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A MACROECONOMETRIC FRAMEWORK FOR CREDIT PORTFOLIO MODELLING IN SOUTH AFRICA

by

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SUMMARY

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Abstract

Driven by intense competition for market share, banks across the globe have allowed credit portfolios to become less diversified (across all dimensions – country, industry, sector and size) and have become willing to accept lesser quality assets on their books. As a result, even well capitalised banks could come under severe solvency pressure when global economic conditions turn. The banking industry has realised the need for more sophisticated loan origination and credit and capital management practices. To this end the reforms introduced by the Bank of International Settlement through the New Basel Accord (Basel II) aims to include exposure specific credit risk characteristics within the regulatory capital requirement framework, but is still not able to allow diversification and concentration risk to be fully recognised within the credit portfolio. In order to enhance earnings and liquidity profiles, active credit portfolio management is becoming a central part of capital management within the banking industry. If any risk mitigation or value enhancing activity is to be

pursued, a credit portfolio manager must be able to identify the interdependencies between exposures in a portfolio and relate macroeconomic credit risk into tangible portfolio effects.

The core principle for addressing practical questions in credit portfolio management lies in the ability to link the cyclical or systematic components of firm credit risk with the firm's own idiosyncratic credit risk as well as the systematic credit risk component of every other exposure in the portfolio. Most structural credit portfolio management approaches have opted to represent the general economy or systematic risk by a single risk factor. The systematic component of all exposures, the process generating asset values and therefore the default thresholds are homogeneous across all firms. Indeed this Asymptotic Single Risk Factor (ASRF) model has been the foundation for Basel II. However the ASRF approach does not allow for enough flexibility when answering real life questions. Commercially available credit portfolio models have made an effort to address this issue by introducing more systematic factors in the asset-value-generating process. From a practitioner's point of view, however, these models are often a "black-box" which allows little economic meaning or inference to be attributed to systematic factors.

The methodology proposed by Pesaran, Schuermann, Treutler and Weiner (PSTW) (2006) has made a significant advance in credit risk modelling because it avoids the usage of proprietary balance sheet and distance to default data, instead focussing on credit ratings which are more freely available. Linking an adjusted structural default model to a structural global econometric (GVAR) model means that credit risk analysis and portfolio management can be done by using a conditional loss distribution estimation and simulation process. The GVAR model used in PSTW (2006) comprises a total of 25 countries and accounts for 80 per cent of world production, but does not include an African component.

This thesis proposes a country-specific macroeconometric risk driver engine which is compatible with and could feed into the GVAR model and framework using vector error-correcting (VECM) techniques. This allows conditional loss estimation of a South African-specific credit portfolio and opens the door for credit portfolio modelling on a global scale because such a model can easily be linked into the GVAR

model. By using firm-specific asset value functions, the outcomes from the macroeconometric vector error-correcting model (VECM) is translated into default probabilities and used to perform credit risk analysis and scenario analysis on a fictitious portfolio of corporate bank loans within the South African economy. These results can be used in credit portfolio management or standalone credit risk analysis which means that practical credit portfolio management and value enhancing applications can be performed.

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To our Lord Jesus Christ, I would like to bring all praise and thanks for his never ending grace and love in my life. To You I owe everything.

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LIST OF ABBREVIATIONS

ADF	Augmented Dickey-Fuller
AIC	Akaike information criterion
APT	Arbitrage Pricing Theory
ASRF	Asymptotic Single Risk Factor
BA	Banker's acceptance
BIS	Bank of International Settlement
bps	Basis points
CDF	Cumulative default frequency
EL	Expected loss
EAD	Exposure at default
GDP	Gross domestic product
GIRF	Generalized-impulse response function
GVAR	Global vector autoregression
IFS	International Financial Statistics
INS	Information notice system
IMF	International Monetary Fund
KPSS	Kwiatkowski, Phillips, Schmidt, and Shin
LGD	Loss given default
MGE	Mean-group estimators
OIR	Orthogonalised-impulse-response
PD	Probability of default
PSTW	Pesaran, Schuermann, Treutler and Weiner
PSW	Pesaran, Schuermann and Weiner
q.a.	Quarter on quarter annualised

SARB	South African Reserve Bank
Stats SA	Statistics South Africa
SD	Standard deviation or unexpected loss
Tbill	Treasury bill
UL	Unexpected loss
VAR	Vector autoregression
VECM	Vector error-correcting model