Development Discussion Papers

The Pricing of Credit Risk in Banking Regulation: The Case of Peru

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Development Discussion Paper No. 742
February 2000

Harvard Institute for International Development

HARVARD UNIVERSITY

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ABSTRACT

In this paper, an analytical framework is developed to measure the aggregation of credit risk under the standard method proposed in Basle Committee guidelines. An application of this framework is carried out for Peru. The results indicate that while the standard method would overestimate credit risk, leading Peruvian banks to maintain higher capital levels than would otherwise at the expense of operations and welfare, it may provide an additional cushion against bad loans if that is necessary.

Keywords: applied welfare analysis, banking regulation, benefit-cost analysis, capital requirements, credit risk, public policy, Peru.

JEL Codes: D61, G12, G21, G28

Carlos de la Torre has served as an HIID consultant in a number of projects in Asia, Africa and Latin America.

I would like to thank Robert Taliercio, Jr., whose comments resulted in an improved version of this paper. Any errors and omissions are responsibility of the author. Comments on this paper may be addressed to carlos_de_la_torre@usa.net.

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The Pricing of Credit Risk in Banking Regulation: The Case of Peru

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I. INTRODUCTION

Following a global trend set by the Basle Committee on Banking Supervision[1], the 1996 Peruvian Banking Act[2] adopted new standards for capital requirements in the industry.

Capital requirements are one response of bank regulators to moral hazard.[3] In the presence of high leverage and limited liability, capital requirements inhibit some bankers to place at risk the assets of depositors, which, in the extreme case, may make a bank insolvent. If insolvency occurs, the deposit insurance fund, the government, the depositor or a combination of them would absorb the losses. An insolvent bank also poses an indirect threat to healthy banks as confidence in the industry is questioned. Therefore, capital requirements serve as important protection for the deposit insurance fund and, ultimately, the taxpayers.

The paper develops a framework for analyzing the assumptions behind the standard method and the impact of these assumptions on risk-weighted assets, net capital, leverage and welfare.

The paper is divided into nine sections. Section II reviews the components of risk-weighted assets and net capital. Assisted by a mean variance model and a sample bank, Section III examines the method's implicit assumption that banks' asset categories are perfectly correlated; that is, banks' asset categories do not derive any diversification from correlation. By relaxing this assumption, Section IV derives a

[1] Basle Committee on Banking Supervision (1988) International convergence of capital measurement and capital standards (as amended to April 1995) July, Bank of International Settlements, No. 4b.
[2] Banking Board (1996) Ley General del Sistema Financiero y del Sistema de Seguros y Orgánica de la Superintendencia de Banca y Seguros, Ley 26702.
[3] For an overview of these issues, see White, L. J. (1992) "The United States Savings and Loan Debacle: Some Lessons from the Regulation of Financial Institutions" in D. Vittas (ed.) Financial Regulation: Changing the Rules of the Game, Economic Development Institute, World Bank, pp. 263-282.

new set of measures for risk, risk-weighted assets, net capital and leverage for the sample bank; compares these estimates to the ones generated by applying the standard method; and estimates the degree of these differences. Section V estimates the welfare loss associated with the standard method for the sample bank. Section VI extends the analysis conducted for the sample bank to the industry and generates deterministic and probabilistic estimates. Section VII generates a monetary estimate of what society gains by following the standard method or an alternative. Section VIII summarizes the paper results. Finally, section IX, an appendix, provides deterministic and probabilistic estimates for net capital, net leverage and total welfare loss.

II. CREDIT RISK AND CAPITAL

This section reviews the components of risk-weighted assets and net capital under current banking provisions.[4]

A. Risk-weighted assets

Risk-weighted assets (RWAs) are assets that account for credit risk, the potential for default on bank loans. RWAs have two components: total assets and an aggregate risk weight.

Total assets are classified in five categories according to their perceived risk. Assets with a risk weight of 0% and 10% are assumed to have a low or no credit default risk. These assets include cash, claims on the central government or central bank, claims collateralized by central government or central bank securities, claims collateralized by OECD central government or central bank securities and claims collateralized by deposits and claims collateralized by non-OECD central government or central bank securities.

[4] Banking Board (1996) Ley General del Sistema Financiero y del Sistema de Seguros y Orgánica de la Superintendencia de Banca y Seguros, Ley 26702 and Banking Board (1997) Activos y Créditos Contingentes Ponderados por Riesgo Crediticio, Circular N° B-1992-97.

Assets with a risk weight of 20% and 50% are assumed to have a higher credit default risk. Assets with a risk weight of 20% include claims on local financial firms, claim on first-rated foreign financial firms, claims collateralized by securities from domestic local firm, foreign banks and multilateral development banks, claims insured by local financial firms. Assets with a risk weight of 50% include loans secured by residential property, claims on regulated foreign financial firms, claims collateralized by securities from regulated foreign financial firms and claims insured by regulated foreign firms.

Finally, assets with a risk weight of 100% are assumed to have either the highest credit default risk or very low liquidity. These assets include claims on the private sector, claims on unregulated foreign financial firms, fixed and intangible assets and other assets.

The aggregate risk weight, the second component of RWAs, serves as a measure of the credit uncertainty in a bank's asset portfolio. The aggregate risk weight is a function of the credit risk weights, the asset composition in the portfolio, and the correlation or degree of linear association between each pair of assets. The aggregate risk weight would increase if the risk weights increase, if the structure of assets shifts toward assets with higher weights, or if each pair of assets tend to be positively correlated. On the other hand, the aggregate risk weight would decrease if the risk weights decrease, if the structure of assets shifts toward assets with lower weights, or if each pair of assets tends to be negatively correlated.

B. Total, Required and Net Capital

Total capital measures the financial strength of a bank and serves as a cushion against a decline in the value of its assets. Composed of paid-in capital, subordinated debt, reserves and general provisions/general loss loan reserves, total capital can be divided into required capital and net capital. Required capital, maintained for regulatory purposes, is determined by RWAs and by the minimum capital requirement

set at 8.7%.[5] Net capital is the difference between total and required capital and is used to expand bank operations.

For example, for a bank having RWAs of 1 million soles and total capital of 100,000 soles, required capital is 87,000 soles and net capital is 13,000 soles. When RWAs increase to 1.1 million, holding total capital constant at 100,000, required capital increases to 96,000 and net capital decrease to 4,000. When, on the other hand, RWAs decrease to 0.9 million, with total capital held constant at 100,000, required capital decreases to 78,000, and net capital increase to 22,000. TABLE 1 summarizes the relationships among aggregate risk weight, risk weighted assets, required and net capital as well as leverage.

TABLE 1. Summary of Relationships

Risk-Weighted Assets	Aggregate Risk Weight x Total Assets
Required Capital	Risk-Weighted Assets x 8.7%
Net Capital	Total Capital - Required Capital
Leverage	Net Capital x 11.5

III. THE ANALYTICAL FRAMEWORK

This section examines the standard method's implicit assumption that banks' asset categories are perfectly correlated; that is, banks' asset categories do not derive any diversification from correlation.

An alternative method, based on a mean variance model, serves as a framework for analyzing the assumptions behind the aggregation of credit risk. Such method captures the spectrum of assumptions about asset correlation in a bank[6]. This spectrum range from complete diversification (a perfect negative correlation for each

[5] As of December 1998.

[6] See Reylly F. (1994) "Standard Deviation of a Portfolio" in Investment Analysis and Portfolio Management, Dryden Press, Fourth Edition pp.250-258.

pair of assets) to no diversification at all (a perfect positive correlation for each pair of assets).

TABLE 2 summarizes the information about the risk (σ), composition (W) and correlation (r) of assets for CREDITO, a sample bank. Those parameters help obtain two estimates for the bank's aggregate risk weight. The first estimate, a weighted average of credit risks, is derived by applying the standard method. The second estimate is derived by using the alternative method.

TABLE 2. Aggregate Risk Weight for CREDITO with a correlation coefficient of 1

CREDITO

Table of Parameters

σ_1	0,0
σ_2	0,1
σ_3	0,2
σ_4	0,5
σ_5	1,0
W_1	21%
W_2	0%
W_3	11%
W_4	5%
W_5	63%
$r_{1,2}$	1,00
$r_{1,3}$	1,00
$r_{1,4}$	1,00
$r_{1,5}$	1,00
$r_{2,3}$	1,00
$r_{2,4}$	1,00
$r_{2,5}$	1,00
$r_{3,4}$	1,00
$r_{3,5}$	1,00
$r_{4,5}$	1,00

Standard Method Aggregate Risk Weight		Alternative Method Aggregate Risk Weight	
0,000	$(W_1)(\sigma_1)$	0,000	$(W_1)^2(\sigma_1)^2$
0,000	$(W_2)(\sigma_2)$	0,000	$(W_2)^2(\sigma_2)^2$
0,023	$(W_3)(\sigma_3)$	0,001	$(W_3)^2(\sigma_3)^2$
0,025	$(W_4)(\sigma_4)$	0,001	$(W_4)^2(\sigma_4)^2$
0,627	$(W_5)(\sigma_5)$	0,393	$(W_5)^2(\sigma_5)^2$
			0,000 $2(W_1)(W_2)$
		0,000 $2(W_1)(W_2)r_{1,2}\sigma_1\sigma_2$	*0,000* $r_{1,2}\sigma_1\sigma_2$
			0,048 $2(W_1)(W_3)$
		0,000 $2(W_1)(W_3)r_{1,3}\sigma_1\sigma_3$	*0,000* $r_{1,3}\sigma_1\sigma_3$
			0,021 $2(W_1)(W_4)$
		0,000 $2(W_1)(W_4)r_{1,4}\sigma_1\sigma_4$	*0,000* $r_{1,4}\sigma_1\sigma_4$
			0,261 $2(W_1)(W_5)$
		0,000 $2(W_1)(W_5)r_{1,5}\sigma_1\sigma_5$	*0,000* $r_{1,5}\sigma_1\sigma_5$
			0,000 $2(W_2)(W_3)$
		0,000 $2(W_2)(W_3)r_{2,3}\sigma_2\sigma_3$	*0,020* $r_{2,3}\sigma_2\sigma_3$
			0,000 $2(W_2)(W_4)$
		0,000 $2(W_2)(W_4)r_{2,4}\sigma_2\sigma_4$	*0,050* $r_{2,4}\sigma_2\sigma_4$
			0,000 $2(W_2)(W_5)$
		0,000 $2(W_2)(W_5)r_{2,5}\sigma_2\sigma_5$	*0,100* $r_{2,5}\sigma_2\sigma_5$
			0,012 $2(W_3)(W_4)$
		0,001 $2(W_3)(W_4)r_{3,4}\sigma_3\sigma_4$	*0,100* $r_{3,4}\sigma_3\sigma_4$
			0,144 $2(W_3)(W_5)$
		0,029 $2(W_3)(W_5)r_{3,5}\sigma_3\sigma_5$	*0,200* $r_{3,5}\sigma_3\sigma_5$
			0,063 $2(W_4)(W_5)$
		0,031 $2(W_4)(W_5)r_{4,5}\sigma_4\sigma_5$	*0,500* $r_{4,5}\sigma_4\sigma_5$
0,675	Sum of Factors	0,455	Sum of Factors
		0,675	Square Root of Sum

Standard Method Aggregate Risk Weight	Alternative Method Aggregate Risk Weight
0,675	0,675

TABLE 2 shows that these two estimates for the price of credit risk are the same (67.5%) when the correlation coefficient for each pair of assets in the alternative

method is 1. That is, both estimates are equal when assets have perfect positive correlation. In any other case, that is, when a correlation coefficient is below 1 but above -1, the first and the second estimates differ. The closer the pair-wise correlation coefficients are to -1, the wider the gap between the two estimates. Thus, the standard method implicitly assumes a perfectly positive correlation between each pair of asset categories within a bank, which would indicate that a bank's asset portfolio does not derive any diversification from asset correlation.[7]

There may be at least two good reasons to believe that a bank's portfolio diversification benefits from correlation. First, each asset category represents a distinct group of assets with certain perceived characteristics of liquidity and credit. It is unlikely that the returns on these different assets would behave equally. Second, there are extensive provisions in the Banking Act which limit concentration of assets. A limit on concentration can be seen as a way to encourage diversification. There are limits to concentration in financial instruments, loans to private individuals and companies, connected lending and foreign lending. These limits require banks to hold assets whose returns, most likely, will behave differently. Thus, for these two reasons, it is plausible to assume a correlation coefficient lower than 1 for each pair of asset categories.

IV. SOME ESTIMATES FOR CREDITO

This section derives a new set of measures for risk, risk-weighted assets, net capital and leverage for the sample bank; compares these estimates to the ones generated by applying the standard method; and estimates the degree of these differences.

The table of parameters in TABLE 3 provides some tentative estimates of asset correlation for CREDITO based on monthly observations between July 1997 and December 1998. These estimates were generated by establishing a 95% confidence

[7] From the perspective of the alternative method.

interval for each correlation coefficient and by selecting the interval's upper limit values, the most conservative estimates. Although the probability of these estimates occurring is low, we use them since they represent the closest values to the coefficient correlation (+1) assumed by the standard method.

Using the new set of correlation coefficients, TABLE 3 provides two new estimates for CREDITO's aggregate risk weight. The standard method's estimate remains at 67.5%, while the alternative's estimate is now 64.2%. Although small, this 5.0% change has a significant effect on RWAs, required capital, net capital and leverage.

TABLE 3. Aggregate Risk Weight for CREDITO with the estimated set of Coefficients

CREDITO

Table of Parameters

σ_1	0,0
σ_2	0,1
σ_3	0,2
σ_4	0,5
σ_5	1,0
W_1	21%
W_2	0%
W_3	11%
W_4	5%
W_5	63%
$r_{1,2}$	0,48
$r_{1,3}$	0,10
$r_{1,4}$	0,22
$r_{1,5}$	-0,14
$r_{2,3}$	0,48
$r_{2,4}$	0,48
$r_{2,5}$	0,48
$r_{3,4}$	0,36
$r_{3,5}$	0,05
$r_{4,5}$	0,53

Standard Method Aggregate Risk Weight

0,000	$(W_1)(\sigma_1)$
0,000	$(W_2)(\sigma_2)$
0,023	$(W_3)(\sigma_3)$
0,025	$(W_4)(\sigma_4)$
0,627	$(W_5)(\sigma_5)$

0,675 Sum of Factors

Alternative Method Aggregate Risk Weight

0,000	$(W_1)^2(\sigma_1)^2$		
0,000	$(W_2)^2(\sigma_2)^2$		
0,001	$(W_3)^2(\sigma_3)^2$		
0,001	$(W_4)^2(\sigma_4)^2$		
0,393	$(W_5)^2(\sigma_5)^2$		
		0,000	$2(W_1)(W_2)$
0,000	$2(W_1)(W_2)r_{1,2}\sigma_1\sigma_2$	*0,000*	$r_{1,2}\sigma_1\sigma_2$
		0,048	$2(W_1)(W_3)$
0,000	$2(W_1)(W_3)r_{1,3}\sigma_1\sigma_3$	*0,000*	$r_{1,3}\sigma_1\sigma_3$
		0,021	$2(W_1)(W_4)$
0,000	$2(W_1)(W_4)r_{1,4}\sigma_1\sigma_4$	*0,000*	$r_{1,4}\sigma_1\sigma_4$
		0,261	$2(W_1)(W_5)$
0,000	$2(W_1)(W_5)r_{1,5}\sigma_1\sigma_5$	*0,000*	$r_{1,5}\sigma_1\sigma_5$
		0,000	$2(W_2)(W_3)$
0,000	$2(W_2)(W_3)r_{2,3}\sigma_2\sigma_3$	*0,010*	$r_{2,3}\sigma_2\sigma_3$
		0,000	$2(W_2)(W_4)$
0,000	$2(W_2)(W_4)r_{2,4}\sigma_2\sigma_4$	*0,024*	$r_{2,4}\sigma_2\sigma_4$
		0,000	$2(W_2)(W_5)$
0,000	$2(W_2)(W_5)r_{2,5}\sigma_2\sigma_5$	*0,048*	$r_{2,5}\sigma_2\sigma_5$
		0,012	$2(W_3)(W_4)$
0,000	$2(W_3)(W_4)r_{3,4}\sigma_3\sigma_4$	*0,036*	$r_{3,4}\sigma_3\sigma_4$
		0,144	$2(W_3)(W_5)$
0,001	$2(W_3)(W_5)r_{3,5}\sigma_3\sigma_5$	*0,010*	$r_{3,5}\sigma_3\sigma_5$
		0,063	$2(W_4)(W_5)$
0,017	$2(W_4)(W_5)r_{4,5}\sigma_4\sigma_5$	*0,263*	$r_{4,5}\sigma_4\sigma_5$

0,412 Sum of Factors
0,642 Square Root of Sum

Standard Method Aggregate Risk Weight	Alternative Method Aggregate Risk Weight
0,675	0,642

Under the alternative method, RWAs for CREDITO would decrease from 11.8 to 11.2 billion soles. As RWAs decrease, and holding total capital constant at 1.2 billion, required capital also decreases from 1.02 to 0.97 billion. Net capital would increase by 49.4 million, from 260.7 to 310.2 million while leverage would grow by 568 million, from 3.0 billion to 3.6 billion. The percentage change in net capital and leverage is 3.5 times larger than the percentage change in the aggregate risk weight. TABLE 4, below, summarizes these results.

TABLE 4. Net capital and Leverage for CREDITO, December 1998

(,000 Real Nuevos Soles)
Base Month =July 1997

Standard Method			Alternative Method			CHANGE		
AGGREGATE RISK WEIGHT	NET CAPITAL 8,70% (1)	NET LEVERAGE 11,50 (2)	AGGREGATE RISK WEIGHT	NET CAPITAL (1)	NET LEVERAGE 11,50 (2)	AGGREGATE RISK WEIGHT	NET CAPITAL	NET LEVERAGE 11,50
						ABSOLUTE		
67,5%	260.786	2.999.040	64,2%	310.211	3.567.430	3,3%	49.425	568.390
						RELATIVE		
						-5,0%	17,3%	17,3%
						ELASTICITY		
							-3,50	

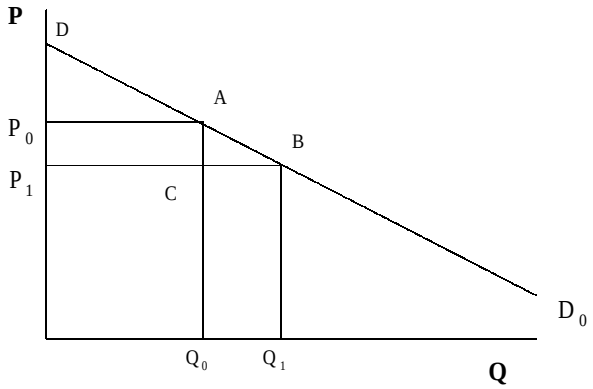
(1) NET CAPITAL IS THE DIFFERENCE BETWEEN TOTAL CAPITAL AND REQUIRED CAPITAL.
(2) NET LEVERAGE IS THE PRODUCT OF NET CAPITAL AND THE REGULATORY LEVERAGE LEVEL (11.5).

V. WELFARE EFFECT UNDER THE STANDARD METHOD

In order to estimate the welfare loss associated with the standard method, we need to estimate the area P_0ABP_1 in Figure 1 for the sample bank. This area represents the change in consumer surplus or difference between the consumer surplus under the alternative method (DBP_1) and the consumer surplus under the standard method (DAP_0).

The area representing the change in consumer surplus may be divided into (1) a rectangle representing the welfare loss to the existing consumers (P_0ACP_1) and (2) a triangle representing the welfare loss in forgone demand (ABC).

Figure 1. Estimation of the welfare loss associated with the Standard method



Taking the information estimated for CREDITO in TABLE 4 on P_0 (0.675), P_1 (0.642), Q_0 (2,999 million) and Q_1 (3,567 million), the standard method may cause an estimated loss of 97.7 million in existing demand and 9.2 million in foregone demand. The total welfare loss is estimated at 107 million soles.

VI. INDUSTRY ESTIMATES

A. Deterministic Estimates

In this section, we extend the analysis carried out for CREDITO to the industry. To do this, we, first, compute a set of correlation coefficients for each bank under the alternative framework and select the interval's upper limit values. Second, based on the set of coefficients for each bank, we estimate an aggregate risk weight. Third, with the aggregate risk weight, we derive RWAs, net capital and leverage for each institution and compare these estimates to the ones generated by applying the standard method. Finally, the welfare losses for the industry are estimated based on two sets of prices and quantities generated for each bank.

Table 5, below, presents a set of measures representing the change in net capital, foregone leverage and welfare for each bank and for the industry. From an industry perspective, net capital increases by 316 million, from 1.2 to 1.5 billion and leverage grows by 3.6 billion, from 14.2 to 17.8 billion. Appendix 1 presents the deterministic

estimates in detail. Welfare losses for the industry's resources are estimated at 853 million soles, of which 720 million from existing demand and 133 million from foregone demand.

(,000 Real Nuevos Soles)

Base Month = July 1997

	INSTITUTION	NET CAPITAL	%	NET LEVERAGE	%	WELFARE ANALYSIS CURRENT DEMAND	%	FOREGONE DEMAND	%	TOTAL LOSS	%
1	CONTINENTAL	44.314	14,0%	509.616	14,0%	80.408	11,2%	12.597	9,4%	93.006	10,9%
2	INTERBANC	8.986	2,8%	103.342	2,8%	9.397	1,3%	909	0,7%	10.307	1,2%
3	CREDITO	49.425	15,6%	568.390	15,6%	97.756	13,6%	9.264	6,9%	107.020	12,5%
4	WIESE	28.882	9,1%	332.144	9,1%	71.082	9,9%	4.919	3,7%	76.001	8,9%
5	LIMA	22.360	7,1%	257.137	7,1%	12.874	1,8%	7.847	5,9%	20.722	2,4%
6	LATINO	3.808	1,2%	43.791	1,2%	10.014	1,4%	398	0,3%	10.412	1,2%
7	REG. DEL NORTE	5.901	1,9%	67.865	1,9%	5.748	0,8%	2.094	1,6%	7.842	0,9%
8	BANCOSUR	45.046	14,2%	518.030	14,2%	163.245	22,7%	32.170	24,1%	195.416	22,9%
9	FINANCIERO	5.057	1,6%	58.158	1,6%	13.612	1,9%	1.738	1,3%	15.350	1,8%
10	COMERCIO	988	0,3%	11.357	0,3%	4.139	0,6%	116	0,1%	4.255	0,5%
11	DEL PROGRESO	4.272	1,4%	49.132	1,4%	15.369	2,1%	1.016	0,8%	16.386	1,9%
12	SUDAMERICANO	30.843	9,8%	354.693	9,8%	11.061	1,5%	29.008	21,7%	40.069	4,7%
13	BANEX	1.959	0,6%	22.531	0,6%	8.112	1,1%	373	0,3%	8.485	1,0%
14	DEL TRABAJO	78	0,0%	898	0,0%	289	0,0%	1	0,0%	290	0,0%
15	SOLVENTA	327	0,1%	3.756	0,1%	5.868	0,8%	55	0,0%	5.923	0,7%
16	CITIBANK	19.155	6,1%	220.278	6,1%	19.124	2,7%	9.640	7,2%	28.764	3,4%
17	S. CHARTERED	792	0,3%	9.104	0,3%	4.389	0,6%	57	0,0%	4.447	0,5%
18	SANTANDER	15.146	4,8%	174.177	4,8%	49.789	6,9%	4.338	3,3%	54.127	6,3%
19	INTERAMERICANO	8.797	2,8%	101.167	2,8%	47.721	6,6%	5.038	3,8%	52.759	6,2%
20	NUEVO MUNDO	15.234	4,8%	175.195	4,8%	30.356	4,2%	8.199	6,1%	38.555	4,5%
21	SERBANCO	483	0,2%	5.556	0,2%	1.958	0,3%	76	0,1%	2.034	0,2%
22	BANK OF BOSTON	4.197	1,3%	48.269	1,3%	56.961	7,9%	3.559	2,7%	60.520	7,1%
23	ORION	170	0,1%	1.958	0,1%	312	0,0%	2	0,0%	315	0,0%
24	DEL PAIS	15	0,0%	167	0,0%	97	0,0%	0	0,0%	97	0,0%
	INDUSTRY	316.236	100,0%	3.636.712	100,0%	719.682	100,0%	133.415	100,0%	853.098	100,0%

TABLE 5. Change in Net capital, Leverage and Welfare for the Banking Industry, December 1998

B. Probabilistic Estimates[8]

This section provides probabilistic estimates for net capital, net leverage and total welfare loss for the industry. These estimates are based on a set of assumptions about the probability distribution of correlation coefficients corresponding to Continental, Credito and Wiese. Appendix 2 summarizes the assumptions and probability distributions for these coefficients. Appendix 3 presents the probabilistic estimates in detail.

[8] The estimates were generated using Crystal Ball Version 4.0, Decisionengineering 1996.

TABLE 6. Probabilistic estimates for net capital, net leverage and welfare loss
(,000 Real Nuevos Soles)
Base Month =July 1997

Estimate	Mean	Standard deviation
Net Capital	316,293	3,925
Net Leverage	3,637,374	45,134
Welfare Loss	853,322	9,998

VII. THE STANDARD METHOD AND THE ALTERNATIVE

In the previous section, we estimated that the cost to society under the standard method would result in the immobilization of 316 million in capital and in a welfare loss of 853 million. Does society derive a benefit from following this same method?

Regulators usually stress that additional capital provides more strength to the financial system. If we follow this line of thought, the additional capital may be seen as a potential ability to assist additional industry's assets when in trouble. If this is the case, we may estimate this benefit to be the product of the net capital (316 million) and the regulatory leverage level (11.5) or 3.6 billion. Here, we assume that each additional sol in net capital enable us to assist up to 11.5 additional soles in troubled assets.

To obtain a more complete picture, the standard method's net contribution should be compared to that of the alternative. Unlike the standard method, the alternative reflects the cost society will incur if resources are needed and the additional net capital is not available. This cost may be estimated as the product of the net capital (316 million) and the regulatory leverage level (11.5) or 3.6 billion. Again, we assume that, by choosing the alternative, we are foregoing the ability to assist 11.5 additional soles for each additional sol in net capital.

TABLE 6 provides some estimates for the standard method[9] and the alternative[10]. It shows that as the need for additional net capital grows, the standard method becomes more attractive. The standard method is a better choice when the probability is above 15% and provides positive net benefits when the probability is above 30%.

TABLE 7. Standard and Alternative methods under different probabilities, December 1998

(,000 Real Nuevos Soles)
Base Month = July 1997

Probability of Additional Excess Capital needed	Standard Method	Alternative Method
0%	(1.169.334)	-
5%	(971.686)	(181.836)
10%	(774.039)	(363.671)
15%	(576.391)	(545.507)
20%	(378.744)	(727.342)
25%	(181.097)	(909.178)
30%	16.551	(1.091.014)
35%	214.198	(1.272.849)
40%	411.845	(1.454.685)
45%	609.493	(1.636.520)
50%	807.140	(1.818.356)
55%	1.004.788	(2.000.192)
60%	1.202.435	(2.182.027)
65%	1.400.082	(2.363.863)
70%	1.597.730	(2.545.698)
75%	1.795.377	(2.727.534)
80%	1.993.025	(2.909.370)
85%	2.190.672	(3.091.205)
90%	2.388.319	(3.273.041)
95%	2.585.967	(3.454.876)
100%	2.783.614	(3.636.712)

VIII. CONCLUSION

This paper develops an analytical framework for measuring the aggregation of credit risk under the standard method proposed in Basle Committee guidelines. The results for Peru indicate that the standard risk measurement method may very well over-estimate credit risk, leading banks to maintain higher capital levels and reducing the level of resources to the rest of the economy.

[9] The standard method's net contribution is estimated to be equal to (((316*11.5)*p) - (316*(1-p)) - 853), where p is a probability.

[10] The alternative's net contribution is estimated to be equal to - ((316*11.5)*p), where p is a probability.

As of December 1998, this over-estimation would have produced the immobilization of 316 million in capital and an estimated welfare loss of 853 million, while providing an ability to assist up to 3.6 billion in troubled assets.

When compared to the alternative, the standard method becomes a more attractive option as the need for additional net capital grows above 15%. Therefore, the perception of what capital level is needed is key to determine which method is recommendable. With the recent experience of two bank failures in the past year and the introduction of a new capital framework by the Basel Committee still at an early stage, the standard method is expected to continue to be the choice of regulators in the near future.

IX. APPENDIXES

A.1. Deterministic Estimates For Net Capital, Net Leverage And Total Welfare Loss For Each Banking Institution, December 1998

TABLE A. CONTINENTAL

(,000 Real Nuevos Soles)
Base Month =July 1997

Standard Method			Alternative Method			CHANGE		
AGGREGATE RISK WEIGHT	NET CAPITAL 8.70% (1)	NET LEVERAGE 11.50 (2)	AGGREGATE RISK WEIGHT	NET CAPITAL (1)	NET LEVERAGE 11.50 (2)	AGGREGATE RISK WEIGHT	NET CAPITAL	NET LEVERAGE 11.50
							ABSOLUTE	
59.7%	141,427	1,626,416	55.2%	182,345	2,096,966	**4.6%**	**40,917**	**470,549**
							RELATIVE	
						-7.9%	**25.3%**	**25.3%**
							ELASTICITY	
							-3.18	

(1) NET CAPITAL IS THE DIFFERENCE BETWEEN TOTAL CAPITAL AND REQUIRED CAPITAL.
(2) NET LEVERAGE IS THE PRODUCT OF NET CAPITAL AND THE REGULATORY LEVERAGE LEVEL (11.5).

TABLE B. INTERBANC

(,000 Real Nuevos Soles)
Base Month =July 1997

Standard Method			Alternative Method			CHANGE		
AGGREGATE RISK WEIGHT	NET CAPITAL 8.70% (1)	NET LEVERAGE 11.50 (2)	AGGREGATE RISK WEIGHT	NET CAPITAL (1)	NET LEVERAGE 11.50 (2)	AGGREGATE RISK WEIGHT	NET CAPITAL	NET LEVERAGE 11.50
							ABSOLUTE	
74.7%	46,425	533,890	72.9%	55,411	637,232	**1.8%**	**8,986**	**103,342**
							RELATIVE	
						-2.4%	**17.6%**	**17.6%**
							ELASTICITY	
							-7.40	

(1) NET CAPITAL IS THE DIFFERENCE BETWEEN TOTAL CAPITAL AND REQUIRED CAPITAL.
(2) NET LEVERAGE IS THE PRODUCT OF NET CAPITAL AND THE REGULATORY LEVERAGE LEVEL (11.5).

TABLE C. CREDITO

(,000 Real Nuevos Soles)
Base Month =July 1997

Standard Method			Alternative Method			CHANGE		
AGGREGATE RISK WEIGHT	NET CAPITAL 8.70% (1)	NET LEVERAGE 11.50 (2)	AGGREGATE RISK WEIGHT	NET CAPITAL (1)	NET LEVERAGE 11.50 (2)	AGGREGATE RISK WEIGHT	NET CAPITAL	NET LEVERAGE 11.50
							ABSOLUTE	
67.5%	260,786	2,999,040	64.1%	312,351	3,592,037	3.4%	51,565	592,997
							RELATIVE	
						-5.2%	18.0%	18.0%
							ELASTICITY	
							-3.48	

(1) NET CAPITAL IS THE DIFFERENCE BETWEEN TOTAL CAPITAL AND REQUIRED CAPITAL.
(2) NET LEVERAGE IS THE PRODUCT OF NET CAPITAL AND THE REGULATORY LEVERAGE LEVEL (11.5).

TABLE D. WIESE

(,000 Real Nuevos Soles)
Base Month =July 1997

Standard Method			Alternative Method			CHANGE		
AGGREGATE RISK WEIGHT	NET CAPITAL 8.70% (1)	NET LEVERAGE 11.50 (2)	AGGREGATE RISK WEIGHT	NET CAPITAL (1)	NET LEVERAGE 11.50 (2)	AGGREGATE RISK WEIGHT	NET CAPITAL	NET LEVERAGE 11.50
							ABSOLUTE	
69.8%	208,669	2,399,696	66.7%	238,825	2,746,484	3.1%	30,155	346,788
							RELATIVE	
						-4.5%	13.5%	13.5%
							ELASTICITY	
							-2.97	

(1) NET CAPITAL IS THE DIFFERENCE BETWEEN TOTAL CAPITAL AND REQUIRED CAPITAL.
(2) NET LEVERAGE IS THE PRODUCT OF NET CAPITAL AND THE REGULATORY LEVERAGE LEVEL (11.5).

TABLE E. LIMA

(,000 Real Nuevos Soles)
Base Month =July 1997

Standard Method			Alternative Method			CHANGE		
AGGREGATE RISK WEIGHT	NET CAPITAL 8.70% (1)	NET LEVERAGE 11.50 (2)	AGGREGATE RISK WEIGHT	NET CAPITAL (1)	NET LEVERAGE 11.50 (2)	AGGREGATE RISK WEIGHT	NET CAPITAL	NET LEVERAGE 11.50
							ABSOLUTE	
63.0%	18,342	210,928	56.9%	40,701	468,065	6.1%	22,360	257,137
							RELATIVE	
						-10.2%	75.7%	75.7%
							ELASTICITY	
							-7.44	

(1) NET CAPITAL IS THE DIFFERENCE BETWEEN TOTAL CAPITAL AND REQUIRED CAPITAL.
(2) NET LEVERAGE IS THE PRODUCT OF NET CAPITAL AND THE REGULATORY LEVERAGE LEVEL (11.5).

TABLE F. LATINO

(,000 Real Nuevos Soles)
Base Month =July 1997

Standard Method			Alternative Method			CHANGE		
AGGREGATE RISK WEIGHT	NET CAPITAL 8.70% (1)	NET LEVERAGE 11.50 (2)	AGGREGATE RISK WEIGHT	NET CAPITAL (1)	NET LEVERAGE 11.50 (2)	AGGREGATE RISK WEIGHT	NET CAPITAL	NET LEVERAGE 11.50
						ABSOLUTE		
72.9%	47,893	550,773	71.1%	51,701	594,564	1.8%	3,808	43,791
						RELATIVE		
						-2.5%	7.6%	7.6%
						ELASTICITY		
							-3.03	

(1) NET CAPITAL IS THE DIFFERENCE BETWEEN TOTAL CAPITAL AND REQUIRED CAPITAL.
(2) NET LEVERAGE IS THE PRODUCT OF NET CAPITAL AND THE REGULATORY LEVERAGE LEVEL (11.5).

TABLE G. REGIONAL DEL NORTE

(,000 Real Nuevos Soles)
Base Month =July 1997

Standard Method			Alternative Method			CHANGE		
AGGREGATE RISK WEIGHT	NET CAPITAL 8.70% (1)	NET LEVERAGE 11.50 (2)	AGGREGATE RISK WEIGHT	NET CAPITAL (1)	NET LEVERAGE 11.50 (2)	AGGREGATE RISK WEIGHT	NET CAPITAL	NET LEVERAGE 11.50
						ABSOLUTE		
63.5%	8,100	93,150	57.3%	14,001	161,014	6.2%	5,901	67,865
						RELATIVE		
						-10.2%	53.4%	53.4%
						ELASTICITY		
							-5.23	

(1) NET CAPITAL IS THE DIFFERENCE BETWEEN TOTAL CAPITAL AND REQUIRED CAPITAL.
(2) NET LEVERAGE IS THE PRODUCT OF NET CAPITAL AND THE REGULATORY LEVERAGE LEVEL (11.5).

TABLE H. BANCOSUR

(,000 Real Nuevos Soles)
Base Month =July 1997

Standard Method			Alternative Method			CHANGE		
AGGREGATE RISK WEIGHT	NET CAPITAL 8.70% (1)	NET LEVERAGE 11.50 (2)	AGGREGATE RISK WEIGHT	NET CAPITAL (1)	NET LEVERAGE 11.50 (2)	AGGREGATE RISK WEIGHT	NET CAPITAL	NET LEVERAGE 11.50
						ABSOLUTE		
74.1%	114,291	1,314,343	61.7%	159,337	1,832,373	12.4%	45,046	518,030
						RELATIVE		
						-18.3%	32.9%	32.9%
						ELASTICITY		
							-1.80	

(1) NET CAPITAL IS THE DIFFERENCE BETWEEN TOTAL CAPITAL AND REQUIRED CAPITAL.
(2) NET LEVERAGE IS THE PRODUCT OF NET CAPITAL AND THE REGULATORY LEVERAGE LEVEL (11.5).

TABLE I. FINANCIERO

(,000 Real Nuevos Soles)
Base Month =July 1997

Standard Method			Alternative Method			CHANGE		
AGGREGATE RISK WEIGHT	NET CAPITAL 8.70% (1)	NET LEVERAGE 11.50 (2)	AGGREGATE RISK WEIGHT	NET CAPITAL (1)	NET LEVERAGE 11.50 (2)	AGGREGATE RISK WEIGHT	NET CAPITAL	NET LEVERAGE 11.50
						ABSOLUTE		
72.7%	19,810	227,811	66.7%	24,867	285,969	6.0%	5,057	58,158
						RELATIVE		
						-8.6%	22.6%	22.6%
						ELASTICITY		
							-2.64	

(1) NET CAPITAL IS THE DIFFERENCE BETWEEN TOTAL CAPITAL AND REQUIRED CAPITAL.
(2) NET LEVERAGE IS THE PRODUCT OF NET CAPITAL AND THE REGULATORY LEVERAGE LEVEL (11.5).

TABLE J. COMERCIO

(,000 Real Nuevos Soles)
Base Month =July 1997

Standard Method			Alternative Method			CHANGE		
AGGREGATE RISK WEIGHT	NET CAPITAL 8.70% (1)	NET LEVERAGE 11.50 (2)	AGGREGATE RISK WEIGHT	NET CAPITAL (1)	NET LEVERAGE 11.50 (2)	AGGREGATE RISK WEIGHT	NET CAPITAL	NET LEVERAGE 11.50
						ABSOLUTE		
65.9%	17,643	202,893	63.8%	18,630	214,250	2.0%	988	11,357
						RELATIVE		
						-3.1%	5.4%	5.4%
						ELASTICITY		
							-1.73	

(1) NET CAPITAL IS THE DIFFERENCE BETWEEN TOTAL CAPITAL AND REQUIRED CAPITAL.
(2) NET LEVERAGE IS THE PRODUCT OF NET CAPITAL AND THE REGULATORY LEVERAGE LEVEL (11.5).

TABLE K. DEL PROGRESO

(,000 Real Nuevos Soles)
Base Month =July 1997

Standard Method			Alternative Method			CHANGE		
AGGREGATE RISK WEIGHT	NET CAPITAL 8.70% (1)	NET LEVERAGE 11.50 (2)	AGGREGATE RISK WEIGHT	NET CAPITAL (1)	NET LEVERAGE 11.50 (2)	AGGREGATE RISK WEIGHT	NET CAPITAL	NET LEVERAGE 11.50
						ABSOLUTE		
59.9%	32,302	371,478	55.7%	36,575	420,610	4.1%	4,272	49,132
						RELATIVE		
						-7.2%	12.4%	12.4%
						ELASTICITY		
							-1.73	

(1) NET CAPITAL IS THE DIFFERENCE BETWEEN TOTAL CAPITAL AND REQUIRED CAPITAL.
(2) NET LEVERAGE IS THE PRODUCT OF NET CAPITAL AND THE REGULATORY LEVERAGE LEVEL (11.5).

TABLE L. SUDAMERICANO

(,000 Real Nuevos Soles)
Base Month =July 1997

Standard Method			Alternative Method			CHANGE		
AGGREGATE RISK WEIGHT	NET CAPITAL 8.70% (1)	NET LEVERAGE 11.50 (2)	AGGREGATE RISK WEIGHT	NET CAPITAL (1)	NET LEVERAGE 11.50 (2)	AGGREGATE RISK WEIGHT	NET CAPITAL	NET LEVERAGE 11.50
							ABSOLUTE	
63.8%	5,880	67,622	47.4%	36,723	422,315	**16.4%**	**30,843**	**354,693**
							RELATIVE	
						-29.4%	**144.8%**	**144.8%**
							ELASTICITY	
							-4.92	

(1) NET CAPITAL IS THE DIFFERENCE BETWEEN TOTAL CAPITAL AND REQUIRED CAPITAL.
(2) NET LEVERAGE IS THE PRODUCT OF NET CAPITAL AND THE REGULATORY LEVERAGE LEVEL (11.5).

TABLE M. BANEX

(,000 Real Nuevos Soles)
Base Month =July 1997

Standard Method			Alternative Method			CHANGE		
AGGREGATE RISK WEIGHT	NET CAPITAL 8.70% (1)	NET LEVERAGE 11.50 (2)	AGGREGATE RISK WEIGHT	NET CAPITAL (1)	NET LEVERAGE 11.50 (2)	AGGREGATE RISK WEIGHT	NET CAPITAL	NET LEVERAGE 11.50
							ABSOLUTE	
76.4%	21,310	245,070	73.1%	23,270	267,602	**3.3%**	**1,959**	**22,531**
							RELATIVE	
						-4.4%	**8.8%**	**8.8%**
							ELASTICITY	
							-1.98	

(1) NET CAPITAL IS THE DIFFERENCE BETWEEN TOTAL CAPITAL AND REQUIRED CAPITAL.
(2) NET LEVERAGE IS THE PRODUCT OF NET CAPITAL AND THE REGULATORY LEVERAGE LEVEL (11.5).

TABLE N. DEL TRABAJO

(,000 Real Nuevos Soles)
Base Month =July 1997

Standard Method			Alternative Method			CHANGE		
AGGREGATE RISK WEIGHT	NET CAPITAL 8.70% (1)	NET LEVERAGE 11.50 (2)	AGGREGATE RISK WEIGHT	NET CAPITAL (1)	NET LEVERAGE 11.50 (2)	AGGREGATE RISK WEIGHT	NET CAPITAL	NET LEVERAGE 11.50
							ABSOLUTE	
74.0%	13,727	157,859	73.9%	13,805	158,758	**0.2%**	**78**	**898**
							RELATIVE	
						-0.2%	**0.6%**	**0.6%**
							ELASTICITY	
							-2.29	

(1) NET CAPITAL IS THE DIFFERENCE BETWEEN TOTAL CAPITAL AND REQUIRED CAPITAL.
(2) NET LEVERAGE IS THE PRODUCT OF NET CAPITAL AND THE REGULATORY LEVERAGE LEVEL (11.5).

TABLE O. SOLVENTA

(,000 Real Nuevos Soles)
Base Month =July 1997

Standard Method			Alternative Method			CHANGE		
AGGREGATE RISK WEIGHT	NET CAPITAL 8.70% (1)	NET LEVERAGE 11.50 (2)	AGGREGATE RISK WEIGHT	NET CAPITAL (1)	NET LEVERAGE 11.50 (2)	AGGREGATE RISK WEIGHT	NET CAPITAL	NET LEVERAGE 11.50
						ABSOLUTE		
50.4%	17,528	201,573	47.5%	17,855	205,329	2.9%	327	3,756
						RELATIVE		
						-5.9%	1.8%	1.8%
						ELASTICITY		
							-0.31	

(1) NET CAPITAL IS THE DIFFERENCE BETWEEN TOTAL CAPITAL AND REQUIRED CAPITAL.
(2) NET LEVERAGE IS THE PRODUCT OF NET CAPITAL AND THE REGULATORY LEVERAGE LEVEL (11.5).

TABLE P. CITIBANK

(,000 Real Nuevos Soles)
Base Month =July 1997

Standard Method			Alternative Method			CHANGE		
AGGREGATE RISK WEIGHT	NET CAPITAL 8.70% (1)	NET LEVERAGE 11.50 (2)	AGGREGATE RISK WEIGHT	NET CAPITAL (1)	NET LEVERAGE 11.50 (2)	AGGREGATE RISK WEIGHT	NET CAPITAL	NET LEVERAGE 11.50
						ABSOLUTE		
55.4%	18,999	218,489	46.6%	38,154	438,767	8.8%	19,155	220,278
						RELATIVE		
						-17.2%	67.0%	67.0%
						ELASTICITY		
							-3.91	

(1) NET CAPITAL IS THE DIFFERENCE BETWEEN TOTAL CAPITAL AND REQUIRED CAPITAL.
(2) NET LEVERAGE IS THE PRODUCT OF NET CAPITAL AND THE REGULATORY LEVERAGE LEVEL (11.5).

TABLE Q. SANTANDER

(,000 Real Nuevos Soles)
Base Month =July 1997

Standard Method			Alternative Method			CHANGE		
AGGREGATE RISK WEIGHT	NET CAPITAL 8.70% (1)	NET LEVERAGE 11.50 (2)	AGGREGATE RISK WEIGHT	NET CAPITAL (1)	NET LEVERAGE 11.50 (2)	AGGREGATE RISK WEIGHT	NET CAPITAL	NET LEVERAGE 11.50
						ABSOLUTE		
62.5%	86,911	999,476	57.5%	102,057	1,173,653	5.0%	15,146	174,177
						RELATIVE		
						-8.3%	16.0%	16.0%
						ELASTICITY		
							-1.93	

(1) NET CAPITAL IS THE DIFFERENCE BETWEEN TOTAL CAPITAL AND REQUIRED CAPITAL.
(2) NET LEVERAGE IS THE PRODUCT OF NET CAPITAL AND THE REGULATORY LEVERAGE LEVEL (11.5).

TABLE R. S. CHARTERED

(,000 Real Nuevos Soles)
Base Month =July 1997

Standard Method			Alternative Method			CHANGE		
AGGREGATE RISK WEIGHT	NET CAPITAL 8.70% (1)	NET LEVERAGE 11.50 (2)	AGGREGATE RISK WEIGHT	NET CAPITAL (1)	NET LEVERAGE 11.50 (2)	AGGREGATE RISK WEIGHT	NET CAPITAL	NET LEVERAGE 11.50
							ABSOLUTE	
76.4%	30,224	347,572	75.2%	31,015	356,676	1.3%	792	9,104
							RELATIVE	
						-1.7%	2.6%	2.6%
							ELASTICITY	
							-1.55	

(1) NET CAPITAL IS THE DIFFERENCE BETWEEN TOTAL CAPITAL AND REQUIRED CAPITAL.
(2) NET LEVERAGE IS THE PRODUCT OF NET CAPITAL AND THE REGULATORY LEVERAGE LEVEL (11.5).

TABLE S. INTERAMERICANO

(,000 Real Nuevos Soles)
Base Month =July 1997

Standard Method			Alternative Method			CHANGE		
AGGREGATE RISK WEIGHT	NET CAPITAL 8.70% (1)	NET LEVERAGE 11.50 (2)	AGGREGATE RISK WEIGHT	NET CAPITAL (1)	NET LEVERAGE 11.50 (2)	AGGREGATE RISK WEIGHT	NET CAPITAL	NET LEVERAGE 11.50
							ABSOLUTE	
77.5%	41,665	479,151	67.5%	50,462	580,318	10.0%	8,797	101,167
							RELATIVE	
						-13.7%	19.1%	19.1%
							ELASTICITY	
							-1.39	

(1) NET CAPITAL IS THE DIFFERENCE BETWEEN TOTAL CAPITAL AND REQUIRED CAPITAL.
(2) NET LEVERAGE IS THE PRODUCT OF NET CAPITAL AND THE REGULATORY LEVERAGE LEVEL (11.5).

TABLE T. NUEVO MUNDO

(,000 Real Nuevos Soles)
Base Month =July 1997

Standard Method			Alternative Method			CHANGE		
AGGREGATE RISK WEIGHT	NET CAPITAL 8.70% (1)	NET LEVERAGE 11.50 (2)	AGGREGATE RISK WEIGHT	NET CAPITAL (1)	NET LEVERAGE 11.50 (2)	AGGREGATE RISK WEIGHT	NET CAPITAL	NET LEVERAGE 11.50
							ABSOLUTE	
69.3%	28,203	324,338	59.9%	43,438	499,533	9.4%	15,234	175,195
							RELATIVE	
						-14.5%	42.5%	42.5%
							ELASTICITY	
							-2.94	

(1) NET CAPITAL IS THE DIFFERENCE BETWEEN TOTAL CAPITAL AND REQUIRED CAPITAL.
(2) NET LEVERAGE IS THE PRODUCT OF NET CAPITAL AND THE REGULATORY LEVERAGE LEVEL (11.5).

TABLE U. SERBANCO

(,000 Real Nuevos Soles)
Base Month =July 1997

Standard Method			Alternative Method			CHANGE		
AGGREGATE RISK WEIGHT	NET CAPITAL 8.70% (1)	NET LEVERAGE 11.50 (2)	AGGREGATE RISK WEIGHT	NET CAPITAL (1)	NET LEVERAGE 11.50 (2)	AGGREGATE RISK WEIGHT	NET CAPITAL	NET LEVERAGE 11.50
						ABSOLUTE		
67.0%	6,217	71,498	64.2%	6,700	77,053	**2.7%**	**483**	**5,556**
						RELATIVE		
						-4.2%	**7.5%**	**7.5%**
						ELASTICITY		
							-1.79	

(1) NET CAPITAL IS THE DIFFERENCE BETWEEN TOTAL CAPITAL AND REQUIRED CAPITAL.
(2) NET LEVERAGE IS THE PRODUCT OF NET CAPITAL AND THE REGULATORY LEVERAGE LEVEL (11.5).

TABLE V. BANK OF BOSTON

(,000 Real Nuevos Soles)
Base Month =July 1997

Standard Method			Alternative Method			CHANGE		
AGGREGATE RISK WEIGHT	NET CAPITAL 8.70% (1)	NET LEVERAGE 11.50 (2)	AGGREGATE RISK WEIGHT	NET CAPITAL (1)	NET LEVERAGE 11.50 (2)	AGGREGATE RISK WEIGHT	NET CAPITAL	NET LEVERAGE 11.50
						ABSOLUTE		
36.5%	33,591	386,294	21.8%	37,788	434,563	**14.7%**	**4,197**	**48,269**
						RELATIVE		
						-50.6%	**11.8%**	**11.8%**
						ELASTICITY		
							-0.23	

(1) NET CAPITAL IS THE DIFFERENCE BETWEEN TOTAL CAPITAL AND REQUIRED CAPITAL.
(2) NET LEVERAGE IS THE PRODUCT OF NET CAPITAL AND THE REGULATORY LEVERAGE LEVEL (11.5).

TABLE W. ORION

(,000 Real Nuevos Soles)
Base Month =July 1997

Standard Method			Alternative Method			CHANGE		
AGGREGATE RISK WEIGHT	NET CAPITAL 8.70% (1)	NET LEVERAGE 11.50 (2)	AGGREGATE RISK WEIGHT	NET CAPITAL (1)	NET LEVERAGE 11.50 (2)	AGGREGATE RISK WEIGHT	NET CAPITAL	NET LEVERAGE 11.50
						ABSOLUTE		
66.4%	11,443	131,592	66.1%	11,613	133,551	**0.2%**	**170**	**1,958**
						RELATIVE		
						-0.4%	**1.5%**	**1.5%**
						ELASTICITY		
							-4.12	

(1) NET CAPITAL IS THE DIFFERENCE BETWEEN TOTAL CAPITAL AND REQUIRED CAPITAL.
(2) NET LEVERAGE IS THE PRODUCT OF NET CAPITAL AND THE REGULATORY LEVERAGE LEVEL (11.5).

TABLE X. DEL PAIS

(,000 Real Nuevos Soles)
Base Month =July 1997

Standard Method			Alternative Method			CHANGE		
AGGREGATE RISK WEIGHT	NET CAPITAL 8.70% (1)	NET LEVERAGE 11.50 (2)	AGGREGATE RISK WEIGHT	NET CAPITAL (1)	NET LEVERAGE 11.50 (2)	AGGREGATE RISK WEIGHT	NET CAPITAL	NET LEVERAGE 11.50
							ABSOLUTE	
85.7%	7,201	82,808	85.6%	7,215	82,975	0.1%	15	167
							RELATIVE	
						-0.1%	0.2%	0.2%
							ELASTICITY	
							-1.47	

(1) NET CAPITAL IS THE DIFFERENCE BETWEEN TOTAL CAPITAL AND REQUIRED CAPITAL.

(2) NET LEVERAGE IS THE PRODUCT OF NET CAPITAL AND THE REGULATORY LEVERAGE LEVEL (11.5).

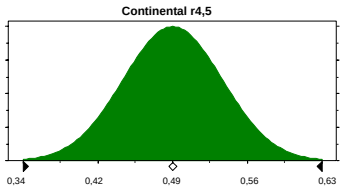
A.2. Probability Distribution For Critical Correlation Coefficients

Assumption: Continental r4,5

Normal distribution with parameters:

Mean	0,49
Standard Dev.	0,05

Selected range is from -Infinity to +Infinity
Mean value in simulation was 0,49

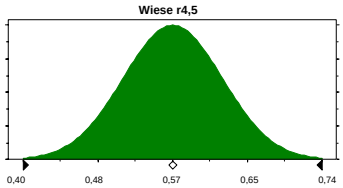


Assumption: Wiese r4,5

Normal distribution with parameters:

Mean	0,57
Standard Dev.	0,06

Selected range is from -Infinity to +Infinity
Mean value in simulation was 0,57

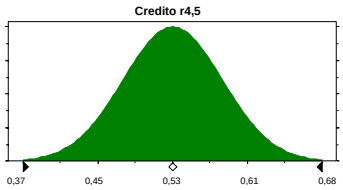


Assumption: Credito r4,5

Normal distribution with parameters:

Mean	0,53
Standard Dev.	0,05

Selected range is from -Infinity to +Infinity
Mean value in simulation was 0,53



A.3. Probabilistic Estimates For Net Capital, Net Leverage And Total Welfare Loss

Forecast: Industry Net Capital

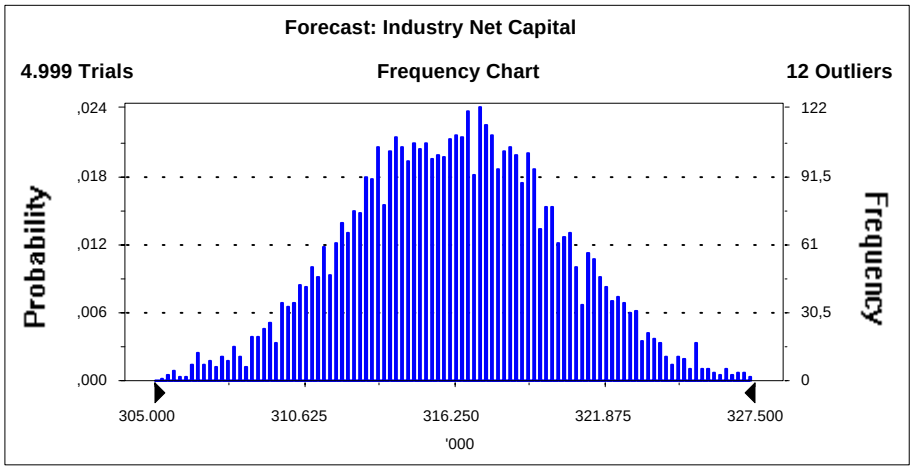
Summary:

Display Range is from 305.000 to 327.500 '000

Entire Range is from 303.376 to 329.946 '000

After 4.999 Trials, the Std. Error of the Mean is 56

Statistics:	Value
Trials	4999
Mean	316.293
Median	316.293
Mode	---
Standard Deviation	3.925
Variance	15.403.564
Skewness	0,04
Kurtosis	2,86
Coeff. of Variability	0,01
Range Minimum	303.376
Range Maximum	329.946
Range Width	26.571
Mean Std. Error	55,51

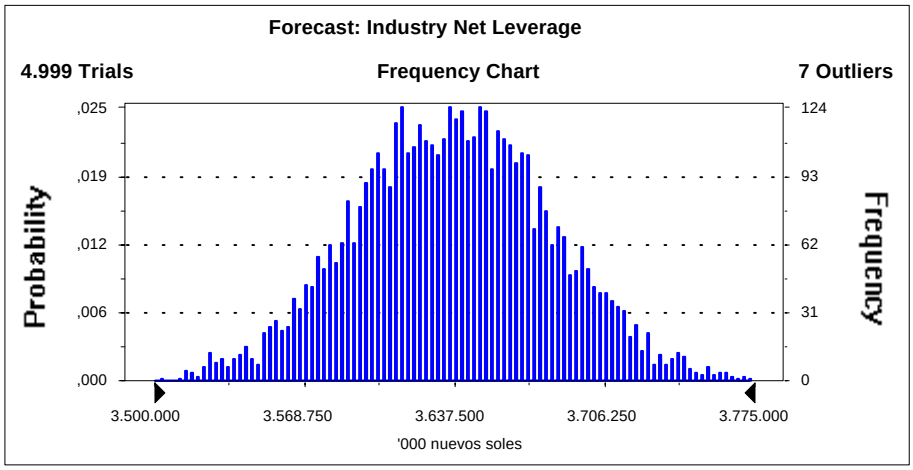


Forecast: Industry Net Leverage

Summary:

Display Range is from 3.500.000 to 3.775.000 '000 nuevos soles
Entire Range is from 3.488.822 to 3.794.384 '000 nuevos soles
After 4.999 Trials, the Std. Error of the Mean is 642

Statistics:	Value
Trials	4999
Mean	3.637.374
Median	3.637.366
Mode	---
Standard Deviation	45.134
Variance	2.037.121.295
Skewness	0,04
Kurtosis	2,86
Coeff. of Variability	0,01
Range Minimum	3.488.822
Range Maximum	3.794.384
Range Width	305.561
Mean Std. Error	638,36



Forecast: Total Welfare Loss

Summary:

Display Range is from 825.000 to 880.000 '000
Entire Range is from 819.579 to 888.014 '000
After 4.999 Trials, the Std. Error of the Mean is 142

Statistics:	Value
Trials	4999
Mean	853.322
Median	853.281
Mode	---
Standard Deviation	9.998
Variance	99.956.093
Skewness	0,06
Kurtosis	2,87
Coeff. of Variability	0,01
Range Minimum	819.579
Range Maximum	888.014
Range Width	68.434
Mean Std. Error	141,40