BSP Vision

The BSP aims to be a world-class monetary authority and a catalyst for a globally competitive economy and financial system that delivers a high quality of life for all Filipinos.

Mission Statement

The BSP is committed to promote and maintain price stability and provide proactive leadership in bringing about a strong financial system conducive to a balanced and sustainable growth of the economy. Towards this end, it shall conduct sound monetary policy and effective supervision over financial institutions under its jurisdiction.

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Innovative Solutions to Increase Access to Finance: The Role of Enabling Policy and Regulation

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The municipality of Agutaya in Palawan Island has ten barangays and over 10,000 residents (NSCB, 2011). Should the residents want to access financial services from a bank, they have to travel for two and a half days and spend a significant amount of money to rent a lantsa (big boat). This situation is not unique. Agutaya is only one of 610 municipalities in the Philippines (out of 1,635) without a banking office.

Access to financial services is important for every household. Recent empirical evidence indicated that access to basic financial services such as savings, payments and credit makes a substantial positive difference in people's lives (Dupas & Robinson, 2009). For the poor, the need for such access is even more important. Financial tools become vital for managing meager incomes that will allow them to meet their family's daily needs. In the book *Portfolios of the Poor* (Collins, Morduch, Rutherford and Ruthven, 2009), it was found that without access to basic forms of financial intermediation, small emergencies often triggered broader economic crises. Families were also unable to accumulate savings, build assets and seize opportunities to increase income thereby depriving them of a chance at a better life.

In addition, a financial system which is able to mobilize broad-based savings and invest in the growth of the productive sector drives economic growth (Levine, Loayza and Beck, 2000). Aside from the strong indications of the relationship of deep financial systems to growth, a deeper and more diversified financial system also contributes to financial stability (Hannig & Jansen, 2010).

Interest in building an inclusive financial system, one where there is access for all, has therefore become an important policy objective. In 2009, the G20 leaders, amid the global financial crisis and economic downturn, recognized the reinforcing policy objectives of financial stability, financial inclusion and consumer protection (G20 Leaders Declaration, 2009). This recognition is also evident in the growing number of countries adopting some aspect of a financial inclusion agenda under the purview of the main financial regulator (Consultative Group to Assist the Poor (CGAP) & World Bank (WB), 2010). [1]

Realizing that both the depth and breadth of access are crucial to stable and broad-based growth in the Philippines, the Bangko Sentral has taken significant and pioneering steps in ensuring a sound, stable and inclusive financial system.

Current Access Scenario and the Bangko Sentral's Response

The Bangko Sentral's banking reforms and efforts at strengthening the banking system to allow strong banks to expand their operating networks have borne fruit. The banking system has expanded its reach with 739 head offices, 8,176 branches/other offices and 9,847 automated teller machines (ATMs). This is an impressive 17 percent increase of banking offices in the last six years despite closure and consolidation of some banks (Bangko Sentral ng Pilipinas (BSP), 2011).

[1] 90 percent of the 142 countries included in the survey have some financial inclusion agenda.

Yet, the challenge of increasing access to financial services remains a daunting one. Aside from the lack of banks in a large percentage of the country's municipalities, concentration of banking services are generally biased toward higher-income areas leaving much of the low-income areas significantly underserved. For example, more than 50 percent of the country's deposit accounts are found in the National Capital Region where each of its 17 municipalities/cities have banking offices as compared to the Autonomous Region of Muslim Mindanao, the poorest region, where only 8 of their 118 municipalities/cities (7 percent) have banking offices (BSP, 2011).

There is also much room for improvement in terms of usage of formal financial services. The latest global Financial Access Report (CGAP & WB, 2010) indicated that only 26 percent[2] of the country's adult population has a basic deposit account. Other studies have estimated this figure at 35 percent (McKinsey, 2010).[3] Further, in a survey of mid-sized, non-metro cities, over 60 percent[4] of households still keep their savings at home (CGAP, 2005). While these indicators are not perfect measurements of inclusion or exclusion, and do not even touch on the many possible reasons for such exclusion, it can be safely surmised that many Filipinos, especially the poor, are therefore left wanting for much needed financial services.

The current access to finance scenario shows that traditional constructs, while successful in delivering financial services, leave much to be desired. There is an urgent need to find new ways to deliver useful and quality financial services to more people in a safe, sound and sustainable manner. Thus, innovation plays a central role in expanding the scale and scope of the banks to effectively reach the unserved or underserved.

The Bangko Sentral has taken serious and deliberate measures in establishing a supportive regulatory environment that can allow such innovations and market-based solutions to address financial access issues to blossom. The general approach is to promote an enabling environment based on the proportionate application of sound and generally accepted regulatory and supervisory principles toward the establishment of an inclusive financial system.

The envisioned inclusive financial system recognizes the need for a wide range of services such as savings, credit, insurance, payment services and remittance which are appropriately designed and priced; and delivered by institutions that have the authority and capacity to safely and effectively provide or deliver such services. New players also have a crucial role in leveraging on the physical network of banks to further expand the touch points to access financial services. For all these to work, it is important that all providers are properly and proportionately regulated to ensure consumer protection, financial system stability and integrity.

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[2] This estimate is based on a regression model created using data from 46 countries with household data on banked individuals wherein the number of banked individuals is predicted using the estimates of the model where the number of deposit account per 1,000 adults and number of branches per sqkm are controlled for.

[3] This is based on a survey with a sample of 900 consumers undertaken jointly by GSM Association (GSMA), CGAP and McKinsey.

[4] Based on a random sample of 1,285 persons in major market places in the cities of Butuan (North Eastern Mindanao), Baguio (Central Cordillera region) and Bacolod (Negros Occidental). Approximately 70 percent of the sample had incomes below the median household income in the Philippines at that time.

Founded on this framework, many innovations have emerged which have demonstrated success. Innovations in products as well as delivery channels boast of positive results in terms of sustained and expanded delivery of financial services.

Microfinance: A Success in Product Innovation

Microfinance is defined as a broad range of financial services such as deposits, loans, payment services, money transfers and insurance products to the poor and low-income households, generally for their microenterprises and small businesses, to enable them to raise their income levels and improve their living standards (BSP, 2010). Apart from this definition, microfinance is also seen as a methodology and technology which has proven that a properly designed product, aligned with the needs and capacities of the low-income sector, can be provided in a sustainable and viable manner.

In 2000, the General Banking Law mandated the Bangko Sentral to recognize microfinance as a legitimate banking activity. This came at a time when microenterprises, and even the small and medium enterprises, faced the usual barriers in accessing credit – lack of collateral, voluminous requirements, lack of credit history, among others. Microenterprises often had to resort to informal lenders who exacted a steep price. Financial institutions were also wary of this market due to high credit risk and transaction costs.

The Bangko Sentral then endeavored to create the environment to address these barriers. The main objective in the approach to bank-based microfinance is to enable the delivery of commercially sustainable microfinance in the banking sector where the government only provides a supportive role through policy, regulation and capacity building. Successful microfinance practices around the world were studied to set in place regulations that recognized and accepted best practices such as using group support or liability arrangements, cash flow-based lending, and high-frequency amortizations that matched a client's cash flow. This allowed traditional rural banks and thrift banks that were willing to adopt the new technology from technical assistance providers to legitimately transform their business model.

Entry into the banking system was also liberalized, which created an environment that allowed new entrants into the market particularly through the establishment of microfinance-oriented banks which are licensed and regulated as regular banks but dedicate at least 50 percent of their loan portfolio in microfinance. This became an ideal vehicle for microfinance NGOs that wanted to transform into formal financial institutions which are able to mobilize savings from the general public. The further liberalization of branching regulations allowed the establishment of microfinance-oriented branches as well as micro-banking offices (MBOs). In terms of requirements, MBOs are "stripped-down" or simple branches that make it easier for a bank to have a presence in areas where it may not be immediately economically feasible to set up a full bank branch such as small markets or hard-to-reach areas.

Box 1[5]

MBOs Bringing Services to Hard-to-Reach Areas

CARD Bank has successfully delivered microfinance products to its nearly 300,000 clients. It has attributed using MBOs as a key factor to the significant increase in its outreach. As an example, just five of its MBOs are servicing 11,000 clients with a loan portfolio of PhP 55 million and a savings portfolio of PhP 32 million. In less than one year of its MBO operations, these five offices have seen an increase in its clients, loans and savings by 34 percent. The bank sees the MBO as an ideal vehicle to service harder-to-reach areas, reach new markets as well as provide greater convenience for its clients. The increase in its deposits has been significant due to the proximity of the MBOs to its clients.

Recently, more innovative products have been developed by the market to respond to the obvious demand for a wider range of products beyond credit or microenterprise loans. These include micro-agri loans, housing microfinance loans, micro-deposits and microinsurance. These products are built on the best practices of microfinance, such as frequent amortizations or payments based on client capacity and cash flow.

The Bangko Sentral remained responsive to these innovations and created the regulations that allow them to be provided in the market in a safe manner. At present, microfinance clients are now able to access loans for their businesses and at the same time access other products for their other needs. No longer do they have to apply for a microfinance loan and use it both for their business and for the expansion of their homes. There are now products directly attuned to their needs. For the banks, they have been able to increase the value of their service to their markets as well as improve the transparency in their portfolios.

Box 2[6]

Benefits of Product Innovation

Ms. Rizza Mascardo has been a client of Cantilan Bank since 2003 under its microfinance program. Her business of selling local snacks and treats such as puto, ice candy, banana cue and bread has been steadily growing with the help of a microfinance loan. Since 2003, she has had 20 loan cycles from the bank starting from PhP 5,000 to her last loan of PhP 100,000. Even before her business flourished, she always dreamed of a bigger and better home for her family. In 2009, she applied for a housing microfinance loan and, in two cycles, she was able to proudly construct her new home.

While these innovations have been allowed in the banking system, prudent standards have been instituted for the conduct of microfinance operations, including the use of portfolio-at-risk[7] to monitor and measure portfolio quality in the context of risk-based supervision. This approach has allowed bank supervisors to fully understand the risk profile of microfinance and not lead the banks to simply avoid exposure to this market.

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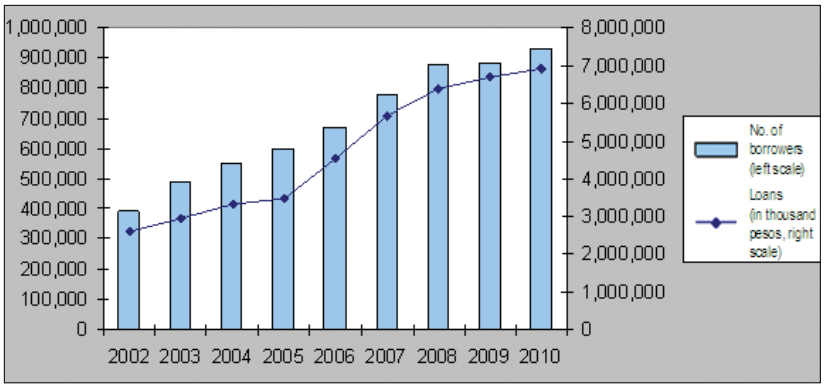
[5] Information from CARD Bank, a microfinance-oriented rural bank

[6] Information from Cantilan Bank, a rural bank with microfinance operations

[7] The outstanding principal amount of all loans that have at least one installment past due for one or more days. The amount includes the unpaid principal balance but excludes accrued interest (BSP, 2003).

The Bangko Sentral's enabling environment for microfinance has borne much fruit. In 2001, shortly after the initial issuance of circulars for microfinance, there were 119 banks with microfinance operations serving 390,000 clients with an outstanding portfolio of PhP 2.6 billion. As of March 2011, there were 202 banks with microfinance operations reaching nearly one million clients/ households with loans outstanding amounting to PhP 7.3 billion and savings of PhP 3.6 billion (BSP, 2011). The steady increase of players and outreach is evidence of a growing and dynamic industry.

Box 3



Apart from the numbers, the Bangko Sentral has received international recognition for the significant strides it has made in microfinance. For three years in a row, the Economist Intelligence Unit's global survey on microfinance (Economist Intelligence Unit, 2011) has ranked the Philippines as number one in the world (out of 55 countries) in terms of policy and regulatory framework for microfinance and consistently in the top 10 overall, which includes other criteria such as institutional frameworks and stability.

Electronic Money and Mobile Banking: Technological Innovations in Service Delivery

The use of information and communication technology in delivering financial services holds the promise of reaching new markets that conventional infrastructures (i.e., brick and mortar bank offices) are unable to service. One such technological application is the use of mobile phones as channels to access financial services or what some have defined as branchless banking.[8] The potential to reach new markets, together with the promise of increased efficiency and lowered costs, has demonstrated a significant growth and has spurred the interest of many.

The interest is not only from within the financial system but also from other players such as telecommunications companies. A study by McKinsey and Company elaborated that providing financial services for the unbanked are among the most promising opportunities for mobile telecom operators "hoping to counter slowing subscription with auxiliary offerings such as banking, health care and education services (2010)."

These opportunities are clearly present in the Philippines. The country has an estimated 80 percent mobile phone penetration (McKinsey, 2010), significantly larger than banking penetration. An even starker contrast is seen when

[8] The use of information and communication technologies and non-bank retail channels to reduce costs of delivering financial services to clients beyond the reach of traditional banking (CGAP, 2008)

compared to insurance coverage, which is only at around 12 percent[9] (Llanto, Geron and Almario, 2009) of the population. This large mobile penetration represents users across all income groups in both urban and rural areas. Filipinos have also demonstrated comfort with using the short messaging system (SMS) or "texting" (they send over a billion text messages in a day), earning for the Philippines the recognition as the "most SMS-intensive country in the world (Wireless Intelligence, 2007)."

It is crucial to note that results of the survey in the Mckinsey study showed that a large percentage of the country's unbanked has a mobile phone and nearly 60 percent of these unbanked mobile customers keep some form of savings and 13 percent borrow from various informal sources. The overall results of the survey led to the conclusion that the "unbanked have a desire to use a range of financial services, particularly savings, and—especially among the lowest-income groups—are comfortable using mobile devices to get them (2010)."

From a financial inclusion standpoint, these facts present an enormous and possibly even transformational opportunity. The depth and breadth of the reach of mobile phones can be massively leveraged as possible access points for basic fund transfer activities and, with the appropriate linkages, for financial services.

The country's top telecommunications companies recognized this opportunity and launched their respective electronic money (e-money) products. Smart Communications launched Smart Money in partnership with Banco de Oro in 2000 and expanded the product features in 2003 while Globe Telecom, through its 100 percent-owned subsidiary GXchange, launched Gcash in 2004. These e-money products, stored in a mobile phone or a card, are pre-paid, low-value fund transfer mechanisms which allow their holders to make purchases, send and receive e-money, pay bills and make other similar transfers electronically.

The Bangko Sentral recognized the potential of these innovations to increase the efficiency and accessibility to make low-value payments. In addition, these innovations also provided a significant growth potential in terms of efficient and cost-effective delivery of remittances from over 8 million overseas Filipinos amounting to over USD 1.6 billion in monthly remittances (BSP, 2011). Since many of the beneficiaries have mobile phones, they provided an additional safe, convenient and cost-effective channel.

Box 4[10]

Sending PhP 1,500 and Encashment	*E-Money**	*Remittance Agent*	*Pawnshop**	*Bank*
Total for P1500 principal amount	*P11.50*	*P120*	*P80*	*P152.50*
% of PHP 1,500	*0.8%*	*8%*	*5.3%*	*10.2%*

* Average of two e-money providers and pawnshops

[9] 2006 figures measuring number of life insurance in force to the total population

[10] Prices were gathered through telephone interviews with various stated providers.

The Bangko Sentral therefore endeavored to fully understand the product, the underlying technology and systems to appropriately identify the risks, the possible ways to address them as well as other issues surrounding this novel application. It also remained flexible in light of the different models that were emerging. The Bangko Sentral saw the importance of its involvement in the evaluation and approval of the two products and therefore used existing regulations to appropriately and actively engage both service providers. As a result, adequate space was created for both a bank-led (Smart Money) and a non-bank-led (Gcash) model to be developed.

The banks also saw the opportunities in the e-money space and actively made use of these available platforms as channels to provide financial services.In a matter of five years, there were over 50 rural banks that used e-money as a channel to receive deposits and microfinance loan payments, and pay out microfinance loans to their clients (BSP, 2011). This new delivery channel has dramatically lowered transaction costs for both the bank and the client, increased the productivity of account officers, decreased cash-on-hand risk and increased access to financial services.

As the technology, products and applications developed, the Bangko Sentral continued to be responsive by crafting appropriate regulations and undertaking necessary initiatives. By issuing regulations on e-money, it created a clear framework for e-money business in the country. The regulations provided qualifications of e-money issuers (i.e., capital requirements, fit and proper standards, etc.), rules in the issuance of e-money (i.e., transaction limits, anti-money laundering compliance, security features, and consumer protection) and parameters in the development of e-money agent networks. The regulations also addressed the potential entry of new players, provided for a clear and level regulatory framework, and allowed for the orderly development of e-money. The Bangko Sentral further issued regulations that allowed banks to outsource e-money activities to an e-money service provider to leverage on existing investments in infrastructure. This awards banks the option to create linkages with e-money service providers like telecommunications companies or become e-money issuers either directly or through outsourcing arrangements. This presents an enormous opportunity for banks to create their own local agent network in partnership with merchant customers as extended financial access touch points, thereby expanding their virtual reach to unbanked communities.

Recently, the Bangko Sentral issued another circular on updated anti-money laundering rules and regulations which provides a crucial complement to the developing e-money ecosystem. With the new rules, barriers to customer acquisition especially for the unbanked are addressed particularly the requirement of face-to-face contact with a bank personnel to open an account. The recent issuance allows banks to outsource or rely on customer identification by duly authorized agents that are located in unbanked communities. It therefore addresses the limitations of the existing physical reach of banks and lowers the cost of acquiring new customers. The decision to open accounts and provide credit still rests on the bank.

Recognizing the potentially revolutionary solution for low-value payments, what the Bangko Sentral endeavored to create, is a policy and regulatory environment that enables the creation of a broad, sound and proportionately regulated e-money ecosystem comprised of ubiquitous agent networks that can have a massive reach as potential outlets. Financial service providers can therefore build and leverage on this infrastructure to deliver their financial services. At present, there is evidence that this enabling environment is delivering positive results. There are now 21 e-money issuers that are banks and two that are non-banks. These issuers have an expanding agent network currently with 25,000 cash in/out agents. As of end-2010, there were nearly 150 million e-money transactions amounting to PhP 440 billion (BSP, 2011). E-money applications have also enabled meaningful retail payments. E-money is currently being used to pay out government's conditional cash transfer (CCT)[11] to over 400 municipalities in the country.

Complementing these numbers is the recognition that the Bangko Sentral is a global leader in establishing the appropriate enabling environment for mobile banking, in particular, and branchless banking, in general, to flourish in the country (CGAP 2008). *The Economist* published an article with the sub-title "Follow the Filipinos" (2007) referring to the well-balanced regulatory approach by the Bangko Sentral in promoting mobile banking.

Conclusion

Based on the initial positive results, these innovations prove that they can possibly unlock the potential of reaching large populations of unbanked in our country. Innovative solutions, whether in product design or service delivery, can go beyond the confines of conventional thinking, break down barriers to access, bridge gaps and ultimately create new pathways that benefit and transform the lives of millions. In all of these undertakings, proportionate regulation is the necessary approach. Useful innovations need not be stifled but instead be allowed to operate in an environment where the risks associated with such innovations are adequately understood and addressed and where there is a judicious and proportionate application of sound principles.

The municipality of Agutaya now has an e-money cash in/out agent through which many of its residents are receiving their conditional cash transfers from government (GXI, 2011). With enabling policies and regulations that allow for innovative products, delivery channels and strategic linkages, this can be seen as the important first step in finally including the residents of this municipality into the formal financial system.

[11] The Philippines is implementing a CCT program called the Pantawid Pamilyang Pilipino Program (PPPP). The CCT program provides cash to the poorest households as long as they comply with the conditions of the program (Fernandez & Olfindo, 2011).

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Impact of Monetary Policy on Consumer Loan Delinquency

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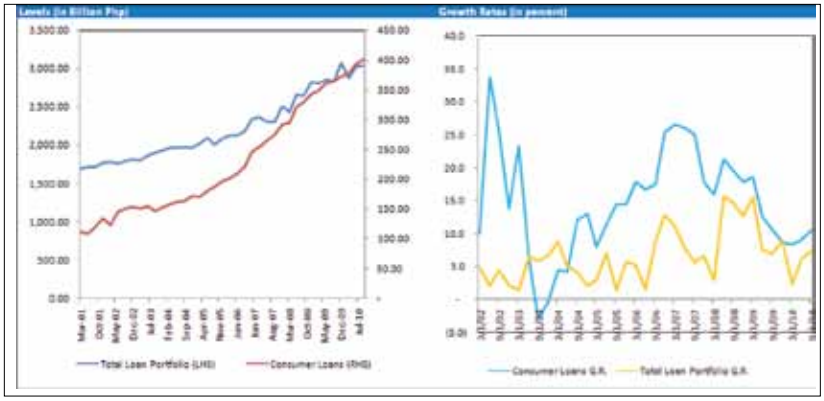
The level of consumer lending in the Philippines has risen considerably in the last decade. From 2001 to the third quarter of 2010, the annual average growth rate of consumer loans[1] (CL) from universal and commercial banks (UKBs) and thrift banks (TBs) stood at 16.3 percent. This year-on-year expansion 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

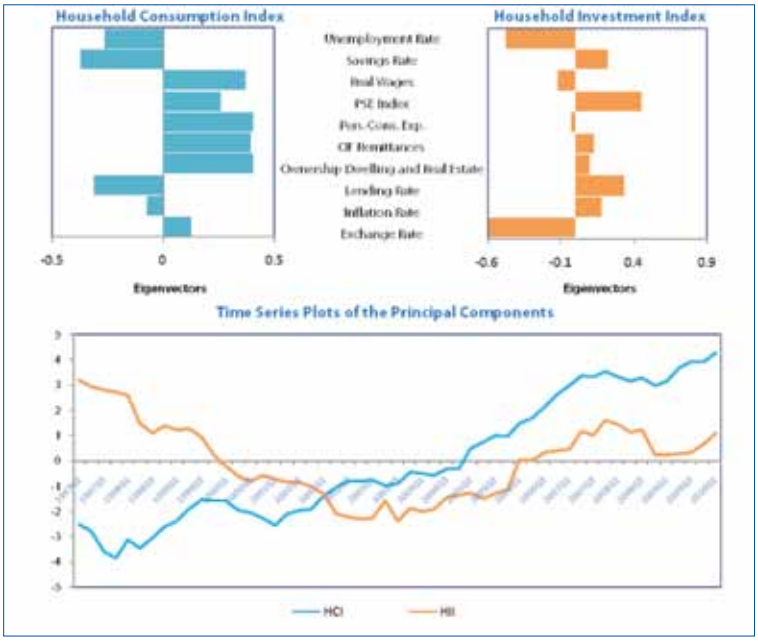


Chart 3
HCI and OF Remittances

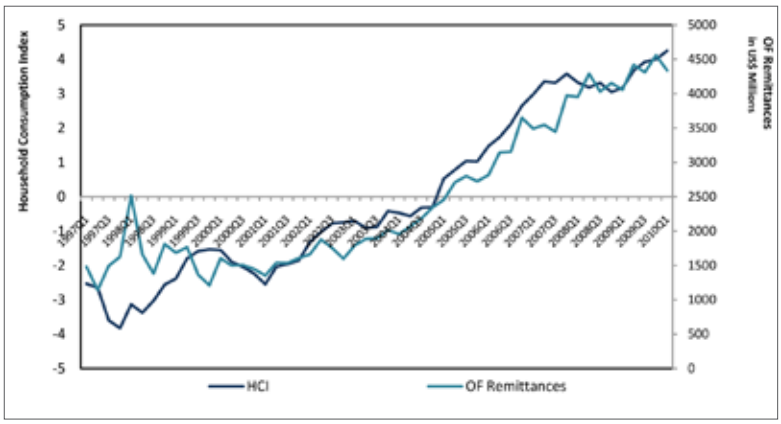
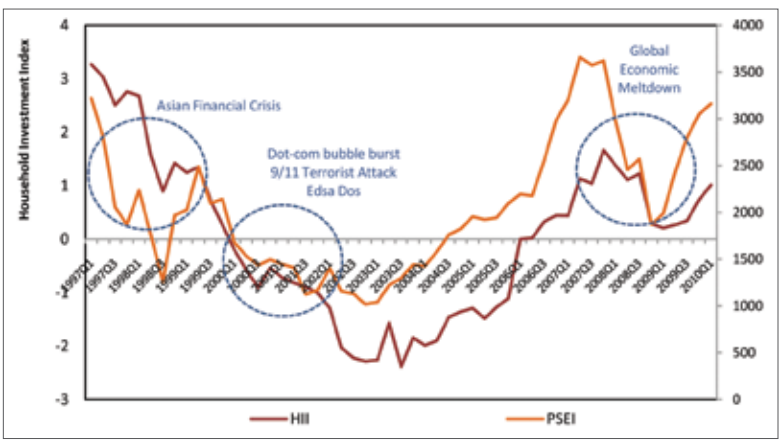


Chart 4
HII and PSE Index



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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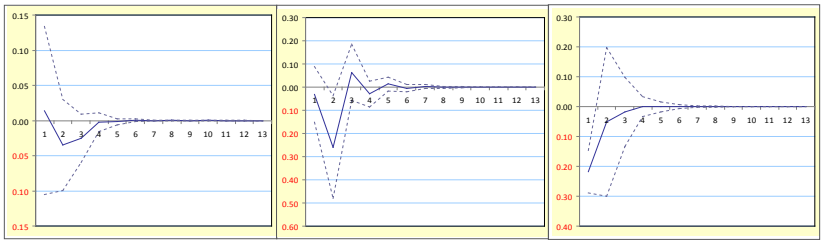
[6] A number of researches have highlighted the important role of monetary authorities in balancing both monetary and financial stability due to the strong linkage between the two. As specified in the paper of Bordo and Jeanne (2002), policy rates have a strong link to the development and/or bursting 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

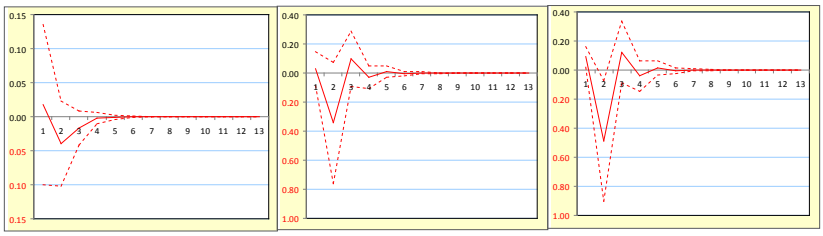
Household Consumption Channel

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

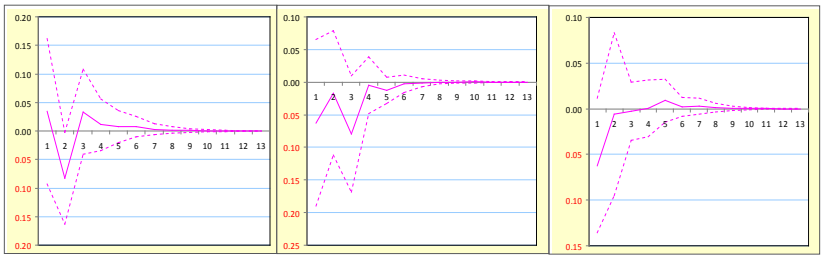
RRP to HCI | RRP to NPLCL | HCI to NPLCL



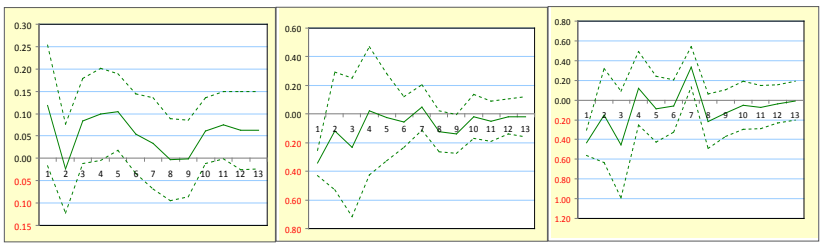
RRP to HCI | RRP to NPLCC | HCI to NPLCC



RRP to HCI | RRP to NPLAL | HCI to NPLAL



RRP to HCI | RRP to NPLRE | HCI to NPLRE

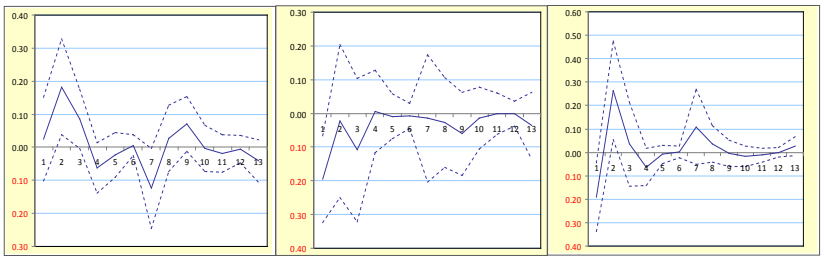


Impulse Response on the Effect of Monetary Policy Shocks on Household Loan Delinquency

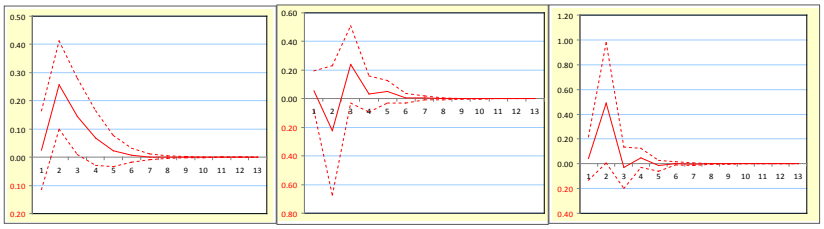
Bank Lending Channel

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

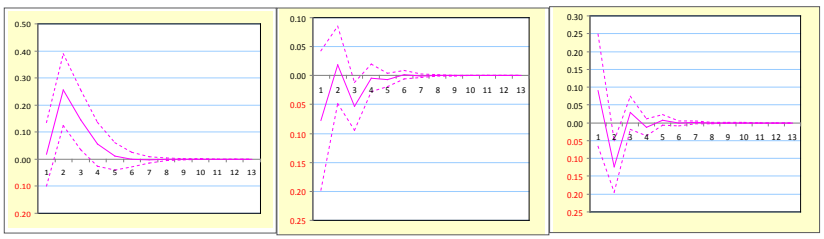
RRP to LR | RRP to NPLCL | LR to NPLCL



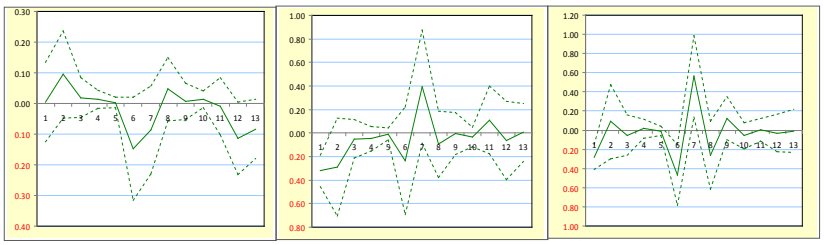
RRP to LR | RRP to NPLCC | LR to NPLCC



RRP to LR | RRP to NPLAL | LR to NPLAL



RRP to LR | RRP to NPLRE | LR to NPLRE



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Capital Requirements of Rural Banks in the Philippines

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1. Introduction

The efficiency of rural financial markets, which serves to improve income levels and reduce poverty, is a crucial objective in the formulation of monetary policy (see, e.g., Yaron, Benjamin, & Charitonenko, 1998). Capital is a major source of loan-based funds for rural banks and it is necessary to strengthen bank capital in order to stabilize the rural banking system by improving institutional resilience in the face of negative shocks. For this purpose, a growing number of emerging economies have adopted rules for capital adequacy that are based on the 1988 Capital Accord initiated by the Basel Committee on Banking Supervision. Following in the spirit of the Accord, the central bank of the Philippines, the Bangko Sentral ng Pilipinas (BSP), made meeting the capital regulation requirements of rural banks an important item on its stabilization policy agenda.[1] In this study, we address the crucial issue of the influence of capital regulation on the lending behavior of rural banks, which helps to determine the course of rural development through the use of available credits.

Many theoretical and empirical studies have addressed the ways in which capital regulations influence banking behavior in the context of portfolio selection, moral hazard and adverse selection problems, and bank heterogeneities (see VanHoose, 2007, for a review). Empirical studies, such as Bernanke and Lown (1991), Berger and Udell (1994), and Peek and Rosengren (1995a, b), discuss the capital or credit crunch of the early 1990s' recession in the United States by examining a possible link between the Basel Committee's newly introduced capital adequacy rule and contraction in bank lending. With respect to the case of Japan, Kim and Moreno (1994), Peek and Rosengren (1997), Ito and Sasaki (1998), and Honda (2002) evaluate how negative shocks on capital affected the availability of bank credit. Additionally, Ediz, Michael, and Perraudin (1998) and Rime (2001) assess the relation between capital regulation and bank behavior by focusing on the UK and Switzerland, respectively. These studies focus, however, on relatively large commercial banks in developed economies; they do not examine how these issues affect rural banks in developing economies like the Philippines.[2]

[1] See the speech by Governor Rafael Buenaventura of BSP, "Rural Banks: Pillars in the Development of Local Economies," on 31 August 2001 (Speech Archives, BSP).

[2] One exception includes the work of Chiuri, Ferri, & Majnoni (2002). Their study shows that the capital crunch associated with strict capital regulations is more pervasive in emerging economies where alternatives to bank credit are less developed, although their focus is not on rural banks.

To understand the role of capital requirements in Philippine rural banking, this study attempts to empirically assess how banks change their lending behavior in response to shocks to their capital associated with changing economic conditions, partly following the analysis of Peek and Rosengren (1995a, b). In particular, we examine the effect of prompt corrective action (PCA) on the rural banking system. To establish a statutory framework for bank supervision in 1998, the BSP initiated early intervention and corrective action by bank regulators to address problems facing troubled rural banks. The PCA framework is related to under-capitalized banks and it encompasses such specific actions as the implementation of capital restoration plans, business improvement plans, and corporate governance reforms, affording little discretion to prudential regulators to avoid the costly and painful exercise of bank closures. Several studies pertain to PCA issues but focus mainly on the case of the United States (see, e.g., Benston & Kaufman, 1997; Aggarwal & Jacques, 2001).[3] This paper extends the line of analysis in a new direction by examining the effect of PCA in a developing economy, which we accomplish with our focus on the Philippine rural banking system.

Banking data are obtained from the database of the BSP at the individual bank level for the period 2001 (Q3) to 2006 (Q4), covering nearly two-thirds of all banks that comprise the entire Philippine rural banking system. The model employs panel data estimation techniques using instrumental variables. The estimated results prove that the behavior of under-capitalized rural banks is different from that of well-capitalized rural banks in terms of their lending activities in response to capital changes. First, under-capitalized banks are relatively more sensitive to changes in capital compared with well-capitalized banks. This observation supports the conventional argument that capital regulation provides under-capitalized banks with a strong motivation to meet the requirement to avoid possible closure.

Second, as the capital adequacy ratio rises, well-capitalized banks are less sensitive to capital shocks while under-capitalized banks are more sensitive. The result for well-capitalized banks is consistent with the findings of various studies, such as Peek and Rosengren (1995a,b), regarding the effect of capital requirements on bank behavior. In contrast, the result for under-capitalized banks is the opposite and subject to debate and further examination. We conjecture that under-capitalized rural banks with lower capital adequacy ratios have a weaker incentive to achieve the minimum capital requirement.

Our proposition about under-capitalized banks relates to the implicit and explicit costs faced by rural banks and their managers. These costs include additional bureaucratic documentation and fear of regulatory intervention associated with PCA. Specifically, when the capital adequacy ratio is close to the minimum capital requirement, the marginal cost in response to a change in capital is relatively large; this may incentivize rural banks to adjust their lending behavior. In contrast, when the capital adequacy ratio is far below the minimum capital requirement, the marginal cost is relatively low. In this case, rural banks have a little incentive to adjust their lending behavior. That is,

[3] For a sophisticated dynamic model of PCA, see Shim (2006).

managers of under-capitalized rural banks tend to abandon the effort to meet capital requirements as the capital adequacy ratio declines. This phenomenon can be explained partly by the relation between the regulatory pressure of PCA and the capital adequacy ratio.

The remainder of the paper is organized as follows. Section 2 illustrates the evolution of capital regulations in the Philippine rural banking system. Section 3 explains data and the empirical model as well as evaluates the estimated results of the regression. In section 4, we offer some concluding remarks.

2. The Philippine Rural Banking System

Philippine financial institutions, each of which has its own purpose, include (1) commercial banks, (2) thrift banks, (3) rural banks, (4) offshore banks, (5) specialized government banks, and (6) non-bank financial institutions (see Torreja, 2003, for a review of the Philippine financial system). Rural banks operate in many ways in a different universe from that of commercial banks. Although rural banks' assets comprised just 2.2 percent of total assets in the Philippine financial system in 2006, their role is significant in promoting and expanding the rural economy and providing basic financial services to rural communities that are not served to any significant extent by commercial banks. In particular, the primary objective of rural banks is to meet the credit needs of farmers and fishermen as well as of cooperatives and merchants in rural areas. Moreover, rural banks are locally based with relatively few resources, deposits, and equity capital; they are typically run by private individuals with shareholders and management residing in the region and these individuals often behave like monopolists (see, e.g., Wehnert, 1999).

In the early 1950s, the government vigorously promoted the establishment of rural banks to serve as a conduit for its credit program as it sought to make loans widely available across the countryside. Additionally, since the rural poor are generally unable to save and cannot afford the cost of credit offered by large commercial banks, the government along with several international donors frequently offered incentives, such as loan subsidy funds, to private individuals to create rural banks (Owens & Agabin, 2006). The Philippine rural banking system was established through the Rural Banking Act of 1952 which was later amended by the Rural Banking Act of 1992. The new law empowers the Monetary Board of the BSP with greater flexibility to formulate regulations governing rural banks. With the Act of 1992, the BSP encouraged proactive competition by liberalizing the establishment of new banks and branches.

The rural banking industry, as noted, comprises a small portion of the Philippine financial system as a whole and may seem insignificant from a monetary and financial policy perspective. However, the rural banking industry has a wide reach and is an integral component of the government's strategy to increase global competitiveness by strengthening rural economies. Given this strategic significance, rural bank failures are a major concern. During the period 1970–2007, around 400 rural banks were placed under liquidation or receivership by the Philippine Deposit Insurance Corporation. Failures are attributed to various factors, such as misguided government policies and programs that subsidize credit initiatives (see Florendo, 2007).[4] Thus, several financial policy

[4] One of the largest government programs was a targeted and subsidized credit initiative to achieve self-sufficiency in rice production, which was called Masagana 99 (see Owens & Agabin, 2006).

reforms have been initiated to stabilize the rural banking system. Among them is a tightening of minimum capital regulations, under which there is a buffer that is sufficient to protect bank depositors in the event of normal adversity and reversals.

Similar to other financial institutions, rural banks currently observe capital requirements based on the Basel Accord.[5] In July 2001, the BSP adopted a risk-based capital adequacy ratio patterned after the standards set under the International Convergence of Capital Measurement and Capital Standards, otherwise known as Basel I. The ratio accounts for the heterogeneity of risk exposures across different sets of bank assets.[6] Under this framework, the capital adequacy ratio is expressed as a percentage of qualifying capital to risk-weighted assets. Qualifying capital is the sum of a bank's Tier 1 (core) capital and Tier 2 (supplementary) capital less required deductions. Tier 2 capital is the sum of upper Tier 2 and lower Tier 2 capital; while risk-weighted assets are the bank's assets with corresponding risk weights, depending on the level of risk exposures that characterize the assets.[7] The rural banking industry is now subject to this new risk-sensitive capital regulation despite the absence of derivative products and other financial instruments traded in financial markets from its current portfolio.[8]

By and large, rural banks are limited to the traditional services of deposits and lending activities, although recently several have ventured into fee-based products such as fund transfers, remittances, management training, software development, and have acted as service provider for other allowable financial and non-financial undertakings. Interestingly, rural banks have exhibited a burgeoning interest in microfinance. Microfinancing is typically provided by non-government organizations, non-bank cooperatives, and other kinds of banks, including cooperative banks. Given the argument that microfinance is a tool for poverty alleviation, the rural banking industry is now attracting greater public attention.

Since rural banks are government partners in countryside development, these banks fill an important niche in the rural economy with rural borrowers forming the grassroots of the social class. These banks help stimulate rural development by catering to the needs of local communities where access to

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[5] Capital requirements are based mainly on the risk-based capital adequacy framework as well as on a bank's geographical location, according to the Manual of Regulation for Banks (2009 Revised Edition). Although these two frameworks serve as benchmarks in assessing bank solvency, this study is limited to the review/analysis of capital requirements that address risk-based capital adequacy because figures on minimum capitalization of each bank based on geographical location are not available in the dataset.

[6] See BSP Circular 280 dated 29 March 2001 and subsequent amendment, BSP Circular 360 dated 3 December 2002, to incorporate market risks. Basel I was issued in 1988 to standardize the computation of risk-based capital across banks and across countries by the Basel Committee on Banking Supervision, a group of banking supervisors whose secretariat is based at the Bank for International Settlements in Basel, Switzerland. It had credit risk as the main risk-weight factor with minimum capital requirement as its sole pillar. This was subsequently amended in 1996 and 1999 to incorporate market risks. On 26 June 2004, the Committee issued the Revised International Convergence of Capital Measurement and Capital Standards (Basel II). Basel II had a three-pillared approach consisting of minimum capital requirements, supervisory review, and market discipline.

[7] See BSP Circular 280 dated 29 March 2001 for details on the composition of qualifying capital and risk- weighted assets.

[8] This is because a rural bank can now carry products and services offered by commercial banks if its total capital accounts reach that of the minimum capital accounts required of commercial banks. The capital requirement of a commercial bank, however, is prohibitively high for rural banks; thus, no Philippine rural bank has offered derivative products or other services allowable to banks with capital accounts equivalent to what is required from commercial banks.

credit through commercial banks seems impossible. To ensure the viability of the rural banking industry as a catalyst for countryside development, rural banks need to have adequate capital stocks, superior asset quality, sound management, improved profitability, and suitable levels of liquidity. The BSP aims to stabilize the rural banking industry by providing measures to detect problematic banks and take appropriate corrective actions to prevent collapse. The PCA, initiated by the BSP in 1998, is required along with the adoption of other regulations to reduce bank failures in rural economies.

3. Empirical Analysis

3.1. Data

Since the early 1990s, the Philippine rural banking system has improved significantly, even avoiding the serious impact of the 1997 Asian financial crisis. At the end of 2006, the rural banking system had total assets of PhP126.6 billion, comprising 2.2 percent of the total assets of the Philippine financial system as well as 1,964 operating units. The operating units include main and branch offices, comprising 26 percent of all operating units in the banking industry.

In this study, the banking data is obtained from a BSP database at the individual rural bank level, for the sample period of 2001 (Q3) to 2006 (Q4). The observation covers 603 of the 923 rural banks in the entire Philippine rural banking system.[9] To better understand the overall picture of Philippine rural banking, Table 1 compares the balance sheet structures of well-capitalized and under-capitalized rural banks as of 2006. The regulator imposes a 10 percent capital adequacy ratio (qualifying capital divided by risk-weighted assets) as the minimum capital requirement under the framework of the Basel Accord. Banks that meet this requirement are classified as well-capitalized, while those that do not meet this requirement are classified as under-capitalized. Under-capitalized banks are typically subject to the PCA framework implemented by the BSP. The average capital adequacy ratio for the group of well-capitalized banks is 26 percent, while that for the group of under-capitalized banks is seven percent. Moreover, a significant portion of rural banks (18 percent) are under-capitalized. This is in sharp contrast to the typical ratio of commercial banks.

3.2. Model

Our empirical analysis of rural banks examines how banking behavior is influenced by external capital shocks under capital regulation. Since such regulation takes the form of a minimum capital adequacy ratio, the behavior of rural banks may depend on their current capital adequacy ratio. Furthermore, the PCA framework associated with capital regulation may also affect banking behavior of under-capitalized banks. If the BSP adopts the regulation strictly,

[9] Two sets of rural banks are omitted from the total of 923 rural banks, namely: (1) liquidated or closed banks and (2) newly established banks. The zero-end balances of liquidated or closed banks at the time of bank closure would generate negatively biased results in measuring the impact of capital requirements. The newly established banks, on the other hand, would generate positively biased results as fresh capital can quickly expand the newly established bank's portfolio. In cases of bank mergers or consolidation, banks were treated as if the mergers or consolidation processes were consummated at the beginning of the sample period.

there will likely be few under-capitalized rural banks. However, because a significant portion of rural banks does not meet this requirement, we question the effectiveness of the regulation in the form of PCA. Thus, we evaluate this issue as part of our empirical analysis.

To analyze rural bank lending activities under capital regulation with PCA, we specify a lending equation based on a modification of the analysis of Peek and Rosengren (1995a, b). Lending is assumed to depend on the capital adequacy ratio of the previous period, the current capital stock, and a dummy variable for PCA that will be explained later:

$$L_{i,t} = \delta_{0,i} + \left(\delta_1 + \delta_2 \frac{K_{i,t-1}}{A_{i,t-1}}\right) K_{i,t} PCA_{i,t} + \left(\delta_3 + \delta_4 \frac{K_{i,t-1}}{A_{i,t-1}}\right) K_{i,t}(1 - PCA_{i,t}) \quad (1)$$

$$+ \delta_5 Log(A_{i,t-1}) + \delta_6 NIM_{i,t-1} + \varepsilon_{i,t} \quad ,$$

where $L_{i,t}$ is a loan issued by bank i at time t, $K_{i,t}$ is bank i's capital at time t, $Log(A_{i,t-1})$ is the log of assets at time t-1, $NIM_{i,t-1}$ is the lending-borrowing margin at time t-1, and $\varepsilon_{i,t}$ the mean zero error term. The parameters, signified by the δ_i's, capture the effect of capital fluctuation on lending. A change in capital affects the level of lending directly or indirectly through interaction with the capital adequacy ratio. And $\delta_{0,i}$ is a dummy variable for bank i, capturing the time-invariant, bank-specific individual effect on each bank's lending activity. Given that banking behavior is regulated under the Basel Accord during the sample period, the assets variable (A) represents risk-weighted assets, while the capital variable (K) represents qualifying capital.[10] The capital adequacy ratio (K/A) is calculated as the ratio of risk-weighted assets to qualifying capital.

To explicitly differentiate the lending behaviors of under- and well-capitalized banks, the rural banks are divided into two groups: (1) banks subject to PCA and (2) banks not subject to PCA. In this study, an under-capitalized bank is defined simply as one whose capital adequacy ratio (K/A) does not meet the minimum capital requirement, while a well-capitalized bank is one whose capital adequacy ratio meets the minimum requirement. The variable PCA is unity if a bank is under-capitalized and zero if a bank is well-capitalized.

Our model specification of the capital adequacy ratio and PCA captures regulatory pressure in the context of capital requirements. Several studies, such as Shrieves and Dahl (1992), Jacques and Nigro (1997), Aggarwal and Jacques (1998), Ediz, Michael, and Perraudin (1998), and Rime (2001), examine this issue by considering various factors such as adjustment costs and capital buffers. In particular, both Aggarwal and Jacques (2001) and Rime (2001) capture the effect of regulatory pressure through the classification of banks as well- or under-capitalized. Our model also follows their specification to examine the effectiveness of PCA implemented by the BSP.

In addition, Ediz, Michael, and Perraudin (1998) and Rime (2001) adopt the method of regulatory pressure that reflects the relation between the fluctuation of the capital adequacy ratio and the probability of failing to meet the regulation. This approach captures the banks' incentive to maintain a capital buffer as they attempt to reduce the probability of under-capitalization when their capital adequacy ratio is not high enough compared with the minimum requirement level. In our model specification, the capital adequacy ratio in parentheses

[10] Qualifying capital (QK) is, as previously noted, the sum of a bank's Tier 1 (core) capital and Tier 2 (supplementary) capital, less required deductions. Tier 2 capital is the sum of upper Tier 2 and lower Tier 2 capital. Details on the composition of qualifying capital and risk-weighted assets can be seen in BSP Circular 280, dated 29 March 2001.

differentiates lending behavior through the regulatory pressure associated with PCA. The important distinction between our model and those of previous studies is that a significant portion of rural banks are indeed under-capitalized in the Philippines. This fact calls for careful examination of the effectiveness of PCA associated with capital regulation in the Philippine rural banking industry.

Additional control variables in the model include the log of the initial asset (A) at the beginning of the current period (at the end of the previous period), $Log(A)$, and the net interest margin in the previous period, NIM, which applies to the spread between two banking activities: (1) fund generation (borrowing) and (2) fund application (lending). The first variable captures the scale effect of lending capacity, insofar as bank size might affect lending behavior due to relationships between lending behavior and borrowers' size, risk diversion, investment opportunity, and various government regulations. The second control variable, NIM, captures the operational efficiency of banks, which could also affect loan activity. The model also includes time dummies to control for countrywide, time-specific aggregate shocks.

From equation (1), lending sensitivity in response to a change in capital is then represented as follows:

$$\frac{dL_{i,t}}{dK_{i,t}} = \left(\delta_1 + \delta_2 \frac{K_{i,t-1}}{A_{i,t-1}}\right) PCA_{i,t} + \left(\delta_3 + \delta_4 \frac{K_{i,t-1}}{A_{i,t-1}}\right)(1 - PCA_{i,t}) \quad (2)$$

In equation (2), the value of $\delta_1 + \delta_2 K/A$ represents the slope of the lending function or the lending sensitivity of an under-capitalized bank; the value of $\delta_3 + \delta_4 K/A$ represents the lending sensitivity of a well-capitalized bank.[11] The lines of the slope, $\delta_1 + \delta_2 K/A$ and $\delta_3 + \delta_4 K/A$ may not be continuous at the threshold of the capital adequacy ratio, which differentiates the value of PCA. In this paper, however, we assume that they are connected at the threshold capital adequacy ratio, t^*. In fact, equation (2) is a spline function that connects different segments of lending sensitivity. To make the piecewise function continuous, the following restriction is imposed:

$$\delta_1 + \delta_2 .t^* = \delta_3 + \delta_4 .t^* . \quad (3)$$

The threshold value in equation (3) is called a knot in the spline function (see, e.g., Green, 2003, p. 121).

Following the above procedure, the sensitivity of lending activity with respect

$$\frac{dL_{i,t}}{dK_{i,t}} = \left(\left(\frac{K_{i,t-1}}{A_{i,t-1}} - t^*\right) PCA_{i,t}\right)\delta_2 + \delta_3 + \left(\frac{K_{i,t-1}}{A_{i,t-1}}(1 - PCA_{i,t}) + t^* PCA_{i,t}\right)\delta_4 , \quad (4)$$

and the lending equation will be represented as follows:

$$L_{i,t} = \delta_{0,i} + \delta_2 \left(\frac{K_{i,t-1}}{A_{i,t-1}} - t^*\right) K_{i,t} PCA_{i,t} + \delta_3 K_{i,t} + \delta_4 \left(t^* K_{i,t} PCA + K_{i,t}(1 - PCA)\frac{K_{i,t-1}}{A_{i,t-1}}\right) + \delta_5 Log(A_{i,t-1}) + \delta_6 NIM_{i,t-1} + \varepsilon_{i,t} \quad (5)$$

[11] Peek & Rosengren (1995b) show that the sensitivity of poorly capitalized banks is relatively high compared with that of better-capitalized banks. Our model extends their model to cover banks that are subject to PCA since the presence of under-capitalized banks in the Philippine banking system cannot be ignored.

Before model estimation, the threshold capital adequacy ratio, t^*, must be estimated. The Philippine government imposes a 10-percent capital adequacy ratio. With this in mind, t^* is set at 0.1. The PCA variable is then defined accordingly. However, the actual capital adequacy ratio that binds banks' lending behavior is conjectured to differ from the legally imposed figure. To determine the actual binding capital adequacy ratio, we estimate the regression function iteratively by incrementally changing the value of t^* in the neighborhood of 0.1. We then search for a figure for t^* that provides the best fit of the model. In our case, we find for t^* a figure that minimizes the residual sum of the square of the regression. This procedure, in fact, shows that the legally imposed capital adequacy ratio is binding as the minimum requirement. In other words, the estimated threshold t^* is consistent with the capital requirement actually imposed by the BSP.

3.3. Results

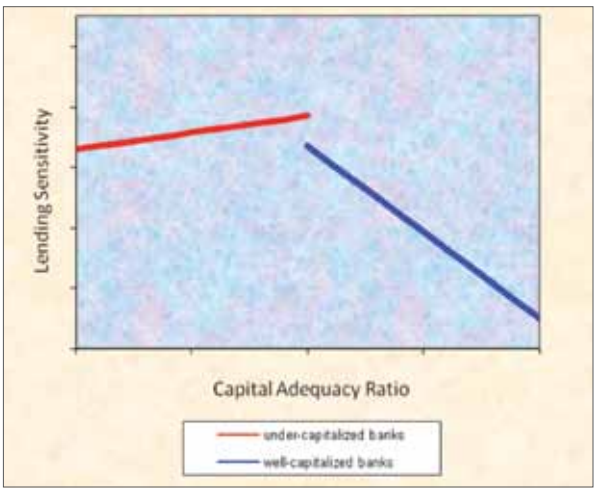
Table 2 shows the summary statistics for our sample, and Table 3 presents the estimated results for lending activity. Two issues concerning model estimation are noteworthy. First, we must address the correlation between the unobserved bank-specific effects and the independent variables. To evaluate this problem, we estimate fixed-effects (FE) and random-effects (RE) models and conduct the Hausman test. With a p-value of 0.00, we reject the null hypothesis that the parameter estimates from the FE and RE models are not systematically different. In this case, the pooled OLS estimates and RE estimates are biased and inconsistent. Therefore, we focus on the estimates of the FE models (models 2 and 4 in Table 3).

The second issue to be addressed is the endogeneity of the independent variables. We use the first and second lagged independent variables as instrumental variables (IVs) to control for the endogeneity (models 4 and 5 in Table 3). A comparison of model 2 and model 4 reveals that the parameters increase in size when the IVs are used. This may validate the IVs. The over-identification test also cannot reject the null hypothesis that the IVs are uncorrelated with the errors in the model (with a p-value of 0.4). To estimate the parameters, we use equation (4). Note that, in equation (4), we cannot estimate parameter δ_1. We recover δ_1 and its standard error from equation (3) using the delta method.

Our results indicate that the coefficients are consistently significant, with the same signs across all models. First, lending sensitivity is, on average, higher for under-capitalized banks than for well-capitalized banks as can be seen from the chart below. When there is a negative capital shock, under-capitalized banks must curtail their loan activity to a greater extent than well-capitalized banks in order to meet the required capital adequacy ratio. This finding suggests that, although many under-capitalized banks exist in the Philippine rural banking industry, the PCA framework of the BSP is, to a large extent, effective insofar as regulatory pressure may intensify the motivation of under-capitalized banks to meet the minimum capital requirement.

Second, more interestingly, when we compare the lending behavior of under-capitalized banks under the PCA constraint with those of well-capitalized banks that are free of the PCA constraint, we observe a significant difference in relation to the capital adequacy ratio. The results indicate that the coefficient on the interaction between the capital adequacy ratio and capital, δ_2, is significantly positive for under-capitalized banks while the coefficient, δ_4 is significantly negative for well-capitalized banks. Notice that the net effect of a capital increase on lending is still positive for both types of banks.[12] These results imply that lending sensitivity to capital changes increases with the capital adequacy ratio for under-capitalized banks, while it decreases with the capital adequacy ratio for well-capitalized banks. In other words, lending sensitivity is greatest when the capital adequacy ratio is near the minimum requirement level, while it decreases as the ratio deviates from the minimum level.

Lending Behavior of Rural Banks



Source: Regression results of Model 4 in Table 3

The logic behind the inverse V shape of lending sensitivity appears to be closely related to the relationship between the capital adequacy ratio and regulatory pressure from the BSP. Regulatory pressure causes rural banks' managers under the PCA constraints to incur additional management costs. For instance, these costs may include the implementation of a capital restoration plan through painful intervention by the BSP.

For 'well-capitalized' banks, regulatory pressure may reflect the relationship between future fluctuations in the capital adequacy ratio and the possibility of future failure to meet the minimum requirement. This implies that poorly capitalized banks that meet the capital requirement tend to be more vulnerable to negative capital shocks, which may cause them to fall under the PCA constraints. As a result, they are more sensitive to capital shocks. This is consistent with the conventional argument in the 'capital crunch' literature that poorly capitalized banks that incur negative shocks to their capital curtail their lending to a greater extent than better-capitalized banks (see, e.g., Bernanke and Lown, 1991; Peek and Rosengreen, 1995a, b; and Hancock, Laing, and Wilcox, 1995).

On the other hand, 'under-capitalized' banks exhibit different lending behavior with respect to the capital adequacy ratio. The positive slope of the lending function for under-capitalized banks under the PCA constraint indicates that

12 For example, if we evaluate lending sensitivity for a well-capitalized bank using model 4, it will be $4.49 - 5.68 \bullet K/A$. If we evaluate the term at the mean of K/A, which is 0.26, it will be 3.46.

the lending behavior of under-capitalized banks whose capital adequacy ratio is near the minimum requirement is more sensitive to changes in capital than that of those which are far below the requirement. One possible explanation may come from the conjecture that the degree of PCA regulatory pressure exerted by the BSP depends on the extent to which the capital adequacy ratio is below the required level.

If the capital adequacy ratio is close to the required level, under-capitalized banks can mitigate regulatory pressure by a sensitive adjustment of loan credit in response to a capital shock. If the capital adequacy ratio is far below the requirement, however, it may be difficult to reduce regulatory pressure by adjusting loan credit, so that there is little hope of meeting the requirement in the near future. Additionally, since the negative macroeconomic consequences of rural bank foreclosures on rural development are highly undesirable for regulators, bank managers may have a weaker incentive to meet the minimum requirement when the capital adequacy ratio is far below the requirement. This discussion suggests that lending sensitivity is high for relatively healthy under-capitalized banks. Conversely, it is low for relatively unhealthy under-capitalized banks. Given that policy effectiveness can be evaluated by lending sensitivity, the results for under-capitalized banks imply that the PCA framework becomes less effective with a decline in the capital adequacy ratio, although the level of effectiveness is relatively high, as previously noted.

Our finding of the inverse V shape of lending sensitivity can also be interpreted in light of the additional management cost associated with regulatory pressure ('regulatory cost'). For well-capitalized banks with adequacy ratio above the minimum requirement, the regulatory cost increases at an increasing rate as the capital adequacy ratio decreases and nears the minimum requirement, i.e., the marginal change in the regulatory cost decreases with a rise in the capital adequacy ratio. As a result, an incentive of well-capitalized banks to adjust loan credit in response to capital shocks is intensified with a decline in the capital adequacy ratio. In contrast, for under-capitalized banks with adequacy rate below the minimum requirement, the regulatory cost decreases at an increasing rate as the capital adequacy rate increases toward the minimum requirement, i.e., the marginal change in the regulatory cost increases with a rise in the capital adequacy ratio. As a result, an incentive of under-capitalized banks to adjust loan credit in response to capital shocks is intensified with a rise in the capital adequacy ratio.

Among the other independent variables that control for lending behavior, the coefficient on the log of the asset is significantly positive. This may suggest that economies of scale make a difference in lending activities. Large banks may be able to provide various types of loans more efficiently than small banks. Also, as in Peek and Rosengren (1995b), rural banks in the Philippines may be constrained not to lend more than some proportion of their capital to any one borrower. Such a constraint can prevent small banks from making large loans.

Meanwhile, the coefficient on the net interest margin is significantly negative. This suggests that, when the margin increases, lending literally shrinks. Even though we use the IVs to control for endogeneity, interpreting the result as a causal relationship is difficult. Still, we infer that there can be a negative correlation between the two variables. For example, instead of increasing capital, rural banks might generate more deposits by increasing deposit rates to fund the increase in the volume of lending; thus, reducing the net interest margin while holding the loan rate constant.

4. Conclusion

This paper has studied the role of capital requirements on rural banks that serve as rural development catalysts in the Philippines over the sample period of 2001Q3 to 2006Q4. This period coincides with capital regulations based on the Basel Accord. Our results pertaining to lending behavior strongly suggest that capital regulations undertaken with PCA (based on the BSP) can be effective. However, their effectiveness with respect to under-capitalized banks declines as the banks' capital adequacy ratios drop below the minimum requirement level. The greater the drop, the less effective are the regulations.

The evidence from this study illustrates clearly that a capital crunch triggers a credit crunch. A capital shock in the presence of more risk-sensitive capital regulation will shrink loans faster for under-capitalized banks than for well-capitalized banks. Because every rural bank plays an important role as a catalyst for rural economic development, a reduction of available funds for lending triggered by a capital shock will, therefore, make it more difficult for rural banks to play such a role. By extension, this may have adverse consequences for rural development. On the other hand, rigid capital regulations stabilize the rural banking industry and ensure continued public trust and confidence in the financial system. With the rural bank at the center, balancing monetary and financial policy vis-à-vis countryside development through effective fiscal administration is necessary; although it represents a challenging task for policymakers.

The timely and dynamic formulation of responsive policies alongside effective implementation of rules and regulations is the ultimate key to stabilizing the rural banking industry. Admittedly, the present study does not examine all the crucial issues in rural banking systems; yet, our analysis serves as an initial step in better understanding the relationship between lending behavior and capital regulations in rural banking systems of developing countries.

Table 1

Summary Statistics (average, 2006)

	Well-capitalized banks	Under-capitalized banks
Risk-weighted Asset	169	329
Qualifying Capital	32.1	25.1
Capital Adequacy Ratio	0.26	0.07
Loan	117	173
# of rural banks	497	106

Note: The numbers, excepting the capital adequacy ratio, are in millions of Philippine pesos.

Table 2

Sample Statistics

Variable	Mean	Std. Dev.
$K_{i,t-1} / A_{i,t-1}$	0.204	0.258
$L_{i,t}$	8.48E+07	1.73E+08
$K_{i,t}$	2.05E+07	4.15E+07
$Nim_{i,t}$	0.065	0.051
$log(A_{i,t-1})$	16.315	1.141

Note: The total number of the sample is 13,228.

Table 3
Results of Regressions

Variables	Model 1 (OLS)	Model 2 (FE)	Mode 3 (RE)	Model 4 (Fixed effects IV estimation)	Model 5 (G2SLS Random effect IV Regression
PCA					
$K_{i,t}$	3.807 (17.08)*	3.268 (4.13)*	3.424 (8.85)*	4.359 (3.98)*	4.375 (5.13)*
$\frac{K_{i,t-1}}{A_{i,t-1}} \cdot K_{i,t}$	1.999 (2.64)*	1.043 (1.83)**	1.114 (2.55)*	1.105 (1.79)**	1.095 (1.97)*
Non-PCA					
$K_{i,t}$	4.800 (15.58)*	3.502 (3.49)*	3.855 (7.65)*	4.937 (4.39)*	5.119 (5.22)*
$\frac{K_{i,t-1}}{A_{i,t-1}} \cdot K_{i,t}$	-7.929 (11.17)*	-1.297 (2.55)*	-3.197 (-2.51)*	-5.679 (-1.83)**	-7.096 (-2.62)*
$\log(A_{i,t-1})$	2.47e+7 (6.83)*	7.43e+07 (2.89)*	4.39e+07 (6.67)*	4.08e+07 (1.91)**	2.85e+07 (2.29)*
NIM	-3.16e+8 (-11.17)*	-1.60e+08 (-4.60)*	-1.73e+08 (-6.85)*	-9.02e+07 (-2.27)*	-9.72e+07 (-2.60)*
R^2	0.779	0.718(within)	0.753(overall)	0.617(within)	0.766(overall)

Notes:

1. All regressions include time-specific dummy variables. The numbers in parentheses are t-values. For OLS, FE, and RE, heteroskedasticity-consistent standard errors are used. For IV estimations, bootstrap standard errors are used.
2. *: significant at the 5% level; **: significant at the 10% level.
3. The Hausman test rejects the null hypothesis that the coefficients from FE and RE are not systematically different at p-values of 0.00. For the IV estimations, we use the first and second lagged values of independent variables as the instrumental variables.

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The IMF Quota Formula Review

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A. Background

At the conclusion of the 14th General Review of Quotas (14th Review), the Board of Governors of the International Monetary Fund (IMF) requested that a comprehensive review of the quota formula be completed by the Executive Board by January 2013.

The timetable for completing the 15th General Review was also advanced by two years to January 2014.[1]

Quotas: Basics

- *Quotas determine a member's: (1) voting power; (2) IMF's financial resources (financial contributions of member countries); (3) members' access to IMF resources.*
- *The current quota formula was agreed in 2008. It includes four variables (GDP, openness, variability, and reserves), expressed in shares of global totals, with the variables assigned weights totaling to one. The formula also includes a compression factor that reduces dispersion in calculated quota shares.*
- *The formula is: $CQS = (0.5*Y + 0.3*O + 0.15*V + 0.05*R)^k$*

  where: CQS = calculated quota share;

  Y = a blend of GDP converted at market exchange rates (MER) and purchasing power parity (PPP) exchange rates averaged over a three-year period. The weights of MER and PPP GDP are 0.60 and 0.40, respectively;

  O = the annual average of the sum of current payments and current receipts (goods, services, income, and transfers) for a five-year period;

  V = variability of current receipts and net capital flows (measured as the standard deviation from a centered three-year trend over a thirteen-year period);

  R = twelve-month average over one year of official reserves (foreign exchange, SDR holdings, reserve position in the Fund, and monetary gold); and

  k = a compression factor of 0.95. The compression factor is applied to the uncompressed calculated quota shares which are then rescaled to sum to 100.
- *Voting power = basic votes + member's quota/100,000*

  basic votes = 5.502% of total no. of votes/no. of members

The Articles of Agreements of the IMF do not prescribe specific mechanisms on how individual member quotas should be adjusted. Hence, the IMF has broad discretion to decide the relevant considerations that should serve as guide in the determination of the members' quotas. The formula provides guidance in quota reviews. In practice, the Board of Governors takes into account other considerations when deciding on adjustments in members' quotas, which require 85 percent majority of the total voting power.

In the lead-up to the 2008 reform, the Executive Directors emphasized that the formula should conform to a number of principles, i.e., it should be (i) simple and transparent, so that the basis for differences in relative quota shares is readily understandable; (ii) consistent with the multiple roles of quotas, appropriately reflecting global economic and financial trends and capturing members' relative positions in the world economy; (iii) broadly acceptable to the membership; and (iv) feasible to implement based on timely, high-quality and widely available data.

[1] The proposed quotas under the 14th Review are expected to become effective no later than the Annual Meetings in 2012. The 2008 reform went into effect on 3 March 2011.

B. Issues Concerning the Quota Formula in the Lead-Up to the 2008 Reform

The new formula adopted as part of the 2008 reform was deemed a major improvement from previous formulas. In particular, it was simpler, more transparent and updated. However, it should be noted that the current quota formula represented a difficult compromise, and a number of members expressed their reservations about the various aspects of the formula. A staff paper entitled "Quota Formula Review—Initial Considerations" dated 10 February 2012 reviewed a number of issues raised about the quota formula in the lead-up to the 2008 reform. These issues represented the most challenging aspects in quota formula deliberations during the course of the 2008 reform.

On the existing variables in the quota formula

There was general agreement that gross domestic product (GDP) is the most important variable in the quota formula. GDP provides a comprehensive measure of economic size. It is a widely-reported and -utilized economic measure that is available on a timely basis for the majority of the membership. Market GDP has been viewed as the single most relevant indicator of a member's ability to contribute to the IMF's finances and is also relevant to a member's potential demand for IMF resources. Moreover, the GDP variable also captures the dynamism of member countries. Meanwhile, purchasing power parity (PPP) GDP was viewed as a relevant measure of members' weight in the global economy.

It was observed that two main issues have been raised regarding the role of GDP in the formula. First, some have argued that GDP should have a higher weight relative to the other variables in the formula, while others suggested that it should be the only variable. The staff paper pointed out that market GDP has played a significant role in decisions pertaining to members' access to IMF resources in some exceptional access cases. The second issue relates to the mix between market GDP and PPP GDP in the blend variable. The 2008 agreement to use a 60/40 weight reflected a compromise that took into account the central role of quotas in the IMF's financial operations, for which market GDP is the most relevant indicator. However, views on this matter have continued to diverge. Some IMF members have indicated that market GDP is the only relevant measure, while others expressed the view that PPP GDP should play a larger, if not exclusive, role.

Openness has been viewed as an indicator of a member's involvement and stake in the global economy. It was argued that countries that are relatively more open to trade and financial flows are presumed to have greater stake in promoting global economic and financial stability. Openness also may have a bearing on a member's ability to make financial contributions to the IMF and on a member's potential need for IMF resources. The current openness measure is observed to be highly correlated to GDP, but gives a greater relative weight to countries with higher ratios of exports to GDP. Some have questioned the role of openness in the formula as currently measured. Among the issues raised were:

- The current gross measure leads to double counting of cross-border flows which can overstate the importance of openness. Moving to a value-added

basis could address these issues, but the lack of a reliable database with sufficient coverage has prevented such a change to date.

- Intra-currency union flows should be excluded as they take place in a common domestic currency and may exaggerate a member's broader integration into the global economy. It has also been argued that since trade takes place in a common currency, the existence of a currency union reduces an important source of balance of payments risk for its members.[2] Others have emphasized that greater trade integration is not limited to currency unions and the degree of integration can vary across unions.
- It is recognized that integration in the global capital markets is an important indicator of a member's stake in the global economy and global financial stability as well as a member's ability to contribute to the IMF's finances and potential to utilize its resources. Three broad data sets were considered in the 2008 reform, namely: international investment position (IIP), investment income, and financial flows. However, data limitations have precluded the explicit introduction of such a measure in the formula. Estimates of these three possible indicators of a member's degree of integration in the global capital markets have been updated recently as part of the current exercise. The results of estimates of these three indicators suggested that they remained heavily dominated by advanced economies, with particularly large shares for members with important international financial centers.

Variability captures members' vulnerability to balance of payments shocks and potential need for IMF financing. Questions have been raised as to whether this measure captures sufficiently members' potential need for IMF resources, given that advanced economies hold the majority share of the variable. The staff paper examined a range of possibilities for amending the measure of variability as part of the work for the 2008 reform, and this work was updated in 2009.[3] The paper indicated that it is difficult so far to identify a measure that is clearly superior to the current approach. Moreover, it was observed that the largest shifts in quota shares relative to the current measure were registered for the scaled measures of variability. However, the staff paper noted that there is little evidence that scaled variability better reflects potential need for IMF resources, and small countries tend to have the largest shares. Alternative measures based on GDP or consumption tended to give greater weight to domestic shocks and raised data issues in some cases. While these variants all have shortcomings, the staff paper suggested that further analysis of whether the current measure adequately captures potential vulnerability is necessary, given the experience with the recent crisis and the large shifts in shares of this variable for a number of countries resulting from the 2009 data update.

Reserves provide an indicator of a member's financial strength and ability to contribute to IMF finances. While reserves have long been included in the formula, divergent views on their continued relevance were expressed in the lead-up to the 2008 reform. The staff paper indicated that there were many observations made that reserves remained to be a relevant indicator of members' financial strength and ability to contribute to the IMF's finances.

[2] The ongoing Eurozone crisis indicated that even currency union members with relatively well-developed financial systems and institutional frameworks could face balance of payments risks that give rise to requests for financial assistance, especially from the IMF.

[3] The options considered included: scaling the existing measure of variability to GDP or the average of current receipts and net capital flows; use of a three- versus five-year trend; focusing on downside or extreme variability; and summing variability of current receipts and variability of net capital flows. Broader indicators were also explored, such as volatility of GDP growth, volatility of consumption growth and measures of consumption risk sharing.

Meanwhile, there were views that the relevance of this indicator has declined over time and raised concerns about potential distortions associated with excess reserve accumulation. Reserves were seen to have become less relevant to the ability to contribute given the increasing role of international capital markets, and they are considered to be a particularly misleading indicator for countries issuing international reserve currencies. In the end, reserves were retained in the formula with a relatively small weight in the 2008 reform.

Other Issues

The issue on whether to explicitly include a measure of members' financial contributions in the formula was discussed in the 2008 reform and the 14th Review. A general conclusion on this issue was that members' financial contributions to the IMF come in various forms. Hence, difficult measurement and aggregation issues would need to be addressed if members' actual contributions were to be captured on a more systematic basis. These include questions regarding which types of contributions should be taken into account, how different types of contributions should be aggregated, and what time periods should be considered.

A compression factor was introduced in the quota formula in the 2008 reform. This was seen as a way to temper the effects of the high correlation among size-related variables that tends to favor large economies. However, views were expressed that compression would reduce transparency and could dampen the formula's ability to capture dynamism over time. It was noted that compression tends to reduce the shares of a relatively small number of countries with the largest calculated quota shares, and increase the shares of all other members, without changing the ranking of members. Given the diverse views, a relatively modest compression factor was included in the quota formula as a compromise. However, the retention of this variable in the formula would be revisited in 20 years, along with the role of PPP GDP.

C. External Views on the Quota Formula

The more recent external work in relation to the ongoing quota formula review was undertaken by the G-24 Secretariat. In a paper entitled "Overview and Summary Assessment of the 2006-2010 IMF Quota and Voting Reforms"—prepared for the Brookings-Centre for International Governance Innovation (CIGI)-G24 seminar on 12 January 2012—the G-24 Secretariat analyzed the effects of the 2006–2010 reforms on voting and quota shares and assessed the outcomes of the reform in terms of quota and voting shares.[4] The issues that have surfaced with respect to the quota formula and basic votes were likewise discussed.

The paper highlighted that, in the case of the first round of reforms (April 2008 building on the initial September 2006 quota increase to four countries), the voting share of emerging market and developing countries (EMDCs) as a whole increased by 2.7 percentage points. However, the said rise in the voting share

[4] Several benchmarks have been used to assess the outcomes of the reform in terms of quota and voting shares, namely: magnitude of the shift from advanced economies to EMDCs, and within that the shift to dynamic EMDCs; the shift from "over-represented" to "under-represented" countries on the basis of the quota formula; and the proportion of countries that have benefited from the reforms.

of EMDCs was due primarily to the increase in basic votes. The increase in quota shares for EMDCs amounted to only 1.1 percent, all of which was due to the initial allocations to the four countries in 2006.[5] It was also noted that quotas in the April 2008 package did not shift further because the majority of the increase in quotas was allocated to advanced economies. A relatively larger shift in quotas was achieved in the November 2010 reform. The package met the G20/International Monetary and Financial Committee (IMFC) target of a shift of at least 6 percent to dynamic EMDCs and from over- to under-represented countries. China, India, Russia and Brazil became part of the largest 10 shareholders. Of the 61 countries that received quota increases, 53 were EMDCs, and an additional 46 poor countries had their quota shares maintained. The reform led to a further net shift in quota shares and voting shares to EMDCs. The paper noted that the 2006-2010 reforms resulted in an increase in the aggregate voting power of EMDCs by 5.3 percent. In terms of quota shares, the aggregate shift to EMDCs from the 2006-2010 reforms amounted to 3.9 percent with the share of dynamic EMDCs increasing by almost 8 percent. This notwithstanding, it was observed that: (1) the shift to dynamic EMDCs, while significant, was not commensurate with the structural change in the global economy; (2) the shift to dynamic EMDCs was achieved at the expense of other EMDCs; and (3) the poorest countries (40 out of 43 poorest countries) were net losers in the quota reform, while sub-Saharan Africa suffered a decline of 18 percent in its aggregate quota share. The paper suggested that this development unmasked the shortcomings of the quota formula in the allocation process and the deficiencies of the formula's structure and underlying variables.

It was observed that the quota formula was not able to capture adequately the changes in the global economy for several reasons, namely: (1) GDP does not have a predominant weight in the formula–the weight of GDP PPP in the blend is only 40 percent and the data used is highly lagged; (2) openness tilts the outcome excessively towards a particular regional bloc and small open economies; and (3) there is misspecification of variability in the quota formula which resulted in advanced countries gaining 60 percent of the variable or nine percentage points in the quota formula that should go primarily to poor and vulnerable economies subject to exogenous shocks. In light of these, the paper suggested that a more systematic review is warranted on the goals that the quota formula should try to achieve and the variables that would best capture those goals. The paper suggested that five separate goals could be distinguished in embarking on a fundamental review of the quota formula, namely:

- Democratic Representation. As an international organization, democratic representation should take into account in the governance of the IMF the role of individual member states and the role of population. Basic votes are aimed at ensuring a minimum voice for each member country no matter how small, but this does not translate into additional quotas. In the current quota formula, the compression factor is aimed at redistributing quotas to the smallest countries in terms of calculated quotas. Whether these measures are appropriate and adequate need to be reviewed. The paper also noted that there is a strong basis to argue that population should

[5] Initial ad-hoc allocations to four countries—China, Korea, Mexico and Turkey—were approved by the Board of Governors of the IMF in 2006 on the basis that they were under-represented on a wide range of benchmarks.

have some weight in the quota formula without overly tilting the balance to the most populous countries.

- Weight in the World Economy. Past discussions suggest that economic weight should be the dominant factor in determining a member's quota, and that a combination of GDP at market prices and GDP PPP should be used to assess GDP weight. The G-24 has strongly argued that GDP PPP should have a much higher weight. Some have continued to argue that openness as presently defined should continue to have a significant weight, but the paper pointed out that the measure is deeply flawed.
- Systemic Importance. The size of GDP already reflects the systemic importance of countries in the global economy. Other factors can also determine systemic importance such as financial size and potential for spillovers. But given that these attributes also suggest the potential for negative externalities, it is not clear that they should be included in the formula. Other elements may also give countries a systemically important role. For instance, Saudi Arabia's role in the oil market gives it a globally important systemic role.
- Vulnerability and Potential Need for IMF Financing. A country's vulnerability to shocks that are beyond its control should in principle be taken into account in determining quota size and access but how this should be achieved remains contentious, as pointed in the paper. It was observed that the present measure of variability does not achieve this objective
- Contributions. It is important to distinguish between countries' ability to contribute usable resources and actual financial and non-financial contributions. Reserves have been used as an indicator of the former but raises concerns of incentive compatibility. How actual contributions should and could be taken into account could pose a number of complex issues.

D. Overall Assessment

The four principles for constructing the quota formula which underpinned the 2008 reform (namely, simplicity and transparency, consistency with multiple roles of quotas, broad acceptability to the membership, and feasibility of implementation, as mentioned earlier) remain relevant for the current review of the IMF's quota formula.

Indeed, GDP is the most important variable in the formula as it provides a comprehensive measure of economic size. This is currently recognized, with GDP having the largest weight of 50 percent in the formula. Within the GDP blend, a higher weight for GDP PPP could better capture the real size of an economy and reflect the growing economic importance of EMDCs. However, GDP alone would not be able to fulfill the multiple roles of quotas. An all-GDP formula also goes against the grain of recent governance and quota reforms. Preliminary estimates indicate that EMDCs could suffer a net loss in their aggregate calculated quota shares, with about three times as many EMDCs losing calculated quota shares as those which gain from such a move. Likewise, it is estimated that there are significantly more EMDCs that lose shares compared to those that gain in the scenarios where non-GDP variables are dropped, except for reserves where the effects of dropping are more evenly divided.

Against this backdrop, the proposals for the quota formula review need to be assessed against the effects the quota formula has on the entire membership. It is therefore important to maintain a balanced formula that preserves an adequate and meaningful role for non-GDP variables. In this regard, openness remains an important indicator of a member's integration into, and stake within, the global economy. It has bearing on both the ability to make financial contributions to the IMF as well as potential borrowing needs. Further, it bears recalling that the IMF was founded to facilitate the growth of international trade and current account liberalization. Trade-based indicators have always been part of the quota formulas used since the Bretton Woods Conference. In this regard, work should continue on improving the data and methodology on possible indicators of a member's degree of integration in the global capital markets as part of the current exercise. There is also merit in retaining variability in the formula. It should be noted that a country's susceptibility to volatile trade and financial flows gives rise to its potential demand for IMF financing. Maintaining variability also seems to primarily benefit large economies and magnify unduly the role of economic size which, to a large extent, is already captured in the GDP variable. Given the continued relevance of this indicator, efforts should continue to explore ways to improve the measurement of variability. We consider reserves as a useful indicator of a member's ability to contribute to the IMF's resources. The weight of reserves is currently minimal and should not be further reduced. Meanwhile, the broad participation of a growing number of countries, including smaller economies, in the New Arrangements to Borrow (NAB), borrowing agreements, and Poverty Reduction and Growth Trust (PRGT) contributions is notable. The contribution from these countries is an encouraging development. Meanwhile, their contribution in proportion to their quota share is not surprising as the IMF should remain a quota-based institution. With regard to financial contributions, further work should be pursued to explore possible incentives and recognition to members that make significant contributions such as embedding a variable in the formula. Lastly, there is merit in retaining the compression factor in the formula to address the concentration of voting power and accord protection to small members and low-income countries (LICs), consistent with the inclusive character of the IMF.

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