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Joong Ho Han

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Joong Ho Han

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Abstract

This paper investigates whether explicit deposit insurance helps or hurts the stability and growth of industrial output. We find that the presence of explicit deposit insurance significantly reduces the volatility of output for the sectors more dependent on external funds. Inconsistent with risk-return tradeoff arguments, we find no significant evidence that the introduction of deposit insurance reduces the average industrial growth of such sectors. In sum, the findings here suggest that the introduction of explicit deposit insurance disproportionately benefits industries relatively more in need of external funds.

JEL codes: O4, F3, G1, G21

1. Introduction

Does deposit insurance help or hurt financial development? How does the introduction of deposit insurance affect borrowing firms? There have been debates on the role of deposit insurance. While the seminal research by Diamond and Dybvig (1986) shows that deposit insurance can prevent bank run, recent studies in financial intermediation show that deposit insurance may be detrimental to financial development, impeding stock market development, inducing moral hazard problems of financial institutions, and increasing the likelihood of banking crisis (Cecchetti and Krause (2005), Senbet, Sorge and Cull (2005), Demirgüç-Kunt and Detragiache (2002)).

Despite the debates, governments in developed and developing countries have aggressively adopted explicit deposit insurance in the wish of avoiding systemic failure of banking sectors; 88 countries have adopted explicit deposit insurance schemes until 2003 while only 34 countries have exposit insurance schemes before 1990s. However, evidence of the benefits of deposit insurance is indeed scant and the question about the impact of prevalent deposit insurance on economic and financial developments remains open.

This paper studies how the introduction of explicit deposit insurance influences the output volatility across industries around the world. We find that the presence of explicit deposit insurance significantly reduces the volatility of output for sectors that are relatively more dependent on external funds, while it does not decrease the average industrial growth of such sectors.

This paper contributes to the prior research by focusing the impact of deposit insurance on borrowing firms' performance using the industry level data. First of all, we establish novel evidence for the benefits of deposit insurance schemes. In addition to Diamond and Dybvig

(1986), Kashyap, Rajan and Stein (2002) show that there may exist a synergetic advantage of deposit taking and lending by banks. If borrowers and depositors do not draw down on lines of credit and on deposits simultaneously, banks can provide both services at lower costs because they can reduce reserves to prepare for unexpected withdrawal. If deposit insurance can prevent bank runs, the link between withdrawal of deposits and draw-down from lines of credit can be effectively severed, and banks are expected to be able to provide liquidity to borrowers more actively. Thus, the increased supply of liquidity by banks can reduce the early liquidation of projects and lower the volatility of output for sectors which are relatively more dependent on external funds.

Our findings also contribute to the growing literature in economic growth. Extensive literature in economic development has shown that financial development is an important catalyst for economic growth and allocative efficiency. For instance, financial environments such as investor protections and accounting standards are important in economic growth. We show that deposit insurance is also an important financial environment to stabilize the growth of sectors which depend relatively more on external funds.

Although our findings look contradictory to Demirgüç-Kunt and Detragiache (2002), it is not necessarily so. Demirgüç-Kunt and Detragiache (2002) show that countries with explicit deposit insurance are more prone to experience banking crisis. Different from Demirgüç-Kunt and Detragiache (2002), we do not examine the impact on extreme events. Instead, our analysis provides evidence for relative effects of explicit deposit insurance on performance of external-fund-dependent firms (or sectors).

The paper is organized as follows. Section 2 describes empirical specifications and discuss data. Section 3 gives the empirical results and discusses robustness tests. Section 4 concludes.

2. Empirical Specifications and Sample Selection

2.1. Empirical Strategy

In this paper, we examine the impact of explicit deposit insurance on external-finance dependent industries following the method used by Morgan, Rime and Strahan (2004). Morgan, Rime and Strahan (2004) examine whether banking industry integration in the U.S. reduces the output volatility within a state and increases the synchronous fluctuations of output volatilities across states. In the first stage, they estimate conditional mean of state-level output and subtract the estimated conditional means from the observed outputs to extract the information about the deviations from the conditional means. In the second stage, they regress the absolute value of the fluctuation on the banking market integration measure.

We use the similar approach to measure proxy for conditional volatility. We estimate a conditional average of industrial output growth for given year t, country c, and industry i and then subtract the conditional average from the observed industrial output growth. We define the absolute value of the deviation from the conditional average of output growth as $Fluctuation_{cit}$. Although it is not the exact measure of conditional volatility, it increases monotonically with conditional volatility.

$$\begin{aligned} Growth_{cit} &= c_c + c_i + c_t + \nu_{cit}, \\ Fluctuation_{cit} &= \left|\nu_{cit}\right|, \end{aligned} \qquad \textbf{(1)}$$

where $Growth_{cit}$ is defined as log growth rate of industrial output (4-digit ISIC industrial output). c_c, c_i, and c_t are dummy variables for country, industry and year respectively. v_{cit} is the residual from regressing $Growth_{cit}$ on the dummy variables.

In the second stage, we regress the $Fluctuation_{cit}$ on the interaction of two dummy variables which are financial dependence of each industry and the introduction of deposit insurance. Unlike Larrain (2006), we attempt to estimate the impact of deposit insurance before and after its introduction to each country instead of the cross-sectional effect of bank credit. To do so, we employ an approach similar to Morgan, Rime and Strahan (2004). The specification is the following:

$$\begin{aligned} Fluctuation_{cit} = \beta \times \left(Dependence_i \times DepositInsurance_{cit} \right) \\ + a_c + a_i + a_t + \varepsilon_{cit}, \end{aligned} \quad \textbf{(2)}$$

Where a_c, a_i, and a_t are dummy variables for country-, industry- and year-fixed effects. $DepositInsurance_{cit}$ is a dummy variable which is one if explicit deposit insurance scheme is introduced and zero otherwise. $Dependence_i$ is a dummy variable which equals one if external finance dependence defined by Rajan and Zingales (1998) is greater than median and zero otherwise.

Rajan and Zingales (1998) measure technology-driven dependence on external funds for each industry. To construct the measure, they sort the U.S. firms into two groups based on the gap between capital expenditures and internal funds from operating incomes during the period of 1980-1990. They construct three measures for external finance dependence: $Dependence_1$ is constructed for all the firms available in the COMPUSTAT, $Dependence_2$ for large firms, and $Dependence_3$ for small firms. We check robustness of our results using the three different proxies of external finance dependence. As Rajan and Zingales (1998) pointed out, the dependence on external funds may be biased against developing countries, suggesting that the bias acts against finding evidence for the impact of deposit insurance. Therefore, if we find any evidence, the findings are likely to understate the true relationship between financial dependence and industrial volatility.

2.2. Sample Selection

We use industrial-level data from United Nations Industrial Development Organization (UNIDO) in order to measure industry-level fluctuations of output for each country and year. The UNIDO data provides information about 3-digit and 4-digit ISIC(version3) output of manufacturing firms around the world. Unlike the previous version of UNIDO, it covers detailed industry classifications but short periods. It covers the period of 1985 to 2010. We hand match the data with the measure of external fund dependence provided by Rajan and Zingales (1998).

The initial data covers 152 industries and 110 countries. When we merge the data with the information about external dependence, it covers 80 countries and 110 industries. Following Rajan and Zingales (1998), we adjust all the information for inflation by using world bank international financial statistics (IFS).

In order to add the information about the year when explicit deposit insurance is introduced to each country, we use financial structure data provided by Demirgüç-Kunt, Karacaovali and Laeven (2005).

The final data is composed of 30,336 industry-year observations covering 47 countries and 110 industries.

3. Results

3.1. Does Explicit Deposit Insurance Reduce Industrial Volatility?

Table 1 shows the results from estimating equations (1) and (2). Estimates of β in Table 1 are always negative and statistically significant at the level of 0.05, suggesting that explicit deposit insurance reduces the fluctuation of output growth for the firms which depend relatively more on external funds. We find that, when explicit deposit insurance is introduced, the absolute deviation from the average increases about 2.5%.

Table1. Fluctuations of output growth and deposit insurance

The dependent variable is the absolute value of residuals from regressing industrial output on firm-, industry-, and country-fixed effects. Dependence1, Dependence2, and Dependence 3 indicate the dummy variables for high dependence of industries on external funds. The measures of external fund dependence for the dummy variables are defined as the gap between capital expenditure and internal funds for U.S. firms in each industry between 1980-1990. t-statistics in parentheses are calculated using heteroskedasticity robust standard errors.

	(1)	(2)	(3)
(Dependence1)×(DepositInsurance)	-0.025**		
	(-2.28)		
(Dependence2)×(DepositInsurance)		-0.024**	
		(-2.14)	
(Dependence3)×(DepositInsurance)			-0.022**
			(-2.00)
Countryeffects	Yes	Yes	Yes
Industryeffects	Yes	Yes	Yes
Yeareffects	Yes	Yes	Yes
Observations	30,336	30,336	30,336
PseudoR^2	0.411	0.411	0.411

The introduction of deposit insurance is likely to be positively associated with financial development, suggesting that the introduction of deposit insurance can be a mere proxy for financial development. In order to control for such possibility, we include bank credit following Larrain (2006). Table 2 reports the results from estimating the Tobit regressions considering the effect of bank credit. The first column of Table 2 confirms the results of

Larrain (2006). The increase in bank credit significantly decreases the fluctuation of output growth for external finance dependent industries. However, when we include the interaction of external finance dependence and deposit insurance, the interactive effects of bank credit become less significant or insignificant depending specifications. Importantly, however, the effects of deposit insurance remains significant at 0.05 regardless of specifications.

Table 2. Bank credit, deposit insurance, and the volatility of industrial output

The dependent variable is the absolute value of residuals from regressing industrial output on firm-, industry-, and country-fixed effects. Dependence1, Dependence2, and Dependence 3 indicate the dummy variables for high dependence of industries on external funds. The measures of external fund dependence for the dummy variables are defined as the gap between capital expenditure and internal funds for U.S. firms in each industry between 1980-1990. t-statistics in parentheses are calculated using heteroskedasticity robust standard errors.

	(1)	(2)	(3)	(4)
BankCredit	-0.015	-0.016*	-0.022**	-0.028***
	(-1.61)	(-1.67)	(-2.31)	(-3.36)
(Dependence1)×(BankCredit)	-0.020**	-0.018*		
	(-1.98)	(-1.82)		
(Dependence1)×(DepositInsurance)		**-0.024****		
		(-2.14)		
(Dependence2)×(BankCredit)			-0.007	
			(-0.72)	
(Dependence2)×(DepositInsurance)			**-0.024****	
			(-2.06)	
(Dependence3)×(BankCredit)				0.005
				-0.51
(Dependence3)×(DepositInsurance)				**-0.022****
				(-1.99)
Observations	30,336	30,336	30,336	30,336
PseudoR^2	0.412	0.413	0.412	0.412

To check the robustness of the results, we also run the Tobit regressions using the fluctuation of industrial value-added growth as dependent variable similar to Rajan and Zingales (1998). Table 3 report the results. The results show that the estimated effects of deposit insurance are slightly bigger than those in the Table 2. The qualitative results remain robust.

Table 3. Robustness check: Deposit insurance and volatility of industrial value-added
The dependent variable is the absolute value of residuals from regressing industrial value-added on firm-, industry-, and country-fixed effects. Dependence1, Dependence2, and Dependence 3 indicate the dummy variables for high dependence of industries on external funds. The measures of external fund dependence for the dummy variables are defined as the gap between capital expenditure and internal funds for U.S. firms in each industry between 1980-1990. t-statistics in parentheses are calculated using heteroskedasticity robust standard errors.

	(1)	(2)	(3)
BankCredit	-0.011	-0.018*	-0.019*
	(-1.05)	(-1.67)	(-1.83)
(Dependence1)*(BankCredit)	-0.01		
	(-0.89)		
(Dependence1)*(DepositInsurance)	**-0.032****		
	(-2.52)		
(Dependence2)*(BankCredit)		0.001	
		-0.1	
(Dependence2)*(DepositInsurance)		**-0.031****	
		(-2.38)	
(Dependence3)*(BankCredit)			0.004
			-0.31
(Dependence3)*(DepositInsurance)			**-0.037*****
			(-2.74)
Observations	30,336	30,336	30,336
Pseudo R^2	0.286	0.286	0.286

3.2. Deposit insurance and industrial growth

In the previous section, we estimate the impact of deposit insurance on industrial volatility, and we find that the adoption of deposit insurance tends to reduce the volatility of output growth for industries which are more dependent on external funds. Although the finding is consistent with the role of deposit insurance as a catalyst for liquidity provision by banks, the findings may also be consistent with the possibility that borrowing firms become reluctant to taking risky projects under deposit insurance. If borrowing firms somehow reduce risk exposure after the adoption of deposit insurance, we expect that both the average output growth and the fluctuation of output growth will decrease with the introduction of deposit insurance. In contrast, if deposit insurance allows banks to provide liquidity to borrowing firms more actively, we expect that the average of industrial output growth will not decrease (or increase in an extreme situation), while the volatility of output growth will decrease after the introduction of deposit insurance. To discern whether our findings stem from the latter or the former prediction, we estimate the following specification:

$$\begin{aligned} Growth_{cit} = \gamma \times \left(Dependence_i \times DepositInsurance_{cit} \right) \\ + d_c + d_i + d_t + \varepsilon_{cit}, \end{aligned} \tag{3}$$

where d_c, d_i, and d_t are dummy variables for country, industry, and year.

Table 4 reports the results from estimating the equation (3). Column (1) of Table 4 shows that the presence of deposit insurance is positively associated with the output volatility for external finance dependent industries, but the effect is not statistically significant at the conventional level. Columns (2) and (3) of Table 4 also show the similar results.

Table 4. Deposit insurance and output growth

The dependent variable is industrial output. Dependence1, Dependence2, and Dependence 3 indicate the dummy variables for high dependence of industries on external funds. The measures of external fund dependence for the dummy variables are defined as the gap between capital expenditure and internal funds for U.S. firms in each industry between 1980-1990. t-statistics in parentheses are calculated using heteroskedasticity robust standard errors.

	(1)	(2)	(3)
(Dependence1)×(DepositInsurance)	0.017		
	(1.58)		
(Dependence2)×(DepositInsurance)		0.009	
		(0.90)	
(Dependence3)×(DepositInsurance)			0.017
			(1.5)
Observations	30336	30336	30336
Adjusted R^2	0.098	0.098	0.098

We also check whether the results are robust for different measures of growth. We run the same regressions using industrial value-added instead of industrial output. Table 5 reports the estimation results. When we use inflation-adjusted value-added following Rajan and Zingales (1998), we also find that the interaction of deposit insurance and small and large firms' dependence on external funds becomes statistically significant at the 10 percent level.

Table 5. Bank credit, deposit insurance, and industrial output growth

The dependent variable is industrial output. Dependence1, Dependence2, and Dependence 3 indicate the dummy variables for high dependence of industries on external funds. The measures of external fund dependence for the dummy variables are defined as the gap between capital expenditure and internal funds for U.S. firms in each industry between 1980-1990. t-statistics in parentheses are calculated using heteroskedasticity robust standard errors.

	(1)	(2)	(3)
(Dependence1)×(DepositInsurance)	0.020*		
	(1.69)		
(Dependence2)×(DepositInsurance)		0.018	
		(1.62)	
(Dependence3)×(DepositInsurance)			0.015
			(1.27)
Observations	30336	30336	30336
Adjusted R^2	0.068	0.068	0.068

As we discussed in the previous chapter, our finding may stem from the impact of financial development in disguise. To check the robustness of our results, we also control for the effect of bank credit and its interaction with external-funds dependence. Table 6 shows the regression results after controlling for the effects of bank credit. Our results remain intact.

Table 6. Robustness check: Deposit insurance, bank credit, and volatility of industrial value-added
The dependent variable is industrial value added. Dependence1, Dependence2, and Dependence 3 indicate the dummy variables for high dependence of industries on external funds. The measures of external fund dependence for the dummy variables are defined as the gap between capital expenditure and internal funds for U.S. firms in each industry between 1980-1990. t-statistics in parentheses are calculated using heteroskedasticity robust standard errors.

	(1)	(2)	(3)
BankCredit	0.028***	0.026**	0.026***
	(2.83)	(2.56)	(2.73)
(Dependence1)×(BankCredit)	-0.006		
	(-0.77)		
(Dependence1)×(DepositInsurance)	**0.020***		
	(1.71)		
(Dependence2)×(BankCredit)		-0.001	
		(-0.14)	
(Dependence2)×(DepositInsurance)		0.018	
		(1.61)	
(Dependence3)×(BankCredit)			-0.002
			(-0.25)
(Dependence3)×(DepositInsurance)			0.015
			(1.27)
Observations	30336	30336	30336
Adjusted R^2	0.068	0.068	0.068

4. Conclusion

In this paper, we examine the impact of deposit insurance on volatility and growth of industrial output. We find that the presence of deposit insurance significantly reduces the fluctuation of industrial output, but we do not find conclusive evidence that deposit insurance reduce or increase growth of industrial output. In sum, the findings of this paper are consistent with the claim that deposit insurance allows banks to provide liquidity to their borrowers more actively and reduces the fluctuation of output for sectors which are most dependent on external finance.

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