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Financial integration of GCC banking markets: A non-parametric bootstrap DEA estimation approach

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ABSTRACT

In this paper, we investigate banking sector integration in the Gulf Cooperation Council during the period 1998–2009. The integration inference was derived by testing the convergence of cost efficiency scores. These efficiencies were measured using a smoothed bootstrap procedure that ensures consistency and unbiasedness. The convergence was examined using two tests: a beta convergence test and a sigma convergence test. The two tests show significant convergence, particularly during the transitional period 2003–2009, that witnessed substantial reforms. Therefore, we conclude that integration and harmonization measures taken by the Gulf Cooperation Council Governments have had a significant impact on efficiency and homogeneity of these countries' banking markets.

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1. Introduction

Since founded in 1981, the Gulf Cooperation Council countries (GCC hereinafter)¹ have carried out extensive reforms to achieve a full economic and financial integration.² A key part to this process was the creation of a level playground for financial and banking sector institutions and to enhance competition. This has started by harmonizing banking regulations, supervision practices, and by complying

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¹ The GCC countries consist of the following countries: Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates.

² These reforms include the establishment of a free trade area in 1983, a pegged currency exchange systems to the US dollar in 2002, and a customs union in 2008. The move towards a single currency was scheduled in 2014.

with Basel II for capital adequacy. Following, was the liberation of trade in financial services; and the removal of barriers to investment in the financial sector. The new created framework was expected to increase competition and efficiency in the domestic banking sector, and to support economic integration.

In pursuing a monetary union, national banking sector integration is indispensable. Banks are the major conveyors of policy, and their strength is considered to be the backbone that will ensure effective monetary policy (Harald and Kleimeier, 2004). Also, integration will lead to similarity and homogeneous effects of policy across the GCC economies. This will enhance the financial and economic stability of the council.

Further economic benefits of integration are numerous. It includes gains in efficiency from increased competition and growth. As compared to segmented markets, integrated markets are more specialized, which ultimately benefits all participants through lower intermediation and transaction costs (Berger, 2003). In addition, integration will also dissipate risk through risk sharing, which in turn will increase the flexibility of the financial system, and hence, its ability to withstand economic shocks.

Markets are said to be integrated when products and services of the same characteristics are traded at the same price (Weill, 2009; Casu and Girardone, 2010).³ This implies a minimal cost differences between banks in terms of inputs and comparable efficiencies. As efficiency can be measured by closeness to an optimal efficiency, convergence can then be judged by investigating the dynamics of the closeness measure, and this is the objective of the paper. In particular, the paper aims to investigate the significance of convergence in efficiency scores of the GCC banking sectors over the period 1998–2009. For that end, we empirically measure the relative efficiency scores by using a bootstrap procedure that employs a traditional data envelopment analysis measure (DEA hereinafter) as a basic ingredient. In this context, the DEA allows for comparing banking markets of different size with respect to a single GCC-wide frontier and without the need to impose any specific parametric functional form of the production technology.

Though, widely used, the DEA estimator has a number of disadvantages. First, it is purely deterministic, and a stochastic term is not added in the optimized linear programming approach. Second, as we measure relative to the best practice observations in the sample, the estimator is biased. Though the measure rules out the possibility that the true frontier lies below the constructed frontier, it may still lie above; particularly when there exists more efficient regions outside the sample points. This, in turn, may introduce an upward bias in the measured efficiency scores. Third and most importantly is that the asymptotic sampling distribution of the measure is very hard to get, and hence, standard statistical inference and interval measurement of efficiency scores is not feasible (see Simar and Wilson, 2008).

Thus, to allow for statistical inference, we approximate the sampling distribution by bootstrapping the DEA measure. Specifically, we first resample from the original DEA estimates, and then, we utilize these to generate a smoothed efficiency scores using a kernel density estimate. The smoothed scores are further corrected to guarantee an asymptotic convergence of the first two moments with those of the original scores. This procedure has been described in details by Simar and Wilson (2007).⁴

As efficiency can be measured consistently, we may proceed to investigate convergence across the GCC countries using traditional methods. The focus is on the period that extends from 1998 to 2009. This was the period during which the banking sectors in the GCC countries undergone significant reforms. To check significant convergence, we make our inference from a dynamic panel data model with a fixed effect. In particular, we regress the growth in efficiency scores on the initial (log) efficiency scores to investigate the significance of the speed parameter.

The catching up effect is substantiated, when significant negative slopes are found. This is referred to in the growth literature as β -convergence. However, it is well known that this type of convergence is not sufficient to conclude genuine convergence (see Barro and Sala-i-Martin, 1992; Quah, 1993). Instead, the focus should be on whether the distribution of efficiency scores has become more equitable, rather than on inferring from a significant partial correlation. Hence, it is important that country

³ Significant differences in cost structures may result from heterogeneity in banking regulations such as entry requirements, capital charges, barriers to trade in financial services, taxation and many others.

⁴ Also see Simar and Wilson (1998, 2000).

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