Are Macroprudential Indicators Leading Indicators of Economic and Financial Distress in The Bahamas?

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Outline

- Introduction
- Literature Review
- Macroprudential Measures Across Countries
- Methodology
  - Signals Approach
  - Probit Model
- Results
- Conclusion
- Limitations

Introduction

- The global recession established the need to more effectively monitor developments in the financial (banking) sector given effect on real economy.

- Macroeconomic indicators:
  - Real GDP
  - Employment
  - External Reserves

- Indicators significant to the Banking sector are needed to alleviate pressure from other economic factors

Introduction

- Most recent American recession
  - Connection to The Bahamas

- What are Macroprudential Indicators?
  - Indicators used to mitigate systemic risk within the financial sector

- This paper seeks to test the suitability of macroprudential indicators in detecting potential crises and compare their performance against traditional leading economic indicators

Literature Review

- Lim et al (2011)
  - Focused on determining the effectiveness of macroprudential instruments
  - Panel regression showed that instruments may affect credit growth, systemic liquidity and capital flows.
  - The instruments are only as good as their regulator
- Alberola et al (2011)
  - 10-year macroprudential policy in Spain using dynamic provisioning (DP)
  - Questioned whether or not the standalone policy is sufficient

Literature Review

- Tovar et al (2012)
  - Latin American countries use of Reserve Requirement (RR) as a macroprudential tool
  - Manage prolonged credit accumulation
  - Not one-size fits all
- De la Torre et al (2012)
  - Found DP to be better than RR in the Latin American and Caribbean region
  - Peru and Brazil
    - Credit shocks and other undesirable financial dilemmas

Macroprudential Measures Across Countries

Country	Macroprudential Measures Implemented	Purpose	Results
The United States of America	• Leverage Ratio • Financial Stability Oversight Council	• Contain the increase in leverage build-up to control bank risk • Volcker Rule enacted to protect the economy against financial crises	• More oversight on financial institutions • "Too Big to fail"
Colombia	• Dynamic Provisioning • Liquidity Requirements	• Create a buffer during upturns so that reserves could be used during recessions	• Reduced procyclicality • Losses due to NPLs were partially absorbed
South Korea	• Increased long-term foreign currency denominated borrowing • Macroprudential levy • Withholding tax on foreign purchases • Loan-to-Deposit policy • Loan-to-Value ratio caps • Debt-to-Income ratio caps	• Financial stability, especially with the vulnerabilities of open emerging economies	• Caps on lending growth so that it does not exceed the pace of deposit growth • Limited growth in bank's external borrowing • Somewhat effective in curtailing real estate booms and risks
New Zealand	• Minimum core funding ratio • Liquidity mismatch ratio	• Financial stability • To ensure banks are able to meet liquidity and funding standards	• Reduction in short-term debt • Reduction in short-term external debt • Lending rates increased

*Source: Tovar et al, 2012; Hahm et al, 2012; Alberola et al, 2011; de la Torre, 2012; Lim et al, 2011

Methodology

- Analyze the performance of variables over time to determine their suitability as an early warning indicators of an economic and financial crisis

  - Crisis index is constructed first as the dependent variable in order to identify crisis episodes
    - 2003
    - 2008 & 2009

- Two separate tests were performed using the following techniques:
  - Signals Approach
  - Probit Models

Variable Names and Expected Signs

Exogenous Variables	Regressors	Expected Signs
Total Arrivals	TOTAL_ARRIVALS	-
Air Arrivals	AIR_ARRIVALS	-
Credit to the Private Sector/GDP	CREDIT_GDP	+/-
Growth in Credit to Private Sector	CREDIT_GDP	+/-
National Debt/GDP	N_DEBT_GDP	+
Central Government External Debt/GDP	EXT_DEBT_GDP	+
Fiscal Deficit/GDP	DEFICIT_GDP	-
FDI/GDP	FDI_GDP	-
Ratio of Nonperforming Loans/Total Private Sector Loans	NPL_RATIO	N/A
External Reserves/Demand Liabilities	RES_DEM	-
US Real GDP	US_GDP	-
Ratio of Liquid Assets/Total Assets	LIQ_ASSETS	-
Ratio of Private Sector Credit to Bank Deposits	CREDIT_DEPOSITS	+/-

Key Characteristics of the Signals Approach

- Any variable deviation from its normal level beyond a particular threshold value is considered a warning about a possible crisis

- A threshold is defined based on an analysis of data aimed to ensure that indicators produced significant numbers of good or good and bad signals
  - Once crisis index exceeds the threshold level, this is classified as a crisis
  - 20th Percentile

- A signal that is followed by a crisis within 24 months is a good signal
- A signal not followed by a crisis within 24 months is a bad signal (noise)

Signals Approach

	Crisis (within 8 quarters)	No Crisis (within 8 quarters)
Signal was issued	A	B
No signal was issued	C	D

- A - The number of quarters in which the indicator issued a good signal
- B - The number of quarters in which the indicator issued a bad signal/noise
- C - The number of quarters in which the indicator failed to issue a signal and a crisis occurred (8-A)
- D - The number of quarters in which the indicator did not issue a signal and a crisis did not occur (Residual)

Results of Signals Approach

Variable	Good signals as a percent of possible good signals	Bad signals as a percent of possible bad signals	Noise/Signal (adjusted)	P(Crisis/signals)	P(Crisis/signal) -P(Crisis)
AIR_ARRIVALS	**37.5**	**15.6**	**0.42**	37.50	37.30
TOTAL_ARRIVALS	18.75	20.3	1.08	18.75	18.55
US_GDP	**25**	**16.2**	**0.65**	35.29	35.03
EXT_DEBT_GDP	50.0	80.0	1.60	13.33	13.14
N_DEBT_GDP	50.0	87.7	1.75	12.31	12.11
RES_DEM	87.5	79.7	**0.91**	21.54	21.34
NPL_RATIO	20.0	96.88	4.84	6.06	5.82
C_CREDIT	**100.0**	**73.44**	**0.73**	**25.40**	**25.20**
CREDIT_GDP	**100.0**	**75.00**	**0.75**	**25.00**	**24.80**
CREDIT_DEPOSITS	80.0	79.69	1.00	23.88	23.64
LIQ_ASSETS	50.0	92.65	1.85	16	15.74

Key Characteristics of Probit Models

- Dependent variable consist of 1 and 0 only
  - Eight quarters before crisis = 1
  - All other quarters= 0

- Parameters of model estimated by method of Maximum likelihood

- The sign of the coefficient of the explanatory variable in the regression is the same as for the actual variable
  - The coefficient cannot be interpreted directly

Results of Probit Model (Macroeconomic Indicators)

Variable	Coefficient	Probability Statistic
AIR_ARRIVALS	-0.015134	0.5111
EXT_DEBT_GDP	0.138222	0.5712
N_DEBT_GDP	-0.281970	0.0113
US_GDP	-0.100880	0.1553
RES_DEM	-0.011935	0.1518
C	10.21483	0.0112

McFadden R-squared = 0.290122

Total Gain 8.42 (26.3%)

Results of Probit Model (Macroprudential Indicators)

Variable	Coefficient	Probability Statistic
C_CREDIT	0.238809	0.0213
CREDIT_GDP	-0.49873	0.0093
CREDIT_DEPOSITS	1.357003	0.0078
LIQ_ASSETS	1.23668	0.0551
C	-136.014	0.0101

McFadden R-squared = 0.669134

Total Gain 21.04 (65.74%)

Results of Probit Model (Combined Indicators)

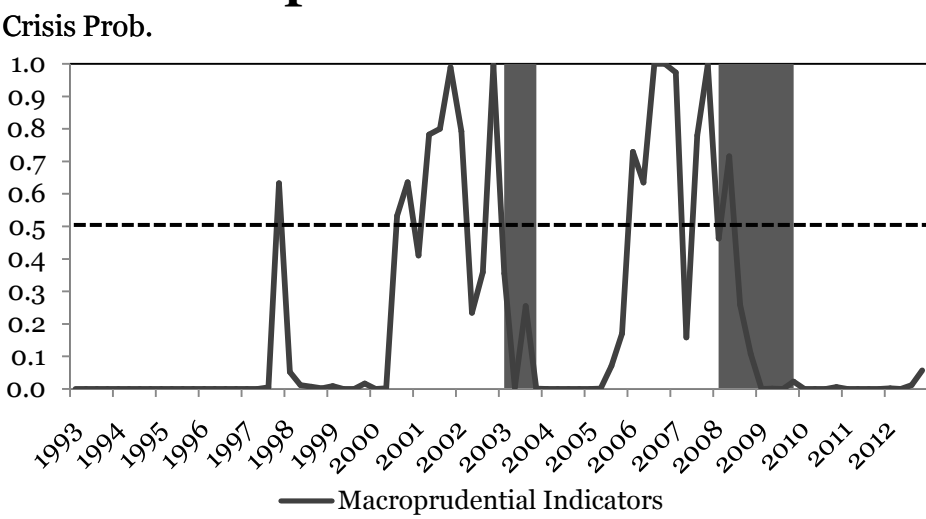| Variable	Coefficient	Probability Statistic
AIR_ARRIVALS	-0.0754	0.3468
EXT_DEBT_GDP	-5.19995	0.078
RES_DEM	-0.04383	0.1747
C_CREDIT	0.958963	0.1066
CREDIT_DEPOSITS	1.634949	0.0424
LIQ_ASSETS	2.547925	0.0921
C	-205.407	0.0457

McFadden R-squared = 0.812089

Total Gain 26.01 (81.29%)
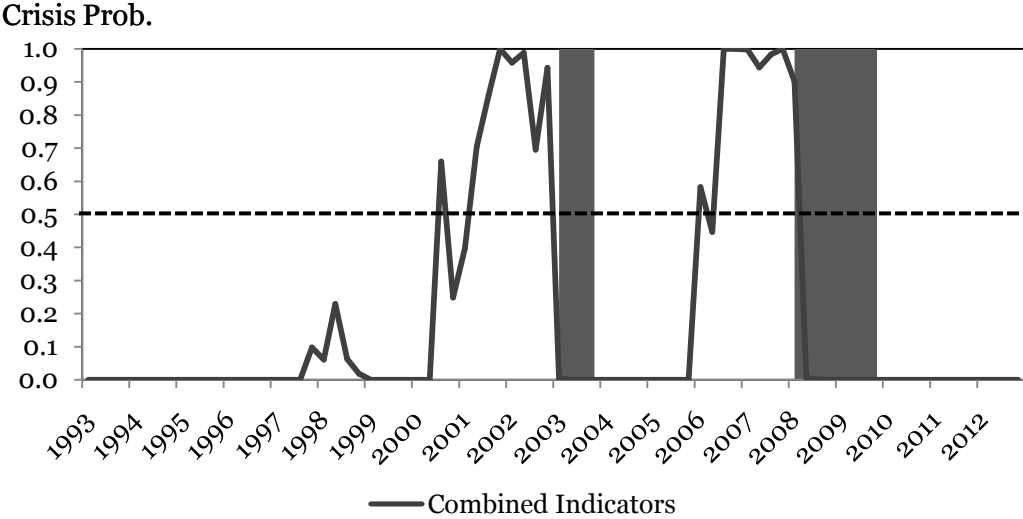
Graphs of Crisis Probabilities

Macroeconomic Indicators
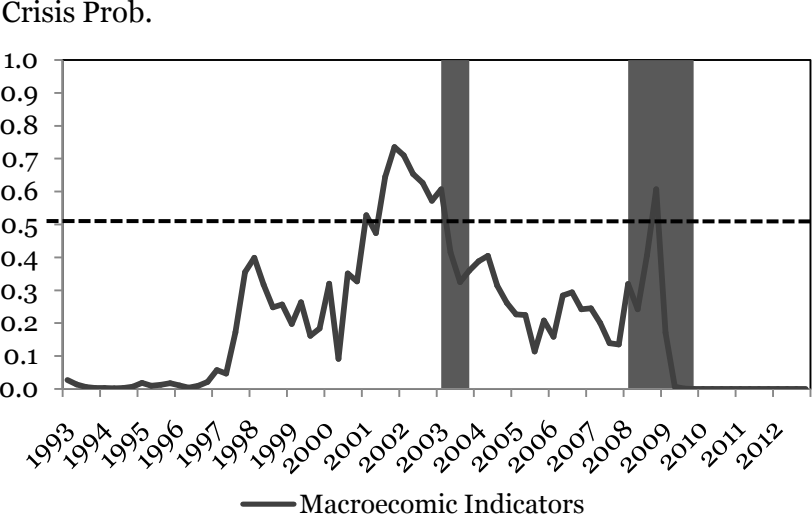
Macroprudential Indicators

Combined Indicators

Summary of Results

- Macroprudential indicators appear to have greater accuracy in predicting an impending crisis than traditional economic indicators.

  ▫ Economic indicators tend to deteriorate most significantly during a crisis

- When combined, both sets of indicators provide the highest degree of accuracy in predicting an impending economic crisis.

Conclusion

- Relatively new development resulting in limited research on the subject area

- Macroprudential indicators appear to be good indicators in predicting economic crises in The Bahamas

- The performance is best when combined with current macroeconomic indictors

- Suggests that indicators can be effective for policy makers in implementing macroprudential policies to mitigate the effects of a crisis.

Limitations of Study

- Time series very short only includes two crisis periods
  - Accounts for changes in sign of some parameters

- In reality some indicators can only be generated with a considerable lag e.g. Nominal GDP may not been available until several quarters into the next year
  - Quarterly nominal GDP needed to be estimated

- Some financial stability/macroprudential indicators are in initial stages of development

THANK YOU!