2018), find that inflation and consumption are statistically insignificant. Conversely, GDP and house prices are of moderate to high significance in predicting household debt levels, whereas interest rates and domestic investments are the only macroeconomic variables highly correlated to the debt levels.

Zimunya & Raboloko (2015), in their work regarding household debt in Botswana, examine the effect of consumption, GDP per capita, money supply and interest rates on household debt and they are found to have a significant influence on its level as it would be expected by conventional theory. Interestingly, they also find that interest rates have a positive effect on debt implying that the relationship between debt and its cost is broken. Households have reached a point where they are indifferent on the cost of borrowing suggesting that credit, as consumption has a positive effect on household debt, is used as a wage substitute. Furthermore, this assumption is further supported by the strong and negative relationship between GDP per capita and the level of debt.

An inverse relationship between household income and debt is found in Meniago et al. (2013). Additionally, consumption is found to have a positive effect on household debt suggesting that households increase their debt levels in order to meet their expenses. Lastly, the confidence in creditor and debtors, stemming from higher GDP, appears to contribute significantly in the increase of household debt.

In Lombardi et al. (2017), the positive impact of debt on consumption and GDP growth are empirically confirmed in the short-run; however, this relation is inversed in the long-run. Kusairi et al. (2019), empirical investigate the relation between the labour market and household debt and find that as the unemployment rate increases, household debt will decrease. Moreover, the positive link between debt and consumption is also confirmed. Inequality, and its relation to

household debt, is explored in Berisha and Meszaros (2018) who find that expansionary monetary policy appears to be more beneficial to higher-income earners.

Social influences in the form of peer pressure and perceived relative standing can potentially affect household debt decisions (Georgarakos et al., 2014). Building on the work of Veblen (1899) and his theory concerning consumption decisions Frank et al. (2014), argues that households make spending decisions based on the lifestyle and consumption of their wealthier peers resulting in them using debt as an income substitute.

Overall, the literature suggests that debt dynamics need to be evaluated in both the short- and long-term in order for useful insights to emerge. The VECM framework allows for the long-run relationship between the variables to be estimated, whilst also allowing for short-run adjustments, and assists with the non-stationarity aspect of macroeconomic variables. This paper adds to the existing literature by applying the VECM approach to investigate the effect of the same macroeconomic variables on both personal and housing debt.

4. Empirical results and methodology

Household debt is jointly determined by supply and demand, and both aspects of the credit market are ultimately affected by the overall macroeconomic environment. The primary purpose of this paper is to investigate the potential relationship between household debt and household income taking into consideration the distinction between credit with the purpose of consumption and credit with the intent for investment. On the basis of the theoretical considerations that were previously explored, it is important to understand the role of employee compensation, private consumption, money supply and unemployment. Therefore, these variables will be included in the model that is to be empirically estimated. To estimate the relationship, we employ a VECM

approach which allows for the contemporaneous and lagged interconnection between the chosen variables.

4.1 Data

The dataset used in this paper is comprised of quarterly, nominal observations from 1959: Q3–2018: Q2 derived from the Australian Bureau of Statistics (ABS): National Accounts and the Reserve Bank of Australia (RBA): Lending and Credit Aggregates Catalogues and includes Compensation of Employees (W), Household Consumption (C), Money Supply (M3), Household Housing Debt (Housing), Household Personal Debt (Personal), and the Unemployment Rate (U). All variables, with the exception of the unemployment rate, have been transformed in real terms through the use of the appropriate CPI as a deflator, and their logarithmic value has been used in the empirical analysis.

The use of wages and unemployment rate aims to capture the effects of the broader labour market conditions on households' decisions around debt. Consumption is used to investigate the impact of the cost of living and how it affects savings and investment decisions. Lastly, the use of the money supply variable aims to capture the effects of monetary policy. M3 instead of Broad Money, which is a slightly broader monetary measurement that also includes M3, was preferred for the empirical investigation as the two variables are almost indistinguishable in terms of their time series and the RBA's database offers a larger dataset on M3 than Broad Money.

Table 3: Summary Statistics, using the observations 1959:3 - 2018:2

Variable	Mean	Median	S.D.	Min	Max	Obs.
W	7.10	7.08	0.307	6.60	7.57	140
C	6.86	6.88	0.573	5.72	7.79	236
U	6.88	6.37	1.768	4.13	11.28	162
M3	8.22	8.12	0.879	6.82	9.82	236
Housing	8.67	8.87	0.780	7.21	9.65	114

Personal	6.69	6.71	0.537	5.54	7.44	167

4.2 The empirical model

A cointegrated VAR analysis will be used to study the relationship between household debt and the other macroeconomic variables following the methodology developed by Johansen (1988) and Johansen and Jueslius (1990).

An unrestricted VAR(k) model of an I(1) time series of p-dimension X_t can be expressed as follows:

$$\Delta X_t = \Pi X_{t-1} + \sum_{i=1}^{k-1} \Gamma_i \Delta X_{t-i} + \varepsilon_t, \; t = 1, ..., T \qquad (1)$$

The rank of matrix Π must be less than full rank but greater than zero for the cointegrating vector to exist:

$$0 < rank(\Pi) < r \text{ or } \Pi = \alpha\beta'$$

where α are referred to the adjustment vectors, β the cointegration vectors and α, $\beta \in R^{p \times r}$.

If the above requirement is satisfied then, the unrestricted model can be rewritten as follows:

$$\Delta X_t = a(b' X_{t-1}) + \sum_{i=1}^{k-1} \Gamma_i \Delta X_{t-i} + \varepsilon_t, \; t = 1, ..., T \quad (2)$$

4.3 Cointegration

The first step when considering cointegration is to examine the stationarity of the time series involved. Stationarity at the first differences level is confirmed through the ADF (Dickey & Fuller, 1979) and KPSS (Kwiatkowski, et al., 1992) tests. The estimation of the optimal lag length is based on the Schwartz Information Criterion (SIC), as developed in (Schwarz, 1978)

whilst model fitness criteria were also taken into consideration. The results for these tests can be found in the Appendix.

The next step will be to investigate the possibility that a cointegrating relationship exists between the chosen variables. Both the Trace-test and Maximum eigenvalue test indicate the existence of a cointegrating equation with an 'unrestricted constant' which allows for the presence of a non-zero intercept in the cointegrating relations as well as a trend in the levels of the endogenous variables.

Table 4: Unrestricted Cointegration Test (Housing)

Rank	Eigenvalue	Trace Test	p-value	Lmax Test	p-value	Corrected Trace test	p-value
0	0.28856	93.740	[0.0001]	37.451	[0.0144]	93.740	[0.0003]
1	0.21495	56.289	[0.0057]	26.621	[0.0636]	56.289	[0.0083]
2	0.14205	29.668	[0.0519]	16.853	[0.1858]	29.668	[0.0585]
3	0.10187	12.815	[0.1221]	11.818	[0.1181]	12.815	[0.1285]
4	0.0090200	0.99670	[0.3181]	0.99670	[0.3181]	0.99670	[0.3253]

In the case of Housing debt, the Trace test indicates the existence of two cointegrating vectors at the 5% significance level whilst the Maximum Eigenvalue test suggests only one cointegrating equation (Table 4). However, estimating the model with one cointegrating relationship is more representative of the underlying theory.

Table 5: Unrestricted Cointegration Test (Personal)

Rank	Eigenvalue	Trace Test	p-value	Lmax Test	p-value	Corrected Trace test	p-value
0	0.25181	80.074	[0.0052]	39.454	[0.0070]	80.074	[0.0080]
1	0.12323	40.620	[0.2027]	17.886	[0.5162]	40.620	[0.2289]
2	0.079341	22.734	[0.2678]	11.243	[0.6327]	22.734	[0.2804]
3	0.072757	11.492	[0.1854]	10.273	[0.1982]	11.492	[0.1916]
4	0.0089191	1.2184	[0.2697]	1.2184	[0.2697]	1.2184	[0.2750]

In terms of Personal debt, both the Trace and Maximum Eigenvalue test suggest one cointegrating relationship at the 5% significance level (Table 5).

4.4 Estimation of VECM

Having established the existence of cointegration, we can proceed with the estimation of the VECM. The VECM essentially treats all variables as endogenous allowing to express household debt as a function of its explanatory variables:

$$Household\ Debt = f(Wages, Consumption, M3, Unemployment) \quad (3)$$

The advantage of this model is that it allows for the study of both the short- and long-run dynamics of household debt in relation to the selected variables. The VECM estimations will show household debt as the dependent variable and normalise it to 1 allowing to simplify the estimation and interpretation of the results. The diagnostic tests regarding Autocorrelation, Heteroskedasticity and Normality were performed and confirmed the good fit of the models. The Normality test returned a p-value of 0.00 in both cases, however, as suggested in the literature, this a not a condition which, if not met, necessitates a rejection of the estimated model (Stengos & Wu, 2009).

The estimated VECM for Housing debt is reported in Table 6 whilst the second model considering Personal debt is shown in Table 7.

Table 6: Unrestricted VECM Coefficients (Housing)

Cointegrating Vector	Coefficient	S.E.	t-statistic	p-value	Adjustment Coefficients
Housing	1				0.013068
W	-11.957	4.0131	-2.97949	0.00	0.008299
C	21.080	4.0617	5.189945	0.00	-0.008098
M3	-5.9281	1.4710	-4.02998	0.00	0.013216
U	0.33969	0.0711	4.777637	0.00	-0.08205
Error Correction	Housing	Wages	Consumption	M3	Unemployment

Coefficient	0.013	0.008	-0.008	0.0132	-0.082
T-ratio	[4.870]	[2.094]	[-1.944]	[2.868]	[-0.704]

The coefficients signs of the explanatory variables in cointegrating vector (β) are reversed in order to determine the effect of each variable on debt and the corresponding t-values are used to determine the significance of each coefficient. Subsequently, the model representing the long and short-run relationships for Housing debt is as follows:

$$Housing = 11.957W - 21.080C + 5.9281M3 - 0.33969U \quad (4)$$

Tables 6 also shows the corresponding adjustment coefficients for each variable which measure the feedback effects of disequilibrium onto the variables in the VECM. The adjustment coefficient of unemployment indicates that this variable does not adjust significantly to short-run deviations from the equilibrium which in turn suggests the possibility of weak exogeneity. Weak exogeneity of the endogenous variables means that disequilibrium in the cointegrating relationship does not feed back onto these variables themselves. Estimators of and inference on the other parameter values (for example, cointegrating vector), conditional on these weakly exogenous variables, do not suffer from a loss of information (Kim, 2016).

Based on the results reported we could observe that income, expressed as employee compensation, has a positive and statistically significant effect on housing debt. This is consistent with the theory and confirms the initial assumption that higher-income households have a higher demand for credit for the purpose of investment. Furthermore, the increased employment income potentially allows households to demonstrate a higher capacity to borrow thus reducing the risk of default and making lenders more willing to provide them with credit.

Consumption is also statistically significant; however, it has the opposite effect on housing debt. Higher consumption appears to be negatively linked to housing debt, confirming the negative

nexus between consumption and investment. Furthermore, this negative relationship suggests that equity release, defined as the extraction of equity from the value of the housing asset for the purpose of financing consumption, does not appear to be confirmed. Lastly, another possible interpretation could be the tendency of households to drastically reduce consumption expenses in their effort to finance deposits in order to enter the housing market. This channel seems to be more appropriate to first-home buyers; nonetheless, it indicates that employment income in itself possibly does not suffice and downwards adjustments to standards of living are also required in order for households to enter the housing market.

Not surprisingly, the availability of credit, measured by M3, appears to also have a statistically important and positive effect on housing debt. The increased money supply reflects the willingness of lenders to provide further credit as demand expands during times of favourable economic conditions. The increased creditworthiness of higher-income households leads to an increased willingness from lenders to supply them with further credit. Furthermore, the securitised nature of housing debt and the low default risk that is associated with home loans are supported by the empirical findings. This finding is important when evaluating the recent monetary policy in Australia. The RBA's goal to ease the downward pressure on housing prices through repeated cash rate cuts (Bloomberg, 2019), seems to be confirmed by the findings.

Lastly, unemployment has an adverse effect on housing debt thus confirming the expectation that unfavourable labour market conditions result in an unwillingness from households to accumulate debt. Moreover, unemployment restrains households' capacity to service their debt; thus it becomes a deterrent for lenders to supply them with credit.

In summary, we can argue that housing debt in Australia has been highly linked with the overall performance in the labour market. Lower unemployment and higher employee income have a

favourable effect on household investment and housing debt. Consequently, households that enjoy higher incomes are more willing to expand their leverage and lenders are also more willing to extend credit to them. Furthermore, the findings provide support to the theoretically inverse relationship between consumption and investment. Lastly, the favourable labour market conditions and low unemployment that historically been experienced in Australia, fuel optimism both in borrowers and lenders thus allowing for the tremendous growth that we have witnessed in the housing market over the past thirty years.

Table 7: Unrestricted VECM Coefficients (Personal)

Cointegrating Vector	Coefficient	S.E.	t-statistic	p-value	Adjustment Coefficients
Personal	1				-0.13298
W	-0.2581	1.1755	-0.21957	0.826	0.00202
C	-4.0117	0.7027	-5.70898	0.000	-0.0065
M3	1.6189	0.4907	3.299164	0.000	-0.0112
U	-0.0230	0.0216	-1.06481	0.288	1.3547
Error Correction	Personal	Wages	Consumption	M3	Unemployment
Coefficient	-0.132	0.002	-0.006	-0.011	1.354
T-ratio	[-2.732]	[0.212]	[-0.669]	[-0.980]	[4.804]

Turning to personal debt, the model will be:

$$Personal = 0.2581W + 4.0117C - 1.6189M3 + 0.023U \quad (5)$$

From Table 7 we can also observe that the corresponding adjustment coefficients for wages, consumption and money supply suggest the existence of weak exogeneity for these variables. In terms of the long-run relationship, the impact of employment income on the level of Personal debt appears to be statistically unimportant. Furthermore, unemployment also appears to not have a statistically important effect on the decision of households to accumulate consumer debt. These two findings in conjunction suggest that a long-run relationship between labour market conditions and personal debt in Australia is non-existent. However, a positive and statistically

strong relationship between consumption and personal debt is found suggesting that the decision for personal debt is highly conditional to consumption thus implying a substitution of wages with credit. Consumption, and subsequently consumer debt, appear to be autonomous and households seem to take on debt in their attempt to maintain their consumption patterns and levels of derived utility. The observed stagnating incomes in Australia's labour market also point to that interpretation of the empirical results. With respect to unemployment, changes in the unemployment rate seem to not have an impact on personal debt decisions thus possibly indicating that underemployment and the ongoing casualization of employment in Australia have a stronger impact on those decisions.

Households may also make use of the available consumer credit options to meet their current consumption needs as they expect or anticipate that their future income will increase. This points more to the direction of liquidity constraints that households may be faced with arising from the precarious nature of employment and resulting in an increasing dependence on future income. This subjective assumption of borrowers regarding their future income is possibly grounded on past experience concerning the performance of the Australian economy. In itself, this raises non-trivial concerns about households' long-term financial wellbeing as an overly optimistic view about their future could potentially undermine their present.

Furthermore, the non-negligible effect of consumption on personal debt raises concerns regarding the ability of households to continue and access credit in the future. As households become more dependent on credit in order to finance their consumption their risk of default increases; thus, lenders become more reluctant to refinance their current debt. Such a development can have severe implications on household utility, wealth inequality and even undermine the prospects of the Australian economy.

Lastly, the money supply and subsequently, the credit supply in the economy, appears to have a negative effect on consumer credit. A possible interpretation of this finding could be the emphasis that credit providers put on housing debt and its prioritisation over consumer debt possibly due to the higher associated profit margins. Moreover, when considering the supply side of credit, lenders appear to be less willing to grant consumer loans to riskier borrowers, such as lower-income households, which could explain the negative but statistically significant coefficient in the above relationship.

The last relation between credit supply and non-housing personal debt is also important in terms of wealth inequality and growth prospects in the economy. Expansionary monetary policy seems to shift debt towards housing and investment that support wealth accumulation. However, the negative impact on personal debt, which is highly correlated with consumption, suggest that maybe monetary policy in Australia has a narrower than assumed impact on the overall economic activity. The expectation that an expansionary monetary stance will stimulate consumption and thus generate economic growth seems to not be confirmed by the empirical results presented here.

5. Concluding remarks

Overall, the empirical findings suggest that housing and consumer household debt have different reactions to the macroeconomic environment and labour market conditions. The hypothesis that higher household income is associated with higher investment in the form of housing seems to be confirmed. Households in Australia appear to increase their demand for housing and subsequently housing debt, as their income from employment increases. This demand is also met with an increased willingness from lenders to supply higher-income households with credit due

to the latter's increased creditworthiness. This dynamic is reinforced by the positive impact that money supply has on housing investment suggesting that expansionary monetary policy, at least in the case of Australia, allows for higher wealth accumulation in the form of housing assets.

When examining the effect of the same macroeconomic variables on consumer debt the findings are not as conclusive. The results suggest the non-existence of a relationship between wages and consumer debt and statistical independence of the latter from the former. Consumption appears to be the primary determinant of demand for unsecured debt suggesting that the relationship between income and consumer finance is broken. Current trends on wage stagnation and the precariousness of employment can provide possible interpretations for the broken relationship between wages and consumer debt. Households possibly substitute wages with consumer credit to avoid temporal fluctuations to their consumption in anticipation of increased future income. The impact of the monetary policy is also important as it appears to negatively impact on personal debt and subsequently consumption. In the current Australia context of expansionary monetary stance, this can have significant implications on the effectiveness of monetary policy on economic growth and wealth inequality.

Finally, the underlying assumption of homogenous households needs to also be addressed. The present paper is limited in this regard as it does not take into consideration how the structure of individual households can affect their financial decision either for investment or consumption. Considerations regarding race, location, intergenerational and single-parent households are only some of the possible extensions. However, they currently lie outside the scope of the present paper which aims to assess the implications of the macroeconomic environment on household debt.

Acknowledgements

I would like to thank the anonymous reviewers whose comments have greatly improved this manuscript.

6. References

Ando, A. & Modigliani, F., 1963. The life-cycle hypothesis of saving: aggregate implications and tests. *American Economic Review,* Volume 53, pp. 55-84.

Berisha, E. & Meszaros, J., 2018. Household debt, expected economic conditions, and income inequality. *International Journal of Finance and Economics,* 23(3), pp. 283-295.

Bloomberg, 2019. *Bloomberg.* [Online]
Available at: https://www.bloomberg.com/news/articles/2019-08-01/australia-property-may-have-found-a-floor-after-two-year-slump
[Accessed 1 October 2019].

Chrystal, A. & Mizen, P., 2001. Consumption, money and lending: a joint model for the UK household sector. *Bank of England, Working Paper no. 134.*

Dabelle, G., 2004. Household debt and the macroeconomy. *BIS Quarterly Review,* Volume March, pp. 51-64.

Dickey, D. A. & Fuller, W. A., 1979. Distribution of the estimation for autoregressive time. *Journal of the American Statistical Association,* Issue 79, pp. 355-367.

Frank, R., Levine, A. & Dijk, O., 2014. Expenditure Cascades. *Review of Behavioural Economics,* Volume 1, pp. 55-73.

Friedman, M., 1957. The permanent income hypothesis. In: *A theory of the consumption function.* Princeton: Princeton University Press, pp. 20-37.

Georgarakos, D., Haliassos, M. & Pasini, G., 2014. Household Debt and Social Interactions. *The Review of Financial Studies,* 27(5), pp. 1404-1433.

Johansen, S., 1988. Statistical Analysis of Cointegration Vectors. *Journal of Economic Dynamics and Control,* Volume 12, pp. 231-254.

Johansen, S. & Jueslius, K., 1990. Maximum Likelihood Estimation and Inference on Cointegration – with Applications to the Demand for Money. *Oxford Bulletin of Economics and Statistics,* Volume 52, pp. 169-210.

Keen, S., 2009. Household Debt: The Final Stage in an Artificially Extended. *The Australian Economic Review,* 42(3), pp. 347-357.

Khan, H., Abdullah, H. & Samsudin, S., 2016. The linkages between household consumption and household debt consumption in Malaysia. *International Journal of Economics and Financial Issues,* 6(4), pp. 1354-1359.

Kim, Y. K., 2016. Macroeconomic effects of household debt: an empirical analysis. *Review of Keynesian Economics,* 4(2), pp. 127-150.

Kusairi, S., Muhamad, S., Musdholifah, M. & Chang, S.-C., 2019. Labor Market and Household Debt in Asia Pacific Countries: ynamic Heterogeneous Panel Data Analysis. *Journal of International Commerce, Economics and Policy,* 10(2).

Kwiatkowski, D., Phillips, B. P., Schmid, T. P. & Shin, Y., 1992. Testing the null hypothesis of trend stationarity. *Journal of Econometrics,* Issue 54, pp. 159-178.

Lombardi, M. J., Mohanty, M. & Shim, I., 2017. The Real Effects of Household Debt in the Short and Long Run. *BIS Working Paper No. 607.*

Magri, S., 2002. Italian Households' Debt: Determinants of demand and supply. *Bank of Italy - Temi di discussione,* Volume 454.

Meng, X., Hoang, N. & Siriwardana, M., 2013. The determinants of Australian household debt: A macro level study. *Journal of Asian Economics,* Volume 29, pp. 80-90.

Meniago, C., Mukuddem-Petersen, J., Petersen, M. A. & Mongale, I. P., 2013. What causes household debt to increase in South Africa?. *Economic Modelling,* Volume 33, pp. 482-492.

Minsky, H. P., 1977. The Financial Instability Hypothesis: An Interpretation of Keynes and an Alternative to "Standard" Theory. *Nebraska Journal of Economics and Business,* 16(1), pp. 5-16.

Nieto, F., 2007. The determinants of household credit in Spain. *Working Paper, Bank of Spain.*

Nizar, B. N., 2015. Determinants of Malaysia Household Debt: Macroeconomic Perspective. *Proceeding - Kuala Lumpur International Business, Economics and Law Conference,* Volume 1, pp. 97-107.

Nomatye, A. & Phiri, A., 2018. Investigating the Macroeconomic Determinants of Hosehold Debt in South Africa. *International Journal of Economics and Financial Issues,* 8(2), pp. 62-69.

Philbrick, P. & Gustafsson, P., 2010. *Australian Household Debt: An Empirical Investigation into the Determinants of the Rise in the Debt-to-Income Ratio (Masters Thesis).* Australia: Lund University Australia.

Reserve Bank of Australia, 2019. *RBA.* [Online]
Available at: https://www.rba.gov.au/media-releases/2019/mr-19-27.html
[Accessed 1 August 2019].

Schwarz, G., 1978. Estimating the dimension of a model. *The Annals of Statistics,* Volume 6, pp. 461-464.

Stengos, T. & Wu, X., 2009. Information-Theoretic Distribution Test with Application to Normality. *Econometric Reviews,,* 29(3), pp. 307-329.

Tudela, M. & Young, G., 2005. The determinants of household debt and balance sheets in the United Kingdom. *Bank of England Quarterly Bulletin,* 45(3), p. 373.

Veblen, T., 1899. *The Theory of the Leisure Class.* Oxford: Oxford University Press.

Zimunya, F. M. & Raboloko, M., 2015. Determinants of Household Debt in Botswana: 1994-2012. *Journal of Economics and Public Finance,* 1(1), pp. 14-36.