Monetary Policy, Development of Financial Market and Banking Lending : An Analysis of the Bank-Lending Channel in Malaysia

NOOR A. GHAZALI
AISYAH A. RAHMAN
Faculty of Business Management
Universiti Kebangsaan Malaysia

ABSTRACT

Recent resurgence of interest in understanding the transmission mechanism of monetary policy focuses on two main channels of explanation, i.e. the money and credit channel. This paper investigates a version of the credit channel, i.e. the bank-lending channel for the Malaysian economy. The bank-lending channel assigns a critical role for the supply of bank loans in transmitting the effect of monetary policy on real economic activities. The study analyzes the effect of monetary policy on the ability and willingness of Malaysian banks to issue loans with respect to the development in the open financial market. Specifically it argues on the changes of the pattern of influence as progress in the open financial market takes place. A multivariate system analysis of vector auto regression (VAR) is used. The results show that prior to the progress in open financial market, the monetary authority has a direct influence on supply of loans of banks. However, this direct influence lessens as the open financial market develops. Loans are more affected by interest rates spread that dictates conditions in open financial markets. Thus, the ability of the monetary authority to steer real economic activities is subjected to development in the financial market.

ABSTRAK

Terdapat dua pandangan utama yang diutarakan oleh penyelidik-penyelidik masa kini dalam membincangkan mekanisma saluran polisi monetari; iaitu mekanisma saluran wang dan kredit. Kertas kerja ini mengkaji satu versi mekanisma saluran kredit, iaitu mekanisma saluran pinjaman-bank. Mekanisme saluran pinjaman-bank menyatakan kepentingan peranan penawaran pinjaman bank dalam menyalurkan kesan polisi monetari terhadap aktiviti ekonomi benar. Kertas kerja ini menganalisis kesan polisi monetari terhadap keupayaan dan kerelaan bank-bank di Malaysia untuk memberi pinjaman berhubung dengan pembangunan pasaran kewangan terus. Secara spesifiknya, ia membincangkan perubahan-perubahan corak pengaruh polisi monetari apabila pasaran kewangan terus mula berkembang. Hasil kaedah sistem analisis pelbagai angkubah vektor autoregresi (VAR) menunjukkan bahawa sebelum pembangunan pasaran kewangan terus, polisi monetari mempunyai kesan langsung terhadap penawaran

pinjaman bank. Walau bagaimanapun, kesan langsung tersebut berkurangan apabila pasaran kewangan terus berkembang. Penawaran pinjaman bank dipengaruhi oleh jurang kadar haedah yang menggambarkan keadaan dalam pasaran kewangan terus. Oleh itu, keupayaan pihak berkuasa monetari untuk mengawal arah aktiviti-aktiviti ekonomi benar adalah tertakluk kepada pembangunan pasaran kewangan.

INTRODUCTION

Recent studies that investigate the impact of monetary policy on the economy have brought a resurgence of interest in understanding the channels through which the policy is transmitted into the economy. These studies generally focus on two main channels of explanation, i.e. the *money channel and the credit channel*. The traditional money channel argues that money affects the economy directly via changes in open market interest rates, which influence final expenditures[1]. On the other hand, within the credit channel framework, the amount of credit available in the economy is the driving force of money non-neutrality in the short run[2]. Changes in monetary policy exert significant influence on the availability of credit in the economy and, this in turn affects the spending of firms and households.

A version of the credit channel, i.e. the *bank-lending channel,* suggests that changes in monetary policy affect availability of bank loans, and this in turn influences spending of economic agents that rely on funding sourced from banking institutions. This paper investigates the bank-lending channel in the Malaysian economy and focuses on the direction of influence of monetary policy on the amount of loans issued by commercial banks with respect to changes in financial environment.

The following discussion is presented as follows. Section 2 describes the framework of credit and bank-lending channel. The methodology and data used are explained in Section 3. The empirical results are discussed in Section 4 and finally, Section 5 ends this paper with conclusions and implications.

THE CREDIT CHANNEL AND THE BANK-LENDING CHANNEL

The Credit Channel
Interest in the credit view explanation of monetary transmission mechanism follows Bernanke's (1983) re-examination of economic downturn during the Great Depression era. It is shown that explanatory power of money-only equation in explaining the depth and persistence of recessions is enhanced by an additional explanatory variable that measures intermediated credit[3]. Supportive evidence on the importance of credit in explaining output variation is also shown by Bernanke (1986) and Bernanke and James (1991). Credit shocks are found to have an immediate and strong impact on output, lasting for a year or more[4].

Modification of the traditional IS-LM model by Bernanke and Blinder (1988), shows the building blocks of the credit channel framework. Based on this modified model, conditions in the credit markets are shown to

be an important source that can exert changes in real output[5]. The credit channel as modeled by Bernanke and Blinder (1988) rests on three necessary conditions which later became the central issues in empirical and theoretical work on credit channel i.e., (i) Bank loans and open market credit must not be perfect substitutes, (ii) The monetary authority must be able to influence supply of bank loans and, (iii) Imperfect price adjustment. The first two conditions are specific for the credit channel. The last condition is a more general condition, which must also be true in the money channel in order for real output to be affected by changes in monetary policy[6].

The Bank-Lending Channel

The bank-lending channel view arises from the first two conditions of the credit channel stated earlier. The first condition implies the existence of *bank-dependent* (i.e. economic units that heavily rely on bank financing) agents in the economy. The inability of bank-dependent group to obtain the needed financing from sources other than banks provides a special role for bank loans in transmitting monetary shock[7]. Various studies such as Gertler *et. al.* (1991), Gertler and Gilchrist (1993), Kashyap *et. al.* (1993, 1994), Oliner and Rudebusch (1996) show that bank-dependent agents are more significantly affected by variations in monetary policy. Gertler and Gilchrist (1994) identify a differential impact of monetary policy on firms of different sizes. It is shown that the effect of monetary policy on small firms (bank-dependent) is larger when compared to large firms. Their findings reflect non-perfect substitute between banks and direct financing and also justify the differential impact of

changes in monetary policy on bank and non-bank dependent borrowers[8]. Hoshi et.al. (1991) indicate that investment spending of Japanese firms that possess a special relationship with Japanese banks through formation of 'keiretsu', i.e. industrial groups, are less vulnerable to economic downturn compared to non-keiretsu firms.

The ability of the monetary authority to influence bank-lending capacity provides additional channel for monetary policy to affect real sector. Proponents of the bank-lending channel argue that non-neutrality of money in the short run significantly depend on how banks react to monetary policy[9]. Monetary equilibrium models developed by Fuerst (1994) and Labadie (1995) are consistent with the bank-lending channel view. The non-neutrality of money is shown to be dependent on reactions of commercial banks toward monetary changes. Both authors indicate that the economy will be stimulated only if loan supply of banks is affected. Thus, the efficacy of monetary policy to influence real activities in the short run requires the central bank's ability to motivate banks to vary their lending activities. Thus, studying the behavior of bank lending toward changes in monetary policy is critical in understanding the mechanism of bank-lending channel.

An important factor that influences the way bank lending reacts to monetary policy is the progress and development in open financial markets. Thornton (1994) identifies the weakening relationship between reserves and loans following the Monetary Control Act of 1980. Loans and reserves are positively and significantly associated for the pre-1980 period, but the significant link disappears after 1980.

Financial innovation and deregulation are argued to be the main factors behind this weakening relationship. Morris and Gordon (1995) also support the view that bank lending is not constrained by the availability of reserves. Keeton (1993) explains that a contraction in reserves might not lead to a reduction in bank loans but instead may result in increase in the issuance of non-deposit liabilities and/or liquidation of securities held; thus, this impedes the effects of monetary contraction. Romer and Romer (1990) argue that banks resorted to CDs financing when monetary policy is contracted. They note that the spread between interest rates on CDs and commercial paper increases as tight monetary policy occurs. This scenario suggests that banks attempt to insulate their loan portfolios from declining by issuing new CDs.

Bernanke and Blinder (1988), Gertler and Gilchrist (1993), Kashyap and Stein (1995), and McMillin (1996) all indicate the lagged effects of bank loans after monetary contraction[10]. Bernanke and Blinder (1992) indicate that when the Fed tightens money supply, bank deposits and securities fall immediately, but bank loans decline gradually after some lag. This supports the view that banks shield their loan portfolios via security liquidation and sourcing borrowed liabilities. Thus, financial liberalization and innovation can exert significant influence on behavior of banks toward policies implemented by monetary authority[11].

Studies cited in preceding paragraphs imply that there are two possible channels of influence that can effect bank lending by changes in monetary condition; i.e. the *direct influence* and *indirect influence* (Morgan, 1992).

A direct influence arises from the ability of central banks to influence the capability of banking firms to issue loans by limiting the availability of loanable funds. As an example, monetary contraction that leads to reduction in liabilities of banks (through the reduction in total reserves) reduces the ability of banks to issue new loans. Limited loanable funds available from banking firms adversely affect spending of bank-dependent agents; thus, it contributes to economic slowdown.

The indirect effect is a result of the influence of monetary policy on open market interest rates[12]. This effect resolves adverse selection problems faced by banking firms, following monetary contractions. Higher open market rates due to monetary contraction push some of the 'high-risk' borrowers (i.e. borrowers whose default premiums increase during economic slowdown) to source their needs for credits from banking firms. In reaction to the increases in 'high-risk' borrowers, banks increase their lending rate during monetary contraction, thus reducing loans issuance[13]. The two channels of influence, the direct and indirect effect, explain the reactions of banks toward monetary policy. Understanding the way monetary policy influences bank-lending behavior is critical for effective evaluation of the bank-lending channel.

This study investigates the mechanism of the bank-lending channel in a developing economy using Malaysia as an example. Existing studies, which investigate this issue, are largely focused on United States of America and other developed western nations. Evidence from developing countries such as Malaysia is still quite limited. Analyzing the bank lending

channel hypothesis in a developing economy is of interest for a number of reasons. Economic characteristics of developing nations are more likely to meet the necessary conditions of the credit channel explained earlier. Market imperfections (limited accessibility to external open market financing) lead to the presence of large groups of bank-dependent agents in a developing economy; therefore, increasing the significance of the bank lending channel. In addition, evolution of banking practices in these countries could affect the way monetary policy exerts its effect on bank lending behavior. The process of financial liberalization, innovation and internationalization of financial markets that have occured in the nineties could have changed the ability of the central bank to influence banks' loans portfolio[14].

Table 1, on page 124, tabulates the amount of funds raised in the Malaysian capital market (equity and debt) vis-à-vis the amount of bank loans from 1980 to 1999. The significant development of the open financial market as indicated by the large increase in the total amount sourced from capital market (column 5) with approximately 270 percent increase between the first (1980-1989) and second sub-periods (1990-1999). A more significant development is recorded for private debt market (column 2). This large growth in the open debt market enhances the indirect effect of the bank-lending channel. In the first sub-period, the amount of private debt sourced from the open financial market is negligible, averaging at around RM478 million a year. However, the second sub-period witnessed a large increase in the yearly average of private debt sourced from the open financial market reaching about RM10,499 million per year.

Efforts to promote the Malaysian private debt market materialized in the second sub-period. Nevertheless, bank loans still dominate the amount of credit issued in the Malaysian economy. In the second sub-period, bank loans represented about 91 percent of the total credit issued, a slight increase compared to about 88 percent in the earlier sub-period. Throughout the whole period, bank loans represented approximately 90 percent of the total credit issued. Thus, increasing the significance of bank-lending channel in explaining transmission mechanism of monetary policy in Malaysia. This paper evaluates the two channels of influence of monetary policy on bank-lending activity described earlier, i.e. the *direct* and *indirect effect*. This paper analyzes the reaction of banks' loans to changes in the monetary policy with respect to development in the Malaysian financial market.

DATA SET AND RESEARCH METHODOLOGY

Monthly observations of the following time series are gathered from the Monthly Statistical Bulletin of Bank Negara Malaysia (the Central Bank of Malaysia); money supply (M1), demand deposits held by commercial banks (DD), total reserves (TR), Industrial Production Index (IPI), Consumer Price Index (CPI), 3-months T-bills rate (TB3M), average lending rate by commercial banks (ALR), and total loans issued by commercial banks (LOAN). The data set begins from 1983:1 to 1999:12.

Table 1
Funds Raised in Capital Market and Bank Loans (RM Million)

Year	Equity (1)	Private Debt (2)	Public Debt (3)	Total Debt (4) = (2) + (3)	Total Capital Market (5) = (1) + (4)	Bank Loans (6)	Total Credit (7) = (4) + (6)	Total Funds (8) = (5) + (6)
1980	137	20	3266	3286	3423	20872	24154	24295
1981	902	0	4665	4665	5567	25521	30186	31088
1982	629	50	6571	6621	7250	29666	36287	36915
1983	1262	137	4297	4434	5696	36053	40487	41749
1984	1972	392	4081	4473	6445	43504	47977	49950
1985	645	0	4980	4980	5625	48982	53962	54606
1986	189	0	5622	5622	5811	52329	57951	58139
1987	1385	395	8672	9067	10452	52181	61248	62633
1988	931	1881	8982	10862	11794	56432	67295	68226
1989	2508	1904	3913	5816	8325	67142	72958	75466
1990	8650	2603	5441	8043	16693	80758	88801	97451
1991	4391	2146	3800	5946	10338	97206	103152	107544
1992	9182	4384	4300	8684	17865	105721	114404	123586
1993	3433	5014	3748	8762	12195	117236	125998	129430
1994	8458	10266	5500	15766	24224	134151	149917	158375
1995	11438	12223	2750	14973	26410	175007	189980	201418
1996	15924	17049	6000	23049	38973	217821	240689	256794
1997	18358	19597	3794	23391	41750	276285	299677	318035
1998	1788	14152	17682	31834	33621	285676	317510	319298
1999	6087	17553	14975	32529	38615	283231	315760	321846
Yearly average								
1981 - 89	1056	478	5505	5983	7039	43251	49251	50307
1990 - 99	8771	10499	6799	17298	26068	177309	194607	203378
1980 - 99	4913	5488	6152	11640	16554	110289	121929	126842
Percent Change (%)						/		
Between Sub-periods	731	2097	24	189	270	310	295	304

Source: Monthly Statistical Bulletin Bank Negara Malaysia

The empirical analysis conducted in this study is based on a vector auto regression (VAR) methodology introduced by Sims (1980). This method involves simultaneous estimations of variables, which affect each other in an autoregressive pattern. A vector of m variables $X_t = (x_{1t}, x_{2t}, ..., x_{mt})'$ can be represented in a VAR system as follows:

$$AX_t = B(L)X_{t-1} + u_t$$

where A is a $m \times m$ matrix of impact multipliers, B(L) is a kth-order matrix of structural polynomials in the lag operator L, B(L) = B_1L + B_2L^2 + ...+ B_kL^k, v_t is a $m \times 1$ vector of structural disturbances with zero mean, E [u_t] = 0, and covariance matrix Su = E[u_t, u_t'] for all t, and the u_t's are serially uncorrelated[15]. Two forms of analysis of the VAR estimations are presented, i.e. the static Granger causality (Granger (1969)) and the variance decomposition analysis[16].

Three sets of data are used in this paper. The first set of data (Sub-period I) begins from 1983:1 to 1989:12. This period reflects the years prior to the development of the Malaysian financial market. The next set of data (Sub-period II) reflects financial development years that witnessed rapid progress and development of an open financial market, i.e. 1990:1-1999:12. The analysis for the whole period (Full-period), covering the seventeen years period, i.e. 1983:1 – 1999:12 is also performed. A five-variable VAR system is estimated involving the following variables according to their ordering; monetary indicator, output, prices, interest rates spread, and loan[17]. Three different proxies for monetary indicators (M1 money, demand deposits, and total reserves) are employed[18]. The direct effect of the bank-lending channel is reflected by the effect of monetary indicator on the amount of loans issued by commercial banks. The indirect effect of the bank-lending channel is reflected by interest rates spread, i.e. the difference between the ALR and 3-month Treasury bills rate[19]. The development of the open financial market increases the importance of indirect effect of the bank-lending view.

EMPIRICAL RESULTS

Table 2, 3a, 3b, and 3c, on the following pages, provide the results of the VAR analysis. The results for the loan's equation characterize the reaction of loans with respect to changes in monetary policy. Monetary policy affects bank loans through the direct effect (monetary indicator) and indirect effect (interest rate spread). Table 2, on page 126, shows the F-statistics that justify the significance of lagged coefficients of monetary indicators and interest rates spread in the loan equations.

The F-statistics examines the null hypothesis, which states that lagged coefficients of the independent variable are all equal to zero. Rejecting the null hypothesis indicates that the variable tested contributes a significant change in loan issuance. The direct effect of monetary policy on bank loans is shown to be an important explanation during the first sub-period. Two of the three monetary indicators (M1 money and demand deposit) significantly caused changes in loan issuances while all other variables are not significantly different from zero[20]. However, the importance of the direct effect diminishes when the data

are limited to the second sub-period (financial development years). The same is true when the full period data set is employed. The ability of monetary authority to influence loan issuances is no longer direct. The results show that the indirect effect has replaced the direct effect. All of the coefficients for lagged interest rates spread are significantly different from zero for the second sub-period and full period analysis. This significance remains, regardless of the monetary indicator used. The significance level is high for all of the estimations. Thus, development in open financial markets changes the way banks react to monetary policy. During a period of monetary contraction, banks cut their loans in reaction toward the influx of high-risk borrowers demanding loans from banking institutions. This, strengthens the indirect effect of bank-lending channel.

Table 2
The F-Statistics for Granger Causality Test

	Sub-period I (1983:1 - 1989:12)	Sub-period II (1990:1 - 1992:12)	Full-period (1983:1 -1999:12)
Null Hypothesis: Money does not influence total loans			
Monetary Indicator:			
M1 - Money	2.861** (0.031)	1.481 (0.214)	1.805 (0.130)
Demand Deposit	3.502** (0.013)	0.703 (0.592)	1.197 (0.314)
Total Reserves	1.166 (0.335)	0.177 (0.950)	0.619 (0.650)
Null Hypothesis: Spread does not influance total loans			
Monetary Indicator:			
M1 - Money	1.330 (0.270)	3.162** (0.017)	4.752** (0.001)
Demand Deposit	0.903 (0.468)	3.444** (0.011)	5.082 (0.001)
Total Reserves	1.593 (0.188)	3.095** (0.019)	4.737** (0.00)

Notes:
1. The reported figures of the F-statistics for the null hypothesis show that all lagged terms of the monetary indicators (or interest rates spread) are equal to zero. The P-values are in parentheses. These are derived from the VAR estimations involving four variables (Monetary indicator, output, prices, interest rates spread, loans). Rejection of the null hypothesis supports causation from the monetary indicator (or interest rates spread) to total loans.

The second evidence that supports the strengthening of the indirect effect is the variance decomposition analysis (VDA). The decomposition of variations in bank loans are shown in Table 3a, 3b and 3c, on the following pages. These tables report the decomposition of the variance of loans derived from the VAR analysis that used M1 Money, Demand Deposits, and Total Reserves, as monetary indicators respectively. The variance of total loans that is due to monetary indicator and interest rates spread is shown to measure the direct and indirect effect of bank-lending channel. Results for the first sub-period (first column of Table 3a, 3b, and 3c) support the strength of the direct effect of the bank-lending channel[21]. In the first sub-period, monetary indicators affect bank loans more significantly as compared to interest rates spread. The average proportion of loan variance explained is approximately 20.4, and 15.3 percent for M1 money and demand deposits respectively.

Table 3a
Variance Decomposition Analysis for Total Loans (Monetary Indicator : M1 Money)

Step	Sub-period I (1983:1 - 1989:12)			Sub-period II (1990:1 - 1999:12)			Full-period (1983:1 - 1999:12)		
	Std. Error	M1 Money	Spread	Std. Error	M1 Money	Spread	Std. Error	M1 Money	Spread
1	0.94	16.56	1.07	1.30	17.65	3.09	1.29	17.04	0.97
2	1.01	19.39	1.58	1.33	16.95	5.07	1.31	16.69	2.43
3	1.08	17.40	1.85	1.40	16.36	11.92	1.35	15.78	5.86
4	1.11	19.69	1.77	1.43	15.89	14.00	1.38	15.49	7.13
5	1.15	19.42	5.18	1.52	14.08	14.53	1.43	14.63	11.02
6	1.15	19.26	5.70	1.53	14.11	14.36	1.43	14.92	11.00
7	1.18	19.42	6.96	1.54	14.07	14.57	1.43	15.33	10.95
8	1.19	19.47	6.87	1.55	15.32	14.41	1.44	15.88	10.87
9	1.20	20.05	6.76	1.56	15.67	14.25	1.45	16.35	10.78
10	1.20	20.16	6.89	1.57	16.39	14.14	1.45	16.88	10.69
11	1.21	20.79	6.81	1.58	16.63	14.06	1.46	17.44	10.60
12	1.22	20.84	6.73	1.59	17.15	13.93	1.47	17.91	10.53
13	1.23	20.97	6.76	1.59	17.34	13.84	1.47	18.28	10.45
14	1.24	21.23	6.67	1.60	17.68	13.74	1.48	18.63	10.38
15	1.25	21.26	6.59	1.60	17.91	13.68	1.48	18.91	10.32
16	1.25	21.36	6.51	1.60	18.10	13.62	1.49	19.16	10.27
17	1.26	21.37	6.46	1.61	18.25	13.57	1.49	19.36	10.23
18	1.27	21.44	6.39	1.61	18.34	13.54	1.49	19.51	10.19
19	1.27	21.43	6.35	1.61	18.42	13.51	1.49	19.63	10.16
20	1.28	21.47	6.29	1.61	18.46	13.50	1.50	19.73	10.14
21	1.28	21.47	6.24	1.61	18.49	13.48	1.50	19.81	10.12
22	1.29	21.47	6.20	1.61	18.49	13.48	1.50	19.87	10.10
23	1.29	21.47	6.16	1.61	18.50	13.47	1.50	19.91	10.10
24	1.30	21.48	6.13	1.61	18.49	13.46	1.50	19.94	10.09

On the other hand, interest rates spread explains only about 5.6, and 5.0 percent of variance of bank loans in the first sub-period.

Thus, changes in monetary policy affect bank loans directly during the pre-development years.

Table 3b
Variance Decomposition Analysis for Total Loans (Monetary Indicator : Demand Deposit)

Step	Sub-period I (1983:1 - 1989:12)			Sub-period II (1990:1 - 1999:12)			Full-period (1983:1 - 1999:12)		
	Std. Error	Demand Deposits	Spread	Std. Error	Demand Deposits	Spread	Std. Error	Demand Deposits	Spread
1	0.92	3.64	1.52	1.32	10.51	2.58	1.30	8.07	1.22
2	1.97	3.28	1.41	1.35	10.06	4.70	1.32	7.82	2.78
3	1.06	11.51	1.53	1.41	9.36	11.65	1.36	7.36	6.46
4	1.09	11.88	1.44	1.45	8.99	14.04	1.39	7.67	7.89
5	1.13	11.76	4.32	1.53	8.21	14.71	1.44	7.18	11.97
6	1.14	12.83	4.63	1.54	8.31	14.53	1.44	7.58	11.96
7	1.17	13.58	6.52	1.55	8.28	14.73	1.45	8.00	11.90
8	1.20	14.26	6.37	1.56	9.11	14.66	1.45	8.45	11.84
9	1.20	14.80	6.33	1.57	9.25	14.54	1.46	8.94	11.81
10	1.21	16.20	6.27	1.58	9.79	14.44	1.46	9.54	11.72
11	1.23	16.96	6.18	1.58	9.97	14.38	1.47	10.10	11.64
12	1.24	17.43	6.07	1.59	10.24	14.28	1.47	10.59	11.57
13	1.25	18.00	5.99	1.59	10.36	14.20	1.48	10.97	11.50
14	1.26	18.52	5.90	1.60	10.48	14.11	1.48	11.31	11.43
15	1.27	18.78	5.80	1.60	10.63	14.07	1.48	11.58	11.38
16	1.28	19.02	5.73	1.60	10.70	14.03	1.49	11.79	11.35
17	1.28	19.20	5.67	1.60	10.78	14.00	1.49	11.95	11.32
18	1.29	19.31	5.61	1.60	10.80	13.98	1.49	12.06	11.29
19	1.30	19.39	5.57	1.61	10.82	13.96	1.49	12.13	11.27
20	1.30	19.43	5.54	1.61	10.82	13.96	1.50	12.18	11.26
21	1.31	19.47	5.50	1.61	10.82	13.95	1.50	12.21	11.25
22	1.31	19.48	5.48	1.61	10.81	13.95	1.50	12.22	11.25
23	1.31	19.48	5.45	1.61	10.80	13.95	1.50	12.23	11.24
24	1.32	19.49	5.44	1.61	10.80	13.95	1.50	12.22	11.24

The variance decomposition analysis also indicates that the indirect effect strengthens as the economy moves into the second sub-period (financial development years). The percentage of loan variance that can be explained by interest rates spread increased sharply. Compared to the first sub-period, the contribution of interest rates spread increased from an average of 5.3 percent (when M1 money and demand deposits are used as monetary indicators) to 13.1 percent. The strengthening of the indirect channel is greater when demand deposits are used as monetary indicator (Table 3b). Prior to the development in the open financial market, demand deposits (the direct effect) contribute to about 15.3 percent of variance in loan. However, this contribution dropped to about 10.0 percent as financial

market developed. The reverse is true for the influence of interest rates spread. This is especially true for the immediate months. The effect of interest rates spread peaks at around 8 months and faded thereafter.

The VDA indicates that loans issuance is less tied to its money liability. The influence of open market rates on variance of loan is greater than the influence of demand deposits. There-fore, the ability of the central bank to influence reservable deposits does not give additional advantage for the monetary authority to influence bank loans. As the open financial market develops, the market condition exerts greater influence on the issuance of loans by Malaysian banks. With the development of financial markets, private banking institutions have wider choices in their decisions.

Table 3c
Variance Decomposition Analysis for Total Loans (Monetary Indicator : Total Reserves)

	Sub-period I (1983:1 - 1989:12)			Sub-period II (1990:1 - 1999:12)			Full-period (1983:1 - 1999:12)		
Step	Std. Error	Total Reserves	Spread	Std. Error	Total Reserves	Spread	Std. Error	Total Reserves	Spread
1	0.99	0.07	6.52	1.33	0.11	1.48	1.31	0.00	1.06
2	1.03	2.07	7.54	1.36	0.11	2.77	1.32	0.11	2.27
3	1.10	4.06	6.79	1.42	0.10	9.23	1.37	0.41	6.14
4	1.14	3.86	7.18	1.45	0.81	11.04	1.40	1.00	7.59
5	1.20	4.55	13.98	1.53	0.74	11.70	1.45	1.04	11.48
6	1.21	4.8	13.93	1.54	0.73	11.60	1.46	1.12	11.57
7	1.23	4.71	15.46	1.54	0.74	11.74	1.46	1.12	11.55
8	1.25	5.33	12.06	1.55	1.45	11.82	1.46	1.37	11.54
9	1.26	5.72	15.91	1.57	2.50	11.71	1.47	1.86	11.54
10	1.27	6.28	15.74	1.58	3.07	11.68	1.47	2.25	11.49
11	1.28	6.83	16.00	1.59	3.69	11.57	1.48	2.77	11.40
12	1.29	7.62	16.03	1.60	4.28	11.46	1.48	3.25	11.34
13	1.30	8.46	15.96	1.60	4.65	11.39	1.49	3.67	11.27
14	1.31	9.36	15.95	1.61	4.99	11.31	1.49	4.03	11.22
15	1.33	10.38	15.99	1.61	5.19	11.27	1.50	4.33	11.18
16	1.34	11.50	16.02	1.61	5.28	11.25	1.50	4.55	11.14
17	1.35	12.60	15.94	1.61	5.31	11.24	1.50	4.70	11.12
18	1.37	13.79	15.99	1.61	3.52	11.23	1.50	4.80	11.10
19	1.30	15.06	15.98	1.61	5.32	11.23	1.50	4.87	11.09
20	1.41	16.36	16.00	1.61	5.32	11.23	1.50	4.91	11.09
21	1.43	17.69	15.97	1.61	5.33	11.23	1.50	4.93	11.09
22	1.45	19.07	15.99	1.61	5.36	11.22	1.50	4.94	11.08
23	1.48	20.51	15.96	1.61	5.39	11.21	1.50	4.94	11.08
24	1.50	21.95	15.95	1.62	5.43	11.20	1.50	4.94	11.08

Under certain circumstances, private profit maximizing objectives can override national goals, which underlie the setting up of national monetary institutions. Therefore, understanding the banking behavior with respect to advancement in the financial market

remains as an important interest for current researchers. As pointed by Fuesrt (1994, pp. 375) *"Since banks appear to be the conduit for these (monetary) injections, one could say that we need more banking theory in monetary theory."*

CONCLUSIONS

Understanding the transmission mechanism of monetary policy is crucial in the evaluating the effectiveness of monetary policy. This paper investigates a version of the credit channel view, i.e. the bank-lending channel. The bank-lending channel assigns a critical role for bank lending behavior in transmitting the effect of monetary policy on real activities. This paper analyzes the bank-lending channel for the Malaysian economy, a small economy that displays significant dependence on bank credit.

The analysis focuses on the effects of development in the open financial market on bank-lending channel. The results show that prior to development of the open financial market (1983-1989), the direct effect of monetary policy on bank loans dominates, and variation in the amount of monetary aggregate exerts direct influence on bank loans issuance. However, as the open financial market developed (1990-1999), the direct effect reduces. The importance of the indirect effect, originating from the open financial market (proxied by the interest rates spread), increases. Banks are shown to take into account, the development of the open financial market in determining loans issuance. The direct influence of the monetary authority on bank loans is lessened by the development in the open financial market. In an adverse situation, there is a possibility that the lending behavior of a bank is strictly directed by their profit objectives rather than the social objectives of the monetary authority. Thus, the phenomena of banking pessimism, where bank lending is shielded from monetary policy during economic slowdown, suggests a tougher task for the monetary authority to influence real activities.

ENDNOTES

[1] The sensitivity of investment expenditures toward changes in the level of interest rates is a critical element that allows money to have real effect. Keynes' (1936) *'animal spirit'* doubts that interest rate variations have a predictable impact on investments spending of firms. Hirtle and Kelleher (1990) provide evidence that challenge the sensitivity of investment toward interest rates changes.

[2] The credit channel view does not in anyway reject the money channel explanation. Instead, the credit channel is proposed as an explanation that enhance the understanding of how money affects the economy. The debate centers on the relative important of each channel. Earlier views of the credit channel can be found in Roosa (1951), Brunner and Meltzer (1963), and Tobin and Brainard (1963), Bernanke (1986). See Bernanke and Blinder (1988) for comprehensive explanation on the role of credit and Bernanke and Mark (1995) for overview of the credit channel.

[3] Drastic decline in the availability of intermediated credit, i.e. the credit crunch,

exerts significant influence on the economic performance. Bernanke and Lown (1992) examine the episode of credit crunch in the early 90's recession in the United States. Credit crunch is also evident in the recent East Asia crisis where a cut down in bank lending dragged the East Asian economies into deep recession. (Bank Negara Malaysia, 1998).

[4] Bernanke and James (1991) provide international evidence favouring the credit channel. They argue that financial distress (i.e. the inability to access new credit and the weakening financial positions of bank) impose deadweight losses on the economy. The regression results indicate that the PANIC variables (i.e. period of serious banking problems) are significantly different from zero. The effect of banking panics on output is considerable.

[5] In addition to the modified IS-LM model, Bernanke and Blinder (1988) also provide empirical evidence on the important of credit cycle. They analyze the money and credit demand functions for two sub-periods; 1974:1-1979:3 and 1979:4-1985:4. The evidence suggests that money demand shock is smaller than credit demand in the first sub-period. However, for the second sub-period this is reversed. The lower credit demand shock in the second sub-period is consistent with credit targeting.

[6] Comprehensive discussion of these necessary conditions is provided by Kashyap and Stein (1994, 1995).

[7] This also indirectly supports the view that banking firms are special. Modern explanations on the justification for the existence of banks are given by Diamond (1984), Ramakrishnan and Thakor (1984) and Allen and Santomero (1998). This studies conclude that banks play a critical role which cannot be performed individually in the direct financial market. These explanations reject Fama (1980) views that banks are not special. This also implies the breakdown of the Modigliani and Miller (1958) capital structure irrelevance hypothesis. For the bank-dependent agents, bank financing is irreplaceable by direct financing from the open market.

[8] Elliehausen and Wolken (1990), and Petersen and Rajan (1992) provide evidence of bankdependence among small firms.

[9] This is in line with Bernanke's (1983) re-evaluation of the great depression which claims the importance of intermediated credit in explaining economic cycles as addition to monetary variables.

[10] The decline in bank loans also varies according to the types of loans (Gertler and Gilchrist, 1993) and the size of banks (Kashyap and Stein, 1995).

[11] In a similar framework, Kashyap and Stein (1995) analyze the response of banks varying in size to monetary shocks based on bank profit maximizing behavior. It is shown that from small banks loans decline more significantly than those of the larger banks whenever tight money policy is implemented. On the other hand, small banks' securities hold-

ings respond significantly less than large banks' to monetary tightening. Thus, differences in bank response may also be due to market imperfection, which affect the banks' ability to shield their loan portfolios.

12 The indirect effect of the bank-lending channel view is partly related to the mechanism of money channel. However, they are not the same. Changes in the level of open market interest rates (a money channel condition) exert influence on the banking lending activities through asymmetry information and adverse selection problems. Inability to discriminate good and bad borrowers (due to the influx of borrowers who cannot borrow from open financial market) causes banks to be more selective in lending following monetary contraction. Exemplifying the credit channel effect.

13 The reactions of banks to reduce loans issuance in such a situation can also be explained based on a credit rationing model of Jaffea and Russell (1976) and Stiglitz and Weiss (1981). Credit rationing adds to the importance of credit channel but it is not a necessary condition for the channel to be valid.

14 Ghazali (1999, 2000) shows that liberalization and innovation that have taken place in Malaysia change the reactions of bank balance sheets components to monetary policy. Development in financial market changes the balance sheets component of Malaysian commercial banks. This is especially true for the sources of funds for banks where traditional deposits (demand deposits) is being replaced

significantly by competitive liabilities, i.e. funds which are not directly controlled by the central bank. Banks are shown to resort to competitive liabilities and securities liquidation to shield their lending capacity.

15 Prior to the VAR estimation we performed the stationarity test based on the Augmented Dickey-Fuller (ADF) test [Dickey and Fuller (1979, 1981)] on all the series compiled. The results indicate that all the series are first difference stationary except for total loan and inflation rate, which require second difference. The VAR analysis is performed using stationary series adjusted based on the ADF test. We do not report this in our paper since this is now a standard procedure. The results are available upon request from the author.

16 Description of the VAR analysis can be found in Enders (1995). The estimation procedure of VAR is simplified by the autoregressive specification. Since all of the right-hand-side variables are pre-determined and the same for each equation, ordinary least square (OLS) yields a consistent and asymptotically efficient estimator. Seemingly unrelated regression (SUR) does not add to the efficiency of the estimation because of the identical regressors. The lag length is chosen by minimizing the Akaike's AIC following Lutkepohl (1982). Assigning last ordering rank for the total loan implies that loans issuance react contemporaneously to changes in all other variables but its effect on all other variables come after some lag. Interest rates spread also reacts in the same manner with respect to monetary indicator, output and prices.

[17] The VAR system employed in this study is similar to Bernanke and Blinder (1992), McMillin (1996), and Ghazali and Kim (1999) except that we use less variables in the system since our analysis only investigates loan portfolios. Bernanke and Blinder, McMillin, and Ghazali and Kim study the reactions of other banks' balance sheets components to monetary policy. We include the output and inflation variables to capture the aggregate demand effect on loan issuance.

[18] The choice of variable to be used as correct identification of monetary innovations is by itself subject to debate. See King and Plosser (1984), Bernanke and Blinder (1992), Friedmand and Kuttner (1992), Eichenbaum (1992), and Strongin (1995) for discussions on the use of interest rates, monetary aggregates, and non-borrowed reserves as monetary indicator. A group of researchers apply a dating procedure to measure monetary policy (see Romer and Romer (1990), Boschen and Mills (1992), and Morris and Sellon (1995)). This method identifies changes in monetary policy through a 'date' that signifies Fed's policy. The choice of monetary indicators for the Malaysian economy is limited by the availability of data. We also note that the amount of total reserves (TR) for the eighties is not reported explicitly in the Monthly Statistical Bulletin of the central bank. Data for total reserves is derived by this author after some re-arrangement of reports.

[19] As discussed by Morgan (1992), the spread between bank lending rates and the open market interest rates reflect the indirect channel of bank-lending. We use the difference between ALR and the 3-month Treasury bill rate in this study to capture the indirect effect of the bank-lending channel. Several interest rate spread measures have been used in previous studies. Bernanke and Blinder (1992) use the difference between the fed fund rate and the 10-year Treasury bond rate as a spread in their VAR estimation. Kashyap et al. (1993, 1994), and McMillin (1996) use the difference between prime rate and commercial paper rate.

[20] Our results are not significant when the total reserves are used as the monetary indicator. These insignificant results suggest that bank lending is not linked to the amount of total reserves in the banking system.

[21] Similar to the causality test (Table 2), the VDA results also could not support the important role for the total reserves in influencing bank loans. Nevertheless, the importance of interest rates spread is supported in line with other monetary indicators. We omit the results from Table 3c when comparing the strength of direct and indirect channel between the two sub-periods since this distorts our conclusions.

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