Box 6.1: Credit riskiness of listed non-financial corporate firms

Introduction

Credit allocation is an important driver of economic growth and the firms utilizing credit are the engines of real growth. Credit, however, tends to be pro-cyclical and its availability to riskier firms increases during expansions.[280] The easy monetary conditions tend to breed financial excesses which could unwind during contractions, leading to defaults.[281]

The corporate non-financial firms (NFFs) of Pakistan happen to be the largest borrowers of the banking sector. Of the PKR 6,291.5 billion loans extended by the banks to the domestic private sector as of December 2019, the corporate private sector has availed a hefty PKR 4,649.8 billion.

While banks institute all measures to ensure that the selected borrowers are financially sound, solvent, and have capability to service their obligations, the idiosyncratic and systemic uncertainties always leave a possibility of default, however small it may be. As of end-CY19, the loan delinquency rate in the domestic corporate lending stands at 9.93 percent. Given the high exposure of banks to the non-financial sector, it would be interesting to explore how the dynamics of financial and macroeconomic factors affect the possibility of corporate delinquencies, conditioned on the information of already delinquent corporates.

Specifically, we use five accounting ratios of a sample of 275 listed firms as well as macroeconomic variables over the period 2013-2019 and assume that the credit riskiness, $P(D_{it} = 1)$, evolves as per the following specification:

$$P(D_{i,t} = 1) = \Phi\left(\alpha + \sum_i \beta_i X_{i,t-1} + \sum_k \gamma_k Y_{k,t-1}\right).$$

Here, X_i refers to the firm-specific financial information and Y_k embodies the systemic factors common to all firms, both lagged one period. The probability transform function, $\Phi(.)$, is assumed to follow a logistic distribution.[282] The idiosyncratic factors, X_i, include the working capital, retained earnings, earnings before interest and taxes, equity and sales, all normalized by total assets. The systemic factors , Y_k, include industrial sector growth and interest rate. The indicator for credit riskiness, D_i, is a binary variable, with $D_i = 1$ denoting default. We proxy the default by using firm specific data from SBP's Credit Registry, where a firm is taken to have defaulted if its credit obligations remain overdue by 365 days and above (OD $\geq$ 365). For 2020, we project financial variables using averages of the five preceding years, industrial sector growth in line with SBP projections for real growth and the prevailing interest rates.[283]

Important as the overall NFF sector is, the textile industry is the mainstay of Pakistan's economy. The industry's contribution in the export earnings of the country is around 54.45 percent in CY19. It also constitutes a substantial share of the corporate lending of the banking industry– around 25.57 percent. However, the major concentration of NPLs also continues to be in the textile sector – 36.86 percent of the total corporate NPLs. Given that textile sector is a key borrower, it has been subjected to the same analysis as the overall NFFs.

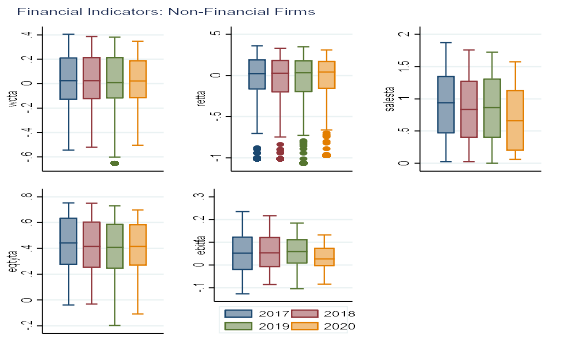
[280] Borio C. and Lowe P. (2002). Asset prices, financial and monetary stability: exploring the nexus. BIS Working Paper No. 114
[281] IMF (2018) Global Financial Stability Report, April.
[282] This is in essence an Altman-type model augmented with macro variables. [Altman E. (1968). Financial Ratios, Discriminant Analysis and the Prediction of Corporate Bankruptcy. The Journal of Finance, 23(4), 589-609.] A similar analysis has also been carried out in Chapter 2 of IMF (2018) and in SBP's FSR 2017, Box 5.1.
[283] See SBP Monetary Policy Statement dated April 16, 2020.

Empirical Results

(a) All Non-financial Firms

The financial performance of the NFFs in terms of above-mentioned five ratios over last five-year period is shown in **Chart B6.1.1**.[284] The working capital ratio, though positive on average, remains tilted towards lower quartile, implying reliance of firms on sources other than their own in the short run. This corroborates the fact that working capital finance (**WCF**) dominates the lending by the banks. However, during CY19 the WCF decelerated as firms scaled down their businesses and enhanced their reliance on internal financing (**see Chart 3.1.6 in Chapter 3.1**).

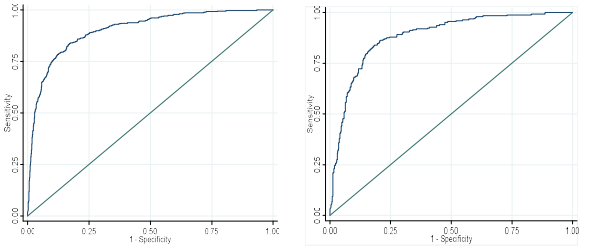
Chart B6.1.1: Financial Indicators - Non-Financial Firms



Source: SBP Staff Estimates

The retained earnings turn out to be highly concentrated below the median, with substantial number of outlying firms, implying low incidence of retention. The corporates' sales, on the other hand, remain robustly positive although declining, with some firms having sales more than 1.5 times their asset size. The equity of the firms on average remains strongly positive as well, though some outliers on the negative side can also be observed. Finally, the corporate sector remains marginally profitable.

Chart B6.1.2: Receiver Operating Characteristics (ROC) Curve



Source: SBP Staff Estimates

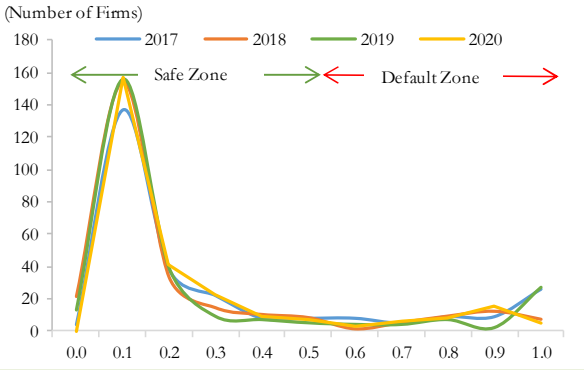
Table 1: Actual and projected number of defaults

	2016	2017	2018	2019	2020
All NFFs					
No. of Firms, *of which*	273	274	274	273	274
OD 365*	61	62	51	49	NA
P(D>=0.5)**	66	65	42	49	44
Textile Sector					
No. of Firms, *of which*	109	109	109	109	109
OD 365*	40	41	33	32	NA
P(D>=0.5)**	50	51	35	36	35

Source: Finanial Statements of Firms and Credit Information Bureau, SBP

* Firms with credit obligations overdue by 365 days and above as per CIB data;
** Model based projections. Subject to usual statistical uncertainty.

Chart B6.1.3: Probability of Default - Corporate Non-Financial Firms



Source: SBP Staff Estimates

The estimates of defaults alongwith actual number of firms defaulted each year between 2016 and 2019 are presented in **Table 1**. The model appears to be mapping the historical defaults quite well. Moreover, the receiver operating characteristic (**ROC**) curve in **Chart B6.1.2** depicts that the model can adequately discriminate between defaulting and non-defaulting firms under various

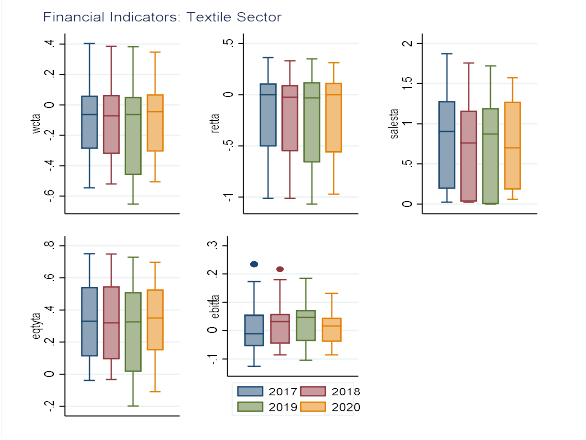
[284] **wcta=**Working Capital to Total Assets; **retta=**Retained Earnings to Total Assets; **salesta=**Sales to Total Assets; **eqtyta=**Equity to Total Assets and **ebitta=**Earnings Before Interest & Taxes to Total Assets.

thresholds. The area under ROC curve (**AUC**) for models for all NFFs and Textile sector is 0.904 and 0.884, respectively.[285]

The model-based distributions of probabilities of default (**PDs**) are depicted in **Chart B6.1.3**. The mass of PDs are concentrated in the range of 0.01 percent to 0.4 percent, i.e. in the *safe zone*. The curve beyond 0.5 percent, the *default zone*, remains thinner and is projected to thin out further in 2020. Indeed, as shown in **Table 1**, the number of firms expected to default in 2020 is 44 against 49 that actually defaulted in 2019, largely on the back of strong equity.

The above estimates are based on data available prior to COVID-19 outbreak. This pandemic has resulted in an unprecedented slowdown of the global economy with the IMF expecting global economic activity to decline on a scale not seen since the Great Depression.[286] It will have consequences for the real growth as well as the financial stability in Pakistan, as well. With deteriorating domestic demand conditions, due to COVID-19, the sales and hence the earnings of the NFFs are expected to fall. The economic fallout, due to the pandemic and lockdown, is yet to unfold and there could be higher defaults.

Chart B6.1.4: Financial Indicators - Textile Sector



Source: SBP Staff Estimates

(b) Textile Sector

The financials of the textile sector depict some deterioration. The sales and profitability indicators show decline and the sector remains net borrower in the short term (see WCTA ratio in **Chart B6.1.4**). However, better earnings in 2018-19 give more resilience to these firms in terms of equity and solvency.

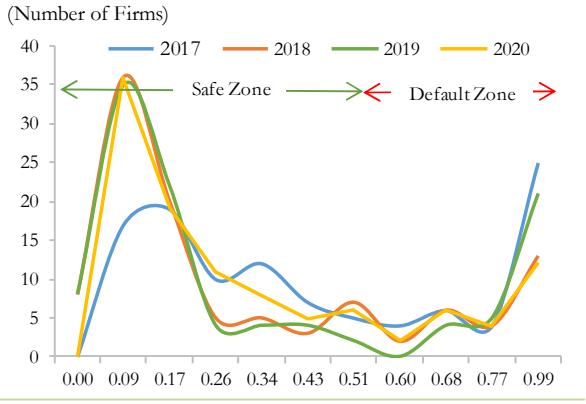
The distribution of default probabilities presents some interesting facts (see **Chart B6.1.5**). There was some leftward movement within the *safe zone* (0.01-0.43 percent) in 2019 as compared to 2017 denoting healthy solvency position of the firms in 2019. Likewise, the healthy solvency conditions in 2019 resulted in fewer firms in *default zone* (0.51-0.99 percent) in 2019 as compared to 2017. In 2020, a slight increase in the *default zone* (0.51-0.99 percent) is expected: Concretely, 35 firms are projected to be delinquent in 2020 as against actual 32 in 2019 (see **Table 1**). However, as noted above, the firm-specific factors are expected to deteriorate in CY20. Moreover, economic fallout from COVID-19 could also result in higher defaults in comparison to predictions in this

[285] The ROC curve is a mapping of the false positive rate (Type II errors) to the true positive rate (the complement of Type I errors). The AUC is a convenient and interpretable summary measure of the signaling quality of a binary signal, with values higher than 0.5 indicating a better quality signal. (see Drehmann, M. and Juselius, M., 2014. Evaluating early warning indicators of banking crises: Satisfying policy requirements. *International Journal of Forecasting, 30*(3), pp.759-780.)

[286] IMF (2020). A Global Crisis Like No Other Needs a Global Response Like No Other. April. <https://blogs.imf.org/2020/04/20/a-global-crisis-like-no-other-needs-a-global-response-like-no-other/>

analysis. From a policy perspective, there is a need for banks to strengthen their credit monitoring and loan re-structuring standards while a continuous regulatory macro-prudential oversight is warranted as well.

Chart 6.1.5: Probability of Default - Textile Sector



Source: SBP Staff Estimates