مؤسسة النقد العربي السعودي

Saudi Arabian Monetary Agency

Commercial Bank Lending and Sectoral Economic Growth in Saudi Arabia; The Causal link

2-10-2017

MOTIVATION

- There is positive cross-country correlation between financial development and economic activity (Goldsmith, 1969; King & Levine, 1993).

- **Thesis: Causality between Bank credit and economic growth across sectors**

- **how can we disentangle two-way causality?**
  - Supply → Firms need external finance to reap growth opportunities.
  - Demand ← Financial development reflects future growth opportunities.

Overwhelming Interest in Access to Finance

- Seminal work of McKinnon (1973) and Shaw (1973) led to re-emergence of the issue of "finance matters in development"
- The classical work of Patrick (1966) – 'demand following' and 'supply-leading' finance strategy is re-visited.
- Debate on the direction of causality between finance and growth. This is well documented (King and Levin (1993), Levin and Zervos (1998), Arestis et. al. (2001), Gupta (1984).
- Several conclusions are derived from the literature: Finance follows growth in developing countries, and growth induces finance in developed countries.

Micro Level Research on Access to Finance

- Rajan and Zingles (1998): Industries with access to external finance grow at faster rate.
- Wurgler (2000) and Aghian et. al. (2007) with similar conclusion: Increase in investment in more growing industries.
- BUT small and medium industries find it difficult to raise funds for inherent behavioral characteristics of financial institutions (Hutchinson and Xavier 2007; Berger and Udell 2004).
- Research on impact of microfinance reinforces the fact 'access to finance' matters (e.g., Hossain 1988; Khandker; Zohir et. al.; Rahman et. al.)

SMEs in Development Agenda

- Most of the growth theories suggest that industrialization is the engine of economic growth
- A balanced growth of sectors is very important and necessary for the economic development
- For pursuing the industrial development efforts, the main objectives and strategies focused are optimal utilization of resources, creating employment opportunities and catalyzing the growth of production and exports

MOTIVATION within local context

- Research have been dominated by time series, or micro-level panel data methodologies, others use panel data methodologies by pooling data across countries.
- Compared with the cross-country panel analysis, the time-series approach yields less convincing analysis.
- Countries with oil-based economies are usually excluded.
- Vital to the objective of economic diversification away from oil dominance.

Study Highlights

- This is the first empirical study on the finance-growth nexus to employ panel data methods within the context of one country's macroeconomic level. that applies the analysis on the level of economic sectors; namely, GDP per sector

Interpreting Causality

Deterministic Causality

- A change in the activity of one group (A) *necessarily* produces a change in that of another group (B).

$$P(B|A) = 1$$

Probabilistic Causality

- A change in the activity of A contributes an influence that changes the likelihood of a change occurring in the activity of B.

$$P(B|A) > P(B|\sim A)$$

GRANGER CAUSALITY

- "Applied economists found the definition understandable and useable and applications of it started to appear."

- "However, several writers stated that 'of course, this is not real causality, it is only Granger causality.' Thus, from the beginning, applications used this term to distinguish it from other possible definitions."

Clive Granger's personal account in:
Seth A. (2007) Granger causality, Scholarpedia 2(7):1667.

➢ *Granger causality tests* – which have been interpreted as testing the validity of the proposition that bank credit have spurred or caused out put fluctuations.

❑ We can distinguish four cases:

- ➢ Unidirectional causality from Bank Credit to GDP
- ➢ Unidirectional causality from GDP to Bank Credit
- ➢ Feedback or bilateral causality
- ➢ Independence

Methodology

- First, the study will establish the order of integration for the variables (Unit Root)
- Secondly, analysis of potential cointegrated relationship follows using different tests.
- Thirdly, Granger causality tests

The Advantages of using Panel Data

There are a number of advantages from using a full panel technique when a panel of data is available.

- We can address a broader range of issues and tackle more complex problems with panel data than would be possible with pure time series or pure cross-sectional data alone.
- It is often of interest to examine how variables, or the relationships between them, change dynamically (over time).
- By structuring the model in an appropriate way, we can remove the impact of certain forms of omitted variables bias in regression results.

Methodology

- First, the study will est ariables (Unit Root)
- Secondly, analysis using different tests.
- Thirdly, Granger ca

Potentially problematic aspects:

- Cross-sectional dependence

-Sectors within the same economy have similar levels of growth opportunities specially given the local economy dynamics, and impact of government expenditure.
-The assumption of cross-sectional independence of the error terms in the panel regression is highly unrealistic

- Structural breaks

Methodology

- First, the study will est… …ariables (Unit Root)

Potentially problematic aspects:
- Cross-s…

Secto…
sim…
sp…
dyn…

Th…
inde…
par…

- Struc…

- Secondly, analysis … …ferent tests.

Potentially problematic aspects:
- Cross-sectional dependence

tests:
Breusch and Pagan (1980)

Pesaran (2004) Frees (2004)

- Thirdly, Granger ca…

Methodology

- First, the study [illegible] Root)

Friedman test		B-PLM test		Frees test	Pesaran test	
Stat	P-val	Stat	P-val	Stat	Stat	P-val
45.62***	0.00	267.35***	0.00	2.601***	5.09***	0.00

The null hypothesis of all the tests is the presence of cross-sectional independence. (***), (**) and (*) denote the rejection of the null hypothesis at 1%, 5% and 10% respectively. B-PLM denotes the Breusch Pagan test. Test performed in STATA software.

- Thirdly, [illegible]

Methodology

- First, the study will establish the order of integration for the variables (Unit Root)

Breitung (2000)
Hadri (2000)
Pesaran's (2003): cross-sectionally augmented Dickey–Fuller (panel-CADF)

- Secondly, analysis of potential cointegrated relationship follows using different tests.

- Thirdly, Granger causality tests

Panel Unit Roots Tests

	Hadri		Harris-Tzavalis		Breitung	
	Levels	Diff	Levels	Diff	Levels	Diff
GDP	39.3**	22.63**	-0.30	-24.5**	1.57	-5.09**
CRE	15.9**	1.05	-0.03	-25.11**	-0.10	-8.23**
GOV	38.1**	2.02	-0.46	-57.44***	-1.19	-12.94***

Note: The null hypothesis for the Hadri test is no unit root while for the Harris-Tzavalis and Breitung tests, there is a unit root. Tests carried for constant and trend. The specification used for the Hadri test is demean, and for the Breitung and Harris-Tzavalis tests, they are robust as prescribed in the presence of cross-sectional dependence. (***), (**) and (*) denote the rejection of the null hypothesis at 1%, 5% and 10% respectively.

Methodology

- First, the study will establish the order of integration for the variables (Unit Root)

Breitung (2000)
Hadri (2000)
Pesaran's (2003): cross-sectionally augmented Dickey–Fuller (panel-CADF)

- Secondly, analysis of potential cointegrated relationship follows using different tests.

Kao (1999) Panel Cointegration Test
Westerlund (2007) ECM-based Panel Cointegration Tests (4) (Bootstrap)
Westerlund and Edgerton (2007) Panel Cointegration Tests

- Thirdly, Granger causality tests

Kao Residual-based Panel Cointegration Tests

	GDP CRE	GDP CRE GOV	GOV CRE
		t- statistic	
ADF	-2.70(0.00)***	-4.36(0.00)***	-8.23(0.00)***

(***) denotes the rejection of the null hypothesis of no cointegration at 1% probability. The test uses automatic lag length selection based on AIC, with a maximum lag of 4, Newey-West automatic bandwidth selection and Bartlett Kernel. Test performed in Eviews software.

Westerlund's (2008) Durbin-Hausman Panel Cointegration Test

		Series: GDP CRE	Series: GDP CRE GOV
Westerlund's Durbain-Hausman test	DHp	9.82***	1.366*
	DHg	4.53***	0.211

The null hypothesis is no cointegration. (***), (**) and (*) denote the rejection of the null hypothesis at 1%, 5% and 10% respectively. Estimation performed in GAUSS software.

Westerlund's Panel Cointegration Tests between GDP, CRE and GOV

	Value	Z-Value	Robust P-Value
Gt	-2.92	-2.88	0.01
Ga	-8.39	0.34	0.00
Pt	-9.24	-3.98	0.00
Pa	-16.07	-5.47	0.00

Note: The lag and lead length of 1 was used and the width of the Bartlett Kernel window was set to 2,

Methodology

- First, the study will establish the order of integration for the variables (Unit Root)

Breitung (2000)
Hadri (2000)
Pesaran's (2003): cross-sectionally augmented Dickey–Fuller (panel-CADF)

- Secondly, analysis of potential cointegrated relationship follows using different tests.

Kao (1999) Panel Cointegration Test
Westerlund (2007) ECM-based Panel Cointegration Tests (4) (Bootstrap)
Westerlund and Edgerton (2007) Panel Cointegration Tests

- Thirdly, Granger causality tests

Granger pair-wise test
Hurlin and Venet (2003).

Pair-wise Granger panel causality test

Direction of Causality	L = 1	L = 2	L = 3	L=4
CRE → GDP	1.5(0.69)	0.39(0.67)	0.52(0.00)	1.9(0.94)
GOV→CRE	32.9(0.00)***	43.06(0.00)***	25.77(0.00)***	36.16(0.00)***
GDP→CRE	125.5(0.00)***	0.39(0.67)	0.52(0.66)	18.9(0.00)***
GOV→ GDP	0.09(0.9)	16.82(0.00)***	17.36(0.00)***	17.42(0.00)***

(***) denotes the rejection of the null hypothesis at 1%. L is lag length, F-statistics are reported with P-values in parenthesis.

Panel Granger non-Causality between CRE and GDP

Sectors	Null hypothesis: CRE does not cause GDP	
	S-R causality	L-R causality
	(δ^2)	(z-stat)
	$\rho_{i1}=\ldots=\rho_{ip}=0$	$\varphi_i=0$
Agriculture	0.48(0.78)	-0.07(0.94)
Commerce	4.87(0.08)*	-2.17(0.03)***
Construction	0.90(0.63)	0.55(0.58)
Manufacture	2.70(0.25)	1.53(0.12)
Mining	4.74(0.09)*	-0.77(0.44)
Services	0.74(0.69)	-0.81(0.41)
Transportation and Communication	0.54(0.76)	-0.68(0.49)
Utilities	1.61(0.44)	1.29(0.20)

The P-values are in parentheses, and (***), (**) and (*) denote the rejection of the null hypothesis at 1%, 5% and 10% respectively.

Argumentation

- In essence, some studies suggested that Saudi banking followed the passive or “demand-following” approach (Abdeen and Shook, 1984, Johany et al., 1986, Dukheil, 1995).
- Only in the commerce sector does a panel causality analysis reveal a consistent causal link running from the bank credit to the GDP. bidirectional Granger causality in this sector
- unfavorable to the development of productive sectors which usually require the commitment of long-term financing.
- Core intermediary aspects in banking sector, while sophisticated enough, its functions are not developed enough to support a sustained economic development and diversification of the economy in Saudi Arabia.
- Possible signaling of resource-curse symptoms in the financial sector.