

## EVIDENCE OF BANK LENDING CHANNEL IN MALAYSIA

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### ABSTRACT

*The aim of this paper is to analyse the role of banks in the transmission of monetary policy and business cycle. This paper attempts to look into the assets side as a monetary policy channel to influence economic activities. Changes in the monetary policy channel give an idea to regulate and strengthen the banking industry. The different views raise the following questions: how do changes in the monetary policy transmission affect commercial banks portfolio? If bank lending plays as a monetary policy channel, does it affect the other portfolios? Do the current regulations (such as capital requirement) affect the bank portfolio behaviour? Furthermore, Generalise Least Squares method was used to estimate the monetary changes toward commercial banks portfolio. Annual data was compiled from the year 1994 until 2004. The number of observations was based on the combination of time series and cross-sectional data, which is known as pooled data. In addition, an unbalanced bank-level panel data set for commercial banks was used. Finally, our results found that there exists a bank-lending channel in the case of Malaysia.*

*JEL Classification numbers: E51; E52; E58.*

**Keywords:** *Transmission mechanism; monetary policy; lending channel; pooled data.*

### ABSTRAK

*Objektif artikel ini untuk menganalisis peranan bank dalam transmisi dasar kewangan dan kitaran perniagaan. Kajian ini cuba melihat aset bank sebagai saluran dasar kewangan dalam mempengaruhi aktiviti ekonomi. Perubahan*

*saluran dasar kewangan ini memberikan idea untuk meregulasikan dan memperkukuhkan industri perbankan. Pandangan yang berbeza telah menghasilkan beberapa persoalan kajian seperti berikut: bagaimana perubahan dalam transmisi dasar kewangan mempengaruhi portfolio bank perdagangan? Jika pinjaman bank memainkan peranan dalam saluran dasar kewangan, adakah ia akan mempengaruhi portfolio lain? Adakah regulasi semasa (seperti keperluan modal) mempengaruhi gelagat portfolio bank? Selain itu, kaedah kuasa dua terkecil umum akan digunakan bagi menganggarkan perubahan kewangan terhadap portfolio bank perdagangan. Data tahunan digunakan dari tahun 1994 hingga 2004. Bilangan sampel yang digunakan adalah berdasarkan kombinasi data siri masa dan keratan rentas yang juga dikenali sebagai kumpulan data. Tambahan lagi, data panel tahap-bank perdagangan yang tidak seimbang akan digunakan. Akhir sekali, kajian ini telah membuktikan wujud saluran pinjaman bank bagi kes di Malaysia.*

## INTRODUCTION

There has been long determined and interest on the role of banks in the transmission of monetary policy and business cycle. For example, Keynes (1936) found that money plays an important role in economic growth. Furthermore, Gurley and Shaw (1995) began to redirect attention toward the overall interaction between financial structure and real activity, emphasising financial intermediation, particularly the role of financial intermediaries in the *credit supply process* as opposed to the money supply process. Several important papers that supported this idea were Kuh and Meyer (1963); Tobin and Dolde (1963); Brainard and Tobin (1963); Minsky (1975); Kindleberger (1978); and Tobin (1975).

However, Bernanke and Blinder (1988) produced another view that looked into the assets side as a monetary policy channel to influence economic activities. For example, in a monetary contraction, bank reserves decrease because of reserve requirements and reduced deposits. Consequently, it may increase the short-term and long-term interest rates and also reduce the supply of bank loans. If bank-dependent borrowers are dominant, the reduction in loan supply would reduce the investments and thereby economic activity.

Besides that, according to balance sheet channel Bernanke and Gertler (1989), monetary policy can affect a borrower's financial position or net worth, thereby influencing the costs of external finance to the borrower (arising from the loss of creditworthiness). For example, an

increase in the bank's interest rate would consequently decrease the borrowers' investment and spending plan.

However, the recent study made by Altunbas, Fazylov, and Molyneux (2002) found that across the EMU systems, undercapitalised banks (of any size) tend to respond more to change in policy. Furthermore, Huang (2003) analysed the cross-section differences between bank-dependent and non-bank-dependent listed companies, and between listed and non-listed companies. Their results concluded that small firms bear most of the reductions in bank loan supplies, and since they do not have many alternatives to bank finance, they suffer more from monetary tightening than big firms. Furthermore, he found that big, non-bank-dependent firms can benefit more from the bank-firm relationship than small, bank-dependent firms.

Changes in the monetary policy channel give an idea on how to regulate and strengthen the banking industry. Thus, several questions can be highlighted: how do changes in the monetary policy tools affect the bank portfolio? If the bank lending plays as a monetary policy channel, do they affect the other portfolios? Do the current regulations (such as capital requirement) affect the bank portfolio behaviour? Thus, we hope this paper could contribute to the policy makers for making a good policy in order to stabilise the economy condition as well as the banking industry.

Therefore, the objective of this paper was to analyse the bank lending channel as one of the important transmission mechanism of monetary policy. We also want to examine whether deregulation can produce a counteract affect on the bank supply of loans (assets side). Besides this, we also want to prove whether bank portfolio can be affected by the monetary policy and current regulations (such as capital requirement).

The organisation of this paper is as follows. Section 2 discusses the stylized facts about monetary policy in Malaysia. Section 3 gives an overview of the Malaysian banking industry. In section 4, it indicates recent literature on monetary transmission and bank lending. In section 5, we develop our methodology. In section 6 we present our empirical results and ultimately, section 7 concludes.

## **STYLIZED FACTS ABOUT MONETARY POLICY IN MALAYSIA**

Prior to the mid-1990s, monetary strategy in Malaysia was targeting monetary aggregates. This was an internal strategy and not formally

announced to the public. The establishment of this strategy was based on the evidence that monetary aggregates were closely linked to the ultimate objectives of monetary policy. This was proven by the correlation test, that is, monetary growth (M3) was shown to be positively and highly correlated with inflation by using quarterly data from 1980 to 1992. The ultimate objective of monetary policy is to stabilise price and it is seen as a suitable target for policy. Prior to 1987, M1 was the main policy target. However, Bank Negara Malaysia (BNM) eventually placed greater importance on the broad monetary aggregate M3 as the policy target because of financial liberalisation and innovation.

However, further developments in the economy and the financial system during the early 1990s had weakened this relationship and highlighted the problems associated with using monetary aggregates as policy targets. There had been large capital inflows in 1992 and 1993 brought about the instability of the monetary aggregates as targets. The annual growth of money supply, as measured by M3 was extremely volatile during the period of large capital flows.

Consequently, BNM had shifted the monetary policy strategy from monetary aggregates to interest rates as the intermediate target. There were four main factors that influenced the changes of the monetary policy. Firstly, the liberalisation of interest rates since 1978 led to a more market-oriented interest rate determination process. Secondly, financial deregulation and liberalisation measures undertaken during the decade had enhanced the role of the interest rate in the monetary transmission mechanism. Thirdly, there was a notable shift in the financing pattern of the economy since the mid-1980s following structural changes in the economy from an interest-inelastic market (Government securities market) to a more interest-sensitive market (bank credit and capital market). Ultimately, BNM also concentrated on the view that needed stability of interest rate in order to promote a stable financial system which would contribute toward a more effective transmission mechanism of monetary policy. Given this economic environment, investors became increasingly more interest sensitive.

In this monetary policy strategy, we could see the evolution of interest rate regime from 1990 until recently. Prior to 1991, the deposit and lending rates were subjected to the administrative control of BNM. However, in February 1991 the policy had changed, where banking institutions were free to determine deposit and lending rates. In this policy, BNM had developed a standardised BLR formula based on an individual institution's cost of funds. Besides this, the margin above

BLR was capped at 4 percentage points. Furthermore, in November 1995, there was another change in the interest rate regime, which was a developed market-based BLR framework incorporating a standardised formula for the computation of maximum BLR for the banking industry. The maximum BLR was computed based on a weighted average of three-month interbank rate and administrative margin of 2.5 percentage points. However, the maximum margin above BLR remained at 4 percentage points. In September 1998, BNM had substituted the interbank rate with BNM intervention rate. Administrative margin was reduced to 2.25 percentage points. However, the maximum margin above BLR was lowered to 2.5 percentage points. The intervention rate was used as a basis to compute the ceiling BLR, as it is the market rate at which banking institutions can borrow from BNM at times when the market is short of liquidity. Ultimately, on 26 April 2004, BNM implemented a new interest rate framework. Under this new framework, the overnight policy rate (OPR) replaced the three-month intervention rate. The OPR was set at the prevailing interbank overnight rate of 2.7% and allowed to fluctuate within a narrow range of plus or minus 25 basis points. Banking institutions could then fix their cost structures and business strategies.

Furthermore, another characteristic of the monetary policy was the transition towards more market-based policy procedures. This strategy tried to enhance the effectiveness of monetary policy in the medium to long run. BNM had accomplished a three pronged strategy to facilitate this transition process, which are enhancing transparency, improving the payment and settlement arrangements, and accelerating regulatory and prudential reforms.

During the financial crisis in mid-1997, there had been adverse effects on financial and economic activities. Within that period, there was extreme volatility in the financial markets. The well built initial conditions and the prompt response and pragmatic measures introduced allowed Malaysia to avoid the extreme effects of the crisis. Policy had been given priority in order to ensure that the payment system and the intermediation function continued to operate efficiently and without interruption.

However, the policy responses to the crisis evolved with the different stages of the financial crisis as circumstances changed. Since the crisis became more long lasting and faced with severe economic contraction on 1 September 1998, BNM took the pre-emptive step to introduce selective exchange controls to contain the internalisation of the ringgit and to stabilise short-term capital flows. On 16 September, BNM

reduced the SRR to 4%. Furthermore, BNM also made a reduction on the intervention rate in three successive steps to 7% per annum in November, which continued until August 1999 where the policy rate was reduced to 5.5% per annum. As a result of the aggressive easing monetary policy, the average BLR of commercial banks and finance companies fell from 11.7% and 14.7% per annum respectively in August 1998 to as low as 6.79% and 7.95% per annum by August 1999.

Subsequently, the rapid easing of monetary policy following the introduction of the exchange control measures has been the best action to provide an environment of low interest rates and ample liquidity to support the economic recovery. This monetary policy change was imperative since more and more instruments in the global economy were market-based. The monetary policy framework would be adapted accordingly to ensure that monetary policy remains an effective policy to promote economic growth and monetary stability.

The Malaysian financial markets are regulated and under the control of BNM. In the late 1990s, the financial sector had undergone a restructuring and consolidation exercise to strengthen the banking sector shock experienced substantial loss from huge non-performing loans. In 2001, BNM announced a 10-year plan for strengthening the financial sector that limits competition from new foreign banks until after 2007 in order to protect the domestic banks. Overall, foreign participation in commercial banking is limited to 30% of equity in any single institution.

## **THE MALAYSIAN BANKING INDUSTRY**

There had been many changes in banking performance since the Asian crisis; the Malaysian banking sector faced the disruption of liquidity, capital and performance. Many banks were merged and acquired in order to recover their losses incurred during the crisis. However in recent years, the Malaysian bank exists in three types of institutions: commercial banks, finance companies, and merchant banks. Domestic commercial banks have the largest share in the market. The government has implemented many restrictions for foreign banks operating in Malaysia to develop in the domestic financial sector. The restrictions have decreased the hold of foreign commercial banks bank assets. This can be shown by the reduction of share held by foreign commercial banks in 1957 (over 90% of banking system) that

decreased in 1997, only 16.7% of bank assets. Besides this, since 1971, foreign banks have been prohibited to open new branches and the last license was given in 1973.

The evolution of financial intermediation in Malaysia from 1960 to 2000 reflected in Table 1 shows major financial intermediary assets by value and also by percentage. The traditional banking has recorded percentage increase in its financial assets for the period 1960, 1970, and 1980, which accounted for 65.9%, 64.1% and 73.2% respectively. However, the period 1990 shows a decline to 69.7% and this is followed by further decline in 2000 to 66.9%. On the other hand, the assets of the non-bank institutions revealed the contrary. For the year 1960, 1970, and 1980, the assets showed a declining trend from 33.5% to 33.3%, and finally to 26.7% respectively.

However, in the year 1990 and 2000, the assets record rising trend of 30.2% and 33.05% respectively. These developments witnessed the moving of funds from the traditional banking to non-banking financial institutions. It seems that banking experienced contraction as evidenced in Table 1. This is also supported by a decrease of commercial bank assets as a fraction of total intermediated assets from 43.39% in 1980 to 41.08% in 2000.

Nevertheless, during the period 1990 to 2000, the traditional banking sector was exposed to the non-performing loans that stood very high, for instance at 9.1% for the periods of 1997 to 1999 (Source: Bank Negara Malaysia Annual Reports of 1980-2000). Therefore, firstly, the so-called decline of commercial banking is limited to a decline in the relative importance of commercial banking because the banking industry assets actually increased between 1960 and 2000. In other words, bank assets have actually increased – just not as fast as the assets of other financial intermediaries. Secondly, many of the new innovative activities in which banks engage in are not reflected on the bank balance sheets as assets, even though they add significantly to bank revenue. These include, for example, trading in interest rate and currency swaps, selling derivative instruments, and issuing credit guarantees. Thirdly, banks have a strong comparative advantage in lending to individuals and small businesses. Credit guarantee schemes given by Credit Guarantee Corporation encourage banks to provide loans to small borrowers. Finally, banks have joined forces with a number of other types of financial intermediaries. The synonym word of financial supermarket is very much relevant in this case. For example, banks have combined with unit trust funds,

**Table 1**  
**Malaysia: Assets of the Financial System**

		As end of											
		1960		1970		1980		1990		2000			
		RM ('000)	%										
Malaysia: Assets of the Financial System <sup>a</sup>													
I. Banking Institution													
		2356	65.9	7455	64.1	54346	73.2	223.5	69.7	829.9	66.7		
	Central Bank	1114	31.1	2422	19.3	12994	17.5	37.5	11.7	148.9	11.9		
	Commercial Banks	1232	34.5	4460	35.6	32186	43.3	130.6	40.7	513.6	41.0		
	Finance Companies	60	1.6	531	4.24	5635	7.5	39.4	12.3	109.4	8.7		
	Merchant banks	-	-	-	-	2229	3.0	11.1	1.5	36.9	2.9		
	Discount houses	-	-	42	0.3	1292	1.7	4.9	3.4	21.1	1.6		
II. Non-bank financial intermediaries													
		1197	33.5	4167	33.3	19807	26.7	96.9	30.2	413.1	33.0		

(continued Table 1)

Provident, pension and Insurance funds	733	30.5	2717	21.7	11370	15.3	51.8	16.1	217.6	17.4
Life and General Insurance	103	2.8	439	3.5	2476	3.3	10.3	3.2	52.2	4.1
Development and Finance Insurance	1	0.1	133	1.0	2193	2.9	6.0	1.8	25.1	2.0
Savings institutions	267	7.4	645	5.1	2463	3.3	10	3.1	32.3	25.8
Other Financial <sup>d</sup> Intermediaries	93	2.6	233	1.8	1305	1.7	19.8	6.1	85.9	6.8
Total	3553	100	11622	100	74153	100	320.4	100	1243	100

Notes:-

a. Combined assets of individual institutions as at end of year.

b. Includes Bank Islam

c. Includes Teachers Provident Fund, Armed Forces Fund, Social Security Organisation, Pension Trust fund, and other provident funds.

d. Includes Building Societies, Pilgrim Management and Fund Board, Cagarmas Berhad, Credit Guarantee Corporation, Leasing companies, Factoring Companies, and Venture capital companies

e. Borneo Housing Mortgage Finance and Malaysia Building Society Berhad.

Source: Money and Banking in Malaysia, published by Bank Negara Malaysia and Bank Negara Malaysia Annual Reports of 1980-2000

merchant banks, insurance companies, and finance companies. Bank acquisitions of non-bank financial intermediaries are part of a broader consolidation of the entire financial service industry.

Similar to other financial intermediaries such as unit trust, leasing companies, factoring companies, and venture capital companies compared to the traditional finance, that financial intermediaries show their relative importance with rising trend after the year 1980. The percentage of financial assets has increased from the lowest 1.75% in the 1980s to 6.87% in the year 2000.

This evolution showed the emergence of various types of non-bank financial institutions and the increase in the number of instruments introduced. It also indicates customer preferences on the various new types of instruments introduced or investment opportunities exist. For instance, the declining trends of commercial bank funds show customer preference toward investment in insurance or unit trust (Source: Money and Banking in Malaysia).

During the onset of crisis in the mid-1997, the Malaysian economy became more unstabilised as a result of the volatility in the financial markets. Capital outflows were affected by the short term portfolio investment prevailing fluctuating in market shares by the decline in equity values. Prior to the crisis, the economy strongly operated with an average annual real growth rate of 8.5 %. The banking sector was hit by the deterioration, with non-performing loans increasing from 6% of the total loans at the end of 1997 to 22% at the end of 1998, while provisioning as shares of non-performing loans declining from 66% to 42%.

As the economy continued to deteriorate in June to July 1998, two special agencies were established, which were Danaharta and Danamodal. Danaharta was established to handle buying non-performing loans at a discount in banks. Besides that, Danamodal was to inject new capital in selected institutions. Additionally, there was also the creation of the corporate debt restructuring committee (CDRC) in order to accelerate the pace of corporate debt restructuring in Malaysia. The establishment of the agencies would give an improvement and recovery of the non-performing loans that was decreased to 15.3% of the total loans, while provisions rose to 53.8% of bad debt in year 2000.

## **PRIOR STUDIES**

The role of bank as a transmission of monetary policy can be seen from both assets and liabilities. Money channel tries to highlight an important

role of banks in order to generate liabilities. Banks expand their money through the deposits and placements earning from customers, banks, and other financial institutions. Ford, Agung, Ahmed, and Santoso (2003) examined monetary contraction by increasing bank reserves owing to reserve requirement and had constrained the ability of banks to increase their deposits. Consequently, depositors hold less money (bank deposits) in their portfolios.

The role of banks in the transmission of monetary policy emanates also from their assets. Loans are the main bank asset, where monetary policy action would also influence the loan variable. The transmission of monetary policy on the bank lending has been classified into two wide views, namely traditional money view, and credit view which affect the aggregate demand and thus the output.

The influence of monetary shocks on real economic activity has two dimensions in the credit view, namely the borrower net worth channel (also known as the balance sheet channel) and the bank-lending channel.

Firstly, a monetary shock can influence the financial position of a borrower firm. A high net worth firm's balance sheet makes its external financing from the loan market possible and hence, stimulates investment decisions. As the transmission of monetary shocks to the real economy occurs through the borrower's balance sheets, this channel is called the balance sheet channel (loan demand). Secondly, monetary shock can also influence the bank's loan supply to bank dependent firms. This change in the availability of loans influences the investment decisions of the borrower firms by reducing the external source of finance. The transmission through such a channel is called the bank-lending channel (loan supply). However our research will only concentrate on the bank-lending channel as a mechanism transmission in monetary policy.

The approach to the monetary transmission mechanism appears to be an important channel of credit view as there are bank dependent borrowers who have few or no alternative sources of finance other than bank loans. Any frictions in the asset-liability management of banks due to monetary shocks would be transmitted to real economic activity through bank dependent producers in the economy. A tight monetary policy drains reserves from the banking system and restrict the supply of loanable funds so that it increases the external finance premium of bank dependent borrower firms.

In other words, in this channel, Kishen and Opiela (2000) concluded that asymmetric information and time deposit purchasers expose these purchasers to the default risk through the non-reservable, uninsured deposits, i.e. time deposits. Consequently, an increase in reserve requirement by central banks may cause some banks unable to completely offset an increasing withdrawal in time deposits by depositors. This implies that open market operations can directly affect loan supply and create an additional channel of monetary transmission.

The effect of a monetary shock on the external finance premium of small size firms is assumed to be higher than large size firms, under the assumptions that large size firms have easier access to the credit markets and have more alternative sources of finance. Kakes and Sturm (2002) used quarterly data of six different banking groups in Germany. They concluded that lending by the credit co-operatives, which are on average the smallest banks declining most, whereas big banks are able to shield their loans portfolio against monetary shocks. This shows that the response of bank lending after a monetary contraction is very different across banking sectors.

Besides that, Kashyap and Stein (1995; 2000) analysed disaggregated data of banks and found that large banks are better able to neutralise monetary shocks than small banks. Small banks face more credit market imperfections and have only limited access to alternative sources of finance, hence they cannot absorb monetary shocks as easy as larger banks.

The presence of an active bank-lending channel may serve to explain the amplified and propagated conventional effects of policy shocks. It has been noted that since bank-lending channel focuses only on the lending behaviour of banks affected by monetary policy shocks, this transmission channel view is assumed to be a narrow typed credit channel approach. Kashyap and Stein (1995) use micro data on bank balance sheet to identify effects of monetary policy on bank lending. They divided banks into size categories and looked at the response of lending to monetary policy shocks, which they identified as changes in the federal funds rate. They found that bank lending declines after a monetary policy contraction at all but the largest banks. They interpreted this as an evidence supporting the existence of a bank-lending channel since one of the links in the chain of causality behind the bank-lending channel is that after a monetary contraction, a bank lends less. Similarly, the research made by Huang (2003) also revealed similar results using a UK balance sheet panel data.

However, their result is consistent with a fall in credit demand of small bank borrowers relative to large bank borrowers, which is consistent with the Oliner and Rudebusch (1995), but with criticism of Kashyap, Stein, and Wilcox (1993). Kashyap and Stein (1995) did not look at the next step in the chain of causality to see whether the differential response of small and large banks to monetary shocks has effect on the real economy and they found that a bank-lending channel exists for small balance constrained banks.

However other researchers have studied the effects of the monetary transmission on bank size and their behaviour towards lending. In addition, these studies also investigated whether monetary policy has a differential impact for banks of different asset size (Kashyap & Stein, 1995), asset size and liquidity (Kashyap & Stein, 1997a) and asset size, and capital strength (Kishan & Opiela, 2000). These studies found that a bank-lending channel exists and this is mainly transmitted through small banks, which means that the bank-lending channel appears to be strengthened when small banks are either relatively illiquid or undercapitalised.

In short, the evidence strongly suggests that a bank-lending channel is present for small balance sheet constrained banks. The use of bank size as a measure to generate cross-sectional differences does not correspond precisely to the underlying theoretical models, which stressed the importance of net worth. In this context, bank capital may be a better proxy. Favero *et al* (1999) and Kishan and Opiela (2000) categorised banks by size into six asset size categories and further subdivided them into three capital strength groups.

Though regulators use a variety of definitions of bank capital, they focus on the equity capital ratio to total asset ratio (Benston, 1998, Estrella *et al.* 1999). This includes bank with equity to asset ratios with: < 5% (undercapitalised), > 5% and <10% (adequately capitalised), and > 10% (well/over capitalised).

For the asset size of each bank, there is a significant inverse relationship between bank lending and changes in money market rates for undercapitalised small, medium, and large banks across 11 EMU countries. The case of small and large bank relationship is contemporaneous, whereas for medium sized banks there is a significant lagged relationship as they probably are better insulated from monetary policy shock. It seems that bank-lending channel is more prevalent for undercapitalised banks operating in the other smaller EMU countries.

As such evidences of a bank-lending channel in EMU countries are mainly transmitted through undercapitalised banks operating in smaller banking systems. They indeed found that lending behaviour of small-undercapitalised US banks (those with less than RM300 million in assets) were most responsive to monetary policy. Peek and Rosengren (1992) analysed the lending behaviour of New England banks over the 1990-1991 recession. Their results indicated that the loans of well-capitalised banks fell less than the loans of poorly capitalised banks.

Hence, as with the Kashyap and Stein findings, their evidence suggested there are effects on informational imperfections in financial markets on the balance sheets of intermediaries as well as borrowers. Debondt (1998) was the first to use disaggregated bank data to test for evidence of the lending channel across various European countries, following a similar approach to Kashyap and Stein (1995, 1997a).

Debondt (1998) also tested European banks with varying characteristics (in terms of balance sheet size and liquidity) responding to the changes in the stance of monetary policy (short term interest rates) during the 1990-1995 periods in order to examine whether there exist important differences. In his interactive regression models, he used changes in money market rates (as a proxy for monetary policy stance). Overall, the evidence showed there exists bank-lending channel in Germany, Belgium, and Netherlands, while the rest of countries under study (France, Italy, and United Kingdom) no significant effects were found. However, when the stance of monetary policy is measured by a monetary condition index, the bank-lending channel also appeared to exist in Italy and France.

In 1999, he adopted a different approach by using aggregate bank data to examine the main lending channel in the same six European countries. By including security holdings in a vector error correction model as a variable used to detect loan supply effects, he found evidence that credit constraints due to monetary policy were important in Italy, Germany, and France, but not in United Kingdom, Belgium, and Netherlands.

Furthermore, Altunbas *et al.* (2002) by using panel data approach, found that EMU systems, undercapitalised banks (of any size) seem to respond more to change in policy. It seemed that the bank-lending channel is more prevalent for undercapitalised banks. However, Favero (1999) used individual bank balance sheet data to investigate the response of banks in France, Germany, Italy, and Spain to monetary

tightening in 1992. They found no evidence of bank-lending channel although they did find that banks in different countries respond in different ways to protect the supply of loans from the liquidity squeeze.

In other perspectives, bank lending is also exposed to GDP shocks. This is because demand for loans is pro-cyclical. However, bank lending supply could behave differently according to the business cycle. According to Boot (2000) and Thakor (2004) the reason is that banks deeply involved in relationship lending are likely to smooth lending *through the cycle*. Although, well-capitalised banks could be in a better position to absorb temporary financial difficulties on the part of their borrowers. Besides that, much previous literature had emphasised on the relationship between bank capital and risk aversion (Rochet, 1992). This meant, that if banks choose *ex ante* a loan portfolio with higher return and risk, their borrowers are on average, more financially fragile and more exposed to economic downturns. These could highly debate an important issue of how bank capital influences the response of bank lending to monetary policy and GDP shocks.

Gambacorta and Mistrulli (2004) found that well-capitalised banks are less constrained by capital requirements and have more opportunities to expand their loan portfolio. Furthermore, the results showed that the response of bank lending to a monetary policy has the expected negative sign. The findings also showed that the effects of monetary tightening are smaller for banks with higher capital ratios, which have easier access to uninsured financing. Their findings also showed that there is positive correlation between credit and output. An increase in output causes a loan increase. The interaction term between GDP and excess capital is negative. This means that the credit supply of well-capitalised banks is less dependent on the business cycle. This is consistent with Kwan and Eisenbeis (1997), where capital is found to have a significantly negative effect on credit risk.

## METHODOLOGY

### The Model

In this section, we adopted an approach similar to Kashyap and Stein (1995), and Kishen and Opiela (2000). Though, we tried to examine evidence of the bank-lending channel in Malaysia. In particular, we examined evidence of the lending channel for the commercial banks

in Malaysia between 1994 and 2004.

According to bank-lending channel theory, the central point in the issue of procyclical behaviour of banks is the passing through of lending into the macroeconomic sphere similar to that of Bernanke and Blinder (1992). Therefore, this section briefly discusses the extent to which lending depends on either demand or supply variables. Naturally, there is a strong correlation between demand for credit and the business cycle. The model developed below is estimated using the random effects panel data approach. This was set out as follows, with index  $i$  referring to bank  $i$  and  $t$  to period  $t$ . Our empirical model for lending was given as:

$$\text{Lending}_{it} = \alpha_1 \text{gdp}_{it} + \alpha_2 \text{unemployment}_{it} + \alpha_3 \text{M3}_{it} + \alpha_4 \text{interbank rate}_{it} + \alpha_5 \text{profits}_{it} + \alpha_6 \text{non-deposit}_{it} + \alpha_7 \text{capital and reserves}_{it} + \alpha_8 \text{securities}_{it} + \alpha_9 \text{treasurybills} + \mu_t$$

The explanation of the above variables is as follows:

### Macroeconomic Factors

- (i) Real GDP growth. The GDP growth figure is the most general and most direct measure of macroeconomic development. In our context, it is first and foremost an indicator of the demand for banking services, including the extension of loans, and the supply of funds, such as deposits, and as such is a direct determinant of profits. As a growth figure, it is the single most useful indicator of the business cycle, while the costs of banks are also expected to be linked to the economic cycle. The GDP growth figure is made real by deflating it with inflation.
- (ii) Unemployment (%). Unemployment does not directly influence profitability, but it is a major cyclical indicator. If short-term unemployment is primarily a reflection of the business cycle, long-term unemployment indicates structural disequilibrium in the economy. In addition, unemployment is a measure of the current *phase* in the business cycle, whereas GDP growth merely indicates the *degree of change* in the business cycle.
- (iii) Real money supply (M3; % change). The money supply is represented by the monetary aggregate M3, defined as the sum of cash and non-cash balances held by the public, short-term deposits, foreign-exchange holdings, and short-term savings. Growth of the money supply makes real growth possible, and is primarily an indicator of future growth potential (Boeschoten

*et al.*, 1994; Berk & Bikker, 1995). In the first place, it reflects the availability of money, which is strongly linked to the creation of money by banks through lending. Excessive money growth implies a risk of overheating the economy and its concomitant rising inflation. The European Central Bank therefore regards excessive M3 growth as a preamble to rising inflation. The impact of money supply on profits is mostly indirect, which is why this variable, too, functions mostly as a *control* variable. Like real GDP, the real money supply is deflated by GDP price increase.

- (iv) Interbank rate. The three-month KLIBOR is determined by the supply and demand of funds by financial institutions in the interbank market, the largest lender being Bank Negara Malaysia. The central bank can influence the interbank rates through its open market operations by borrowing from and lending to the financial institutions. According to Affin-OUB Research, the drop in the three-month KLIBOR reflects a change in the central bank's open market operation and does not signal a change in monetary policy or an impending spike in the statutory reserve requirement (SRR) of banks. In a recent report, the research house said now that the three-month KLIBOR is more market-determined than before, the financial instrument is expected to display a greater degree of volatility. A head of research from a stockbroker said BNM, by making a shift from the three-month KLIBOR to the shorter-end one-month KLIBOR, hopes to encourage banks to lend more among themselves, indirectly boosting loan growth which has stagnated because banks are unable to find good borrowers.

### **Banking Sector Specific Factors**

- (i) Loans (as a share of total assets). This variable represents the (relative) size of lending. Generally, loans have a positive influence on profitability, because as a bank's core business, they are a major generator of interest income, but lending also entails operational costs and credit losses. If costs and risks are not expressed adequately in the price of credit (*i.e.* the mark-up rate), as a result of cross subsidisation, then lending becomes a loss-making business. In any case, this variable serves to characterise a bank's balance sheet. Like the variables that follow below, the loans variable is divided by total assets in order to standardise it and allow comparisons across countries and years.

- (ii) Capital and reserves (as a share of total liabilities and shareholder's funds). This includes paid-up capital, reserved funds, retained profits and other capital funds. Capital and reserves constitute the *own funds* or core capital of a bank and it also could measure solvency of a bank. If investment is risky, the more capital is needed to shield any negative possibility from the investment. While high-risk investments bring in more returns, greater capital could go together with high profits, so that a positive coefficient may be expected as well, depending on the degree to which risk pays off. If profits are defined as *returns on equity*, then a relatively small capital may leverage high profits, and one should expect to see a negative coefficient. If profits are defined as the margin on assets, capital and reserves become a *free* source of finance, so that from this perspective, one must expect a positive coefficient. Thus, on account of the many possible ways they may pass through to the results, the capital and reserves variable is primarily a *control* variable.
- (iii) Non-bank deposits (as a share of balance sheet total). Non-bank deposits include all deposit liabilities of banks except interbank deposits. This variable characterises the funding structure of the banking system.
- (iv) Securities (securities purchased under resale agreement). Securities include foreign government bonds and foreign government treasury bills.

### **Estimation Methods**

To verify whether the sample data is normally distributed, the data was tested using several techniques such as the skewness test, kurtosis, the Jarque Bera as well as the value of mean and median. If a sample is normally distributed, the value of skewness will be equal to zero, the value of kurtosis should be three and the value of mean should be the same as the value of its median while the value of Jarque Bera should not be significant or with high value of probability. A sample data that is normally distributed should be an efficient estimator, unbiased, and consistent. If the sample data is not normally distributed, i.e. the value of mean and median for all the variables are not the same while their skewness is not equal to zero, the value of kurtosis are not equal to three, and the values of Jarque-Bera are significant, therefore it can be concluded that based on the above, the Ordinary Least Squares estimation method is not a better estimation method to be used.

Hence, the Generalised Least Square method is more appropriate and expected to yield a much better result.

The standard unit root test has to be performed first to check the stationarity of our data. However, it is often argued that the commonly used unit root tests, such as the augmented Dickey-Fuller test and the Phillips-Perron test, are not very powerful. As a response, panel unit root tests were developed. These tests are in essence motivated to increase the power through pooling information across units.

In order to adopt the appropriate panel estimator, Hausman test statistic was used to compare random effects with the fixed effects model. In all the estimations outlined in our paper, the fixed effects was the preferred model.

### **Data**

To estimate equation (1), we use an unbalanced bank-level panel data set for 25 commercial banks. The data are annual and span the period from 1994 to 2004. The total number of observations in the sample is 275. Before we can estimate the equation, the number of degrees of freedom (df) should be taken into account. In this manner, a full cycle of the Malaysian economy is included, a point of particular importance given that the aim of this paper is, as mentioned, to analyse whether there is a relationship between the business cycle, lending, monetary policy, and regulatory framework (capital requirement).

## **EMPIRICAL RESULTS**

Our first step of estimation is to test the unit root test for each pool data. From the equation we developed, there are 10 variables to be estimated. Below are the results for the stationary test. From the unit root test, we specified them into individual process and common process, in which the common test indicates that the tests are estimated assuming a common AR structure for all the series, while the individual test is used for tests which allow for different AR coefficients in each series.

The probability values are in the parenthesis, while others are t statistics. Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

**Table 2**  
Stationary Test (Level)

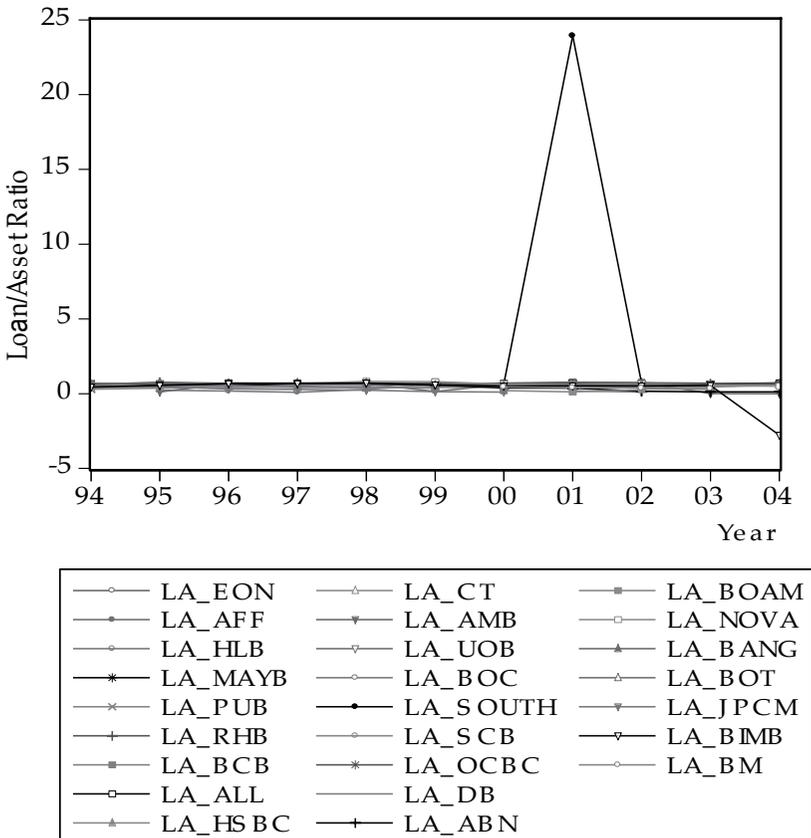
Variables	Individual unit root process		Common unit root process			
	Im, Pesaran and Shin W-stat	ADF - Fisher Chi-square	PP - Fisher Chi-square	Levin, Lin & Chu t*	Breitung t-stat	
Loan	-0.15896 (0.4368)	42.8491 (0.2709)	67.434 (0.0043)*	-6.88764 (0.0000)	-1.23514 (0.1084)	
N-Deposit	-0.84638 (0.1987)	56.3843 (0.0278)***	103.744 (0.0000)*	-10.8525 (0.0000)*	-2.3305 (0.0099)*	
Share Capital & Reserves	-0.13824 (0.445)	63.7551 (0.0635)***	60.2594 (0.1103)	-8.25881 (0.0000)*	-2.71226 (0.0033)*	
Profit	-0.67399 (0.2502)	43.1575 (0.0900)***	122.45 (0.0000)*	-12.8157 (0.0000)*	-1.65814 (0.0486)**	
Securities	0.53754 (0.7046)	28.7856 (0.63)	16.1823 (0.9909)	-4.15524 (0.0000)*	-0.85473 (0.1963)	
GDP	-1.65016 (0.0495)	95.3707 (0.0001)*	136.625 (0.0000)*	-18.7977 (0.0000)*	-0.62311 (0.2666)	
Unemployment	-0.45496 (0.3246)	62.559 (0.1095)	152.1 (0.0000)*	-13.6948 (0.0000)*	4.84201 (1.0000)	
M3	-0.00205 (0.4992)	43.075 (0.7453)	22.674 (0.9997)	-0.25708 (0.3986)	7.51002 (1.0000)	
Overnight	0.29784 (0.6171)	37.5605 (0.861)	38.2819 (0.841)	-0.26215 (0.3966)	-0.65813 (0.2552)	
3 Month	-0.24002 (0.4052)	47.5375 (0.5728)	49.7164 (0.4847)	-4.33503 (0.0000)*	-1.27468 (0.1012)	
Treasury Bills	-2.81517 (0.0024)*	71.398 (0.0251)***	70.0656 (0.0352)**	-6.16529 (0.0000)*	-1.09716 (0.1363)	

Note: \*, \*\* and \*\*\* indicate significance at the 1%, 5%, and 10% levels, respectively. The probability values are in the parenthesis, while others are t statistics. Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

According to Table 2, our results show that only several variables are significant at level stage for unit root test that is loan, non-deposit, share capital and reserves, profit, securities, GDP, unemployment, three month interbank rate, and three month treasury bills. However, variables that are not significant at level stage will be dropped from our next estimations, which are M3 and overnight interbank rate. This is to prevent from the problems of mis-specification.

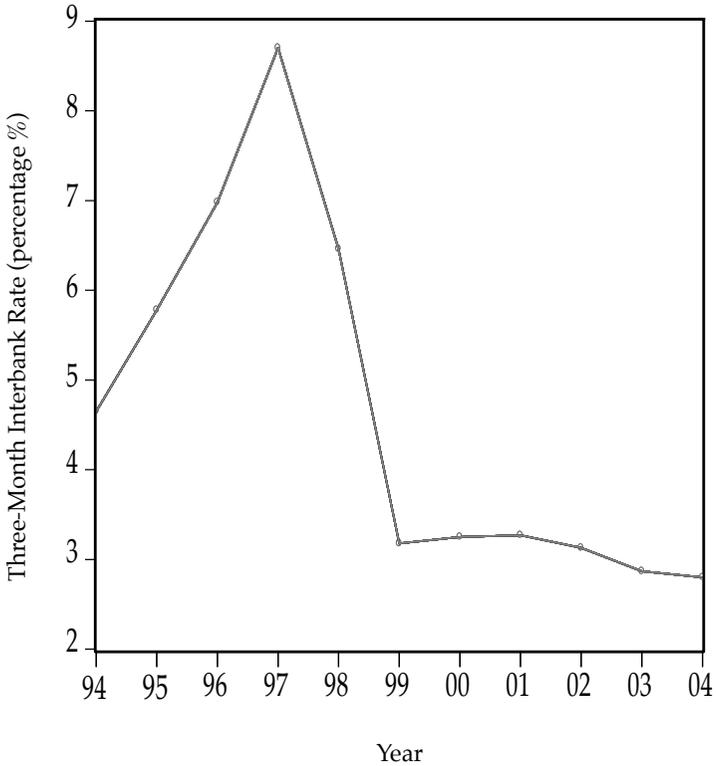
### Descriptive Analysis

Figure 1 shows the loan-deposit ratio of commercial banks in Malaysia. The figure shows that all banks were mostly at the same ratio and only Malayan Banking Berhad in 2001 showed differently, which boosted up to 25.



**Figure 1**  
Trend of loan-asset ratio by banks from 1994 to 2004

Figure 2 shows the three-month interbank rate from 1994 to 2004. Obviously, the rate increased from 1994 to 1997, however after economic crisis in 1997 the rate rapidly decreased to just over 3% in 1999 and more or less than 3% until 2004. Solving of the economic crisis was the main reason behind the decline of three-month interbank rate in 1999. In addition, it could inculcate the supply of loans since the cost for borrowers were low.



**Figure 2**  
Trend of three-month interbank rate

From the descriptive analysis shown in Table 3, we could find out the distribution of the samples data. From our analysis, we found that the mean and median value is not equal for each variable tested. Furthermore, the skewness value was mostly is not equal to zero, for example deposit and loan are 2.778081 and 2.512297 respectively. Also from our analysis, we found that the kurtosis value is also not equal to three. Most of the values are more or less than three. The most important thing in the analysis was we proved that all the probability values are significant. Thus, we could conclude that sample of the data

**Table 3**  
Descriptive Analysis

Non-deposit	Loan	Share capital & Reserves	Profit	Securities	GDP	Unemployment	3-Month Interbank Rate	3-Month Treasury Bills
Mean	857411.2	11244515	1427519	303701.5	356544.8	1.02E+11	3.057143	4.953
Median	284000	7422219	343177.5	117425	187462	1.03E+11	3.1	3.635
Maximum	7973293	80160354	37574104	14354601	2529118	1.17E+11	3.9	9.43
Minimum	20	31959	-184638	-747438	4	8.09E+10	2.5	2.84
Std. Dev.	1466681	14306541	3743709	1088945	455235.5	1.10E+10	0.469951	2.339473
Skewness	2.778081	2.512297	6.924071	11.45928	2.035694	-0.41212	0.387586	0.679673
Kurtosis	11.02802	10.30265	59.53302	146.9435	7.417861	2.173926	2.121194	1.920557
Jarque-Bera	770.5043	618.7798	38676.85	169074.8	243.6325	12.76662	10.01285	31.38561
Probability	0	0	0	0	0	0.00169	0.006695	0

is not normally distributed. Therefore, the next estimation would be more appropriate by using Generalise Least Squares method instead of Ordinary Least Squares.

**Table 4**  
The Responsive of Total Loan to Changes in Monetary Policy.  
Generalise Least Squares (Fixed Effects)

Dependent variables/Independent variables	Loan
Deposit(1)	0.875317 (4.281491)*
Share capital & reserves	0.005209 (0.094848)
Profit	1.513614 (2.198545)**
Securities	1.555317 (2.112524)**
GDP(2)	-0.000116 (-11.7566)*
Unemployment (2)	-554212.4 (-2.11936)**
3-Month Interbank Rate	-458321.8 (-1.90256)***
3-Month Treasury Bills	382713.8 (0.85825)
Constant	-1.19E+08 (-7.13838)*
Trend	1375403 (8.200615)*
Adjusted R-squared	0.949852
F-statistic	122.738

Note: \*\*, \*\* and \*\*\* indicate significance at the 1%, 5% and 10% levels, respectively. The t-statistics are in the parenthesis, while others are coefficient values.

Table 4 illustrates the responsiveness of total loans (LOAN) to changes in monetary policy across 25 commercial banks in Malaysia from 1994 to 2004. It can be seen from the loan equation that bank lending does appear to be statistically and significantly related to the changes in the stance of the monetary policy. The changes in monetary policy proxy by three-month interbank rate significantly show the effect of changes in total loans. This revealed that, an increase of 1% in

interbank rate (monetary contraction) would result in a total loan decrease by 458321.8%. This suggests how the changes in monetary stance would affect the supply of loans, which is consistent with the bank-lending channel.

Additionally, the results also revealed that there is a significant positive relationship between total lending and deposits, securities, and profit, at coefficient values 0.875317, 1.555317, and 1.513614, respectively. This would suggest that banks adjust their deposits during the monetary changes. An increase in deposits will more likely inculcate the supply of loans to customers. Specifically, deposit is an obligation of the banks and it has been used as one of the sources of funds to offer more loans to customers. Therefore, it seems to be that all banks have a buffer of liquid assets to offset the monetary shock.

Furthermore, their profits also increase in the effect of the monetary stance. However, the two remaining macro variables that are output (GDP) and unemployment are statistically significantly proven at a lag two years after the monetary policy. This would suggest that changes in monetary policy could affect the supply of loans in the current period, while it would reduced output after two years at coefficient value -0.000116.

Nevertheless, the other variable is not significant including share capital and reserves, that proxy as capital requirement. This finds that the capital strength at any level cannot be proved by the changes of monetary policy. In other words, no matter how high capital ratio of banks, they do not get affected by the monetary shock from bank-lending channel.

## CONCLUSIONS

Following the approach suggested by Kashyap and Stein (1995), Kishen and Opiela (2000) the bank balance sheet was used to estimate the response of bank lending to changes in the monetary policy stance between 1994 and 2004. From the estimations it was found that there was evidence on the bank-lending channel in the case of Malaysia. This means that any changes in monetary policy, for example a change in the interbank rate, would affect supply of loans in the current year. This result can directly answer the first research question that was highlighted.

In addition, the existence of a bank-lending channel shows that any changes in interest rate proxy by three-month interbank rate can

influence loan supply and it would affect the other portfolios such as deposit, profit, and securities in a positive relationship. An increase in these three variables would increase the supply of loans that can function as sources of funds. The monetary stance also affects the securities holding by banks in order to get a buffer of funds. These findings show that it was successfully proven that monetary stance can give a positive effect to the bank portfolio.

Nevertheless, we had failed to prove the capital requirement as the component that maybe taken into account in order to prove whether bank with well capitalised or under capitalised would reflect more the monetary policy shock. Therefore, it is concluded that the capital requirement in Malaysia is not a factor that may influence the performance of the bank lending, reflected by the changes of monetary policy.

A policy implication that could be concluded from this paper is that there exists a bank-lending channel in the case of Malaysia. This means that our monetary policy could not only affect the liabilities side, but also the assets side. Thus, as policy makers, they can use the monetary policy in order to change the supply of loans to overcome the recession and inflation in the economy. We could also keep in mind that monetary policy could not only be regulated by money as intermediation targets, but also as interest rates.

#### END NOTE

The term number of degrees of freedom means the total number of observations in the sample ( $= n$ ) less the number of independent (linear) constraints or restrictions put on them. In other words, for the  $k$  variable model it will have  $n - k$  df. The general rule is this:  $df = n -$  number of parameters estimated.

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