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Banking Operational Cost in the Balkan Region under a Quadratic Loss Function

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Abstract

This paper presents of theoretical specification of a quadratic loss function based on forward looking rational expectations to model the underlying dynamics of operational performance of the banking industry. As an empirical application we examine the determinants of total operating costs within a dynamic panel analysis in the Balkan region that is the South East Europe (SEE) over the period 1998-2005. Results show that operating performance is positively related to loan quality and the asset size or the bank's market share, whilst the speed of adjustment to the long run operational cost is substantial in magnitude.

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1. Introduction

Studying the operating performance of the banking industry in the South East Europe (SEE thereafter) is of interest as financial markets in this particular region primarily consist of banks. In the SEE, banks, as the main financial intermediaries, dominate financial transactions. This domination of banks in the financial markets is the outcome of the slow development of capital markets compared to banks in the EU, whilst equity markets lack maturity and face uncertainties. The uncertainties are mainly linked to the application of non prudent economic policies, whereas the slow pace of implementing the necessary structural reforms in the SEE does little to unfold the full potential of a market based economy as inefficiencies and rigidities of a centrally planned economy persist (see Staikuras et al. 2008). These inefficiencies and rigidities resulted in the mid nineties in major financial and banking crises in the SEE.

Following Kwan (2003) this paper examines the dynamic performance of the banking industry in the SEE. In addition, we employ a specification of forward looking rational expectations similar to the one found in the optimal money demand literature (see Cuthbertson and Taylor, 1990, Huang and Shen, 2002). Our underlying theoretical specification is based on a quadratic loss function that in turn is used to derive a dynamic panel model. By doing so, we estimate the speed of adjustment from the optimal level of operational performance within a multi period forward looking rational expectations framework. To this end, the operational performance is not seen as a static process, and thus time invariant, but as a dynamic process based on rational expectations. The findings of the paper show a low speed of adjustment to the optimal level of operational cost, providing evidence of persistence in the banking industry in SEE.

The rest of the paper is organized as follows. Section 2 presents the theoretical specification, while Section 3 describes the data used in the analysis and the findings. Finally, some conclusions are offered in Section 4.

2. A theoretical specification

The starting point of our analysis is a simple model of operating performance as in Kwan (2003):

$$O_{ct} = \alpha_1 + \Sigma a_2 X_{ct} + \Sigma a_3 Z_{ct} + \varepsilon_{t,} \qquad (1)$$

where O_{ct} refers to Bank's operational cost, defined as total operating expenses divided by total asset to account for operating cost per unit. X_{ct} represents balance sheet variables, while Z_{ct} are external variables common to all banks.

Following Cuthbertson and Taylor (1990) and Huang and Shen (2002), we assume that the typical bank minimizes the conditional expectation of a discounted quadratic loss function (L):

$$L = E_t \left\{ \sum_{i=1}^{n} D^i \left[\gamma_1 (O_{ct+i} - O^*_{ct+i})^2 + \gamma_2 (O_{ct+i} - O_{ct+i-1})^2 \right] \right\} , \qquad (2)$$

where δ_i (i=1, 2) are the non-negative adjustment cost coefficients, *D* denotes the discount factor less than unity, γ_1 represents the disequilibrium parameter, measuring the deviation of actual operating cost O_{ct+i} at time *t+i* from its optimal (long-run equilibrium) value O^*_{ct+i}, while γ_2 counts for the short-run adjustment (transaction) between any two consecutive periods.

Taking a partial derivative of equation (2) with respect to O_{ct+i} and rearranging gives the following equation for operational costs:

$$O_{ct} = \lambda O_{ct-1} + (1-\lambda)(1-D\lambda)\sum_{i}^{n} (D\lambda)^j E_t (O^*_{ct+i}) , \qquad (3)$$

where λ is the stable root of the Euler equation and its value lies between zero and one.

We assume that the long run operating cost is C^*_{ct} approximates the functional form of the desired operating cost as defined by Kwan (2003). Here, we assume that this functional form follows a simple stochastic process:

$$O^*_{ct} = \zeta O^*_{ct-1} + \varepsilon_t , \qquad (4)$$

where ε_t is white noise.

The reduced form cost equation on the basis of (3) and (4) can then be expressed as:

$$O_{ct} = OC^*_{ct} + \delta O_{ct-1} + \varepsilon_t , \qquad (5)$$

where OC^*_{ct} is function of *D*, γ, and the parameter of equation (4).

Equation (5) provides the underlying dynamic effect as measured by δ. In detail, δ captures the persistence of operating costs over time, whilst $1-\delta$ reflects the adjustment speed.

3. Data and empirical analysis

Our sample is derived from Bankscope and consists of banks from the six SEE countries, namely Albania, Bosnia-Herzegovina, Bulgaria, FYR of Macedonia, Romania, and Serbia-Montenegro. The period of the study covers the 1998-2005. Our dataset includes 77 banks over the sample period, which comprises a large portion of banks both in terms of the number of financial institutions operating, but mainly in terms of importance based on the balance sheet aggregates.

The dependent variable is measured as total operating expenses divided by total asset to account for operating cost per unit (O_{Ct}). As explanatory variables we include: the loan loss reserves to gross loans (*LRES*), the cash and due from banks to total assets (CA), the equity to total assets (EQA), the bank's deposits to customer and short-term funding (*DEP*), the loans to total assets (*LA*), and the ratio of domestic credit to the private sector as a percentage of GDP (*DmCr*) (see Berger and DeYoung, 1997). We also include a variable that accounts for the age of the representing bank (*AGE*). To capture any market power related correlation, we use the Herfindahl Index (*HHI*). We use country specific dummy variables (*D*) to identify any heterogeneity in operating performance across markets. Lastly, a time trend captures systematic changes in the underlying operating cost structure over time.

Table 1 presents the regression results of Equation (5) with total operating expenses as the dependent variable. The estimation of the above equation follows the GMM method of Arellano and Bond (1991) so as to correct for the existence of endogeneity and possible heterogenous relationship between different Banks. The models fit the data reasonably well, with R-square is 58 per cent.

Table 1: Regression Estimates of Operating Costs

	Parameter Estimate	t-stat
LRES	0.048*	2.36
CA	0.168**	6.1
EQA	0.121**	2.68
DEP	-0.023	-1.6
LA	0.216**	4.78
AGE	-0.078*	-2.31
DmCr	0.278**	5.36
HHI	0.01	0.006
Pro	0.094	1.58
BH	-0.563*	-2.29
BUL	-0.090	-0.96
FYROM	-0.712*	-2.73
ROM	1.604**	3.4
SB	-0.101**	-5.48
T	-0.031**	-3.59
Con	2.64	1.27
R^2	0.58	

* statistical significant at 5% level, ** statistical significance at 1%. Country dummies are: Albania (AL), Bosnia-Herzegovina (BH), Bulgaria (BUL), FYR of Macedonia (FYROM), Romania (ROM), and Serbia-Montenegro (SB).

The coefficient of the loan loss reserves ratio (LRES) is positive and statistically significant, consistent with the *'bad management'* or the *'bad luck'* hypothesis (Altunbas et al., 2000, and Akhigbe and McNulty, 2003). The liquidity ratio, that is the cash and due from banks to total assets (CA), is positive and statistically significant, insinuating that although liquid assets reduce bank's liquidity risk, these assets imply additional operating costs (Altunbas et al., 2000 and Kwan, 2003).

The coefficient of the ratio of equity to assets (EQA), is positive and statistically significant, indicating, in conjunction with the sign of deposits (DEP), that the process of raising equity involves higher costs than raising deposits. The ratio of loans to total assets (LA) is positive and statistically significant, indicating that the costs associated with the credit origination and loan monitoring are quite substantial. On the other hand, the deposit mix variable presents the expected negative sign, though it is not statistically significant. An interesting finding is that the coefficient of the age variable is negative and statistically significant, in line with the *'learning by doing'* hypothesis as identified by Mester (1996) and Akhigbe and McNulty (2003). As found in previous studies (Altunbas et al., 2000, and Akhigbe and McNulty, 2003) the ratio of domestic credit to the private sector as a percentage of GDP (*DmCr*) raises operating costs. The Herfindahl index is statistically significant positive. Overall, the dummy variables indicate that there are substantial differences in the operating cost across SEE countries. The coefficient of the time trend is negative and statistically significant in most cases, indicating that, on average, operating costs among the seven SEE countries follow a downward path from 1998 to 2005; the latter verifies the efforts undertaken to direct the banking sector towards a more efficient structure.

Table 2 present the estimates for δ, capturing the persistence of operating costs over time, whilst $1-\delta$ reflects the adjustment speed. The results show the most of the parameter estimates are statistical significant.

Table 2. Estimates of Persistence Parameter δ.

No	δ	S.E.	No.	δ	S.E.	No.	δ	S.E.
1	0.200	0.055	**27**	0.487	0.054	**53**	0.059	0.041
2	0.438	0.074	**28**	0.195	0.161	**54**	0.236	0.219
3	0.384	0.083	**29**	0.331	0.051	**55**	0.216	0.027
4	0.457	0.009	**30**	0.412	0.043	**56**	0.310	0.024
5	0.516	0.007	**31**	0.444	0.048	**57**	0.352	0.092
6	0.453	0.017	**32**	0.730	0.028	**58**	0.289	0.064
7	0.381	0.013	**33**	0.640	0.044	**59**	0.226	0.065
8	0.580	0.080	**34**	0.491	0.034	**60**	0.452	0.045
9	0.454	0.153	**35**	0.213	0.067	**61**	0.459	0.159
10	0.224	0.147	**36**	0.177	0.034	**62**	0.425	0.049
11	0.343	0.034	**37**	0.478	0.002	**63**	0.131	0.127
12	0.662	0.010	**38**	0.847	0.052	**64**	0.104	0.023
13	0.655	0.024	**39**	0.294	0.030	**65**	0.143	0.023
14	0.504	0.021	**40**	0.199	0.013	**66**	0.296	0.026
15	0.120	0.031	**41**	0.224	0.045	**67**	0.454	0.056
16	0.153	0.016	**42**	0.683	0.037	**68**	0.457	0.037
17	0.179	0.023	**43**	0.486	0.005	**69**	0.523	0.007
18	0.076	0.052	**44**	0.209	0.029	**70**	0.313	0.065
19	0.175	0.020	**45**	0.223	0.051	**71**	0.631	0.031
20	0.184	0.015	**46**	0.216	0.023	**72**	0.502	0.013
21	0.204	0.128	**47**	0.386	0.007	**73**	0.195	0.056
22	0.240	0.045	**48**	0.350	0.032	**74**	0.197	0.057
23	0.263	0.077	**49**	0.300	0.088	**75**	0.071	0.073
24	0.140	0.052	**50**	0.205	0.020	**76**	0.174	0.007
25	0.191	0.017	**51**	0.412	0.134	**77**	0.257	0.020
26	0.318	0.190	**52**	0.714	0.073	**All**	0.342	0.051

No indicates the number of bank in the sample, δ is the adjustment parameter, and S.E. reports the standard errors.

Note that the parameter estimates of δ capture, in effect, the degree of persistence of bank's operating cost over time, and as a result the $1\text{-}\delta$ reports the speed of adjustment to the desired optimal level of operating cost. The results show variability across different banks, though the average speed of adjustment is leaned towards low values. In detail, the range of values for δ is from 0.059 to 0.73 with the average value 0.342, implying that the average speed of adjustment is 0.66. This value for the speed of adjustment is quite low and shows a long persistence of non-optimal operating cost in the banking industry of the SEE. In effect, the average bank in SEE faces a sluggish operating performance as it fails to optimise operating costs quickly over time, as it adjusts previous period's non optimal operating cost at a rate of a mere 65%.

A possible explanation of this finding could be the high capital ratios observed in the SEE banking systems, largely the result of the restructuring plan implemented by the SEE governments to manage insolvency problems. This process of restructuring it appears that comes at a cost in terms of the speed of operating performance. Thus, the low pace of adjustment could be seen as a signal of low degree of exploiting technological advances to curb operating costs.

4. Conclusion

The paper contributes to the analysis of operating performance of the banking industry. To this end, we present a theoretical specification based on forward looking rational expectations regarding operating performance. We find that the speed of adjustment to optimal operating costs is low in the SEE, an area rarely being investigated, over the period 1998-2005. This is a clear sign that banks, on average, could accelerate further the pace of improvement of their operating performance over time, as the average bank adjusts previous period's non optimal operating cost at a rate of around 65%.

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