Impact of Monetary Policy on Consumer Loan Delinquency

AUTHOR

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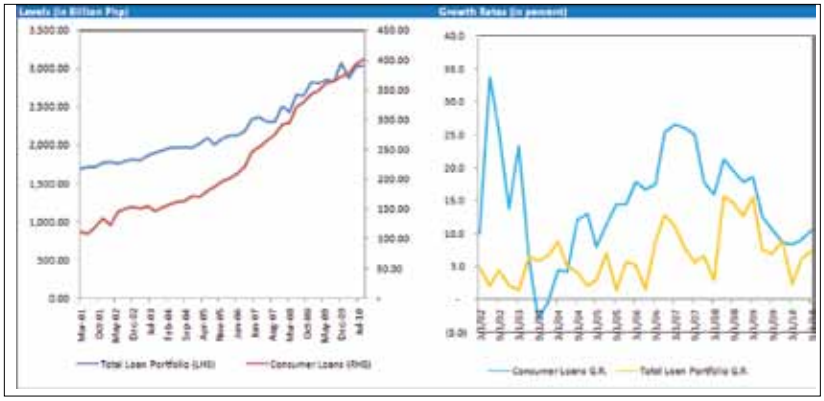
The level of consumer lending in the Philippines has risen considerably in the last decade. From 2001 to the third quarter of 2010, the annual average growth rate of consumer loans[1] (CL) from universal and commercial banks (UKBs) and thrift banks (TBs) stood at 16.3 percent. This year-on-year expansion is more than twice the average annual growth rate in the total loan portfolio of UKBs and TBs of only 6.6 percent. Likewise, the share of household financing to the level of total loan portfolio (TLP) has expanded from 6.6 percent in the first quarter of 2001 to 14.7 percent as of end-September 2010.

Chart 1

Consumer Loans and Total Loan Portfolio of UKBs and TBs



The substantial expansion in household lending can be attributed to the increasing number of products and services offered by the financial sector to the retail market with the general improvement in the operating environment and liberalization of the financial industry in the past years. Similarly, the wider accessibility of the various financing instruments to the previously untapped segments in the market paved the way for households to obtain financing from the formal sector. Furthermore, the massive inflow of remittances from overseas Filipinos increased the disposable income and standard of living of recipient households which inspired them to augment current consumption from external financing driven mainly by the higher level of expected future household income (Tabuga, 2007). Although the level of exposure of household indebtedness to the banking sector in the Philippines has not reached the amount comparable to neighboring Asian countries,[2] the rapid rise in such exposure has numerous macroeconomic implications. The primary aim of this

[1] BSP defines consumer loans as the aggregate of housing loans, loans for purchase of a car, household appliance(s), furniture and fixtures, loans for payment of educational and hospital bills, salary loans, and loans for personal consumption, including credit card loans. However, because of the unavailability of a complete series of consumer loans data, this paper uses the term consumer loans to mean the sum of residential real estate loans, auto loans, and credit card receivables.

[2] Based on Moody's Banking System Outlook for the first quarter of 2010, Malaysia has the highest share of CL to TLP at 54 percent among selected Asian countries. Malaysia was followed by Singapore (44 percent), Hong Kong (35 percent), Indonesia (30 percent), Thailand (22 percent), and the Philippines (15 percent).

paper is to assess how monetary policy affects the quality of household lending and determine specific factors which can influence the health of household balance sheet. The paper discusses the macroeconomic implications of household lending and presents a theoretical model underlying household borrowing. The impact of monetary policy on household loan delinquency was analyzed using a vector autoregression (VAR) model with asymmetric lag lengths. The paper concludes with an analysis of the model and some policy recommendations.

Macroeconomic Implications of Household Debt

The rise in the level of household lending in the Philippines in the past decade reflects the households' response to technological improvements in banking services, lower interest rates, and higher inflow of income from abroad. With higher expected future income and easier access to credit, households augment current consumption and investment by relying on external financing from the formal sector. However, the higher level of indebtedness of households has also increased the vulnerability of their balance sheet. As Debelle (2004) highlights, the increased loan exposure of households has heightened the sector's sensitivity to changes in interest rates, income, and asset prices. The vulnerability of households is more prominent in countries where variable-rate mortgages are prevalent as adjustments in policy rates affect the paying capacity of borrowers. In contrast, in countries where fixed-rate mortgages are dominant, household borrowers are shielded from the direct effect of increases in policy rates. Instead, interest rate risks are borne mostly by the end-holder of the securitized mortgage. Further, Debelle (2004) clarifies that an increase in household indebtedness is not likely to be a source of a negative shock in the macroeconomy. Instead, the increased leverage of households will help amplify the effect of a shock coming from other sources, specifically those that affect household income and consumption. In the case of the Philippines, this may come in the form of a faster rate of inflation, sudden appreciation of the peso, and shocks in the level of global and local unemployment.

Meanwhile, Filardo (2009) points out that the rapid expansion of household credit can be viewed in two ways: An optimistic view is that the deepening of the financial and banking system implies a more sound and efficient environment which helped households tap resources not previously accessible. Another view is that increased exposure implies larger vulnerability for household balance sheets, as households leverage against high and increasing prices of different assets, which may place them in an unstable position of holding too much credit with too heavy debt-servicing cost. The recent global financial crisis highlighted the second point. Particularly in the US, the crisis showed how vulnerability in household loans, particularly from the residential real estate sector, can destabilize the financial system and eventually derail the whole economy. Filardo (2009) also highlights that a rise in the level of household debt is not a sufficient reason to call for a monetary policy response. However, monetary policy decisions should consider the role household debt plays in the economy.

The global financial crisis highlighted the shortcomings of most central banks' monetary policy model. These impelled Filardo (2009) and Muellbauer (2010) to formulate monetary policy models which include an active role of households in the economy. Households, through credit and consumption channels, were

incorporated as an endogenous, rather than the usual passive, variable in monetary policy decision making.

Given the increasing importance of household debt and the sharp rise in its share in the total loan portfolio of the Philippine banking system, it is imperative to assess how the exposure to the household sector is affected by the monetary policy decisions through the different macroeconomic variables. Though the size of consumer loans is still below a quarter of the total loan portfolio of the banking industry, the rapid growth of consumer loans suggests the increasing importance of monitoring the household sector in ensuring a sound and stable financial system.

Model for Household Lending

A two-period life-cycle model of Lawrance (1995) with extensions from Rinaldi and Arellano (2006) was used as a starting point for examining household lending. Assuming perfect financial markets and no uncertainty, households will attempt to maximize utility by smoothing consumption spending over time despite varying income. During periods of relatively low income, households will borrow funds to augment current consumption and repay the loans in periods when income is relatively high. Since income of households is usually low during the early periods and increases gradually over time, younger households solely relying on labor wages may not be able to afford big-ticket spending early in life. Hence, houses and cars are usually acquired through loans during the period. With information asymmetry and market imperfections, availability of credit is hampered by the household's current income level and the ability to raise collateral. Hence, consumption among households varies with their current income and net worth. The life-cycle model postulates that the level of household debt is determined by demographic facts, expected future income, and the real interest rate.

In the two-period model of Lawrance (1995) and Rinaldi and Arellano (2006), households maximize their lifetime utility level given their consumption preference using the equation:

$$V(C_1, C_2) = U(C_1) + \frac{1}{1+e}E(U(C_2))$$

where $U(.)$ is the constant relative risk aversion utility function, C_1 and C_2 are consumptions in the first and second period, e is the rate of time preference, and $E(.)$ is the conditional expectation operator subject to the information available in the first period. Consumption is a function of total income (Y) composed of wages and income from own wealth. Meanwhile, since income is uncertain for the second period, consumption is likewise uncertain. Total income is assumed to follow a stochastic process with Y_L a low level income with probability q and Y_H a high level income with probability (1-q). Further, households can borrow freely at the risk-free rate r which is exogenous. Consumption in the first period can be increased by x_1 units by giving up x_2 units of consumption in the second period, where $x_2=(1+r)x_1$.

We can also format the model in terms of savings decisions by consumers. Households can save x_1 units of consumption for the first period in exchange for x_2 units of additional consumption for the second period. As with the consumption setup, the second period income is still uncertain; hence,

consumption for the second period is also uncertain. Given these, households maximize their intertemporal expected utilities by:

$$V(x_1, x_2) = U(Y_1 + x_1) + \frac{1}{1+e}(qU(Y_L + x_2) + (1-q)U(Y_H + x_2))$$

where $x_2=(1+r)x_1$.

The household maximizes the function at the marginal rate of substitution equals $(1+r)$:

$$MRS = \frac{(1+e)U'(Y_1 + x_1)}{qU'(Y_L + x_2) + (1-q)U'(Y_H + x_2)} = 1 + r$$

where borrowers will have $x_1>0$, $x_2<0$, while savers have $x_1<0$ and $x_2>0$.

In the last two equations, x_1 represents the amount borrowed $(x_1>0)$ or lent $(x_1<0)$ during the first period while x_2 is the payment received $(x_2>0)$ or the payment made $(x_2<0)$ in the second period. As specified by Rinaldi and Arellano (2006), x_2 will only depend on the exogenous real market interest rate (r) under the perfect capital markets scenario. However, banks are willing to lend at r only in a perfect market scenario with no default risk. By incorporating the risk of default into the model, the interaction between the household's intertemporal trade-offs and the terms of the loan will differ. Lawrance (1995) assumes in the model that the bank can claim all income in excess of Y_L if the borrower defaults. Since the household has q probability of receiving Y_L in the second period, then the bank also has q probability that it will not receive any repayment. In this scenario, the bank will consequently charge a rate higher than the risk-free rate but is equal to a competitive borrowing rate where expected profit equals zero. The rate will be equal to $(1+a)=(1+r)(1+rp)$, where rp is the additional risk premium charged by the bank dependent on the probability of default of the borrower, collateral of the loan, and general market conditions. Also, the bank will set a maximum loanable amount, b_{max}, at the rate $1+a$. Hence, a borrower who receives Y_H in the second period can repay

$$b_{max} = \frac{1}{1+a}(Y_H - Y_L)$$

.

Rinaldi and Arellano (2006) extended the model by assuming that a portion of the amount borrowed can also be used for a real or financial investment I. In case of default, the bank can claim the income in excess of Y_L and the financial and real assets. Given this assumption and the probability of default, the borrower will maximize expected utility using:

$$V(x_1, x_2) = U(Y_1 - I_1 + x_1) + \frac{1}{1+e}(qU(Y_L) + (1-q)U((Y + I_2)_H + x_2))$$

subject to the constraint $x_2=-(1+a)x_1$.

Note that this is a two-period model and it is assumed that the entire wealth in the second period has to be consumed. I_1 in the last equation represents the investment made during the first period and I_2 is the market value of the investment in the second period. The sign of I_1 in the last equation is negative because it is the investment amount that does not provide any utility during the first period. Since it is assumed that everything has to be consumed in the second period, the market value of I_2 will be included in the utility function for the last period. The model has been further detailed by assuming two states: the scenario with no default $(Y+I_2)H>-x_2$ and the scenario with default $(Y+I_2)$

$L < -x_2$. In the first state, the borrower enjoys the period of high income and high return on investment and consumes the amount in excess of the loan repayment. In the second state, the borrower will only have low income, which is the amount that cannot be claimed by the lender in case of default. In this equation, x_2 is the amount to repay for the loan x_1 at real lending rate *a* charged by the bank. To recall, *a* is the rate charged by the bank after incorporating the risk-free rate plus some premium dependent on the risk profile of the borrower, quality of the collateral, and the general economic environment. The first order condition of the optimization process is shown by the following equation:

$$MRS_2 = \frac{(1+e)U'(Y_1 - I_1 + x_1)}{(1-q)U'((Y+I_2)_H + x_2)} = 1 + a$$

Rearranging the terms to get the probability of default *q*:

$$q = \frac{(1+a)U'((Y+I_2)_H + X_2) - U'(Y_1 - I_1 + X_1)(1+e)}{(1+a)U'((Y+I_2)_H + x_2)}$$

where $(1+a)=(1+r)(1+rp)$ and $x_2<0$, $x_1>0$.

It can be deduced from the last equation that the probability of default, which is associated with the chance of a loan falling past due, is dependent on the amount borrowed, x_1, current income, Y_1, investment level, I_1, the uncertain future income and wealth due to the possibility of unemployment, and the lending rate. Lastly, it also depends on *e* which Rinaldi and Arellano (2006) associated with the individual's inflation expectation.

Monetary Policy and Household Lending

A two-step process will be taken in analyzing the impact of monetary policy on delinquency of household borrowing. Because of limited data for the quarterly series of consumer loans in the Philippines, a dimension-reduction technique will be initially employed for the macroeconomic data before proceeding to the VAR analysis with asymmetric lag lengths. Using the life-cycle model from the previous section, the author hypothesizes that monetary policy affects household delinquency through the bank lending and household consumption channels. The former analyzes the impact of changes in policy rates to the lending rate charged by the bank and how it affects the capacity of households to service its obligations, while the latter looks at the impact of the monetary policy rate changes to household consumption capacity and how it translates to an increase or decrease in the non-performing consumer loans.

Principal Components Analysis

Principal components analysis (PCA) is a multivariate technique typically used for dimension reduction and index construction from a large set of interrelated variables. PCA is a method for forming new orthogonal variables which are linear composites of the original variables (Sharma, 1996). As a dimension reduction technique, the new set of uncorrelated principal components (PCs) possesses the equal amount of variability of the original data set, but with the first PC possessing the highest variability, followed by the second PC, and so on. The maximum number of the newly derived PCs is equal to the number

of the original variables, but data reduction is greatly achieved if one can find *k* PCs much less than the *p* original variables, with the *k* PCs possessing most of the variability of the original set of data. PCA is usually applied on cross-sectional data for descriptive purposes. Time-series applications of PCA were tackled by Joliffe (2002) with some conditions imposing stationarity and requiring the use of frequency domain analysis. Meanwhile, Lansangan and Barrios (2009) studied the effects of using PCA in non-stationary time series data. The paper reveals that with non-stationarity in the data, the first few PCs often capture the trend of the original variables without necessarily reducing the dimensionality of the data set. Hence, Lansangan and Barrios (2009) utilized the Sparse PCA by Zhou et al. (2006) where sparsity among loadings of the PCA was achieved provided that the appropriate parameters for the algorithm are satisfied.

The main goal of employing PCA in this paper is to lump various economic time series into fewer indices which can be utilized for the succeeding analysis. Since sparsity is not an issue with the data used in the paper, we will utilize the regular PCA to derive the indices. Following the life-cycle model of household debt of Lawrance (1995) and Rinaldi and Arellano (2006), quarterly series from Q1:1997 to Q1:2010 of ten macroeconomic variables believed to be useful in determining the general economic status of households in the Philippines were summarized using PCA. Real wages (RW), the unemployment rate (UR), overseas Filipinos' remittances (OF), the peso-dollar exchange rate (ER), and the inflation rate (IR) are reflective of the flow of income and households' purchasing power. Meanwhile, changes in the value of ownership of dwellings and real estate (ODRE) and the Philippine Stock Exchange index (PSEI) were included to reflect changes in the level of households' wealth. The average commercial lending rate (LR) and savings rate (SR) charged by banks influence households' propensity to save and affect their capacity in servicing their loans, while movements in personal consumption expenditure (PCE) reflect the general movement in the level of disposable income of households in the economy. All variables included in the analysis were deseasonalized using the X-12 ARIMA procedure by the US Census Bureau.

Two principal components were retained which accounted for 80.7% of the total variability of the 10 economic variables used in the analysis. The first principal component (PC1) is driven primarily by the PSEI, ODRE, OF, RW, and PCE, countered by LR, SR, and UR. Higher PSEI and ODRE are reflective of the changes in the relative wealth of households, while movements in the OF, RW, and PCE are a good indicator of households' purchasing capacity. On the contrary, labor market uncertainty and higher financing cost as reflected by UR, LR, and SR, respectively, discourage households from non-essential spending. Given the sign and magnitude of each variable, the first principal component can be summarized as the "Household Consumption Index (HCI)."

Meanwhile, the second principal component (PC2) is dominated by the PSEI and LR, and contradicted mainly by ER and UR. Higher PSEI and LR encourage households to postpone consumption and invest in the financial market while a peso appreciation and job uncertainty reduce risk tolerance of households to enter the financial market. Hence, PC2 was termed as the "Household Investment Index (HII)."

The corresponding eigenvectors for the first and second principal components, with the time series plot of HCI and HII are summarized in the Chart 2.

Chart 2
Principal Components

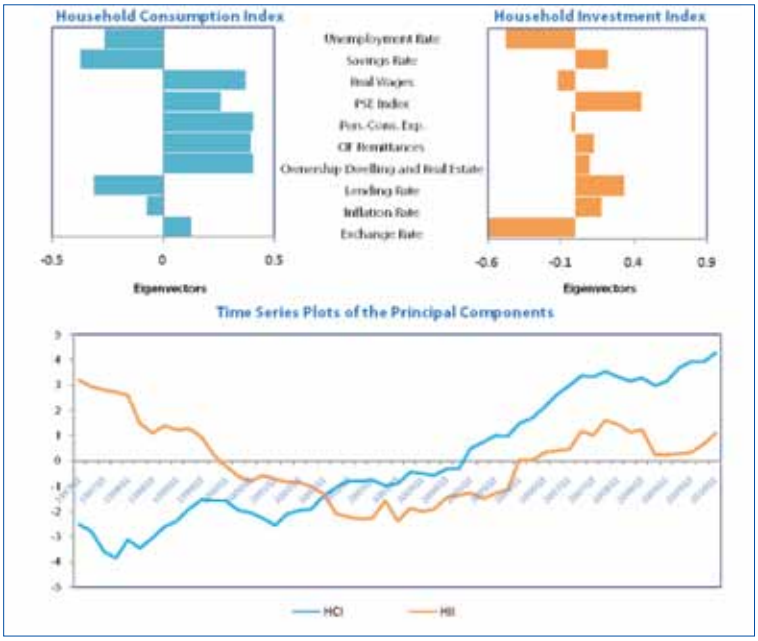


Chart 3
HCI and OF Remittances

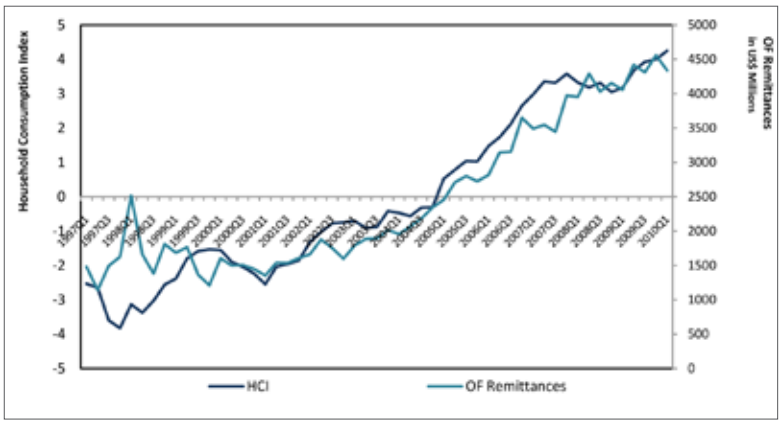
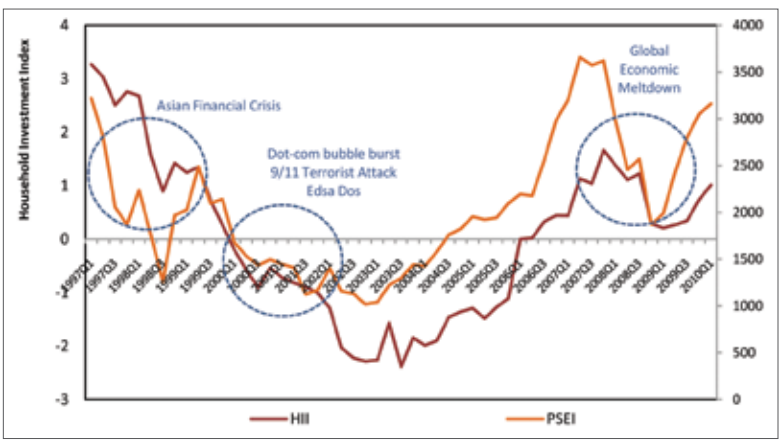


Chart 4
HII and PSE Index



As shown in Chart 3, HCI is highly correlated with the level of OF remittances. This outcome supports the result of Tabuga (2007) which provides evidence that remittances fuel household consumption and that recipient households tend to consume more of their remittances on housing, education, medical care, and other consumer items. The Q2 2010 Consumer Expectations Survey of the Bangko Sentral ng Pilipinas further points to the importance of remittances in providing strong support to domestic consumption. According to the survey, many Filipino consumers believe that owning real property is a good investment and recent trends in the real estate sector show that recipient families allocate 11.9% of remittances they receive for the amortization or full payment of purchased residential real estate properties (BSP, 2010).

Unit Root and Co-integration Test

Before proceeding to the structural analysis, each variable in the model was tested for unit root using the augmented Dickey-Fuller test and the Dickey-Fuller GLS test. Table 3 shows that all variables are integrated at order 1, though the Johansen's VAR-Based co-integration test rejects the co-integration of the groups of variables defined in Table 4.

Table 3
Unit Root Test[3]

Variable	Description	ADF*	DF-GLS-ERS**
RRP	Monetary Policy Rate	I(1)	I(1)
NPLCL	Non-Performing Loan Ratio - Consumer Loans	I(1)	I(1)
NPLCC	Non-Performing Loan Ratio - Credit Card Receivables	I(1)	I(1)
NPLAL	Non-Performing Loan Ratio - Automobile Loans	I(1)	I(1)
NPLRE	Non-Performing Loan Ratio - Residential Real Estate Loans	I(1)	I(1)
LR	Average Commercial Lending Rate	I(1)	I(1)
HCI	Household Consumption Index	I(1)	I(1)

*Augmented Dickey-Fuller Test

**Dickey-Fuller GLS Test / Elliot, Rothenberg and Stock Test

Table 4
Variable groupings for the co-integration tests

Group	Variables
1	RRP - HCI - NPLCL
2	RRP - HCI - NPLRE
3	RRP - HCI - NPLCC
4	RRP - HCI - NPLAL
5	RRP - LR - NPLCL
6	RRP - LR - NPLRE
7	RRP - LR - NPLCC
8	RRP - LR - NPLAL

[3] NPLCL refers to non-performing consumer loans, while NPLCC, NPLAL and NPLRE stand for non-performing credit card receivables, non-performing autoloans and non-performing real estate loans, respectively.

Vector Autoregression with Asymmetric Lag Lengths

A subsequent analysis was conducted on the derived household consumption index to determine the impact of monetary policy on financial stability through the household consumption channel. Given that the monetary policy tool affects the demand side factors in the economy, it is assumed that changes in the policy rate, represented by the central bank's reverse repurchase rate (RRP), will affect households' investment and consumption decision and debt-servicing capacity. The HCI was used in the structural analysis as a 'link' between RRP and household loan delinquency. Similarly, changes in RRP are assumed to influence the rate charged by lending institutions to their clients since most loan re-pricing mechanisms are tied to the RRP rate by the central bank. A VAR model with asymmetric lag lengths was specified for the non-performing loans ratio (NPL) of the whole consumer loan portfolio and on each of its subcategory (auto loans (AL), credit card receivables (CCR), and residential real estate (RREL)) in an attempt to build a connection between monetary policy rates and household loan quality.

The employment of asymmetric lag length for the VAR model was inspired by the paper of Braun and Mittnik (1993) and Lutkepohl (1993). These papers show that the VAR model, whose lag lengths vary from the true lag length, provides inconsistent estimates for the impulse response functions and variance decomposition. Similarly, Lutkepohl (1993) shows that misspecification in the lag length of the VAR model produces estimates with substantially higher mean-square forecast error or autocorrelated errors compared to the correctly specified model.

This paper used a two-stage methodology for the VAR estimation. First, an unrestricted VAR model was defined for each group of variables using the Akaike's information criteria (AIC) and Schwarz's information criterion (SIC). Each lag parameter of the estimated unrestricted VAR model was evaluated and those that were highly insignificant were dropped from the equation. The impulse response function was defined based on the re-estimated model with asymmetric lags.

Discussion of Results

The results of the VAR models that were estimated (both at the aggregate and specific levels) support the findings of Debelle (2004) which showed that loans that move with changes in interest rate create a more adverse effect on the loan delinquency of households, while loans which have fixed interest rate charge buffer households from the negative effect of a rising interest rate. We first discuss the results of the VAR model from the HCI channel then the estimates from the bank lending channel. We analyze the estimates from the resulting impulse response function (IRF) at a 90 percent level of confidence (see Appendix).

Impulse definition: Policy Rate > Household Consumption > Loan Delinquency

The result of the model shows that household spending is rather inelastic with a one-time shock in the RRP at a 90 percent level of confidence. This result may be due to the fact that a one-standard deviation increase in the policy rate is not sufficient to reduce household consumption which is driven mainly by remittance inflow, job uncertainty and the value of households' property and investments. This result is consistent for all VAR models estimated for the household consumption channel.

In terms of loan quality, the one-time shock in the policy rate will temporarily improve the household loan delinquency at the aggregate level of CL by as much as 0.26 standard deviation (SD) within 2 quarters. This temporary improvement came as the non-performing RRELs[4] similarly fell by as much as 0.43 SD within a quarter after the shock in the policy rate. However, RRELs will eventually feel the adverse impact of the interest rate shock after 7 quarters, with an approximate increase in the ratio of NPL by 0.34 SD. Meanwhile, both the NPL ratio of CCRs and ALs are unaffected by the jolt in the policy rate through the HCI channel. This result is consistent with the findings of Debelle (2004). Auto loans and credit card borrowings are short-term loans, with interest charge 'fixed'[5] for the lifetime of the loan. Meanwhile, most real estate loans are subjected to regular interest rate re-pricing based on the prevailing market interest rate. Residential real estate loans are typically re-priced every four quarters at the minimum, depending on the loan agreement signed by the borrower with the financing entity. Hence, the intuition behind the temporary improvement in the loan delinquency after a quarter for the RRELs is that borrowers, assuming they also allocate funds for investment, feel better off by paying a rate relatively lower than the prevailing market interest rate while enjoying higher yield from their financial assets. However, come re-pricing period, the borrower will suddenly face higher interest premiums from lending institutions due to the one-time shock in the policy rate.

Meanwhile, the orthogonal impulse response from a positive shock in the HCI (implying a one-time improvement in the purchasing capacity of households) improves loan delinquency of the aggregate CL portfolio within one quarter, while the NPL of CCRs and RRELs will improve after two quarters and one quarter, respectively. The NPL ratio of ALs, on the other hand, will be unaffected. This further confirms Debelle (2004) which highlighted that vulnerabilities in the economy will be further amplified by the larger balance sheet exposure of households. For instance, a negative shock in the level of unemployment or remittances from OFs abroad will bring more prominent and immediate adverse effects in the balance sheet of lending institutions.

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[4] As of end-September 2010, residential real estate loans accounted for the largest share of total CLs at 44.5 percent (or P178.8 billion), followed by credit card receivables with 27.8 percent (P111.9 billion) and by auto loans with 27.6 percent (P111.0 billion).

[5] Traditional automobile loans offered by UKBs and TBs usually have maximum loan terms of 5 to 6 years. The interest rate is fixed for the lifetime of the loan, computed outright upon loan availment. Meanwhile, credit card receivables are similar to short-term loans with interest rates being charged only after the non-payment of total monthly due.

Impulse definition: Policy Rate > Bank Lending Channel > Loan Delinquency

Similar to the results from the household channel, a positive shock in the RRP produces a temporary improvement in the delinquency ratio of the aggregate level of CLs, and for the ALs and RRELs subcategories. For the total CL portfolio, the short-term reduction in the NPL ratio will be felt within a quarter by approximately 0.19 SD. Likewise, the temporary improvement in the ALs delinquency will be transmitted after three quarters, with an approximate decrease of 0.05 SD. Lastly, a 0.32-SD fall in the NPL ratio of RRELs will also be felt immediately after 1 quarter. On the contrary, credit card receivables will be unaffected by the shock in the RRP.

Meanwhile, a shock originating from the average commercial lending rate will immediately spike the NPL ratio of the total CL after two quarters by approximately 0.26 SD. Similarly, the NPL ratio of RRELs will temporarily increase by around 0.56 SD, approximately seven quarters after the initial shock. ALs, on the other hand, will see a temporary reduction in the delinquency ratio by 0.12 SD after 2 quarters. Non-performing credit card receivables will be unaffected by the jolt in the lending rate.

Conclusion and Policy Implications

Household lending in the Philippines has grown significantly in the past decade and has increased the vulnerability of the macroeconomy from shocks coming from the household sector. We saw in the empirical analysis that both the household consumption channel and the bank lending channel effectively transmit weaknesses of the household sector to the balance sheet of lending banks through their exposure in consumer loans. Furthermore, monetary policy decisions affect the quality of the consumer loan portfolio via the household consumption and bank lending channel, with the residential real estate portfolio being the most sensitive among subgroups. For the household consumption channel, a shock in the RRP rate will be predominantly felt by the residential real estate loan portfolio with a rise in the NPL ratio after seven quarters. Meanwhile, the increase in the policy rate will create a temporary improvement in the NPL ratio of the residential real estate loan portfolio in the next quarter.

A one-time increase in household consumption creates a larger and more direct impact on household loan delinquency. A one-standard-deviation shock in the HCI (which is driven largely by remittances from abroad, level of unemployment, real wages, etc.), immediately improves the delinquency rate of the aggregate CL portfolio, CCRs, and RRELs.

The bank lending channel has a more effective impact on household loan delinquency in contrast to the other channel since it directly adjusts the cost of household borrowing. The shock in the RRP transmitted to the household sector through the lending rate channel will have a statistically significant impact on the delinquency rates of RRELs, ALs, and the total CL portfolio. Moreover, a positive shock in the lending rate transmits a larger and more adverse impact on households' paying capacity, creating loan delinquency rate spikes in the RRELs and total CL portfolio.

The research also confirms the findings of Debelle (2004) stating that household vulnerability is more prominent in loans with variable interest rates (i.e., real estate loans) compared to loans with a fixed borrowing rate (i.e., credit card and auto loans). A fixed borrowing rate shields households from the direct effect of increases in the policy rates.

The findings of this paper highlight the link between monetary policy and financial stability. In the current inflation-targeting framework of the BSP, this paper shows that a trade-off exists between maintaining low levels of inflation and financial stability. Given that an increase in the policy rates will help maintain low levels of inflation, this action may similarly put pressure on the asset quality of banks heavily exposed to consumer lending, which may have a negative spill-over to the other agents in the industry. These findings highlight the importance of macro-prudential policies that help regulate the exposure of the banking system to specific sectors of the economy, and prevent the build-up of imbalances that can potentially threaten financial stability. At the same time, reiterating Filardo (2009), monetary policy decisions should also consider the role that household debt plays in the economy.[6]

Moreover, this paper may act as an initial step in the inclusion of a more dynamic role of households in macroeconomic models. McNelis et al. (2009) constructed a dynamic stochastic general equilibrium (DSGE) model for policy analysis in the Philippine macroeconomy. In the model, the household sector was defined as a passive agent in the economy - supplying labor, making deposits in banks, and consuming goods in the economy. In contrast, as the share of household lending in the economy rises, it may be timely to recalibrate and redesign the model in such a way that households' balance sheets provide a feedback mechanism in response to changes in policy rates from the central bank.

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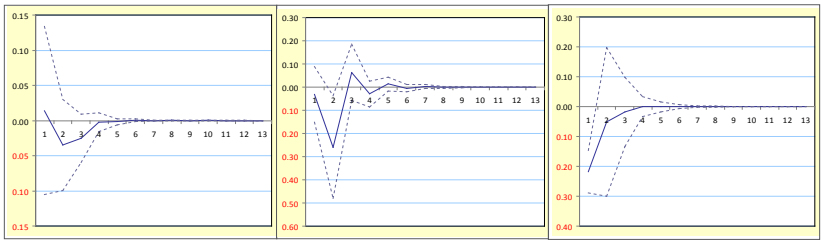
[6] A number of researches have highlighted the important role of monetary authorities in balancing both monetary and financial stability due to the strong linkage between the two. As specified in the paper of Bordo and Jeanne (2002), policy rates have a strong link to the development and/or bursting of asset price bubbles which affect the balance sheet of financial institutions. Meanwhile, Borio and Lowe (2002) and Bernanke and Gelter (2000) argue that instability in the financial sector builds up during periods of low and stable inflation through the increasing pressure in the credit channel and in the rise of asset prices. The development of asset bubbles in the market can result in large market corrections, which may have adverse effects on economic output, the financial sector's balance sheet, and both the monetary and financial systems. Hence, it is suggested that central banks should formulate policies which attempt to preserve balance in monetary and financial stability.

Impulse Response on the Effect of Monetary Policy Shocks on Household Loan Delinquency

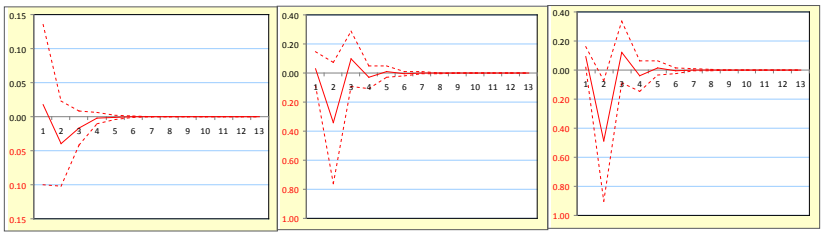
Household Consumption Channel

Cholesky Definition: Monetary Policy Rate > Household Consumption Index > Non-Performing Loans

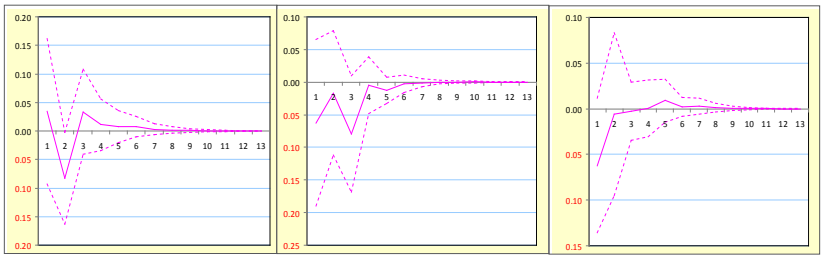
RRP to HCI | RRP to NPLCL | HCI to NPLCL



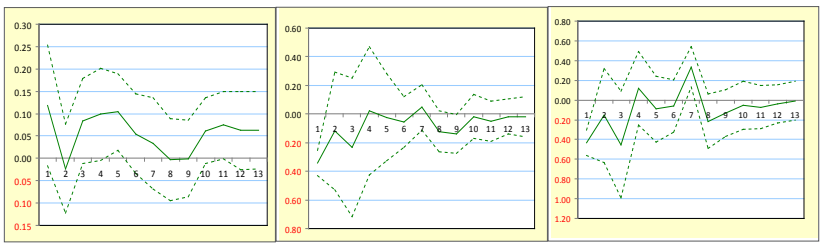
RRP to HCI | RRP to NPLCC | HCI to NPLCC



RRP to HCI | RRP to NPLAL | HCI to NPLAL



RRP to HCI | RRP to NPLRE | HCI to NPLRE

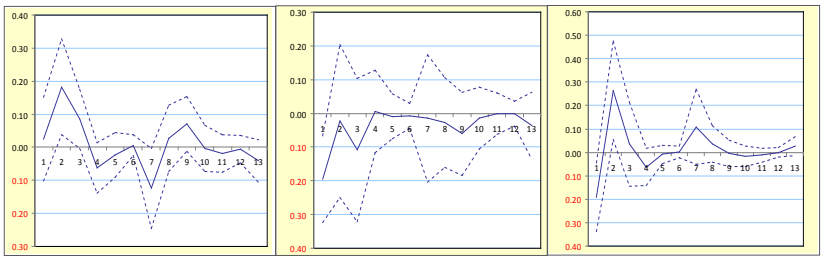


Impulse Response on the Effect of Monetary Policy Shocks on Household Loan Delinquency

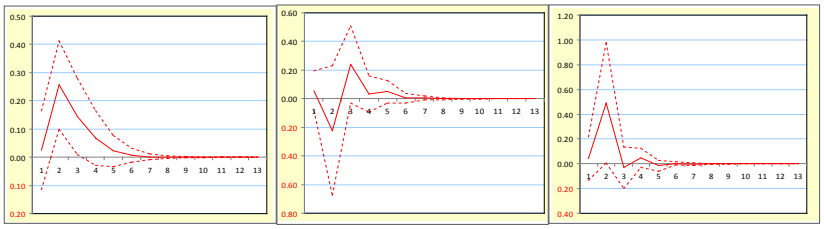
Bank Lending Channel

Cholesky Definition: Monetary Policy Rate > Average Commercial Lending Rate > Non-Performing Loans

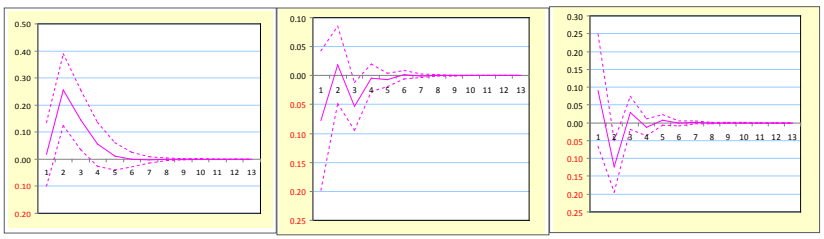
RRP to LR | RRP to NPLCL | LR to NPLCL



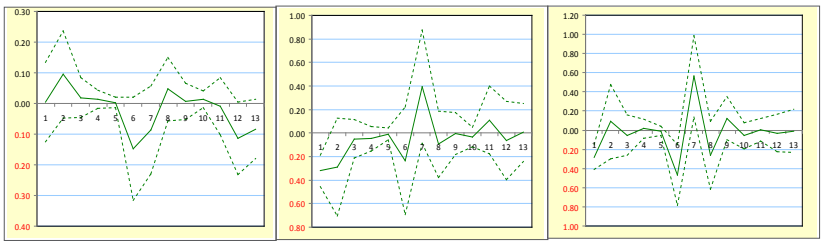
RRP to LR | RRP to NPLCC | LR to NPLCC



RRP to LR | RRP to NPLAL | LR to NPLAL



RRP to LR | RRP to NPLRE | LR to NPLRE



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