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Johnes, Jill, Izzeldin, Marwan and Pappas, Vasileios

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# Efficiency and productivity change in Islamic and conventional banks:

## Evidence from the Gulf Cooperation Council (GCC) countries

Jill Johnes • Marwan Izzeldin • Vasileios Pappas



# Overview

1. Introduction
2. GCC: Background
3. Methodology
4. Literature review
5. Sample data and models
6. Results
7. Conclusion



## Why are we interested in the efficiency of Islamic banking (IB) relative to conventional banking (CB)?

- IB sector has fared better than CB one during global banking crisis
- Huge growth in IB sector worldwide
- Efficiency in the financial sector and economic growth are closely related; IB has a dominant share of the banking sector in some developing countries

## Why are we interested in the GCC?

- Economic stability in this region is important to the west as it has more than 80% of world oil reserves

## Aim of the paper:

- To evaluate and compare the performance of IBs and CBs using 2 methodological approaches
- To identify and compare the sources of inefficiency
- To investigate sources of inefficiency and productivity change over time



# GCC: Background

- Demand for Islamic financial products grew in the GCC following the 1970s oil boom
- Dubai Islamic Bank founded in 1975
- Since then there has been an increasing array of Islamic financial products to match those offered by CBs
- 2012: IBs in the GCC have around 34% of global Islamic assets
- Saudi Arabia, UAE and Kuwait are three of the big-4 countries in Islamic finance (Ernst and Young, 2013)
- Effect of the financial crisis on the GCC has been less than in other parts of the world



## Banking performance is evaluated here using:

- Financial ratio analysis (FRA) to indicate performance
- Data envelopment analysis (DEA) to indicate technical efficiency (TE)



## FRA

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### PERFORMANCE RATIOS

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#### COST PERFORMANCE RATIOS

<b>Cost to income (CTI)</b>	Calculated as $[\text{Overheads}/(\text{Net Interest Margin} + \text{Other Income})]*100$ where Overheads are mostly salaries
<b>Non-interest expenses to average assets (NIE)</b>	Calculated as $[(\text{Overheads} + \text{Loan Loss Provisions})/\text{Average Total Assets}]*100$

#### REVENUE PERFORMANCE RATIOS

<b>Net interest margin (NIM)</b>	Calculated as $[\text{Net Interest Margin}/\text{Average Total Earning Assets}]*100$
<b>Other operating income to average assets (OOI)</b>	Calculated as $[\text{Other Operating Income}/\text{Average Total Assets}]*100$

#### PROFIT PERFORMANCE RATIOS

<b>Return on average assets (ROA)</b>	Calculated as $[\text{Net Income}/\text{Average Total Assets}]*100$
<b>Return on average equity (ROE)</b>	Calculated as $[\text{Net Income}/\text{Average Equity}]*100$

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## FRA

- **Cost performance ratios**

Cost to income ratio; Non-interest expenses to average assets

- **Profit performance ratios**

Net interest margin; Other operating income to average assets

- **Revenue performance ratios**

Return on average assets; Return on average equity

## BUT

- One ratio cannot capture performance over breadth of activities
- Assumes eg. cost minimisation, profit maximisation or revenue maximisation

## DEA

- Allows each bank to have its own objectives as it will only be compared with peers using a similar mix of inputs and outputs
- Flexible and easy to incorporate multiple inputs and outputs

## BUT

- Does not allow for stochastic errors
- Results can be influenced by outliers



## Meta-frontier DEA (MF-DEA) (Charnes *et al* 1981)

- Gross efficiency: measured against the meta-frontier; incorporates technical competence (managerial and scale) and efficiency arising from *modus operandi*
- Net efficiency: measured against the group frontier; isolates the technical component (managerial and scale)
- Type efficiency (TGR): is the component of efficiency arising from *modus operandi*

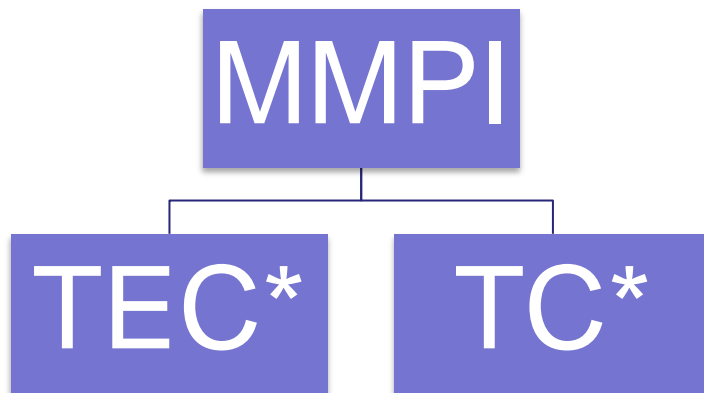
## Malmquist productivity

- Malmquist productivity analysis can identify improvements in productivity between periods  $t$  and  $t+1$
- A decomposition of the Malmquist index can give insight to whether productivity changes are due to
  - Technical efficiency changes (i.e., Banks using existing resources more efficiently thus getting closer to the production frontier)
  - Technological progress (i.e., shifts in the production frontier)

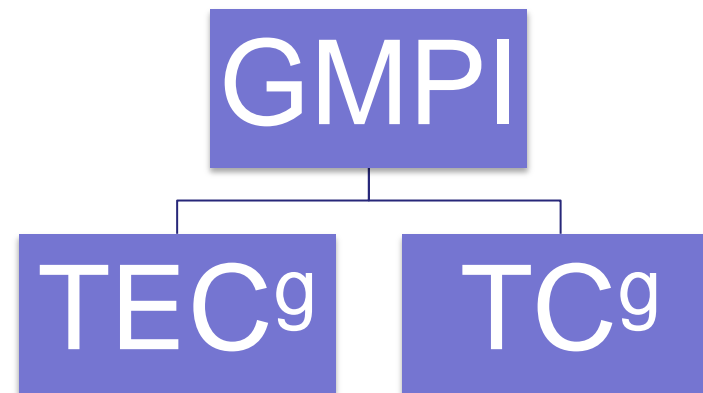
## Meta-frontier Malmquist

- Provides further insights for data comprising groups
- Technical efficiency changes and Technological progress are allowed to differ between groups

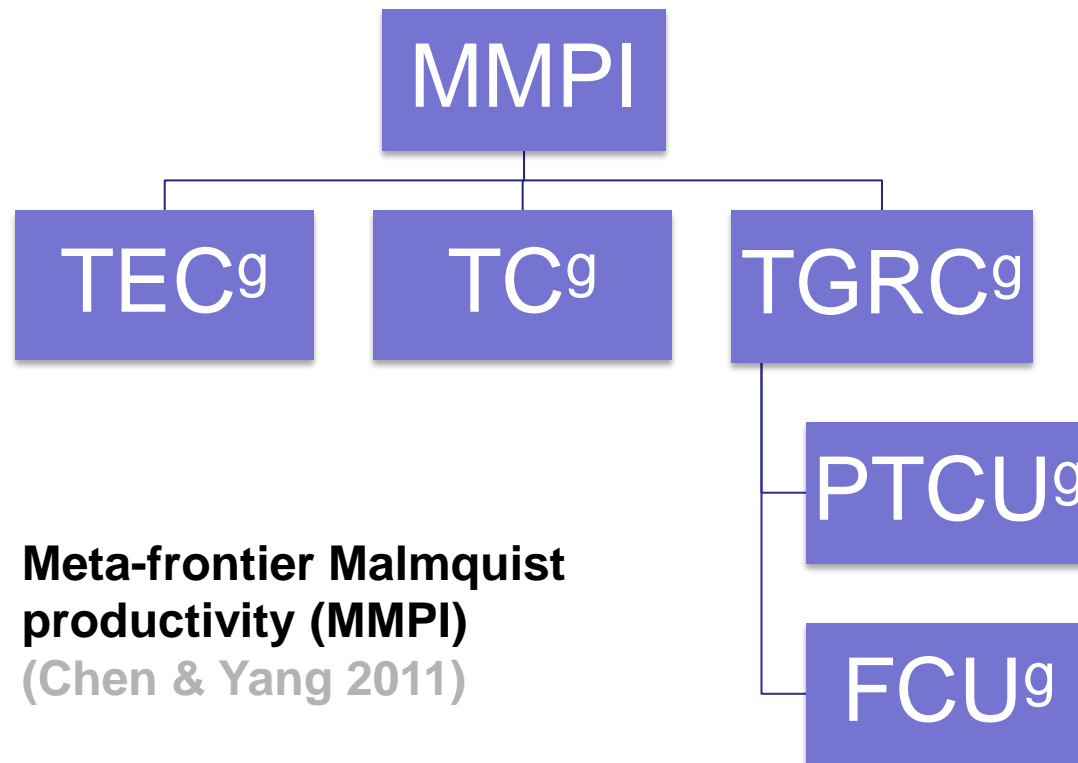
## Meta-frontier Malmquist productivity (MMPI)



## Group Malmquist productivity (GMPI)



# Methodology



- $TGRC^g = \frac{MMPI}{GMPI}$  is the technology gap ratio change and comprises 2 components:
- $FCU^g = \frac{TC^*}{TC^g}$  is the frontier catch-up and refers to the band lying between the group and meta-frontiers. It captures the speed of change of the meta-frontier relative to the group frontier
- $PTCU^g = \frac{TGR_{t+1}^g}{TGR_t^g}$  is the pure type catch-up between periods  $t$  and  $t+1$

## Evidence using FRA

- IBs perform better than CBs in terms of profitability (Olson & Zoubi 2008; 2011; Parashar & Venkatesh 2010; Hasam and Dridi 2011)
- IBs perform better than CBs in terms of resource use, cost effectiveness, asset quality capital adequacy and liquidity ratios (Hassan & Bashir 2005)





## Evidence using frontier estimation

Evidence is mixed!

- There is no significant difference between IBs and CBs (Abdul-Majid et al 2005b; Bader 2008; El-Gamal and Inanoglu 2005; Hassan et al 2009; Mokhtar et al 2006)
- IBs are significantly less efficient than CBs (Mokhtar et al 2007; 2008; Srairi 2010; Kamarudin et al 2014; Mobarek & Kalonov 2014)
- IBs are significantly more efficient than CBs (Al-Jarrah & Molyneux 2006; Al-Muharrami 2008; Olson & Zoubi

## Evidence using meta-frontier approaches

### SFA cost function (Abdul-Majid *et al* 2008; 2010; 2011a; 2011b)

- **Malaysia:** Gross efficiency is significantly higher for CBs than IBs
- Net efficiency is only slightly different between types of banks
- **10 countries:** No significant difference in net efficiency.

### DEA output distance function (Johnes *et al* 2014)

- **19 countries:** No significant difference in gross efficiency
- Net efficiency is significantly higher in Islamic compared to conventional banks
- Type efficiency is significantly lower in Islamic compared to conventional banks

## Malmquist productivity

- **Malaysia:** Increase in productivity 1996 to 2002; technology has increased; no difference between bank types (Abdul-Majid *et al* 2008)
- **GCC:** Increase in productivity 2000 to 2004; technology has regressed (Ramanathan 2007)
- **GCC: Fall in productivity** 1999 to 2004; technology has regressed (Ariss *et al* 2007)



# Sample data and models

- 2006 to 2012
- Complete data on all variables required for FRA and DEA (balanced sample)
- 19 IBs, 43 CBs, 434 bank-year observations
- 6 GCC countries: Bahrain; Kuwait; Oman; Qatar; Saudi Arabia; UAE



## DEA model

- Intermediation approach

### Outputs

- Total loans
- Other earning assets

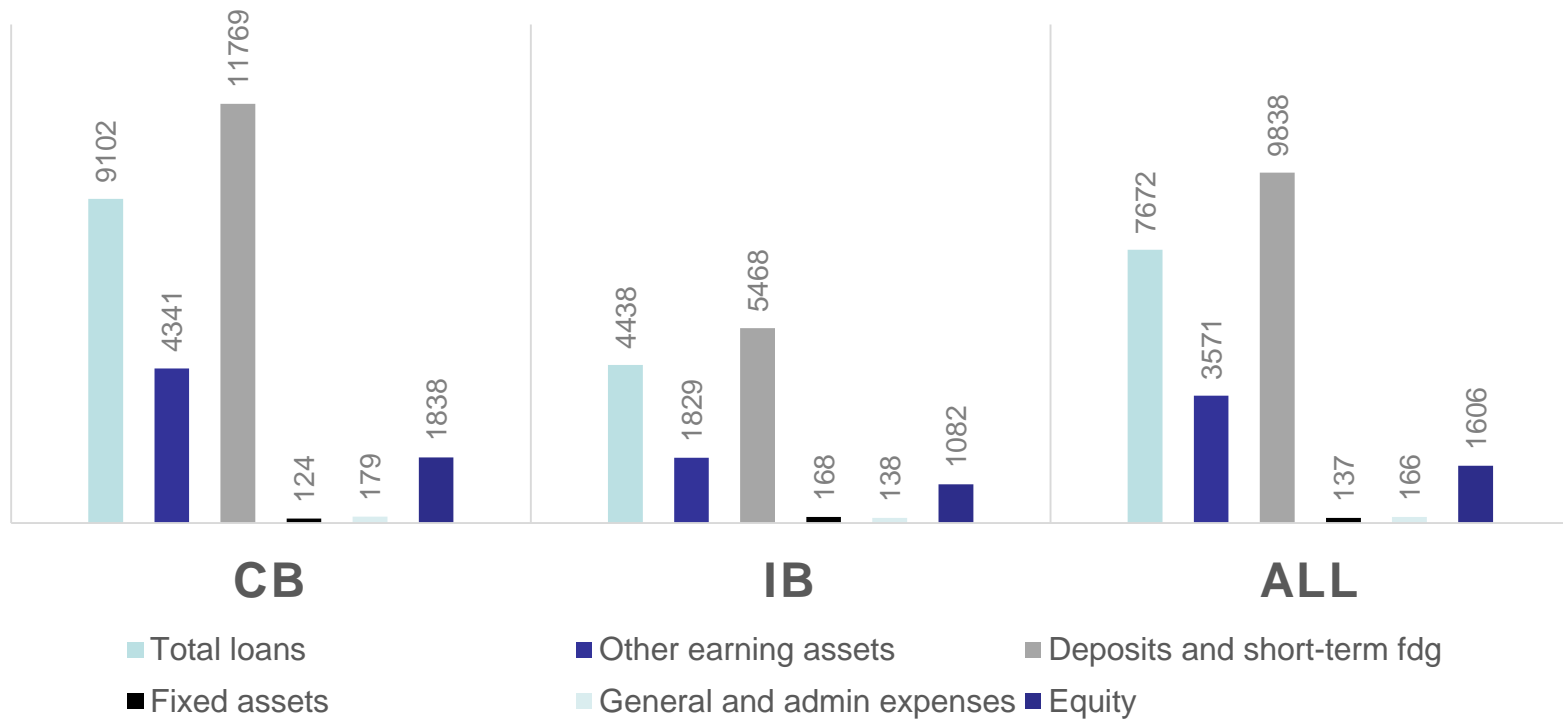
### Inputs

- Deposits and short-term funding
- Fixed assets
- General and administrative expenses
- Equity



# Sample data and models

## Inputs and outputs for CB/IB (US \$ mil in 2005 prices)



## Cost performance

- IBs have lower cost performance (Shariah compliance, complexity of contracts, legal costs, economies of scale)

## Profit performance

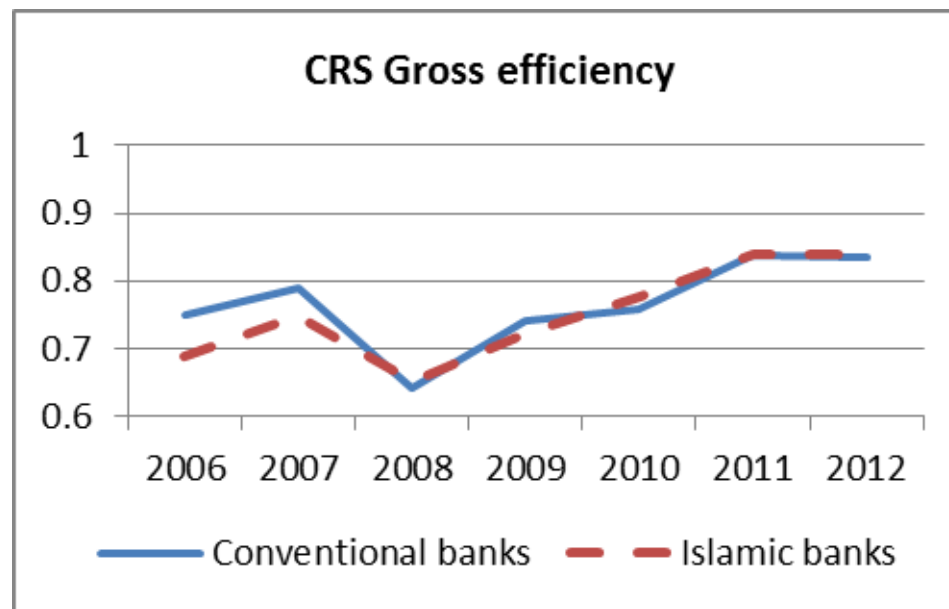
- CBs have greater profit performance particularly after the crisis

## Revenue performance

- Little difference between IBs and CBs

# Results: MF-DEA

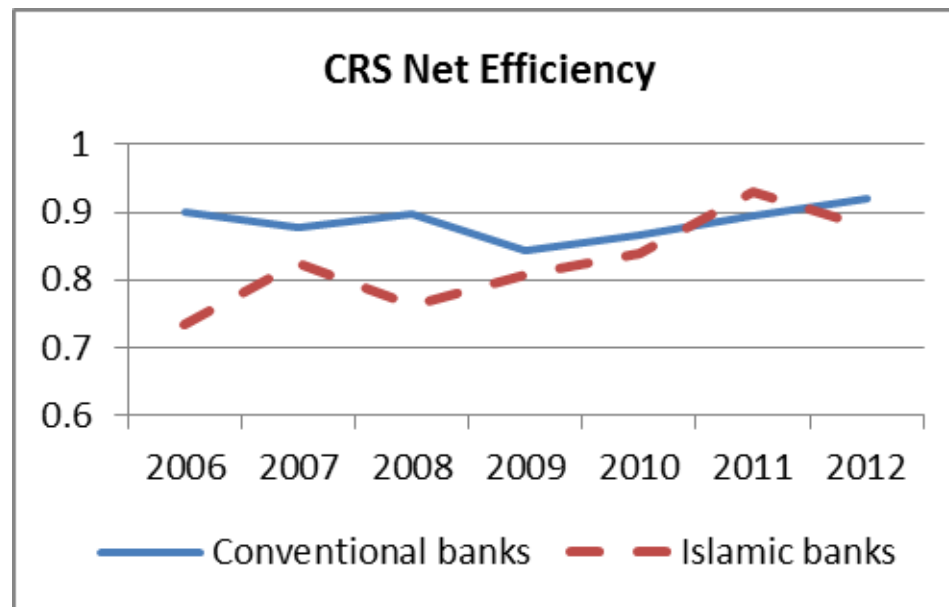
Gross efficiency: no significant differences





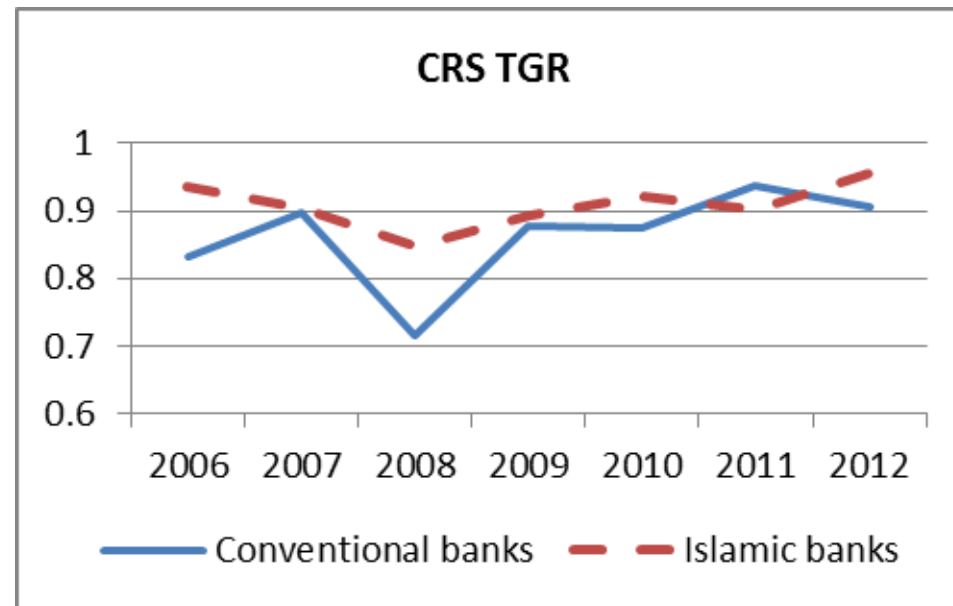
# Results: MF-DEA

Net efficiency: about 6 percentage points higher for CBs



# Results: MF-DEA

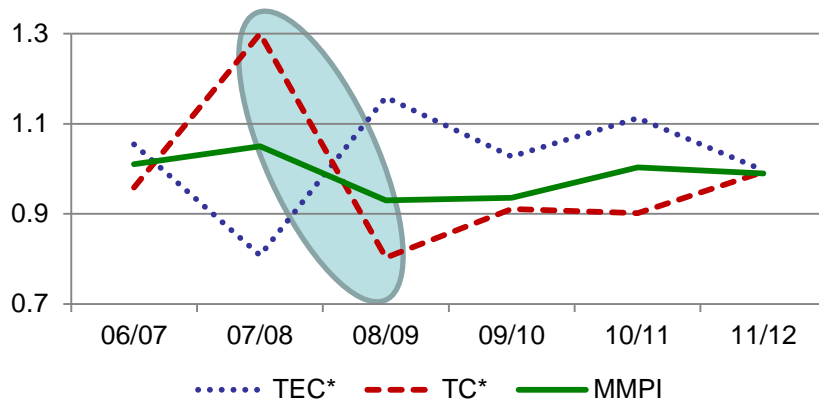
Type efficiency (TGR): about 5 percentage points higher for IBs



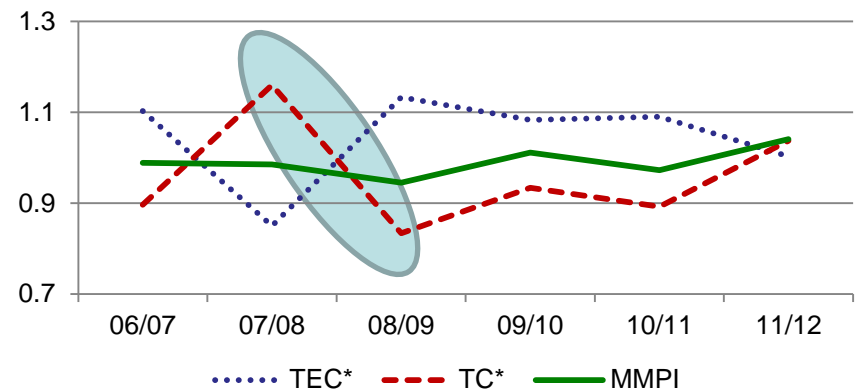
# Results: Malmquist productivity

## MMPI, TEC,TC

### Conventional banks



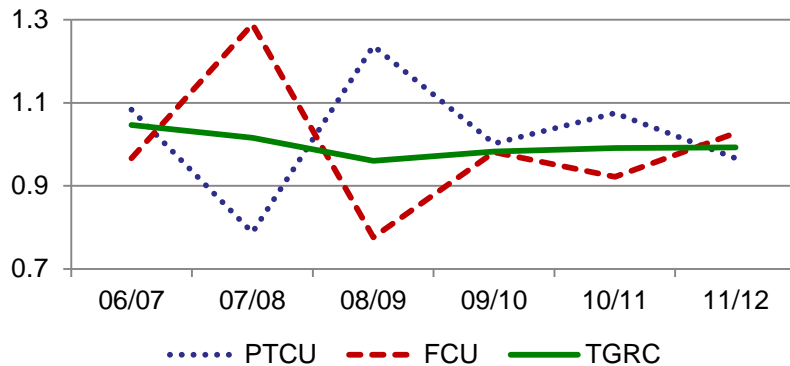
### Islamic banks



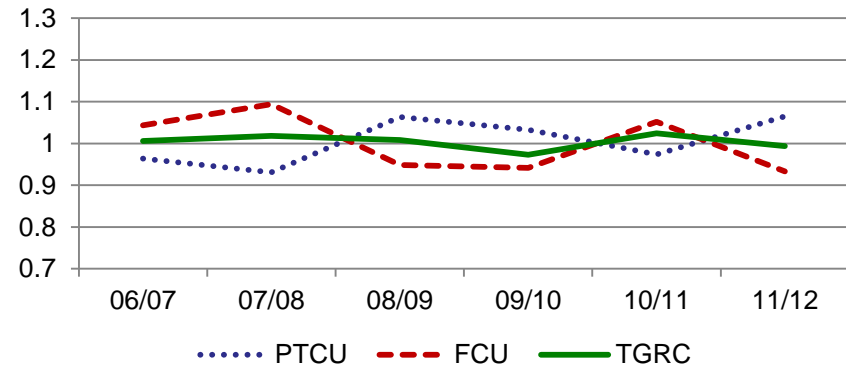
- Productivity changes of around 1% per annum
- More prolonged productivity change for CBs than IBs
- High technology change for CBs before crisis (eg securitisation products). Lower magnitude for IBs.

# Results: Malmquist productivity

## PTCU, FCU, TGRC Conventional banks



## Islamic banks



- CBs experience more volatility than IBs
- IBs are mainly local banks / similar rates of technology diffusion (FCU)
- CBs have strong presence of foreign banks

# Conclusions

- We compare performance of IBs and CBs in the GCC region from 2006-2012 using FRA and MF-DEA
- FRA: IBs have lower cost and profit performance than CBs
- No significant difference between bank types in gross efficiency
- Net efficiency is higher in CBs – better managerial and/or scale efficiency
- Type efficiency is higher in IBs – *modus operandi* more efficient
- Financial crisis has impacted efficiency – more pronounced for CBs (type) and IBs (net).



# Conclusions

- MPI has fallen by 1% per annum on average
- Positive efficiency change and negative technology change
- The gap between the meta-frontier and the group bank frontier widens around the crisis the banking model becomes more distinctive; after the crisis the gap between frontiers narrows and banking model practices become less distinctive.
- This pattern is more pronounced for CBS than IBs
- Having both CBs and IBs in the GCC offers diversity - potential insulation against both general and specific crises
- Dual banking sector should therefore be encouraged.

