

The Right Balance for Banks: Estimating Optimal Capital Requirements

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Status of Banking Reform

- Capital Requirements remain moderately too low
- TLAC for big banks is poor substitute
- Yes banks stronger now from higher capital, but Dodd-Frank weakened Lender of Last Resort
- Basel IV should set floors on Risk Weighting

Seeking the Optimal Capital Ratio

- M&M offset 45%; capital not a free lunch
- Δk by 1% of TA \rightarrow $\downarrow Q$ by 0.15% (Basic production function algebra)
- Bank Crisis Damage = 64% of one year's GDP
- Probability of banking crisis: Highly non-linear function of k

Optimal Capital Ratio cont.

- $k_{TA}^* = 7-8\%$; $k_{RWA}^* = 12-14\%$
- k^* about 1/3 higher than Basel III target
- TBTF incentive to risk-taking exaggerated
- Too Much Finance literature confuses correlation with causation

Modigliani-Miller Equity Cost as Function of Debt/Equity Leverage



$$i_j = \rho + (\rho - r) \frac{D_j}{S_j}$$

i_j = unit cost of equity

ρ = sectoral capitalization rate

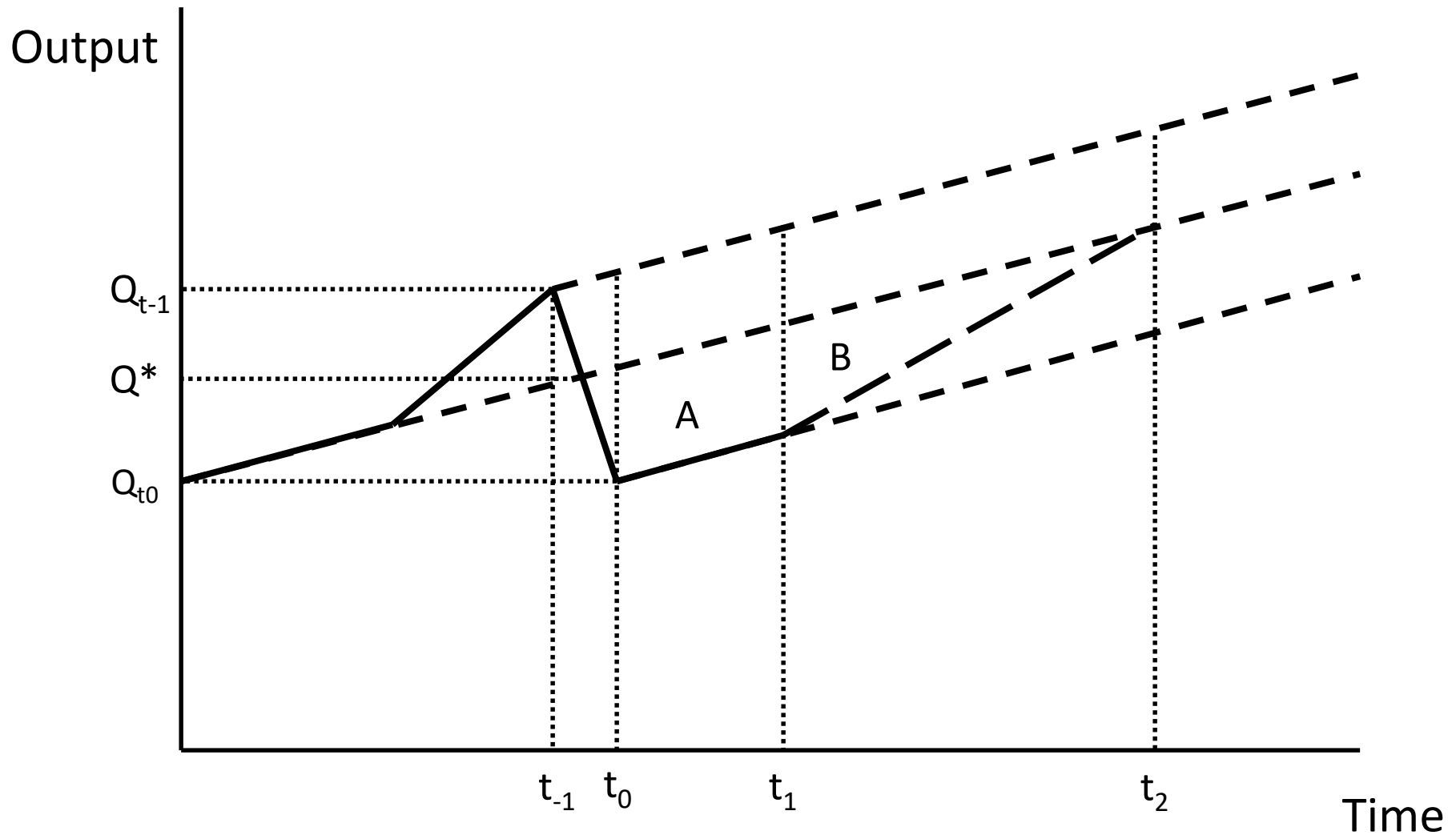
r = interest rate

D_j = debt

S_j = shareholder equity



Losses from a Banking Crisis





Deriving the benefits curve

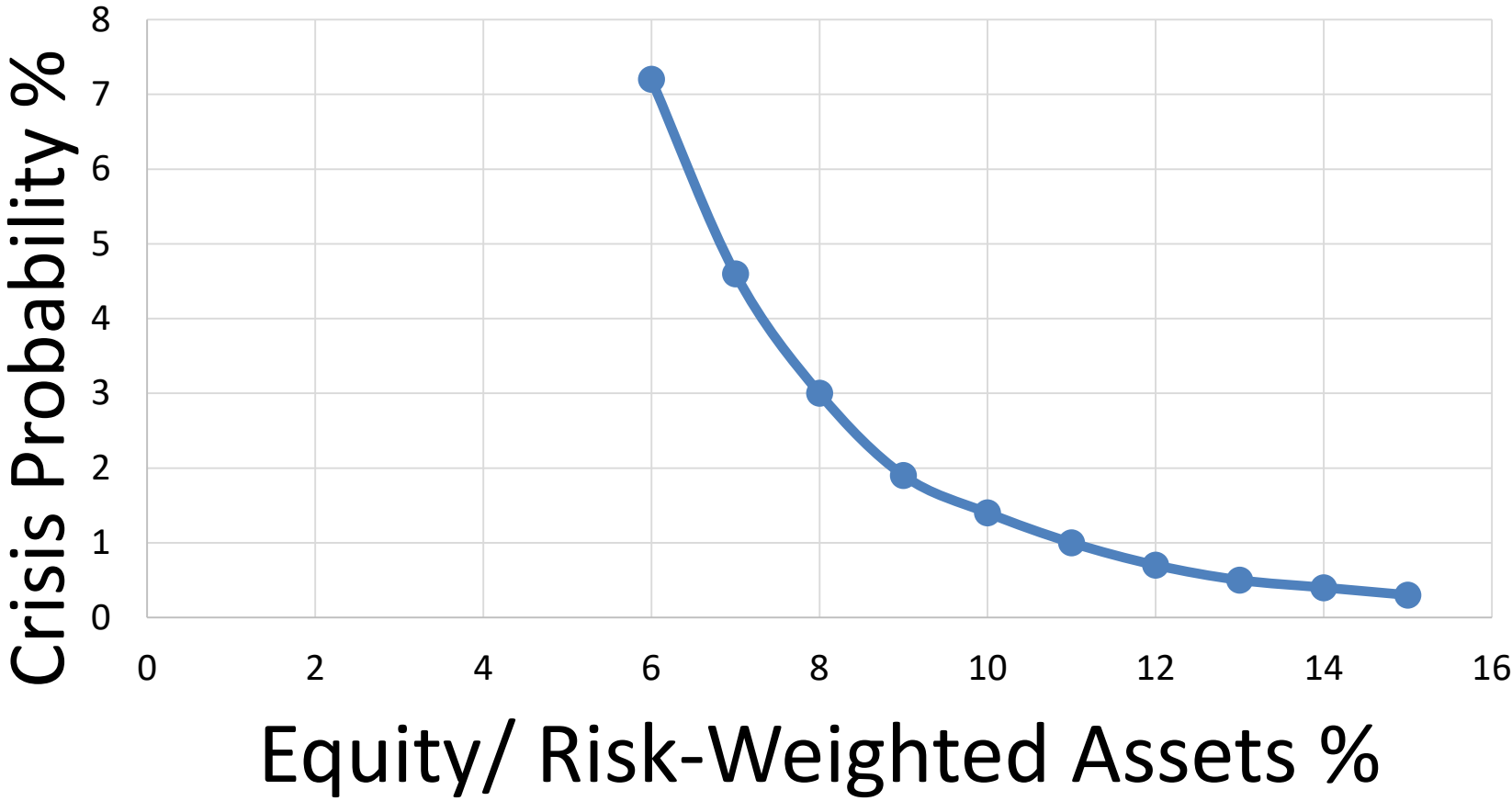
Baseline damage: $D_0 = P_{cr0}\lambda_0$

Crisis probability: $P_{crk} = Ak^\gamma, \quad \gamma < 0$

Benefit: $B = -(P_{crk} - P_{cr0})\lambda_0$
 $= -A\lambda_0(k^\gamma - k_0^\gamma)$

Marginal benefit: $\frac{dB}{dk} = -A\lambda_0\gamma k^{\gamma-1}$

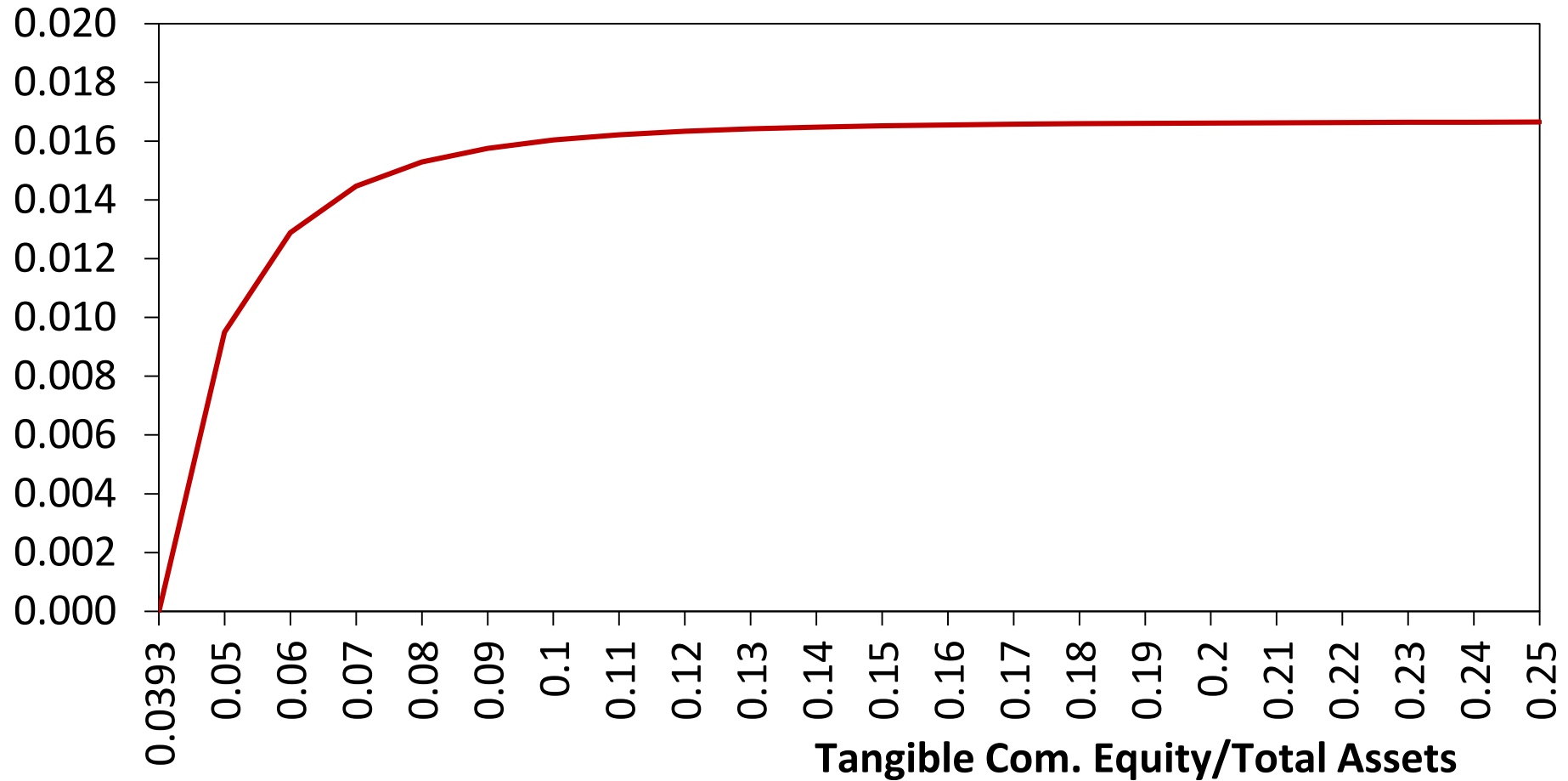
Basel Committee Survey of Capital Impact on Crisis Risk





Benefits of higher capital ratios

Fraction of GDP



Impact on cost of capital to the economy



Banks: $z = z_0 + (k - k_0)(\rho_B - r_d)(1 - \mu)$

Non-banks: $r_{NB,0} + \theta \times (z - z_0)$

Economy:

$$w = \phi_B(z + S_f) + \phi_{NB}r_{NB} + \phi_f\rho_f$$

Proportional change $v = \left(\frac{w_k}{w_0} - 1\right)$

Cost of higher capital cost to economy



$$C = \frac{v \times \alpha \times \sigma}{(1 - \alpha)}$$

α = output elasticity with respect to capital

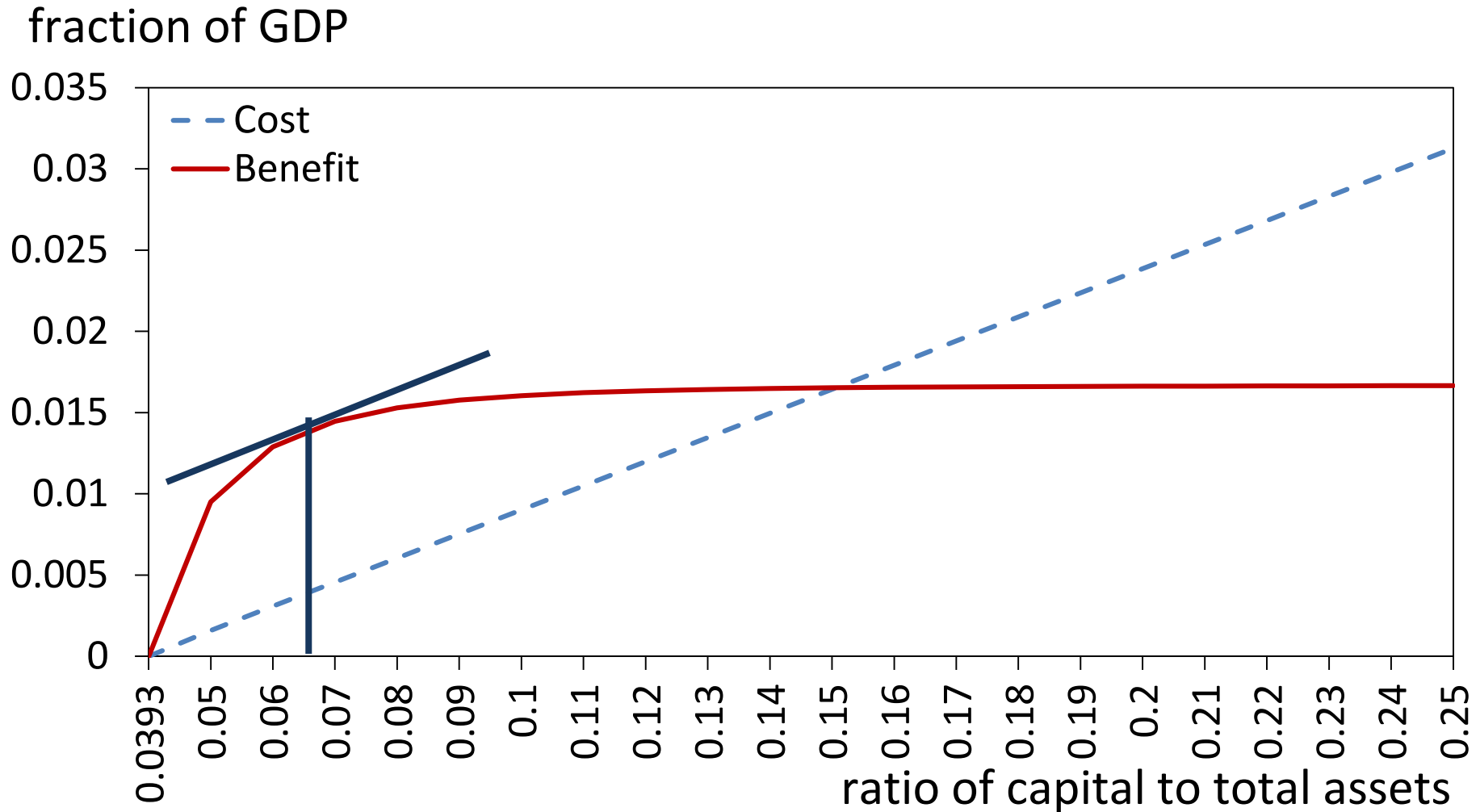
σ = elasticity of substitution, capital & labor



Marginal cost to economy from higher k is constant

$$\begin{aligned}\frac{dC}{dk} &= \frac{dC}{dv} \times \frac{dv}{dw} \times \frac{d_w}{d_z} \times \frac{d_z}{d_k} \\ &= \frac{\alpha\sigma}{1-\alpha} \frac{1}{w_0} (\phi_B + \theta\phi_{NB}) \{(\rho_B - r_d)(1 - \mu)\} \\ &\equiv \psi\end{aligned}$$

Benefits and costs of additional bank capital



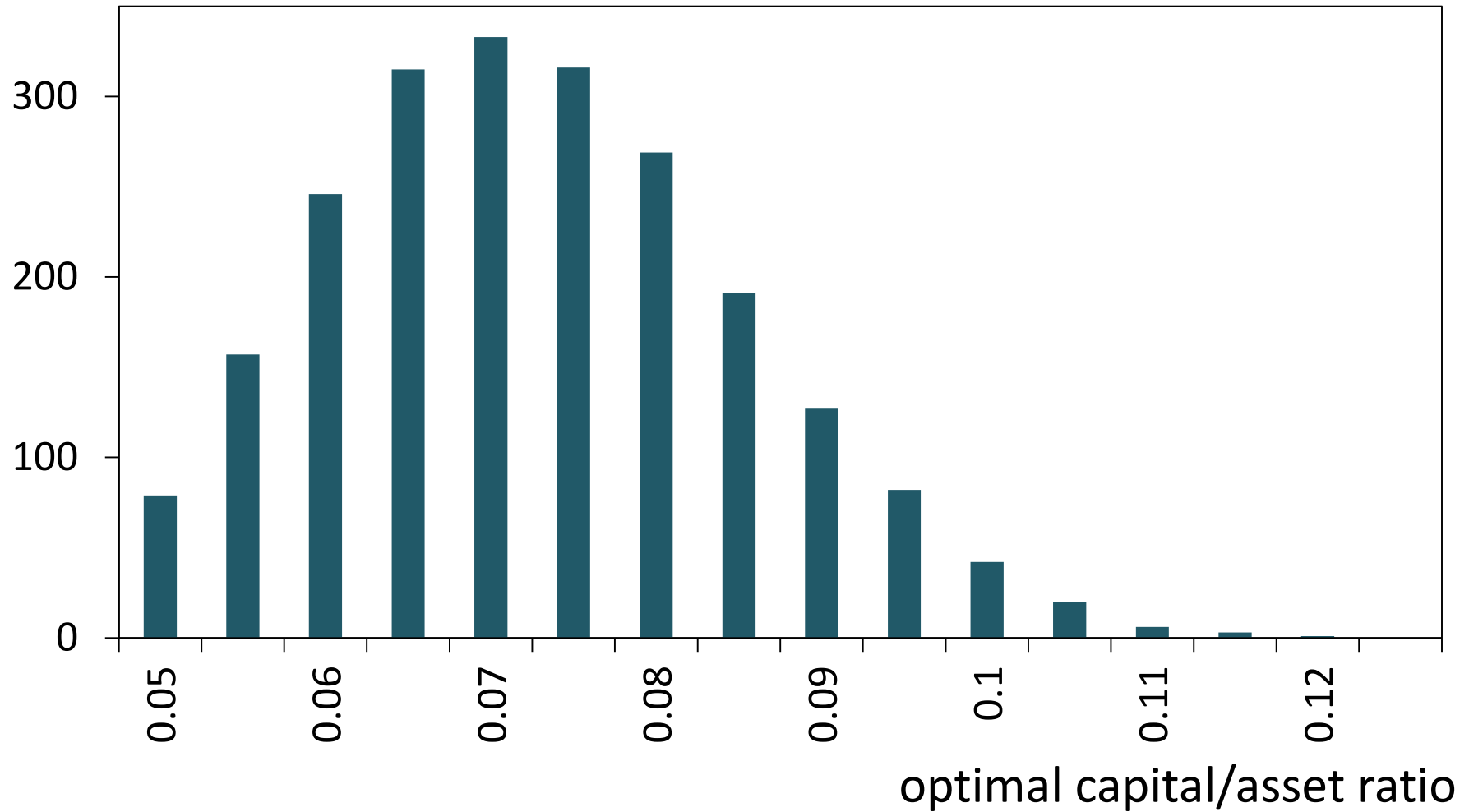


Simulation parameters

Parameter	Concept	Low OCR	Base	High OCR
λ	Loss from crisis	0.3	0.64	1.0
ρ_B	Equity cost to banks	0.13	0.10	0.07
μ	M&M offset	0.35	0.45	0.60
θ	Nonbank spillover	0.7	0.5	0.2
α	Capital elasticity	0.43	0.40	0.33
σ	Substitution elast.	0.8	0.5	0.4



Frequency, optimal capital ratio



Optimal Capital Requirements (tce/rwa %)



STUDY	K/RWA	STUDY	K/RWA
Admati-Hellwig	36-53	Basel Committee	13
Hanson et al	27	Gambacorta	12
Goldstein	18-32	Clerc et al	11
Minneapolis Plan	23.5	De-Ramon et al	10
Kragh-Sørensen	16-23	Mendicino et al	10
Miles et al	16-20	Yan et al	10
Dagher et al	9-17	Barrell et al	9
Cline	12-14	Van den Heuvel	<5
Kato et al	11-14	Median	13

Is the Optimal Capital Ratio Lower for the Euro Area?

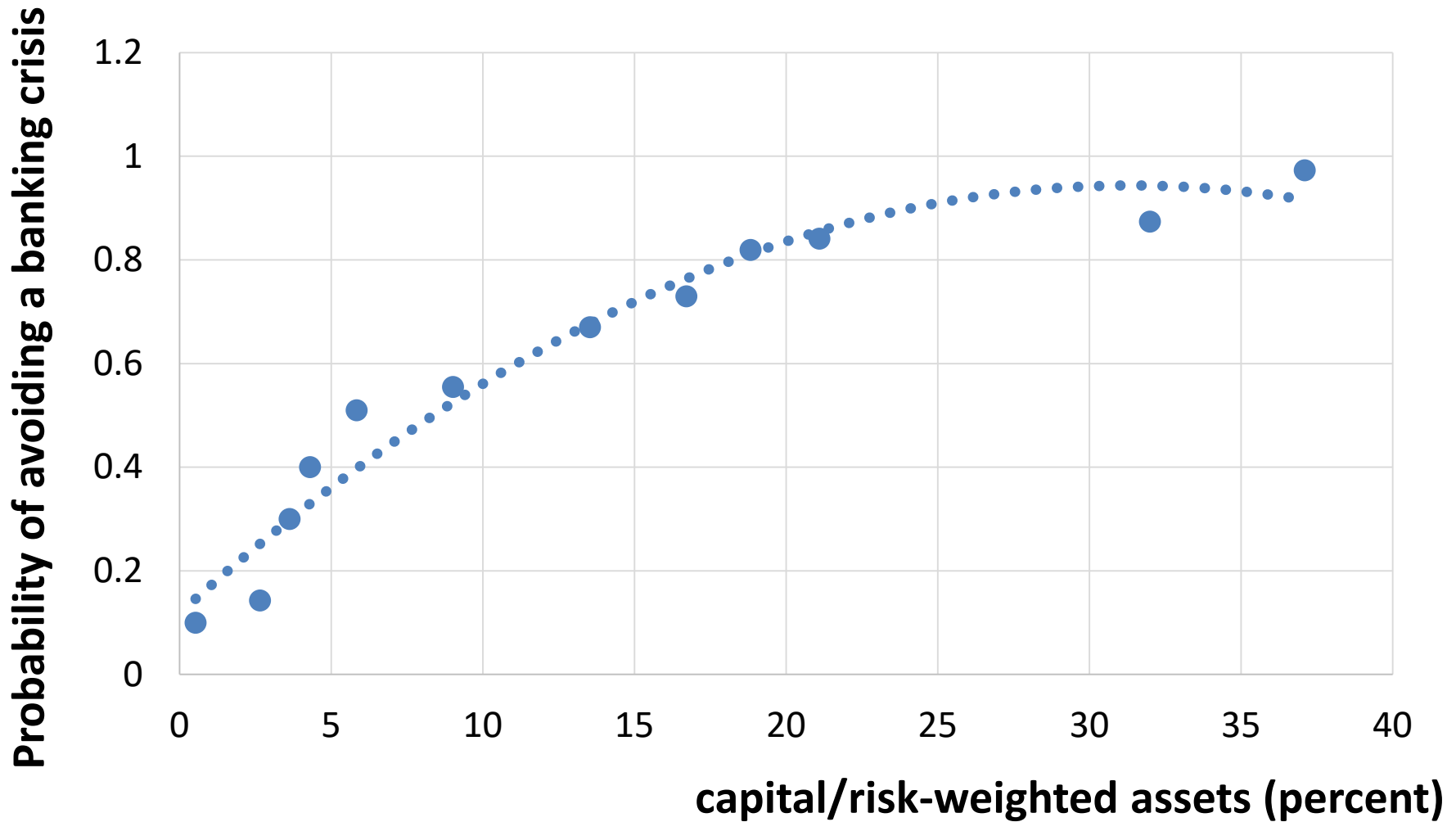


US: $\Phi_B = 0.2$ $\Phi_{NB} = 0.47$
 $k_{US}^* = 1.022k^*$

Euro Area: $\Phi_B = 0.59$ $\Phi_{NB} = 0.08$
 $k_{EA}^* = 0.965k^*$



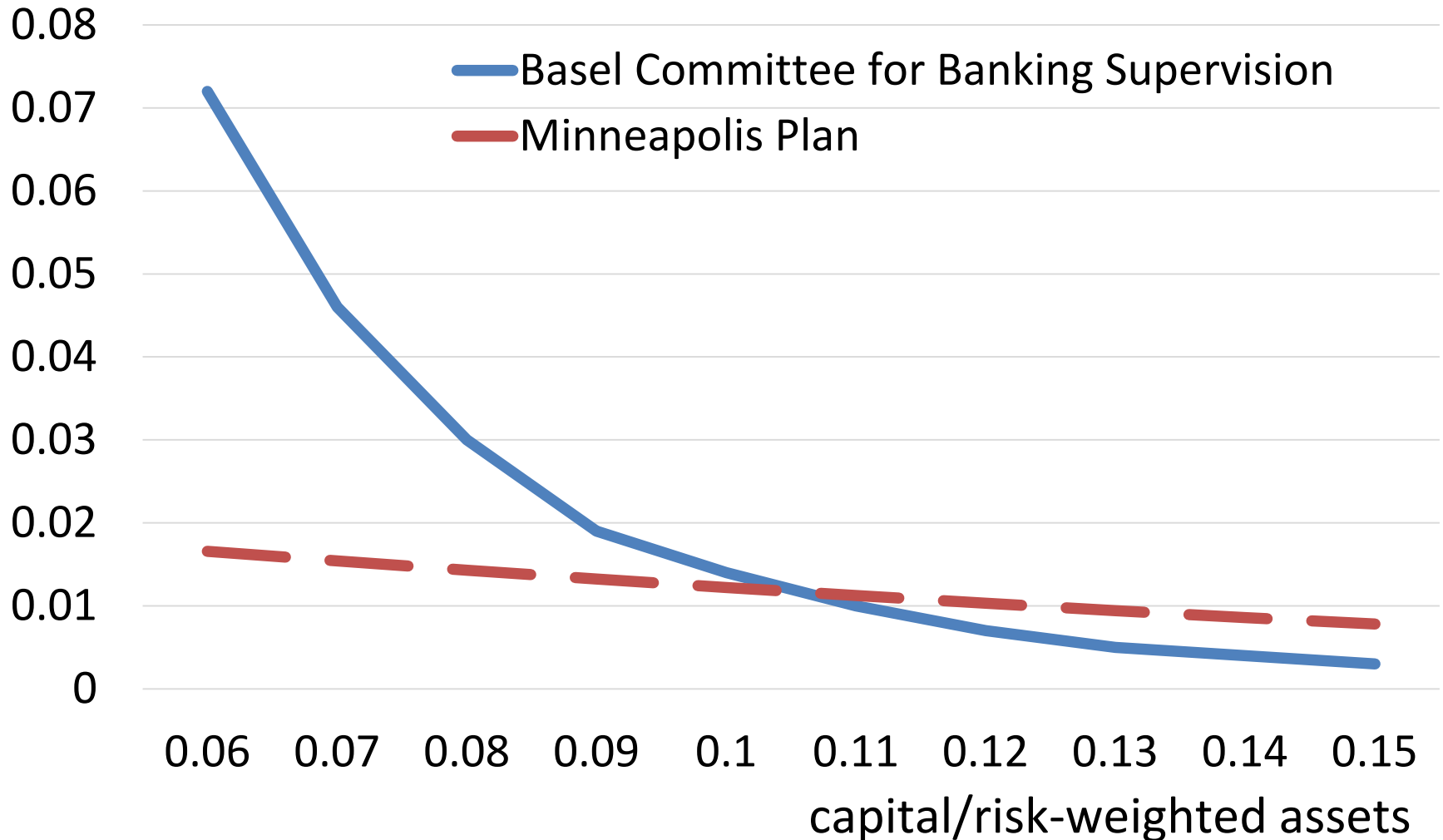
Dagher et al. Crisis Probability



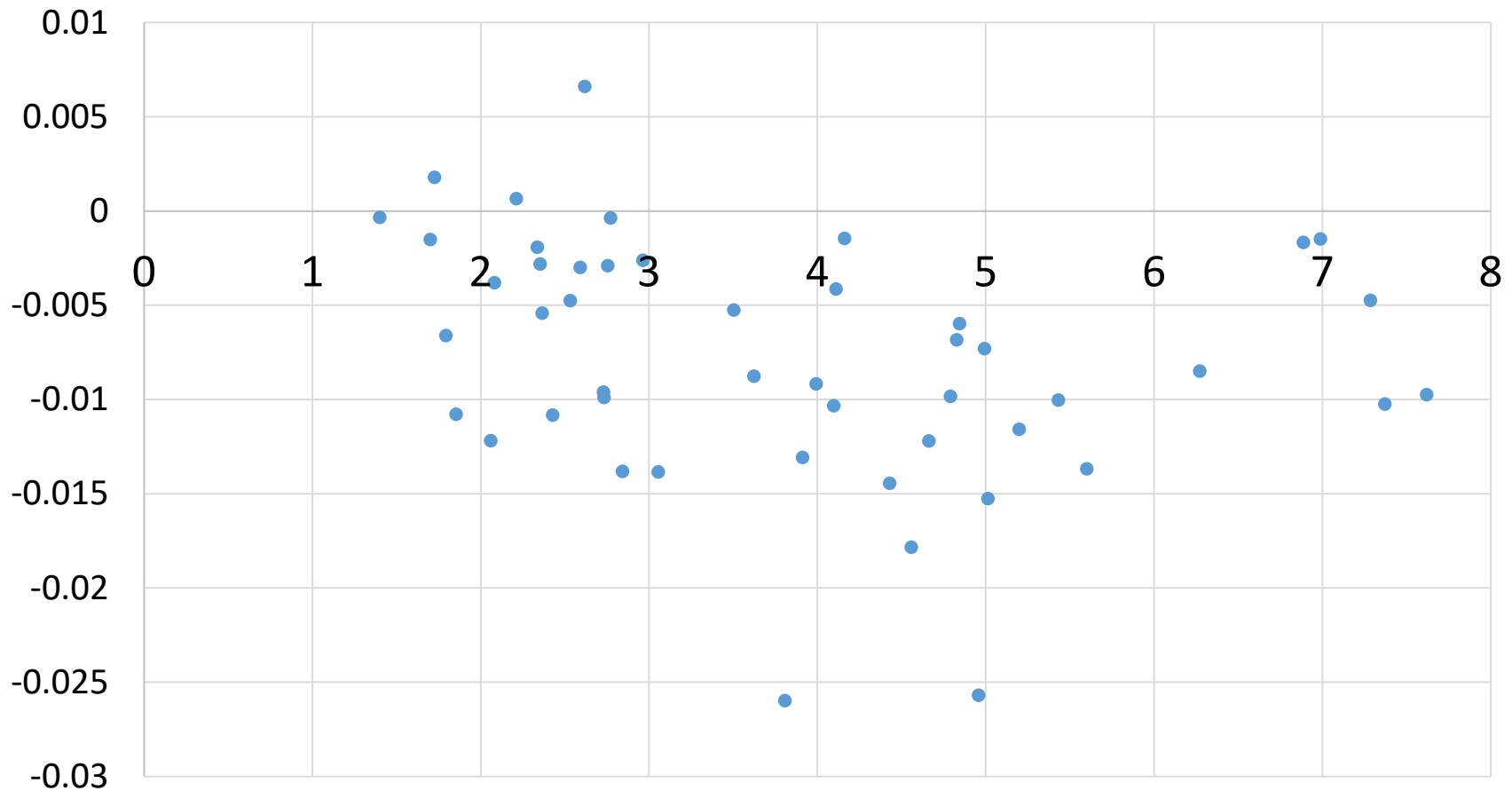
Basel vs. Minneapolis



probability of avoiding banking crisis



Great Recession change, net income/assets, and log asset size, 50 large US banks



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Theory and
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