Bilkent University

Macroeconomic Impact of Bank Regulation and Supervision: A cross-country investigation

Nergiz Dinçer and Bilin Neyaptı

Discussion Papers

Department of Economics

Macroeconomic Impact of Bank Regulation and Supervision:
A cross-country investigation

Nergiz Dincer and Bilin Neyapti [1]

Abstract

We provide an empirical investigation of the channels via which the legal quality of bank regulation and supervision (RS) affects banking sector performance through its impact on depositor and borrower behavior. The results of our event study show that RS has significant positive effects on deposits and investments and a significant negative effect on non-performing loans. These findings remain robust to the addition of control variables.

Key terms: Bank regulation and supervision; bank performance
JEL Classifications: G2, K29

[1] Bilin Neyapti (corresponding author), Bilkent University, Dept. of Economics, 06800 Bilkent, Ankara, Turkey. Tel: (90 312) 290 2030. Fax: (90 312) 266 5140. E-mail: neyapti@bilkent.edu.tr. Nergiz Dincer, State Planning Organization, 06100, Yucetepe, Ankara, Turkey. Phone: (90 312) 294 6036, Fax: (90 312) 294 6077, e-mail: ndincer@dpt.gov.tr.

1.   Introduction

Legislation regarding bank regulation and supervision (RS) is a crucial formal institution for banking sector prudence. The extent of transparency, restrictiveness and the coverage of bank laws helps predict the adverse selection and moral hazard risks the banking sector faces. This paper hypothesizes that RS affects banking sector performance mainly through three channels. First, it increases the deposit-to-GDP ratio by promoting depositors' trust in the banking sector. Second, it facilitates the banks' abilities to channel funds into efficient investment projects through effective balance-sheet management, background checks and monitoring. Third, through effective supervision, RS increases the ratio of loans returned to banks.

The positive relationship between trust and financial market development has been evidenced in the works of Guiso et al. (2004) and Calderon et al. (2001).[1] We argue that RS helps build trust in the banking sector. In accordance, Allen and Gale (2007) and De Haan and Shehzad (2010) argue that regulatory intensity reduces banking crises. Based on survey-based measures of bank regulation and supervision, however, Barth et al. (2005) argue that regulatory and supervisory intensity reduces banking efficiency.

This paper uses the legal indices of RS provided by Neyapti and Dincer (2005) and Dincer and Neyapti (2008) to empirically investigate the effects of RS on banking sector performance. Based on an event study, we provide robust evidence that RS has significant positive effects on deposits and investment, and significant negative effects on non-performing loans. In what follows, Section 2 describes the data and methodology, Section 3 reports the estimation results and Section 4 concludes.

2.   Data and Methodology

Neyapti and Dincer (2005) and Dincer and Neyapti (2008) measure RS based on 99 criteria covering legal provisions regarding capital requirements, lending, ownership structure, directors and managers, reporting/recording requirements, corrective action, supervision and deposit insurance. The *RS* index is available for 53 (24 transitional, 11 developed and 18 developing) countries.

To test the relationship between *RS* and *depositor trust*, we use the ratios of total and time deposits in GDP, denoted by *DEPgdp* and *TDgdp*. The dependent variables chosen to test the effects of RS on investment and borrower behavior are the ratios of investment to GDP (*INVgdp*), and of non-performing loans (NPL) to total credits (*NPLcr*), respectively.

The data, other than *RS,* are organized in five-year averages following the enactment years of banking laws, which identify the *events*.[2] Due to data restrictions, however, *NPLcr* is estimated with the starting date of 2000. Using explanatory variables in five-year lags with respect to *RS* eliminates the potential simultaneity problems. For twelve countries in the sample, the time dimension of data is two due to re-enactment of banking laws. Hence, depending on the model estimated, the number of observations ranges between 34 and 61.[3] To control for possible cross-sectional heterogeneity, the White-heteroskedasticity correction is applied to the error terms.

Table 1 reports the correlations between the components of RS and the banking performance indicators. Not surprisingly, deposit insurance attracts deposits, as shown in the positive correlations of 0.35 and 0.22 for *DEPgdp* and *TDgdp*, respectively. While *DEPgdp* is positively correlated with capital requirements (0.41), *TDgdp* is highly

3

correlated with the legal provisions regarding supervision (0.36), indicating that the enforcement quality of banking laws improves depositor confidence in banks' activities. Also as expected, regulations regarding reporting-recording requirements, supervision and ownership are all highly negatively correlated with *NPLcr* (-0.50, -0.51 and -0.38, respectively). While regulatory provisions on bank lending is positively associated with investment (0.27), it is interesting that legal provisions on both capital requirements and director-manager qualifications are negatively associated with investment (-0.37). The negative relation is even more prevalent with regards to deposit insurance (-0.62). The empirical investigation below indicates, however, this observation may pertain to specific structural circumstances.

Table 1: Correlations between the components of RS and bank performance.

	DEPgdp	*TDgdp*	*INVgdp*	*NPLcr*
RS	**0.30**	**0.26**	**-0.35**	**-0.33**
Capital req.	0.41	0.06	-0.37	-0.05
Lending	0.33	0.11	0.27	0.02
Ownership	0.17	0.12	-0.17	-0.38
Directors-Manag.	0.19	-0.06	-0.38	-0.17
Rep.-Recording	-0.27	0.18	0.04	-0.50
Corrective Action	0.28	0.17	0.12	0.24
Supervision	-0.21	0.36	-0.20	-0.51
Dep.Insurance	0.35	0.22	-0.62	-0.07

3.   Empirical Evidence

Equations (1) to (3) present the basic models to investigate the relationships of deposits, investments and NPL with *RS*. The expected signs of the coefficient are reported below.

In Equation (1), *Dep* stands for either *DEPgdp* or *TDgdp; Sgdp* and *CRgdp* stand

$$Dep = \text{f } (RS, \; CRgdp, \; Sgdp, \; rDep) \qquad\qquad (1)$$
$$\phantom{Dep = \text{f } (}+ \quad\quad + \quad\quad + \quad\quad +$$

for the ratios of savings and total bank credits to GDP; and *rDep* is the real rate of interest on deposits. *CRgdp* controls for the level of financial market development.

Equation (2) models the relationship between *RS* and investment, where *r* is the real lending rate. As typical in investment regressions, *GDPgr* is used to control for the business cycles effects.

$$INVgdp = \text{f } (RS, \; GDPgr, \; r), \qquad\qquad (2)$$
$$\phantom{INVgdp = \text{f } (}+ \quad\quad + \quad\quad -$$

In Equation (3), *R* is expected to increase the moral hazard risk, and hence *NPLcr*, since the real value of borrowed funds decreases with inflation, which affects *R* positively.[4]

$$NPLcr = \text{f } (RS, \; GDPgr, \; R) \qquad\qquad (3)$$
$$\phantom{NPLcr = \text{f } (}- \quad\quad - \quad\quad +$$

The robustness of the above basic specifications are tested by including additional control variables.

As Table 2a shows, *RS* has significant positive effect on *DEPgdp*, which is, on average, lower in transition economies (*TE*) than others. The addition of *CRgdp*, however, makes the effect of *RS* insignificant, indicating that developed financial markets ae already associated with high trust in the banking sector, this reduces the marginal effect of formal insitutions. Generally speaking, where market mechanisms are reinforced with developed business norms, formal mechanisms may add little to trust.

Table 2: RS and depositor trust

Table 2a. Dependent Variable: *DEPgdp*

	I	II	III
Constant	0.70***	-0.21	-0.83
	(5.53)	(-1.01)	(-1.45)
RS	0.07***	-0.14	1.51
	(3.01)	(-1.24)	(1.37)
TE	-0.71***	0.46	1.12
	(-4.44)	(1.12)	(1.45)
*RS*TE*			-1.67
			(-1.42)
CRgdp		0.52***	0.46**
		(2.68)	(2.15)
Sgdp		2.29	2.70
		(1.46)	(1.60)
rDep			0.13
			(1.04)
No. of obs.	45	44	37
R-bar^2	0.20	0.42	0.40

Table 2b. Dependent Variable: *TDgdp*

	I	II	III
Constant	0.70***	-0.19	-1.30*
	(3.49)	(-1.24)	(-1.83)
RS	0.04*	-0.10	2.65*
	(1.88)	(-1.44)	(1.72)
TE	-0.65***	0.30	1.65*
	(-2.83)	(1.21)	(1.71)
*RS*TE*			-2.85*
			(-1.74)
CRgdp		0.77***	0.49
		(3.14)	(1.40)
Sgdp		1.41	3.06
		(1.43)	(1.44)
rDep			0.11
			(0.72)
No. of obs.	37	36	28
R-bar^2	0.16	0.38	0.41

Notes: t-ratios are in parentheses.
***, ** and * indicate statistical significance at 1%, 5% and 10% levels, respectively.

Table 2b also shows a significant, although weaker, effect of *RS* on time deposits, measured by *TDgdp*. *RS* becomes insignificant when *CRgdp* is added, although its significance recovers in the extended specification. The negative interaction term *RS*TE* reflects the inconsistency between formal institutions and norms in the initial stages of transition.[5] Addional interaction variables and governance quality[6] are introduced into the model, but not reported since they are either insignificant or not robust.

3.2   RS and Borrower Behavior

Table 3 shows that, along with *GDPgr*, *RS* is significantly positive in explaining investment, whereas *r* is negative as expected. In addition, investment is observed to be significantly lower in *TE*s than in the rest of the sample. These findings remain robust after the addition of various other variables such as *CRgdp* and inflation, which are insignificant and hence not reported here. In addition, while controlling for governance (the Freedom House Index: *FI*) leaves the findings for *RS* virtually unchanged, its coefficient is not robustly significant and hence regressions involving this term are not reported.

Does *RS* affect the ratio of credit not returned to banks? The answer to this question is affirmative based on the evidence provided in Table 4 that that shows that *RS*, governance (*gov*)[7] and *R* all have significant negative effects on NPL. While the interaction between *gov* and *RS* is not significant, *RS* is significant for all possible values of *gov*.[8] These results remain robust after the addition of *CRgdp*, which is not significant itself and also does not improve the fit of the regression; hence those results are not reported.

7

Table 3: RS and investment

Dependent Variable: *INVgdp*

	I	II	III
Constant	0.21***	0.20***	0.36***
	(20.25)	(20.39)	(3.10)
RS	0.02***	0.02***	0.02***
	(6.83)	(6.51)	(2.20)
TE	-0.09***	-0.07***	-0.09***
	(-5.55)	(-4.99)	(-2.03)
GDPgr		0.27***	1.56***
		(2.74)	(3.71)
r			-0.18*
			(-1.70)
No. of obs.	61	56	34
R-bar^2	0.21	0.26	0.41

Notes: t-ratios are in parentheses.
***, ** and * indicate statistical significance at 1%, 5% and 10% levels, respectively.

Table 4: RS and non-performing loans

Dependent Variable: *NPLcr*

	I	II
Constant	25.64***	29.49***
	(7.82)	(7.78)
RS	-3.12***	-2.32***
	(-3.52)	(-2.58)
gov	-26.20***	-28.75***
	(-8.45)	(-8.04)
*RS*gov*	4.10***	2.97***
	(2.92)	(2.10)
GDPgr	-0.05	-0.85
	(-0.17)	(-0.13)
R		-0.17***
		(-4.03)
No. of obs.	39	33
R-bar^2	0.53	0.58

Notes: t-ratios are in parentheses.
***, ** and * indicate statistical significance at 1%, 5% and 10% levels, respectively.

In addition to the above robustness checks, we controlled for the decade dummies in estimating deposits and investments so as to account for possible shifts in deposit and investment behavior over time. Those dummies are usually insignificant and their addition does not improve the overall fit of the regressions.[9]

4.   Conclusion

Banking laws are formal institutions that are expected to reduce the adverse selection and moral hazard problems in the banking sector. This paper hypothesizes that legal intensity of bank regulation and supervision (RS) improves the banking sector performance by affecting depositor trust and borrower discipline. The empirical evidence supports these hypotheses strongly; RS exhibits a significant positive association with depositors' trust as well as with investment and loan behavior. The results remain generally robust to the addition of other relevant variables such as the indicators of governance and financial market development and decade dummies.

References:

Allen F., and D. Gale, 2007, "Understanding Financial Crises", Oxford University Press, New York, USA.

Barth, J.R., G. Caprio and R. Levine, 2005, "Bank Regulation and Supervision". NBER Reporter: Research Summary, http://www.nber.org/reporter/fall05/levine.html.

Brambor, T., Clark, W. R., Golder, M., 2006, "Understanding Interaction Models: Improving Empirical Analyses", *Political Analysis* 14, pp. 63--82

Calderon. C., Chong. A. and Galindo. A., 2001, "Structure and Development of Financial Institutions And Links With Trust: Cross-Country Evidence", RES Working Papers 4251, Inter-American Development Bank.

Cukierman, A., Webb, S., Neyapti, B., 1992, "Measuring The İndependence Of Central Banks And İts Effect On Policy Outcomes", *World Bank Economic Review* 6, 353–0398.

Cukierman, A., G. Miller and B. Neyapti, 2002, "Central Bank Reform, Liberalization and Inflation in Transition Economies - An International Perspective", *Journal of Monetary Economics* 49, pp. 237-264.

De Haan, J. and Shehzad, C.T., "Financial Reform and Banking Crises", CESifo Working Paper No. 2870.

Dincer, N., B. Neyapti 2008, "Legal Quality of Bank Regulation and Supervision and its Determinants: a mixed sample", *Contemporary Economic Policy* 26, pp. 526-556.

Guiso, L., P. Sapienza and L. Zingales, 2004, "The Role of Social Capital in Financial Development", *American Economic Review* 94, pp. 526-556.

Guiso, L., P. Sapienza and L. Zingales, 2007, "The Cost of Banking Regulation", European University Institute, Economics Working Papers, ECO2007/43.

Hausman, J. 1978 Specification Tests in Econometrics, *Econometrica* 46, pp. 1251–71.

Kaufmann, D., A. Kraay and M. Mastruzzi, 2008, "Governance Matters VII: Governance Indicators for 1996-2007", World Bank Policy Research Working Papers, No.4653.

Knack. S. and P. Zack, 2001, "Trust and Growth", *Economic Journal* 111, pp. 295–321.

Neyapti, B. and N. Dincer 2005, "Measuring the Quality of Bank Regulation and Supervision, with an Application to Transition Economies", *Economic Inquiry* 43, pp. 79-99.

[1] Both Guiso et al.(2004) and Knack and Zack (2001) argue that social capital as well as legal enforcement are important in building trust.

[2] The data are obtained from the World Bank and the IMF.

[3] Because of at most two observations per country, the data can be regarded as cross-sectional. Based on Hausman (1978), the fixed-effects model is rejected, whereas the short and unbalanced time dimension does not allow the use of random effects.

[4] The negative effect of regulation on NPL is also reported by Guiso et al. (2007) for the case of Italy.

[5] Consistently, Neyapti and Dincer (2005) report that not the initial (one-size-fits-all type) but the latter enactments of baking laws (following the development of other market institutions) have significant positive effect on *TE*s' growth.

[6] The governance data of Kaufmann et al (2008) is not available for the period before 1996; instead we use the Freedom House Index of civil liberties.

[7] A la Kaufmann et al. (2008).

[8] Based on Brambor et al. (2006)

[9] In estimating investment and deposits, the inclusion of dummies slightly weakens the results for RS, leaving the other results similar to the reported ones. These results are available from the authors upon request.