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AN ASSESSMENT OF THE LONG-TERM ECONOMIC IMPACT OF THE NEW REGULATORY REFORM ON HONG KONG

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Abstract

This note provides a cost-benefit analysis of the proposed regulatory reform by the Basel Committee on Banking Supervision (BCBS) for Hong Kong. Following largely the methodology of a cross-country analysis by the BCBS, the long-term benefit from the reform is assumed to be derived mainly from a lower probability of a banking crisis, while the cost is mainly reflected in a lower level of GDP because of a higher lending rate charged by banks to compensate for the cost of compliance with the new regulatory standards. Our assessment results suggest that the regulatory reform would bring a net positive long-term effect for the Hong Kong economy, largely consistent with the overall assessment for selected economies by the BCBS. However, the net benefit for Hong Kong is estimated to range from 2.11% to 2.76% (in terms of real GDP) compared with the average estimates of 4.30% to 5.85% by the BCBS, assuming that banking crises cause a permanent GDP loss. The mild impact for Hong Kong probably reflects that, with the already strong capitalisation of the Hong Kong banking sector, the marginal benefit of higher capital may be relatively mild.

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I. INTRODUCTION

This note provides a cost-benefit assessment of the long-term economic impact of the new capital and liquidity reform ("the reform") on Hong Kong. Similar to the cross-country analysis by the Basel Committee on Banking Supervision (BCBS) (2010), the benefit of the reform is assumed to be generated mainly from reducing the expected loss (in terms of the level of GDP) of banking crises, which in turn is determined by the extent to which the reform reduces the probability of a banking crisis and the associated GDP loss. The cost is presumed to arise from lower GDP levels due to higher lending rates charged by banks to fully compensate for the cost of complying with the new requirements. Technical details of the estimation for the benefit and cost of the reform for Hong Kong are in Annexes A and B respectively.

II. ECONOMIC IMPACT OF THE NEW REGULATORY REFORM ON HONG KONG

Main assessment results are summarised as follows:

(1) The expected net benefit (defined as the expected gross benefit minus the expected cost) for Hong Kong is estimated to be positive for a wide range of the ratio of total common equity to risk-weighted assets (*TCE/RWA*), although the net benefit may be lower than the average estimate for selected economies by BCBS (2010). The estimated net benefit for Hong Kong is found to be critically dependent on whether banking crises are assumed to result in a temporary or permanent GDP loss.[1] The estimate for the former scenario is much smaller than the latter scenario (Table 1).

Table 1. Estimated net benefit for Hong Kong

		Temporary GDP loss		Permanent GDP loss	
TCE/RWA	**Expected Cost (%)**	**Gross Benefit (%)**	**Net Benefit (%)**	**Gross Benefit (%)**	**Net Benefit (%)**
9%	0.04	0.20	0.16	2.15	2.11
10%	0.08	0.26	0.17	2.75	2.67
11%	0.13	0.27	0.14	2.88	2.76
12%	0.17	0.27	0.10	2.91	2.74
13%	0.21	0.27	0.06	2.91	2.70
14%	0.25	0.27	0.02	2.91	2.66
15%	0.30	0.27	-0.02	2.91	2.61

Notes:
(1) The initial value of TCE/RWA is assumed to be 8%.

(2) Following BCBS (2010), all figures in the table are expressed as a percentage of pre-crisis annual GDP. The pre-crisis annual GDP for Hong Kong is taken as the real annual GDP in 1998, which preceded the onset of a period of banking distress in Hong Kong in 1999 Q1, when the classified loan ratio reached 10.06%. For details, see Annex A.

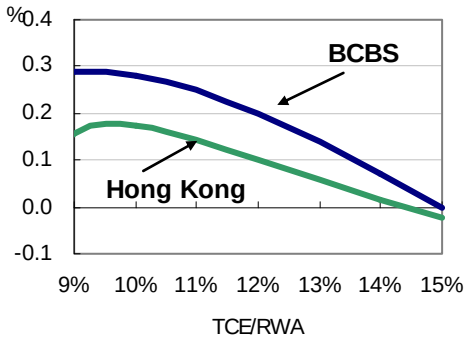
Source: Staff calculations

[1] For a banking crisis with a temporary GDP loss, the path of real GDP will finally regain its pre-crisis trend level some time after the crisis, while for a banking crisis with a permanent loss, the path of GDP stays permanently lower than its pre-crisis trend level.

(2) Assuming that banking crises only cause a temporary GDP loss, the net benefit for Hong Kong is found to be positive when *TCE/RWA* stays between 9% and 14%. The net benefit is estimated to range from 0.02% (measured by the percentage of GDP[2]) to 0.17% (Chart 1) compared to the BCBS estimates of 0.07% to 0.29%.

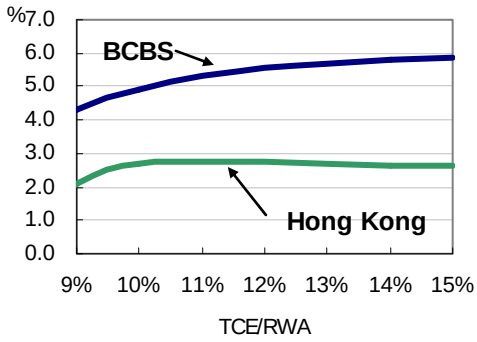
(3) If banking crises are assumed to cause a permanent GDP loss, there would be a positive net benefit for Hong Kong for a wider range of *TCE/RWA*. The net benefit is estimated to range from 2.11% to 2.76% when *TCE/RWA* stays between 9% and 15%. This compares to the BCBS estimates of 4.30% to 5.85% (Chart 2).

Chart 1. Estimated net benefit
(assuming a temporary GDP loss after a banking crisis)



Source: Staff calculations

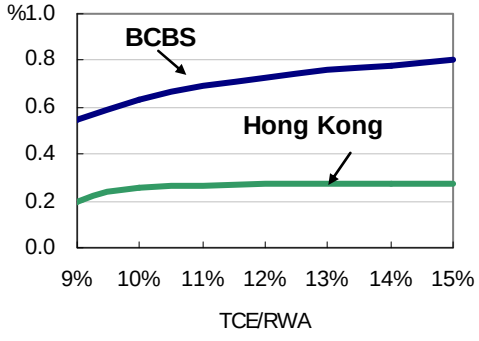
Chart 2. Estimated net benefit
(assuming a permanent GDP loss after a banking crisis)



Source: Staff calculations

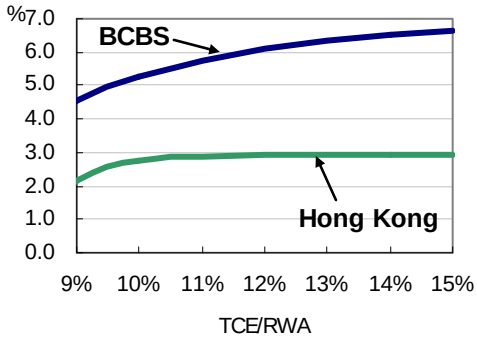
(4) It is considered that the gross benefit in the case of Hong Kong is lower than the average estimate by BCBS(2010) (see Charts 3 and 4 for banking crises with temporary and permanent losses respectively) for two reasons:

Chart 3. Estimated gross benefit
(assuming a temporary GDP loss after a banking crisis)



Source: Staff calculations

Chart 4. Estimated gross benefit
(assuming a permanent GDP loss after a banking crisis)

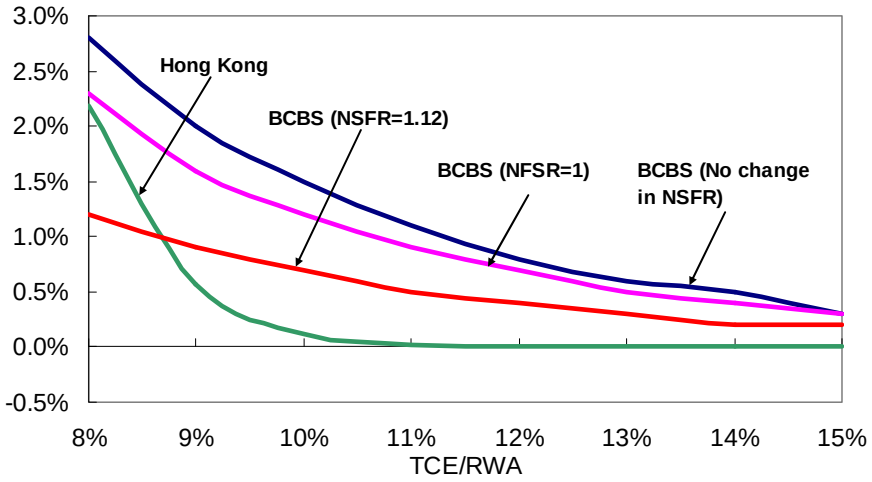


Source: Staff calculations

[2] All figures quoted in this note are expressed as a percent of real GDP in 1998 unless otherwise stated.

(a) Further reductions in the probability of a banking crisis from an increase in capital ratios may not be significant. For the range of *TCE/RWA* between 9% and 15%, the probability of a banking crisis in Hong Kong is estimated to be lower than the average estimates by BCBS (2010) (Chart 5), partly reflecting higher liquidity in the Hong Kong banking system. Therefore, an additional one percentage-point increase in *TCE/RWA* only improves the reduction in the probability of a banking crisis marginally. The marginal benefit becomes virtually zero when *TCE/RWA* is higher than 11%.

Chart 5. Probability of a banking crisis

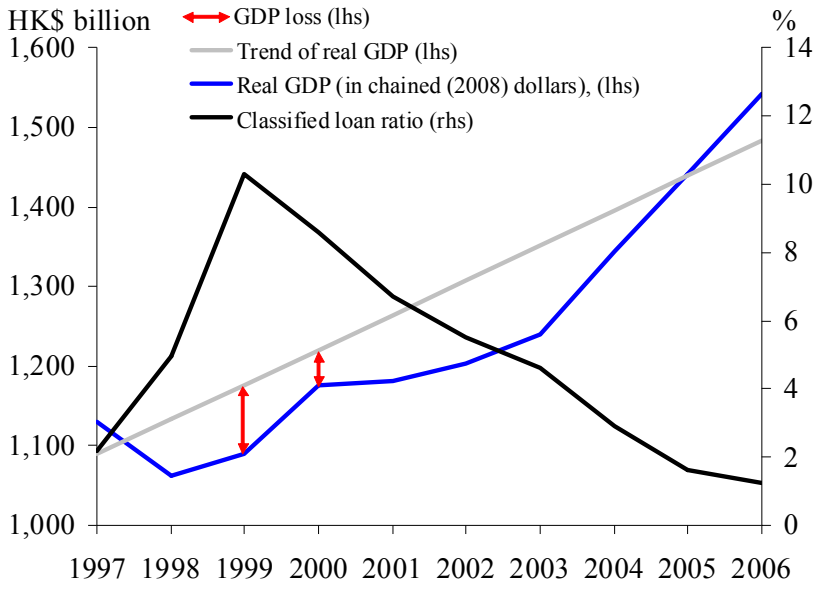


Note: NSFR denotes net stable funding ratio
Source: Staff calculations

(b) GDP losses arising from banking distress are found to be relatively moderate for Hong Kong based on the experience after the Asian financial crisis (Chart 6). Our estimation indicates that the banking distress in Hong Kong in 1999 caused a temporary GDP loss of 12.4%[3], lower than the average estimate of 19% by BCBS (2010). As banking crises that result in a permanent GDP loss have never occurred in Hong Kong, the potential impact of a banking crisis with a permanent loss cannot be estimated directly from historical data. Nevertheless, the loss is proxied by a cumulative discounted loss from a hypothetical crisis that assumes the banking distress in Hong Kong in 1999 were to occur repeatedly. The loss estimate is found to be around 133%, which is lower than the average estimate of 158% by BCBS (2010).

[3] However, it should be noted that the impact of the Asian financial crisis on the Hong Kong economy is significantly larger than the impact of the subsequent banking distress which occurred in 1999 as the negative economic impact of a sharp decrease in property prices in 1998 is not included in the impact of the banking distress which occurred in 1999 because the property price bubble before the Asian financial crisis was developed exogenously.

Chart 6. The GDP loss arising from banking distress in 1999



Notes:

(1) The GDP loss is measured by the positive gap between the trend level and the actual level of real GDP in 1999 and that in 2000. For details, see Annex A.

(2) The classified loan ratio refers to the quarterly average of the ratio.

Sources: Census and Statistics Department, HKMA and staff calculations

(5) The cost of the reform is estimated to be lower for Hong Kong than the average estimate by BCBS (2010). Specifically, a one percentage-point increase in the *TCE/RWA* translates into around 0.042% loss in the level of GDP for Hong Kong, while the median loss estimated by BCBS (2010) is 0.09%.

III. CONCLUDING REMARKS

In summary, the reform is expected to generate positive net benefits for the Hong Kong economy, albeit lower than the average estimate by BCBS (2010). The mild estimated impact of the reform is mainly due to both lower expected gross benefit and cost for Hong Kong. This is consistent with the position that the reform is not likely to generate a drastic change for Hong Kong banks in general given their strong capitalisation, high reliance on common equity in their capital base, and healthy funding structure with customer deposits as the major funding source (i.e. around 77% of total funding).

As a caveat, similar to BCBS (2010), this assessment could at best provide a broad overview of the long-term economic impact of the new regulatory reform rather than an accurate quantification, as other possible economic benefits and costs arising from

the reform[4] have not been taken into account in this assessment due to difficulties in quantification.

[4] See pages 5-6 of BCBS (2010). For example, (1) higher capital and liquidity can reduce the procyclicality of the business cycle and the severity of banking crises, leading to higher benefits; (2) higher regulatory standards, however, could lead to a shifting of risk into non-regulated sectors (e.g. shadow banking systems), which may reduce the benefit, and (3) banks may overreact to the new regulatory standards , which may imply a higher cost of the regulatory reform.

Annex A

ESTIMATIONS OF THE EXPECTED BENEFIT FROM THE REGULATORY REFORM

I. Introduction

The estimation of the expected long-term benefit from the regulatory reforms consists of two parts. The first part involves an estimation of the impact of higher capital and liquidity requirements on the probability of a banking crisis. The second part is an estimation of output losses arising from a banking crisis. The expected long-term benefit is estimated as the product of the reduction in the probability of a banking crisis (resulting from higher capital and liquidity requirements) and the output loss arising from a banking crisis.

II. Estimation of the reduction in the probability of a banking crisis

To evaluate the effect of changes in capitalisation and liquidity on the probability of a banking crisis, a linear regression model is estimated. The model is specified as:

$$Z_t = a_0 + a_1 CAR_t + a_2 LTD_t + a_3 RPPG_t + a_4 GDPG_t + \varepsilon_t \qquad \text{(A.1)}$$

where Z is the standard score implied from the estimated banking distress probability for Hong Kong.[5] The banking distress probability is taken from Wong et al. (2010)[6]. *CAR* refers to the tier-one capital adequacy ratio, while *LTD* is the loan-to-deposit ratio. *RPPG* and *GDPG* are the quarter-to-quarter growth rate of a real residential property price index and that of real GDP respectively. Detailed definitions of variables are in Annex D. Finally, ε_t is the error term with mean zero and variance σ_ε^2. The estimation sample covers the period of 1998Q1 – 2010Q2. The estimation result is shown in Table A.1.

Table A.1: Estimation result of equation A.1

Variables	Estimated coefficients
CAR_t	-0.5341*
LTD_t	0.2447*
$RPPG_t$	0.0071
$GDPG_t$	-0.6136*
R-squared	0.4410

Note: * denotes the 5% level of significance.

[5] The transformation of the probability to the standard score is necessary for satisfying the unboundness restriction on the dependent variable in the regression.

[6] For details, see Wong et al. (2010).

Based on the sign of the estimated coefficients, higher *CAR* and lower *LTD* would reduce the probability of a banking crisis. Since the capital and liquidity ratios used in the model are different from the key variables specifying the regulatory standards in the proposed reform, we follow BCBS (2010) to map the *CAR* and *LTD* to *TCE/RWA* and *NSFR* respectively. Details of the mappings are in Annex C.

The relationship between *TCE/RWA* and the probability of a banking crisis is shown in Table A.2. The probability estimates are obtained by varying the *TCE/RWA*, while keeping the other variables constant.[7]

Table A.2: The relationship between *TCE/RWA* and the probability of a banking crisis

TCE/RWA	Probability
8%	2.1866%
9%	0.5722%
10%	0.1179%
11%	0.0190%
12%	0.0024%
13%	0.0002%
14%	0.0000%
15%	0.0000%

III. Estimation of the output loss arising from a banking crisis

To estimate the output loss arising from a banking crisis, the onset and the end point of the crisis need to be determined. Following a conventional definition, the onset of a banking crisis is defined as the first time point that a banking sector's non-performing loan ratio exceeds 10%. Based on this definition, there was banking distress in Hong Kong starting in 1999 Q1 when the average gross classified loan ratio of retail banks reached 10.06%.

The end point of a banking crisis is defined as the first time point where the path of GDP regains its pre-crisis trend growth rate. Chart A.1 shows a long-term trend[8] and the actual path of real GDP for Hong Kong. As shown in the chart, the path of real GDP regains its pre-crisis trend growth rate in 2000[9] and therefore the banking distress in Hong Kong is assumed to end in 2000.

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[7] Specifically, *LTD* is assumed to be 58%, which is the simple average of the ratio at the end of December 2009 for 17 selected banks in Hong Kong. Based on the mapping in Annex C, a *LTD* of 58% roughly corresponds to a NSFR of 111% on average. For *RPPG* and *GDPG*, their long-run quarter-to-quarter average growth rates, 0.34% and 0.89% respectively, are used.

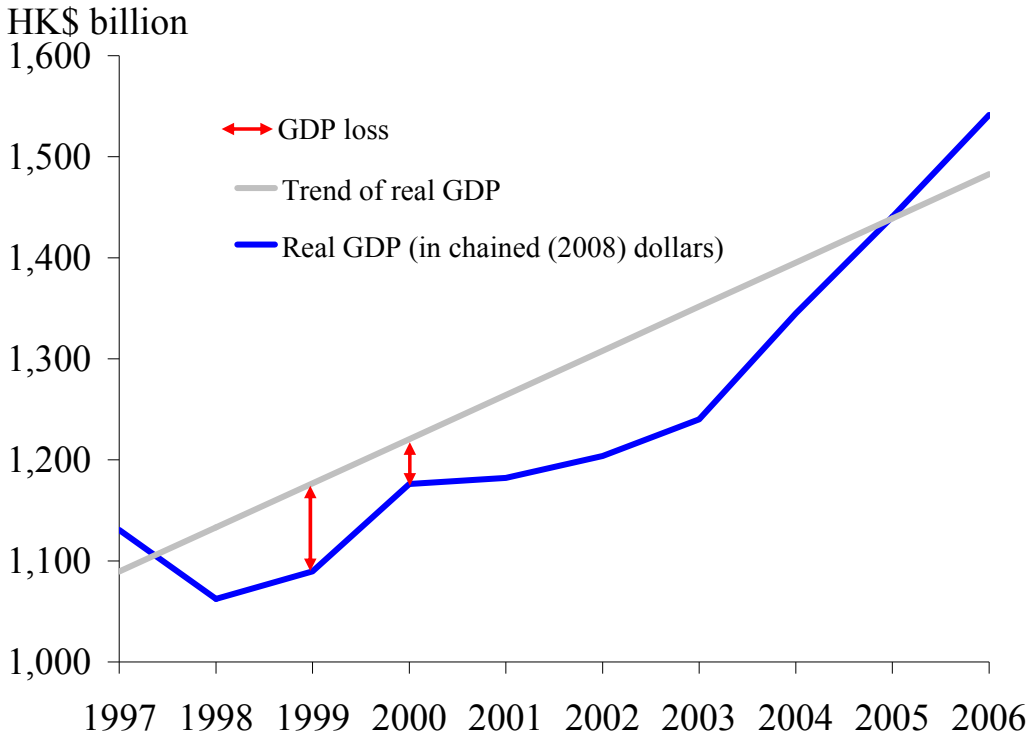
[8] The long-term trend is estimated by regressing the real GDP on a constant and a linear time trend.

[9] It should be noted that after 2000, there was a reduction in GDP caused by the burst of the internet bubble, which is not related to the banking distress.

The estimated GDP loss arising from the banking distress in 1999 is approximated by the sum of the positive gap between the trend level and the actual level of real GDP in 1999 and that in 2000. The GDP loss is estimated to be around 12.4% of pre-crisis GDP (i.e. annual real GDP in 1998).

As the path of GDP finally surpassed the long-term real GDP trend in 2005, the banking distress in 1999 is categorised as banking distress causing a temporary GDP loss rather than a permanent GDP loss.

Chart A.1: Real GDP and its long run trend



Since banking crises that result in a permanent GDP loss have never occurred in Hong Kong, the potential loss from such type of banking crises cannot be estimated directly from historical data. Nevertheless, the potential loss is proxied by a cumulative discounted loss from a hypothetical crisis that assumes the banking distress in Hong Kong in 1999 were to occur repeatedly. Using a conservative discount factor of 5% (i.e. same as that used by BCBS (2010)), the GDP loss of such banking crisis is estimated to be 133%.

Annex B

ESTIMATIONS OF THE EXPECTED COST FROM THE REGULATORY REFORM

I. Introduction

This annex provides technical details on the estimation of the cost of the regulatory reform. As discussed in the main text and further elaborated by BCBS (2010), increases in capital and liquidity requirements will raise the cost of lending. To maintain a similar level of return on equity, banks will pass through the increased cost to customers by charging a higher lending rate, which would reduce investment and consumption, and thus output in the long run. Two error-correction models are adopted to quantify this long-run impact. These include Model I to examine the long-run relationship between lending spread, capital and liquidity, and Model II to study the long-run relationship between lending spread and output.

Model I

Model I estimates the long-run relationship between lending spread (*LSpread*), capital measured by the tier-one capital ratio (*CAR*), liquidity measured by a loan-to-deposit ratio (*LTD*), return on equity (*ROE*) and interest rates (*HIBOR*). Detailed definitions of the variables are in Annex D. The specification is:

$$\Delta LSpread_t = \alpha_0 + \alpha_1 R_{t-1} + \Theta_1' \mathrm{X} + \eta_t \qquad \text{(B.1)}$$

where

$$R_t = LSpread_t - \phi_1 CAR_t - \phi_2 LTD_t - \phi_3 ROE_t - \phi_4 HIBOR_t \qquad \text{(B.2)}$$

describes the long-run relationship between *LSpread*, *CAR*, *LTD, ROE* and *HIBOR.* X is a vector of their lagged terms in first-difference form. η_t is the error term with mean zero and variance σ_η^2, and Δ is the difference operator.

Model II

Model II estimates the long-run relationship between output (*Output*), *LSpread* and *HIBOR*. The error-correction model is specified as

$$\Delta Output_t = \beta_0 + \beta_1 S_{t-1} + \Theta_2' \mathrm{Y} + e_t \qquad \text{(B.3)}$$

where

$$S_t = Output_t - \gamma_1 LSpread_t - \gamma_2 HIBOR_t \qquad \text{(B.4)}$$

describes the long-run relationships among *Output*, *LSpread* and *HIBOR*, Y is a vector of their lagged terms in first-difference form. e_t is the error term with mean zero and variance σ_e^2.

II. Empirical results

The estimation of the two error-correction models is based on quarterly data for the period of 1998 Q1 – 2010 Q2. As the capital and liquidity variables used in Model I are different from the key variables specifying the regulatory standards in the proposed reform, we follow BCBS (2010) to map the *CAR* and *LTD* to *TCE/RWA* and *NSFR* respectively. Details of the mapping are in Annex C.

Estimation results for the long-run relationship between the variables are summarised in Table B.1.[10] For equation B.2, *CAR*, *ROE* and *HIBOR* are found to be significant factors affecting *LSpread* with an expected sign. However, *LTD* is found not to be a significant factor affecting *LSpread*, probably reflecting that liquidity is not a major constraint for banks in Hong Kong on providing credit in general. *LTD* is therefore dropped from equation B.2. For equation B.4, all estimated coefficients are found to be statistically significant and have an expected sign.

Table B.1: Estimation results of equations (B.2) and (B.4)

Equation B.2

$$LSpread_t = 0.0487^{**} CAR_t + 0.1277^{**} ROE_t + 0.0256^{*} HIBOR_t + R_t$$

R-squared: 0.1528

Equation B.4

$$Output_t = -0.9021^{**} LSpread_t - 0.0208^{*} HIBOR_t + S_t$$

R-squared: 0.7645

Note: ** and * denote the 5% and 10% levels of significance respectively.

Table B.2 summarises the long-run impact of *TCE/RWA* on *LSpread* and that on *Output* based on the estimation result in Table B.1. Other things being equal, a one percentage-point increase in *TCE/RWA* will lead *LSpread* to increase by 4.7 basis points in the long run, which in turn reduces *Output* by 4.2 basis points.

[10] Nonstationarity tests suggest that all variables in equations (B.2) and (B.4) are I(1) at the 10% level of significance, suggesting that there may exist long-run relationships between the variables. All estimated coefficients in Table B.1 are found to be statistically significant and have an expected sign. Unit root tests indicate that R_t and S_t are stationary, suggesting that equations (B.2) and (B.4) are well specified to describe the long-run equilibrium relationship between the variables.

Table B.2: Impact of inceases in TCE/RWA on lending spread and output

New Capital definition (TCE/RWA)	Change in lending spread (NIM)	Change in output (GDP)
+1%	0.0468%	0.0422%
+2%	0.0935%	0.0844%
+3%	0.1403%	0.1266%
+4%	0.1870%	0.1687%
+5%	0.2338%	0.2109%
+6%	0.2806%	0.2531%
+7%	0.3273%	0.2953%
+8%	0.3741%	0.3375%

Annex C

MODELLING THE LINEAR RELATIONSHIP TCR/RWA AND CAR, AND THAT BETWEEN NSRF AND LTD

This annex provides details on how *CAR* and *LTD* are mapped to *TCE/RWA* and *NSFR* respectively. The mappings are necessary as historical data on *TCE/RWA* and *NSFR* are not available, but they play a key role in specifying the regulatory standards in the proposed reform. With the mappings, the effect on the economy from changes in *TCE/RWA* and *NSFR* can be analysed using historical data.

In constructing the mappings, we assume that there is a linear relationship (1) between *TCE/RWA* and *CAR*; and (2) between *NSFR* and *LTD*. They are specified by the following equations:

$$CAR = c + \theta \cdot TCE / RWA + \xi \qquad \text{(C.1)}$$

and

$$LTD = d + \omega \cdot NSFR + \zeta \qquad \text{(C.2)}$$

where ξ and ζ are random errors in the models.

The estimation samples for equations (C.1) and (C.2) include 14 and 17 local banks in Hong Kong respectively. The data reflects the banks' positions in 2009 Q4.

Estimation results are reported in Table C.1. As indicated by the coefficients of *TCE/RWA* and *NSFR*, we found that (i) a one percentage-point increase in *TCE/RWA* roughly corresponds to an increase of 96 basis points in *CAR* on average; and (ii) a one percentage-point increase in *NSFR* roughly corresponds to a decrease of 46 basis points in *LTD* on average.

Table C.1: Estimation results of equations (C.1) and (C.2)

	Equation (C.1)		*Equation (C.2)*
Variable	*CAR*	Variable	*LTD*
TCE/RWA	0.9589*	*NSFR*	-0.4614*
Constant	0.0299	Constant	1.0936*
R-squared	0.8408	R-squared	0.4743

Note: * denotes the 5% level of significance.

Annex D

DEFINATIONS OF VARIABLES

Variable	Definitions	Source
CAR	The average consolidated tier-one capital adequacy ratio of locally incorporated Authorised Institutions	HKMA
GDPG	The quarterly growth rate of the real GDP for Hong Kong	Census and Statistics Department
HIBOR	The 3-month HIBOR	The Hong Kong Association of Banks
LSpread	The (quarterly annualised) net interest margin of retail banks	HKMA
LTD	The average loan-to-deposit ratio of retail banks	HKMA
NSFR	Net stable funding ratio	HKMA
Output	Hong Kong's quarterly real GDP in logarithm	Census and Statistics Department
ROE	The ratio of operating profit over shareholders' funds of locally incorporated licensed banks	HKMA
RPPG	The quarterly growth rate of the real residential price index (deflated by the GDP deflator)	The property price index is from the Rating and Valuation Department, while the GDP deflator is from the Census and Statistics Department
TCE/RWA	The ratio of common equity to risk-weighted assets calculated based on the definition in the December 2009 proposal	HKMA

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