SBP Working Paper Series

No.41 July, 2011

The Financial Accelerator: An Emerging Market Story

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STATE BANK OF PAKISTAN

SBP Working Paper Series

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I.I. Chundrigar Road, P.O. Box No. 4456,
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Published by: Editor, SBP Working Paper Series, State Bank of Pakistan, I.I. Chundrigar Road, Karachi, Pakistan.

ISSN 1997-3802 (Print)
ISSN 1997-3810 (Online)

http://www.sbp.org.pk

Printed at the SBPBSC (Bank) – Printing Press, Karachi, Pakistan

The Financial Accelerator: An Emerging Market Story

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Abstract
In support of the financial-accelerator theory, we find evidence on countercyclical price-cost banking margins possibly explaining the amplifications of business cycles in Pakistan.

Acknowledgment
We are grateful to Ali Choudhary for his assistance, Nadeem Aftab for providing data and helpful discussions, Syed Kalim Hyder Bukhari and Jahanzeb Malik for providing assistance with bootstrapping, Farooq Pasha and Hassan Abbas for their helpful comments.

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1. Introduction

Price stickiness is one of the key assumptions of "money view" of monetary transmission channels which asserts that monetary policy affects the aggregate output through interest rates. However, this theory is less applicable in Pakistan where there is a lack of price rigidity as recently discovered by Choudhary et al (2011). Therefore, we need to look at alternative theories of monetary transmission channels, of which "credit view" is one of the most important ones in the literature[1]. According to this theory, credit market conditions play an important role in amplifying the effect that monetary policy has on aggregate economy.

With the expanding financial sector and increasing business fluctuations, there is a good reason to suspect that credit channel of monetary policy transmission is more relevant for Pakistan. This is corroborated by the fact that the fourfold increase in Pakistan's real GDP volatility over the past three decades coincided with the emergence of a deregulated financial sector since the 1980s (see Table 1). As the financial sector grew, so did its co-movement with business fluctuation. Indeed, Table 1 highlights the increasing correlations of the cyclical components of key financial indicators with Gross Domestic Product (GDP).

Table 1:Financial Indicators and GDP

	Period		
	1980s	1990s	2000s
Volatility in Real GDP Relative to 1980's	–	2.82	4.25
Financial Assets/GDP	12.27	36.75	69.65
Detrended Financial Asset Correlation with GDP	-0.32	0.42	0.60
Detrended M2 Correlation with GDP	-0.26	0.42	0.87
Detrended Private Credit correlation with GDP	-0.42	0.07	0.90

Source: Annual Data from the State Bank of Pakistan

These observations motivate us to study the empirical role of financial sector in Pakistan as a possible business fluctuation amplifier. One of the mechanisms through which credit market conditions effect aggregate output is the financial-accelerator à la Bernanke and Gertler (1989) and Bernanke, Gertler and Gilchrist (1996, 1998)(BGG hereafter). According to this mechanism, a wedge is created between cost of funds raised externally by the firm and opportunity cost of its internal funds due to frictions in credit market. This wedge reflects the deadweight loss associated with the information asymmetry and conflict of interests between lenders and borrowers. Based on this wedge, banks charge firms a financial premium which is inversely related to firm's net worth. In downturns, asset prices decline with rising interest rates, lowering the net worth of firms and increasing the premium. This limits the firm's ability to borrow, leading to delay in investment and production decisions and exacerbating economic fluctuations.

To test the relevance of credit channel theory, BGG's theory in particular, banking margins (calculated as the difference between the interest rates on loans and marginal cost of funds for banks) are used as proxy for firm's external finance premia. This is based on the assumption that bank's marginal cost of funds is equivalent to the marginal cost of internal funds. Therefore, countercyclical margins imply that as credit becomes expensive in downturns, endogenously varying margins provide an additional channel through which shocks are propagated to real economy.

However, empirical literature on the testable implications of the financial accelerator is generally scarce but scarcer for emerging markets. With the exception of Aliaga-Díaz and Olivero (2010) on the U.S. and Turgutlu (2010) on Turkey, little attention has been paid to the countercyclical nature of price-cost banking margins; a neat testable implication of the theory.

For the case of Pakistan, previous studies such as Khan and Khan (2010) have looked at the determinants of banking spreads. However, we contribute to this literature by studying the comovement between the business cycle fluctuations and banking price-cost margins. In particular, we apply the VAR forecast error-based methodology employed in den Haan (2000) and Aliaga-Díaz and Olivero (2006), using a consistent time series quarterly data for 2002-2008 on Pakistani banks.

[1] See Hubbard(2000) and Bernanke(1992)

After controlling for credit risk reassessments, term structure of interest rates and monetary policy shocks, results show that price-cost bank margins in Pakistan are countercyclical; a necessary condition for the financial accelerator mechanism[2]. This highlights the significance of banks as shock propagating platform and provide grounds for a stabilization policy. Next we present the data, the methodology followed by the results and finally the conclusion.

2. Data

We compute asset-weighted averages across all banks using quarterly bank level data for 2002-2008. This data is obtained from the detailed bank balance sheets submitted to the State Bank of Pakistan (the Central Bank) which monitors banking industry of the country. High data quality from this source has been used in Khawaja and Mian (2005) but database prior to 2002 is unavailable as the reporting format and requirements were different before 2002. Data consistency issues, thus, prevent us from using older data but we use quarterly data to increase our sample size.

For business cycle indicators, we use data on GDP and loans which is in line with the literature on business cycles (see Chen, Higgins and Mason (2005)). However, data on GDP of Pakistan which is available annually does not match the frequency of our quarterly time series study. To overcome this problem, we use growth rate of Industrial Production Index (a quarterly index for the manufacturing industry in Pakistan) as a proxy for GDP. The fact that it's a good proxy is supported by Figure 1. Loans is another good measure of business cycle as the aggregate value of the loans from the entire banking sector in Pakistan, used here, reflects the aggregate economy. Moreover, it is more sensitive to changes in aggregate economic variables which are of interest to us such as investment.

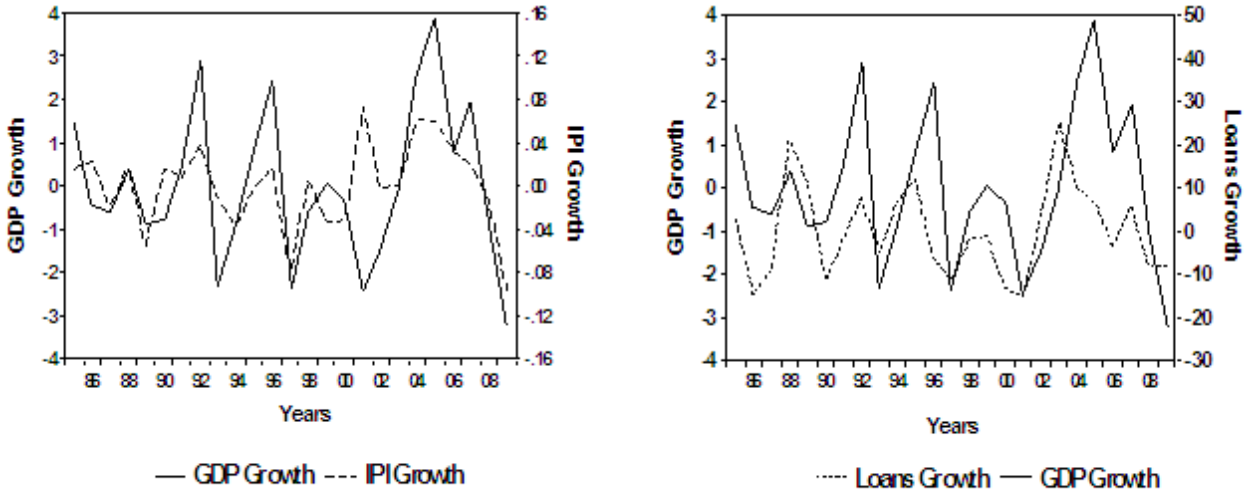

Figure 1

The three alternative definitions of margins used in this paper are drawn from Aliaga-Díaz and Olivero (2006). Margin 1 is defined as the ratio of difference between interest income and interest expense to total assets. Margin 2 is defined as ratio of difference between interest income and interest costs to total loans. Whereas the first two margins are closely linked to the definition of Net Interest Margins (NIMS), the third margin-Margin 3 which is calculated as the difference between lending and deposit rate measures the banking spread. NIMs are distinct from banking spread in that they are calculated as the ratio of the

[2]Existence of countercyclical margins is a necessary but not a sufficient condition for the presence of financial accelerator.

difference between the interest revenues and interest expenses to assets while the latter is calculated as the difference between lending and deposit rates.

With regards to the unconditional correlation between the margins and business cycle indicators defined above, the preliminary results are presented in Table 2. All these values are negative and significant providing indication to the presence of countercyclical margins. However, these values are to be treated with caution as unconditional correlation fails to control for other exogenous variables affecting the counter cyclicality of margins such as credit risk, term structure of interest rates and monetary policy.

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Table 2: Correlation between Margins and Business Cycle Indicators

	IPI Growth	Loan Growth
Margin 1	-0.59449	-0.11097
	(0.0003)	(0.5454)
Margin 2	-0.56966	-0.12043
	(0.0007)	(0.5115)
Margin 3	-0.08599	-0.23325
	(0.6398)	(0.1989)

3. Methodology

We use the method proposed by den Haan (2000) for mainly two reasons. First, unlike the unconditional correlation coefficient presented above or standard regression analysis, this method captures important information related to the dynamic features of the co movement of two variables. Second, results obtained from using this method, hold for any combination of stationary processes or integration processes of any arbitrary order. Therefore, contrary to other standard regression analyses this method does not require data to be transformed. According to the den Haan (2000) methodology, correlations of the VAR forecasted errors at different horizon are calculated to study the co movement of variables.

Equation 1 represents the VAR estimated in this paper:

$$X_t = \alpha + \mu_1 t + \sum^{L} \beta_t X_{t-1} + \epsilon_t \tag{1}$$

where t denotes time, L is the number of lags included in the equations, and Xt is a vector of variables which includes the margin measure and the business cycle indicator.

We estimate the VAR in equation 1 to obtain the value for K- period forecast of the variable Xt. Next, we calculate the K-period forecast errors, using the difference between the actual values of variable Xt and the forecasted values. We calculate the correlation between forecasted errors of the two variables in Xt, namely business cycle indicators and the price cost margins and denote it as Cor(K).

To confirm our results, we bootstrapped data with 2500 replications. Furthermore, we have restricted the minimum number of lags to two in this paper using Schwarz's Bayesian information criterion to determine the number of lags.

In this paper, empirical work is carried out in two stages. In the first stage, we estimate a bivariate VAR where the Xt matrix includes margins and business cycle indicators only. However, there are other factors which explain the cyclicality of banking margins such as credit risk, term structure of interest rates and monetary policy. To ensure that the results obtained earlier are robust to the inclusion of these controls, we estimate multivariate VAR in the second stage. The Xt in this stage includes slope of yield curve and credit risk measures in addition to the margins and business cycle indicators used earlier.

3.1. Default or Credit Risk:

As mentioned above credit or default risk is an important determinant of cyclicality of margins and is used here as a control. This is explained by the fact that banks accommodate default risk in the pricing of the loans and therefore when default rate increases in downturns, banks charge high margins to make up for the increase in risk exposure. In this paper, nonperforming loans are used to measure credit or default risk in the economy. Data on nonperforming loans is obtained from the balance sheets of the banks collected by the State Bank of Pakistan and is defined as the value of non-performing loans minus provision for loan losses.

3.2. Monetary Policy and the Term Structure of Interest Rates:

The other major factor driving the cyclicality of margins is monetary policy. As Angelini and Cetorelli (2003) point out interest rate on deposits exhibit more rigidity than the interest rates for lending. Therefore, it is important to include monetary policy as a control variable in the regressions. We use slope of the yield curve which is measured as the difference between the ten year and one year rate. This was initially used by Bernanke and Blinder (1992) and later by Aliaga-D´iaz and Olivero (2006) as a proxy for monetary policy.

Moreover, slope of the yield curve is also used as a measure for maturity mismatch in assets and liabilities of banks' balance sheets which is another factor that can affect cyclicality of margins. This is true especially if bank assets are of longer maturity than their liabilities. In recessions when the short term rates are typically driven down more than their long term rates, the fall in bank expenses exceeds its earnings. This in turn leads to higher margins during recessions since these margins are calculated as the difference between bank income and expenses.

3.3. Results

Results for both bivariate and multivariate VAR are presented in Figure 2 and Figure 3 respectively. For the bivariate VAR, negative values of Cor(K) illustrated in Fig. 2. across all definitions of business cycle indicators and margins provide evidence for the countercyclical nature of the margins.

For the multivariate VAR, results in Fig. 3 depict counter cyclicality of margins even after controlling for monetary policy, term structure of interest rates and credit risk effects. The significance and sign on the coefficients do not differ significantly showing that there are factors other than monetary policy, term structure of interest rates and credit risk effects which drive cyclicality of the margins.

Results for bootstrapped data are presented in Table 3 and Table 4 for bivariate and multivariate VAR respectively. With the exception of the correlation between Margin 2 and total loans, all results fall within the 90% confidence interval. For the correlations between Margins 2 and total loans, we used moving block bootstrapping as their correlations were serially correlated.

4. Conclusion

By showing countercyclical margins in the banking sector, we provide evidence for the existence of financial accelerator in the Pakistan economy. It is important to point out here that these results have been impaired by limited data availability. Small sample size affects results precision which we addressed by using a quarterly time series and bootstrapping method. However, one of the major drawbacks of this study and lack of information on the length of business cycles in Pakistan is that we do not know whether the quarterly data available from 2002-2008 allowed us to cover a full business cycle or not. Due to the limited scope of the paper, we have not been able to discuss the determinants of the cyclical behavior of margins. In case of Pakistan, one of the major reasons for rise in margins is the rise in interest income earned on investments as a result of the increase in lending to public sector. This "crowding out" behavior is probably being confounded with evidence of presence of financial accelerator and could be explored in future.

Nonetheless, there are two important implications of the countercyclical margins in Pakistani banking sector. First, as credit becomes more expensive in downturns, production gets delayed and recessions get exacerbated, there is a need for stabilizing policy. Second, presence of financial accelerator highlights the

relevance of credit channel in propagating monetary policy shocks to the economy. It is, therefore, important to take this additional channel taken into account when developing a representative model of Pakistan.

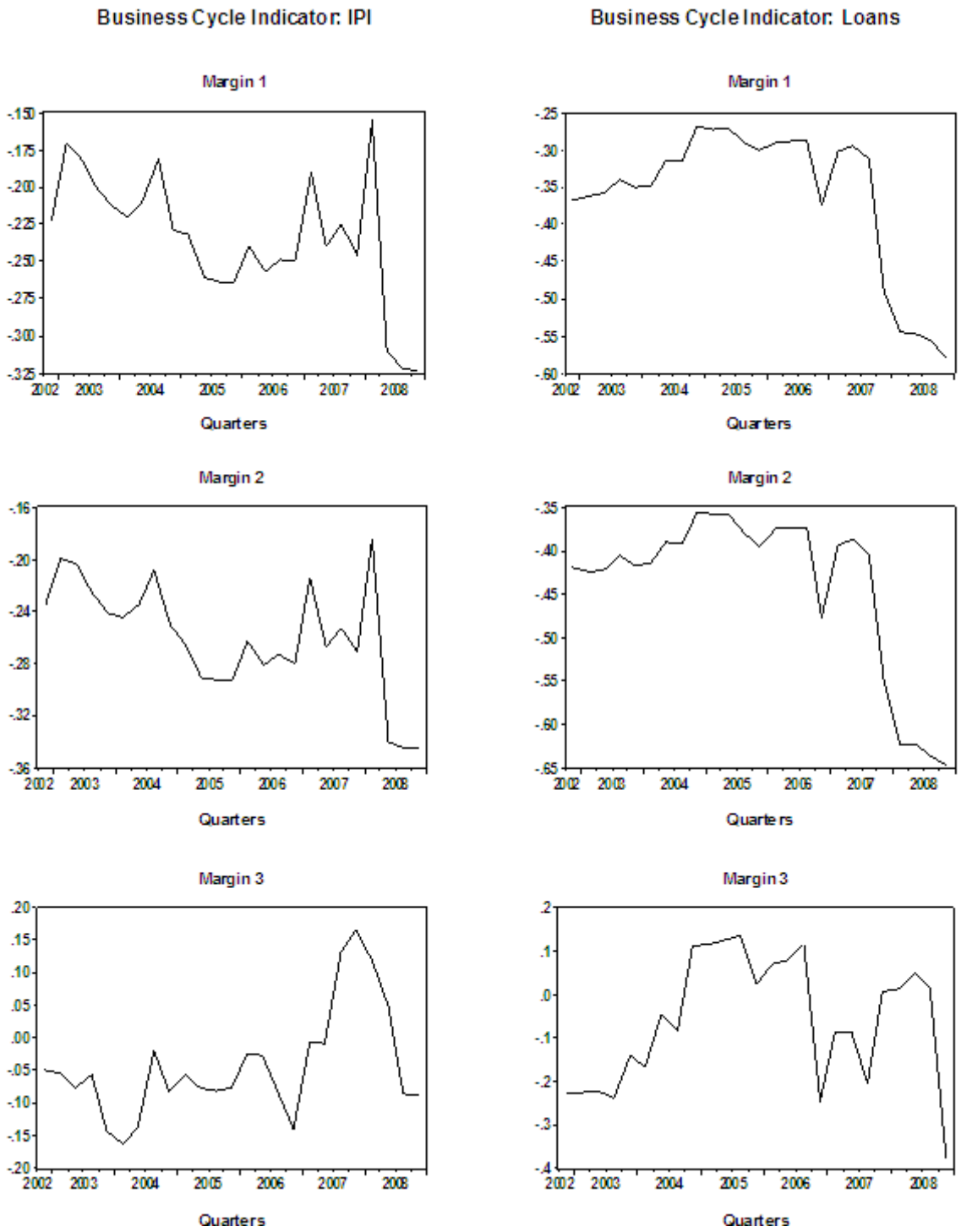

FIGURE 2: BIVARIATE VARs- Correlations of Forecast Errors. The Y-axis measures Correlation Coefficient and X-axis represents Quarters.

FIGURE 3: MULTIVARIATE VARs-Correlations of Forecast Errors . The Y-axis measures Correlation Coefficient and X-axis represents Quarters.

Table 3: Bootstrapped and Estimated Correlations for Bivariate VAR

	M1-IPI	M2-IPI	M3-IPI	M1- Loans	M2-Loans	M3-Loans
Estimated Correlation	-0.222	-0.235	-0.050	-0.367	-0.419	-0.223
Lower Limit*	-0.280	-0.272	-0.258	-0.534	-0.589	-0.270
Upper Limit*	0.305	0.343	0.350	-0.174	-0.223	0.310

*for 90% Confidence Interval, M1=Margin 1, M2=Margin 2, M3=Margin 3

Table 4: Bootstrapped and Estimated Correlations for Multivariate VAR

	M1-IPI	M2-IPI	M3-IPI	M1- Loans	M2-Loans	M3-Loans
Estimated Correlation	-0.203	-0.208	0.013	-0.476	-0.463	-0.046
Lower Limit*	-0.273	-0.253	-0.268	-0.620	-0.589	-0.252
Upper Limit*	0.351	0.353	0.310	-0.295	0.293	0.342

*for 90% Confidence Interval, M1=Margin 1, M2=Margin 2, M3=Margin 3

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