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Suomen Pankin keskustelualoitteita
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# Determinants of the loan loss allowance: some cross-country comparisons

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## Abstract

This paper analyses the determinants of banks' loan loss allowances for samples of US banks and three non-US samples: a group of 21 countries, Canada and Japan. The model includes fundamental (or non-discretionary) determinants of the allowance such as non-performing loans, and discretionary determinants such as income before the loan loss provision. The results suggest that the loan loss allowance is sensitive to pre-provision income in almost all samples. However, the results also suggest that some variables thought to reflect fundamental factors in US analysis, such as net chargeoffs, are not significant factors for non-US banks.

Key words: loan loss allowance, accounting standards, international banking, nonperforming loan, discretionary accruals

JEL classification numbers: G21, G28, E58, F23, G33

# Luottotappiovarauksiin vaikuttavat tekijät: kansainvälisiä vertailuja

## Suomen Pankin keskustelualoitteita 33/2003

Iftekhar Hasan – Larry D. Wall
Tutkimusosasto

## Tiivistelmä

Tässä tutkimuksessa analysoidaan pankkien luottotappiovarauksiin vaikuttavia tekijöitä sekä yhdysvaltalaisista pankeista koostuvassa otoksessa että kolmessa muussa otoksessa, jotka edustavat 21 maan ryhmää, Kanadaa ja Japania. Tutkimuksessa käytetty malli käsittää sekä luottotappioihin vaikuttavat perustekijät, kuten järjestämättömät luotot, että päätösperäiset tekijät, kuten pankin tuotot ennen varauksia. Tulosten mukaan melkein kaikissa tutkituissa otoksissa luottotappiovaraukset riippuvat pankin tuotoista ennen varauksia. Toisaalta tulosten mukaan eräät sellaiset tekijät, joiden Yhdysvalloissa on katsottu johtuvan perustekijöistä, eivät vaikuta merkitsevästi luottotappiovarauksiin muualla. Tällaisia ovat esimerkiksi järjestämättömien luottojen poistot.

Avainsanat: luottotappiovaraus, tilinpäätösstandardit, kansainvälinen pankkitoiminta, järjestämättömät luotot, harkinnanvaraiset jaksotukset

JEL-luokittelu: G21, G28, E58, F23, G33

# Contents

# 1 Introduction

How banks account for their loan and lease losses may have a large affect on their reported earnings and capital. Many argue that the affect on capital is large that Japanese banks have been economically insolvent for years and are able to report positive accounting capital only because they refuse to fully recognize their losses. The affect on earnings is so important that bank stock analysts routinely discuss whether a bank has managed its loan loss accounting to help smooth earnings or hit the current period's earnings target. Wall and Koch (2000) survey a number of papers on US banks' loan loss accounting. While acknowledging that the evidence is not completely consistent, they conclude that the weight of the evidence suggests that banks are using loan loss accounting to manage earnings and capital.[1]

This paper extends a small empirical literature on accounting for impaired loans by non-US banks by including an important determinant, non-performing loans, and by comparing non-US banks with those in the US. Banks in other countries have different accounting rules, different supervision and possibly different incentives. Accounting rules have been set for each country by some combination of national laws and pronouncements by accounting and bank regulatory authorities. More recently, many banks outside the US are preparing financial statements in accordance with standards set by the International Accounting Standards Board (IASB).[2] Bank supervisors in some countries, including the US, routinely conduct on-site examinations, but many other supervisors do not. The differences in incentives may arise either because of differences in incentive compensation or differences in the emphasis given by market participants to quarterly earnings.

Do these differences in the rules and incentives result in different responses to what have been considered the fundamental, or non-discretionary, determinants of the loan loss allowance (LLA)? Do non-US banks use their loan loss accounting to manage earnings or capital? If so, do they appear to have more or less discretion?

Perhaps the biggest constraint on empirical analysis of loan loss accounting by banks outside the US has been their relatively short history of reporting crucial variables, such as non-performing loans, and the small number of banks in those countries that have been providing full information. This study seeks to overcome

[1] Papers on loan loss accounting by US banks include Moyer (1990), Scholes, Wilson and Wolfson (1990), Wetmore and Brick (1994), Beatty, Chamberlain, and Magliolo (1995), Collins, Shackelford and Wahlen (1995), Bhatt (1996), Ahmed, Takeda and Thomas (1998), Kim and Kross (1998), and Hasan and Hunter (1999), Kiridaran K., G.J. Lobo, D. Yang (2003).

[2] Links to a history of the IASB may be found at < http://www.iasc.org.uk/cmt/0001.asp?s=6864420&sc={0A3016DC-1255-4FFF-BE5A-B7698B3989BD}&n=89>.

these limits by using three sources to examine both broad differences in loan loss accounting across the world, and specific differences between the US and two other countries: Canada and Japan.

The broad analysis uses data from the BankScope database. BankScope provides some of the widest coverage of countries and banking organizations of any available bank database. The set of banking organizations includes consolidated statements of bank parents, and some subsidiaries. Unfortunately, some of the variables required for this paper are not reported for many of the banking organizations on BankScope and even where reported are only available from 1993 to 2000. Nevertheless, 2620 observations from the US and 871 observations from 21 other countries are available.

In order to provide a narrower focus on individual countries, this study also compares the US with Japan and Canada. The observations on Japan are obtained by taking the 392 Japanese observations in BankScope and removing observations if the bank is not headquartered in Japan leaving a final sample of 321 observations.[3] Japan is interesting because of the stress on its loan loss accounting system from the prolonged and unusually large loan losses due to weakness in the Japanese economy.

Canada has far fewer banks than does Japan, but its banks have a longer history of reporting crucial loan quality information. Importantly, the data for the Canadian banks are available online from various editions of the six largest Canadian banks' annual reports dating back to the mid-1990s.[4] The Canadian sample is attractive because it provides a set of large banks with nationwide franchises.

Given that BankScope includes subsidiary banks but the Japanese and Canadian samples do not, the US comparison sample for these countries is obtained from a source that includes only parent companies, Bank Compustat. Those US banks smaller than the size of Canada's sixth largest bank in 2000, $US 40 billion in assets, are deleted from the Canadian comparison sample.

The remainder of the paper is organized as follows. The first section summarizes the accounting process and principles followed by banks, and the next discusses the basic empirical model. The following two sections discuss first the data and results from comparison of US and non-Us banks and then from binary

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[3] This limits the sample to banks that are: a City Bank, a Trust Company, a Long-term Credit Bank, a Regional Bank or a Member of the Second Association of Regional Banks. The lists of banks are from the Deposit Insurance Corporation of Japan < http://www.dic.go.jp/english/ e_kikan/e_kikan.html > and Japanese Banks for various years published by the Federation of Bankers Associations of Japan (Zenginkyo). Most of the observations are from the Regional Banks and Second Association of Regional Banks.

[4] These are the Bank of Nova Scotia, Bank of Montreal, Canadian Imperial Bank of Commerce, National Bank of Canada, Royal Bank of Canada, and Toronto Dominion Bank.

comparisons of Japan and Canada with the US. The last section provides concluding remarks.

# 2 Loan loss accounting

The accrual accounting rules under which banks operate require recognition of revenue as it is earned and expenses as they are incurred, regardless of the timing of the actual cash flows. The mechanical steps that banks follow in their loan loss accounting are generally similar around the world and are relatively uncontroversial. The principles that underlie the accounting, however, may differ significantly and are definitely a source of ongoing controversy. The subsection 2.1 summarizes the mechanical steps. Subsection 2.2 summarizes the principles set out by US and international accounting authorities, the views of bank supervisory officials, and the important role of bank managers.

## 2.1 The procedure for loan loss accounting

Banks operating under US generally accepted accounting principals (GAAP) follow a multi-step process to determine their allowance for loan and lease losses (LLA). At the end of each accounting period, a bank determines the probable value of the loan losses in its existing portfolio. The bank then debits its loan loss expense (or provision) by an amount equal to the difference between its estimated loan losses and the current balance in its LLA.[5] The offsetting credit increases the bank's LLA. The LLA is shown on the balance sheet as a reduction in the value of its outstanding loans (in accounting terms, it is a contra-asset account). As the period progresses, a bank will recognize that it is unlikely to collect the full value of selected loans and charges off the portions of those loans that are unlikely to be collected. As individual loans are charged-off, the offsetting entry is a reduction in the LLA. In some cases, the bank will find that it can recover part or all of the value of a loan that had been previously charged-off. The offsetting entry for these recoveries is an increase in the LLA. The combined effect of charge-offs and recoveries n the LLA is often simply referred to as charge-offs net of recoveries, or net charge-offs. At the end of the period, the process repeats. The bank compares the remaining value of its LLA with the losses in its existing portfolio.

[5] A bank may decrease its LLA with a negative provision for loan losses, but this is rare. In order for the required loan loss allowance to drop at the end of the year, a bank must find that the likely recoveries on loans previously charged-off exceed the likely loan losses on newly impaired loans.

Banks analyze loans for impairment on an individual basis where appropriate. However, given the cost of individual analysis, many types of relatively homogenous, small loans, such as credit card loans, are analyzed on a portfolio basis.

The accounting procedures followed by banks headquartered outside the U.S. follow the same basic steps. Perhaps the biggest procedural difference is that many non-US banks divide their LLA into two parts: specific allowances (or reserves) and general allowances (or reserves). As a bank concludes that individual loans will not be recovered in full, it adds to its specific allowances. The general allowance arises for groups of loans where the bank has not identified impairment on any specific loan, but based on historical experience the bank believes it likely that some part of the loan portfolio is impaired.

## 2.2 Principles of loan loss accounting

The principles underlying banks' loan loss accounting are generally determined by the GAAP in their home country. US accounting principles emphasize the importance of accurately measuring a firm's net income rather than conservatively valuing a firm's assets.[6] However, bank supervisors have taken the position that banks must be allowed to maintain "prudent" reserves that are sufficient to offset expected losses. Given their differences, the U.S. accounting authorities have had ongoing discussions with supervisors about the correct application of GAAP.[7]

Loan loss accounting has also received international attention from the accounting authorities and bank supervisors. Many of these countries have historically emphasized conservative valuation of assets over accurately measuring each period's net income. However, the creation of the International Accounting Standards Committee (IASC) and its successor, the IASB, has started many industrial countries outside the U.S. down the road towards a common set of GAAP. The European Commission has proposed that all European Union firms that are listed on a regulated exchange be required to prepare consolidated financial statements in accordance with International Accounting Standards (IAS) by 2005. The IASB has adopted standards for loan loss accounting that are generally similar to US GAAP.

Bank supervisors have also come together internationally through the Basel Committee on Banking Supervision (1998). The Basel Committee is similar to

[6] US GAAP is set by the Financial Accounting Standards Board with oversight by the Securities and Exchange Commission.

[7] Bank regulatory authorities include the Federal Deposit Insurance Corporation, the Federal Reserve, and the Office of the Comptroller of the Currency. See Wall and Koch (2000) for a review of the issues being discussed by the US accounting authorities and bank regulators.

U.S. supervisors in arguing that bank safety and soundness requires that "the accounting principles used by a bank reflect prudent and conservative valuations."

While accountants and supervisors debate the merits of different standards, the actual estimates of loan losses are determined by each bank's management. Bank managers must satisfy their accountants and supervisors that the estimates are within acceptable bounds. However, the determination of when a bank should recognize impairment of a loan and the measurement of the extent of loss is part science and part art. This lack of definitive standards gives bank managers an element of discretion over an item that may have a substantial impact on a bank's reported net income and equity capital.

# 3 Empirical analysis

The goal of empirical analysis in this paper is to determine whether managers use their discretion to influence reported net income and equity. This task would be simplified if banks announced what the value of their LLA would be absent the use of managerial discretion; that is the latent, or (in parallel with the terminology on accounting discretion) the non-discretionary value of LLA. However, given that the non-discretionary value of the LLA is not disclosed, it must also be estimated. Thus, the basic model takes the form:

$$LLA_{it} = \alpha_1 + \sum \alpha_j ND_{jit} + \sum \beta_{kt} D_{kit} + \varepsilon_{it} \qquad (3.1)$$

where
$LLA_{it}$ = loan loss allowance (reserves) for bank i at time t
$N_{jit}$ = the $j^{th}$ non-discretionary determinants of the LLA for bank i at time t,
$D_{kit}$ = the $k^{th}$ discretionary determinants of the LLA for bank i at time t, and
$\varepsilon_{it}$ = a random error.

The non-discretionary component of LLA may be proxied by variables reflecting the level of losses in the loan portfolio. The best proxy is non-performing loans, or loans on which the borrower is not current on payments, typically the borrower is at least 90 days in arrears. One interpretation of the coefficient on non-performing loans is that it estimates the proportion of non-performing loans that a bank expects to lose. In a loan loss accounting system that distinguishes specific from general reserves, this part of the estimation would roughly proxy for specific reserves.

The second proxy, total loans, may be thought of as a way of capturing general reserves. One interpretation of the coefficient on total loans is that it estimates the proportion of seemingly good loans that the bank will lose.

The coefficients on non-performing loans and total loans provide expected losses averaged across the sample. A common way of capturing variations in this expected loss rate is to the banks' net charge-offs. All else equal, a bank with a higher level of charge-offs is expected to suffer greater losses on its existing loans and should have a larger LLA.

Bankers use their accounting discretion over LLA to move their earnings and capital closer to the manager's target values. Latent earnings and capital may be proxied by their values before the incorporation of the current period's loan loss provision. As a first approximation, estimates of the target earnings and capital are often treated as cross-sectional constants. A significant positive coefficient on earnings indicates that banks with lower earnings reduce their LLA to help them increase their earnings target. A positive coefficient on the earnings variable is consistent with earnings smoothing.

Similarly, a positive coefficient on capital suggests that banks with lower capital ratios reduce their LLA to increase their capital adequacy ratios. A coefficient on capital that is not significantly positive need not signify that bank manager would never use LLA to manage capital. The expected gain to boosting capital may be very small once a bank attains sufficiently high accounting capital adequacy ratios.

In any given year, a higher loan loss provision will result in a higher value for LLA, and lower values for earnings and equity all else equal. To avoid this spurious correlation, the proxies for earnings and equity must not include the contemporaneous impact of the loan loss provision, a problem complicated by our inability to observe the impact of the provision on contemporaneous expense for taxes. This may be done with earnings by using net income before taxes and the loan loss provision. However, in the case of equity, this must be done by using the beginning of year value of equity.

Substituting in these proxies into equation (3.1) and adding year fixed effects, the basic estimation equation becomes:

$$\begin{aligned} LLA_{it} = {} & \alpha_1 + \alpha_2 NPL_{it} + \alpha_3 NCO_{it} + \alpha_3 LOAN_{it} + \beta_1 ER_{i,t-1} + \beta_2 RETN_{it} \\ & + \sum \theta_1 Y_{it} + \varepsilon_{it} \end{aligned} \tag{3.2}$$

where:
$NPL_{it}$ = the ratio of non-performing loans to total assets at time t,
$NCO_{it}$ = the ratio of net charge-offs over year t to total assets at time t,
$LOAN_{it}$ = the ratio of total loans to total assets at time t,
$ER_{i,t-1}$ = the equity to assets ratio for bank i at the end of the prior year,
$RETN_{i,t}$ = the ratio of net income before taxes and loan loss provisions to total assets for bank i in period t, and

$Y_{it}$ = year fixed effect variable that equals 1 if the observation is from year t and zero otherwise.

While the use of a variety of proxies is necessary to conduct empirical analysis, their use also complicates the interpretation of the results. In analyzing the problems with these proxies, it helps to separate banks which are experiencing asset quality problems that could generate supervisory problems from all other banks.

If a bank's latent equity capital is comfortably above supervisory capital requirements, then its incentive to manage non-performing loans, total loans and net charge-offs is rather small. Banks have little, if any, ability to increase non-performing loans above their true level within the scope of accounting rules. A bank can decrease its non-performing loans by lending sufficient money to a problem borrower so that the borrower can keep current on prior loans. However, doing so is likely to be costly as the bank must increase its exposure to the borrower and forgo taking actions to collect on the prior loan. Thus, reported non-performing loans are likely to approximate their true value for banks that are comfortably above supervisory minimums. Such banks are also unlikely to distort their reported total loans. Net charge-offs will vary across banks but this is more likely to reflect variations in charge-off policies rather than an attempt to manage LLA.

Managers of banks above their supervisory minimum may still manage their reported earnings to boost their bonuses and the bank's stock price. Banks may do so in a variety of ways, including selling assets that have appreciated or depreciated in value in order to be able to recognize the gain or loss in value in their financial statements. In general, banks may be expected to use other earnings management techniques to move reported net income in the same direction as they use loan loss provisions. The one exception occurs when the bank sharply increases its LLA. In this case, the bank may seek to boost current earnings and offset the higher loan loss provisions by recognizing gains on appreciated assets. Nevertheless, the sale of appreciated assets by the bank at a time when it is boosting its LLA supports the hypothesis that bank executives manage earnings.

A healthy bank does not need to use its loan loss accounting to manage its equity capital and attempting to do so may provoke an adverse supervisory response. However, the lack of adequate controls for the equity capital target may produce a spurious correlation. Banks with high charter value may select less risky loan portfolios and higher equity capital levels to minimize their probability of losing their charter. If so, then LLA may be negatively correlated with latent capital.

Distressed banks may issue financial statements that substantially understates the true extent of the banks' losses and thereby overstates their earnings and capital with supervisory approval. Kane (2000, p. 286) says "Bank initiated

disnformation may be viewed as an interwoven series of cover stories to mask financial weakness."[8] Along with understating the LLA, another natural part of the "interwoven cover" story is likely to be that of understating non-performing loans. Over time, such understatement may boost the coefficient on non-performing loans if the borrower becomes more insolvent through time. Banks with lower capital may also have been hiding more problems, implying the need for a larger LLA when the problems are finally recognized. Banks with severe loan problems that also have unrealized asset gains have a strong incentive to recognize those gains at the same time that they increase their LLA.

# 4 US versus Non-US banks

The US versus non-US analysis uses bank-specific data obtained from the BankScope database during 1993–2000. Although BankScope provides basic bank information on over 7,500 banks per year over the sample period, it does not have consistent information on loan loss reserves and non-performing loans. We select a group of banks from different nations that have reported clean and consistent information on loan loss reserves and non-performing loans during the sample years.[9]

## 4.1 Methodology

The basic equation for the multi-country comparison is based on equation (3.2) with two modifications. First, the expected levels of capital and earnings may vary by country. Thus, instead of the levels of capital and earnings ratios, these variables are measured as deviations from their respective national averages during the sample period. Second, country fixed effects are also added. Thus, the equation to be estimated is:

$$\begin{aligned} LLA_{it} = {} & \alpha_1 + \alpha_2 NPL_{it} + \alpha_3 NCO_{it} + \alpha_3 LOAN_{it} + \beta_1 DER_{i,t-1} + \beta_2 DRETN_{it} \\ & + \sum \gamma_1 C_{1it} + \sum \theta_1 Y_{it} + \varepsilon_{it} \end{aligned} \tag{4.1}$$

[8] See Kryzanowski and Roberts (1993, 1999) for a discussion of how Canadian banks masked their insolvency in the 1930s.

[9] The use of the lagged equity capital ratio requires that first year, 1993, be dropped from the sample.

where:
$NPL_{it}$ = the ratio of non-performing loans to total assets as of time t,
$NCO_{it}$ = the ratio of net charge-offs over year t to total assets at time t,
$LOAN_{it}$ = the ratio of total loans to total assets at time t,
$ER_{i,t-1}$ = the equity to assets ratio for bank i as of the end of the prior year, and
$E_{li}(ER)$ = the average value of $ER_{i,t-1}$ for all banks in the sample that headquartered in the same country as bank i, country l, over 1993–2000,
$DER_{i,t-1}$ = the difference between the value of $ER_{i,t-1}$ for banking organization i and the average value of $ER_{i,t-1}$ for all banks in the sample that are headquartered in the same country as bank i during 1993–2000,
$RETN_{i,t}$ = the ratio of net income before taxes and loan loss provisions to total assets for bank i in period t,
$E_{li}(RETN)$ = the average value of RETN for all banks in the sample that headquartered in the same country as bank i, country l, over 1993–2000, and
$DRETN_{i,t}$ = the difference between the value of $ROA_{i,t}$ for bank i and the average value of $ROA_{i,t}$ for all banks in BankScope that headquartered in the same country as bank i over the 1993–2000 period.

Equation (4.1) is estimated separately for the US banks and non-US banks. In order to determine whether observed differences in the two sets of coefficients in each section are significant, the following regression is estimated with observations where the separate samples are pooled:

$$\begin{aligned} LLA_{it} = {} & \alpha_1 + \alpha_2 NPL_{i,t} + \alpha_3 NCO_{i,t} + \alpha_3 LOAN_{i,t} + \beta_1 DER_{i,t-1} + \beta_2 DRETN_{i,t} \\ & + \sum \gamma_1 C_{1,i,t} + \sum \theta_1 Y_{i,t} + \alpha\alpha_1 \cdot SB_{in} + \alpha\alpha_2 NPL_{it} \cdot SB_{in} \\ & + \alpha\alpha_3 NCO_{i,t} \cdot SB_{in} + \alpha\alpha_3 LOAN_{i,t} \cdot SB_{in} + \beta\beta_1 DER_{i,t-1} \cdot SB_{in} \\ & + \beta\beta_2 DRETN_{i,t} \cdot SB_{in} + \sum \gamma\gamma_1 C_{1,t} \cdot SB_{in} + \sum \theta\theta_1 Y_{i,t} \cdot SB_{in} + \varepsilon_t \end{aligned} \tag{4.2}$$

where
$SB_{in}$ = sample binary variable equal to 1 if bank i is from sample n (US and developed countries in their respective models) and 0 otherwise.

The coefficients $\alpha\alpha_1$, $\alpha\alpha_2$, $\alpha\alpha_3$, $\beta\beta_1$ and $\beta\beta_2$ represent the difference between the coefficients from the two samples and the statistical significance of these coefficients is a test of whether statistical differences exist.

## 4.2 Results: US banks versus non-US banks

The 2620 US bank observations in the sample differ from the 871 observations taken from the rest of the world along every dimension according to Table 1. The second and third columns in Table 1 give the mean and standard deviation for the US sample. The next two columns give the same statistics for the non-US sample with the the last column gives the differences in means and notes which differences are statistically significant at the 5% level, using SAS's Proc TTest (see SAS (1999)) without assuming equal variances.

The US banks' mean assets of $17. billion are statistically significantly less than the non-US sample of $48 billion. US banks reported statistically significantly smaller loan loss problems than their non-US counterparts in all three measures of loan problems: the LLA to asset ratio, nonperforming loans to asset ratio and the ratio of net charge-offs to assets. The difference in non-performing loans is especially notable with the US ratio of 0.0050 less than one-quarter of the non-US ratio of 0.0236. The US banks also recorded substantially higher pre-tax, pre-loan loss provision earnings and a higher equity capital to asset ratio.

The estimation results also show many statistically significant differences between the US and the non-US samples. The results of estimating the model for the US (second and third columns in Table 2) show that all of the coefficients on the explanatory variables are statistically significant. Moreover, the magnitudes of the coefficients for the control variables also appear to be plausible. US banks increased their LLA by approximately $15 for every $100 of non-performing loans, $18 for every $100 of charge-offs and $1 for every $100 of loans. The positive and significant coefficient on the deviation from average pre-tax, pre-provision earnings suggests that US banks with relatively low earnings maintained a smaller LLA than banks with higher earnings. The coefficient on the deviation of the lagged capital ratio from the average capital ratio has a negative sign and is marginally significant (10% level) for US banks. This negative coefficient is consistent with high charter value banks having a higher target equity capital ratio and with banks with the lowest capital having the most hidden loan losses hidden from prior periods.

The results for the non-US sample under the columns labeled "Regression 2." The coefficients on two variables are significant and both have the predicted sign: the non-performing loan ratio and the deviation from their respective country's average pre-tax, pre-provision earnings.

The last two columns of Table 2 present the results of combining the estimation of the two models to determine if the differences between the coefficient estimates are statistically significant. The results suggest that all of the differences in coefficient estimates between the US and non-US banks are

significant except the deviation from their country's average capital ratio ($DER_{t-1}$·DUMMY). The differences in coefficients in the coefficients on non-performing loans may merely reflect differences in expected losses for those loans no longer being repaid on schedule. Not only is the difference in coefficients on charge-offs significant, the coefficient on charge-offs is insignificantly different from zero in the non-US sample. This suggests that banks in the rest of the world are not rebuilding their LLA in response to loan charge-offs. The coefficient on loans for the non-US sample is also insignificantly different from zero and significantly less than the US value. This suggests that, on average, banks in the rest of the world are not increasing their allowance to reflect as yet unidentified problems in their loan portfolio.

The difference between the coefficient on US banks' deviation from their average pre-tax, pre-provision earnings and the coefficient for the rest of the world's deviations ($DRETN_t$·DUMMY) is significantly negative. This result suggests that the allowance is more sensitive to earnings in the rest of the world sample.

# 5 Japan and Canada versus the US

The procedure for comparing Japan and Canada with the US is similar to that used above. One difference is that the use of deviations from national averages for earnings and capital are unnecessary, as separate explanatory variables exist for each country. Thus, the variable $DRETN_{i,t}$ is replaced by the variable $RETN_{i,t}$ and the variable $DER_{i,t-1}$ is replaced by $ER_{i,t-1}$. A second difference is that the country fixed effects variables are dropped.

## 5.1 Japan

Japanese banks suffered from three interrelated problems during the 1990s that may have influenced their loan loss accounting. First, the Japanese economy entered a prolonged period of weak economic growth and declining asset values which started with the decline in the stock market in 1989 and was apparent in land prices beginning in 1992 (Kanaya and Woo, 2000). This ongoing economic weakness has led to sharp reductions in the credit quality of the banks' loan portfolios and in accounting earnings. Earnings problems have, in turn, led to problems in meeting book value based supervisory capital adequacy standards. Kanaya and Woo (2000) further suggest that corporate governance problems at Japanese banks, especially ownership of bank stock by corporate borrowers, created an incentive for banks to forbear on weak credits. This incentive was

magnified by the difficulty many banks had in complying with supervisory capital adequacy standards. The end result was an increase in the levels of weak loans on the bank's books.

This economic weakness may have implications for Japanese banks' reported non-performing loans and LLA. Supervisory forbearance on potential problem loans may have allowed the banks to avoid recognizing the losses. Hoshi and Kashyap (2000) note that private sector analysts claim that official figures understate the amount of problem loans. They also note changes in accounting definitions in 1996, 1998 and 1999 that tightened Japanese reporting standards led to large increases in reported non-performing loans.[10]

The impact of such understatement on the model's estimates is unclear. To the extent that Japanese banks increase their LLA at the same percentage of non-performing loans throughout the period, the understatement may have no impact. Alternatively, if banks are only recognizing the worst of their bad loans, these loans may have higher expected loss given default, which may result in a larger coefficient on the non-performing loan ratio. A second possibility is that Japanese banks reduced their reported LLA by setting aside a smaller portion of their non-performing loans in their LLA. If true, this would reduce the coefficient on non-performing loans in the Japanese bank model.[11]

Japanese loan loss accounting also may have been influenced by several special factors. Genay (1998) points out that Japan's total loan loss reserves may be split into three categories with differing regulations: general reserves, specific reserves and foreign loan reserves. In a survey of the Japanese banking crisis, Kanaya and Woo (2000) point out that the general reserves for Japanese banks after 1964 were limited to the maximum of their own historical experience or to a reference level determined by tax authorities. Japanese banks had historically used the reference level because it had exceeded their historical experience. This reference level was 0.3% of loans in 1989 and most banks continued to use this level through the 1990s even though their actual experience was worse according to Kanaya and Woo (2000). Genay (1998) says that specific reserves were created for that part of loans deemed irrecoverable, but that only 50 percent was tax deductible. Banks could reserve more than the tax-deductible amount with approval from the Ministry of Finance. The third type of reserve for foreign loans was equal to 35 percent of loans to specific countries where transfer risk may have been material, but only one percent of the loan balance was tax deductible. These various rules may have provided an additional incentive for Japanese banks to

[10] Kanaya and Woo (2000) also note changes in the rules for consolidating related companies in December 1988 that reduced the bank's ability to hide problem loans.

[11] Another possibility would be that the non-performing loans that were reported do have a higher loss given default, but that the banks continue to use the same expected loss rate in calculating their loan loss allowance.

minimize their LLA until 1998. The 1998 implementation of prompt corrective action in Japan gave banks a mandate to make adequate provisions based on self-assessment according to Genay (1998).

Japanese banks also follow different loan charge-off policies than US banks according to Genay (1998). US banks are supposed to charge-off loans when the extent and timing of the losses can be determined. Japanese banks can only charge off loans when the debtor is in bankruptcy and the Ministry of Finance gives its approval.

As Japanese banks recognized loan losses, they may also have recognized offsetting capital gains on their holdings of bonds, land and stock during the 1990s to boost reported capital ratios. Banks were allowed to count portion of unrecognized capital gains in their capital ratios. However, Kanaya and Woo (2000) note that by realizing capital gains at the same time they were writing off loans, the banks could fully offset the impact of increased charge-offs and reserves on their tier 1 equity capital. The result may be a larger positive coefficient on pre-tax, pre-provision income empirical model.

### 5.1.1 Descriptive data

Although Japanese banks may have been trying to understate the magnitude of their bad loan problems, Table 3 suggests that problem loans were a more serious problem for Japanese banks than for the US banks. All three measures of loan problems – loan loss reserve ratio, non-performing loan ratio, and charge-off ratio – are significantly higher for Japanese banks than for US banks despite Japanese accounting rules that may have discouraged recognition of problem loans. Moreover, the differences are economically large. The loan loss reserve ratio for Japanese banks is only 10% higher than for the US sample, (0.0113 for Japan versus 0.0101 for the US), but the Japanese nonperforming loan ratio is triple the US ratio, and the charge-off ratio is almost double the US level.

Japanese banks also had statistically and economically significantly lower returns and equity capital ratios. Both ratios are less than one-half the value of US banks.

### 5.1.2 Estimation results

The coefficients on all of the explanatory variables for the US sample except the lagged equity capital ratio are statistically significant with the correct sign in Table 4. All of the coefficients on the explanatory variables for the Japanese banks are significant except for the coefficient on the charge-off ratio. The discussion of Japanese tax rules suggests that the coefficient on the loan ratio

variable might be statistically significant with a coefficient of 0.003. However, the estimated coefficient is substantially larger, at 0.0115.

The coefficients on three of the five difference variables (such as $NC_t \cdot DUMMY$) are statistically significant. One of the significant differences is that US banks increased their LLA in response to higher charge-offs whereas Japanese banks reduced their reserves by a statistically insignificant amount. This weak relationship between charge-offs and reserves in Japan may reflect the greater difficulty in charging off loans in Japan.

The second significant difference is that the coefficient on pre-tax, pre-provision earnings is statistically significantly higher for Japanese banks than for the sample of US banks. Moreover, the difference is economically significant, with the US coefficient of 0.1078 versus the coefficient for Japanese banks of 0.4179. The large coefficient may reflect greater willingness on the part of Japanese banks to recognize losses when they have higher earnings. However, it could also be that Japanese banks were timing their recognition of capital gains to occur in years where they were increasing their LLA.[12,13]

The last significant difference is that the coefficient on the lagged equity capital ratio is significantly negative for Japanese banks, but insignificantly positive for US banks Further, the coefficient $DER_{t-1} \cdot DUMMY$ is significant. The negative coefficient on Japanese banks may reflect differences in target capital ratios or the possibility that banks with lower capital having larger losses.

The value of the coefficient on non-performing loans is 0.2042 for the Japanese samples and the difference with the US ($NPL_t \cdot DUMMY$) is not significant. While only suggestive, this is not what one would expect if Japanese banks thought their non-performing loans were the worst of the worst loans, ones on which they were likely to have little or no recovery. Rather one might have expected a much larger coefficient and for the difference in coefficients with the US to be statistically significant.

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[12] As a test of whether the results were being driven by outliers, we re-estimated the equations deleting the banks in the top quarter of earnings and then re-estimated the equation deleting the top quarter in loan loss allowance. The coefficient on earnings may be substantially smaller in one or both regressions if the high positive coefficient were solely due to banks recognizing large loan losses and offsetting these losses with large securities gains. The coefficient does drop somewhat in magnitude but it remains substantially larger than the comparable coefficient for the US sample.

[13] Shrieves and Dahl (2003) also examine earnings management by Japanese banks over the 1989–1996 period. They find evidence that banks in their sample recognize greater securities gains when they also report higher provisions in a simultaneous-equations framework. One important limitation of their results is that they by using data back to 1989, they lack any information on non-performing loans.

## 5.2 Canada

While Japanese and US banks followed different paths in the 1990s, Canadian and US banks followed broadly similar paths. The early 1990s were marked by economic weakness and high loan losses. However, banks were able to benefit from the strong economic conditions later in the 1990s with lower loan losses and higher earnings.

Canadian loan loss accounting has a number of similarities to US loan loss accounting. Like the US, an independent body, the Canadian Institute of Chartered Accounts, sets Canadian accounting principles. The Canadian and US principles are similar except that the Canadian standards distinguish between specific and a general allowances. Like the US, Canadian banks can be forced to increase their LLA by their supervisor, the Office of the Superintendent of Financial Institutions (OSFI).[14] Also like the US, the equity analysts following large Canadian banks routinely comment on the adequacy of banks' LLA.

### 5.2.1 Descriptive statistics

The evidence on the average loan quality of the two samples is mixed according to Table 5. US banks have a significantly higher loan loss reserve ratio but a significantly lower non-performing loan ratio. The difference in the best measure of loan problems over the period, the charge-off ratio, is statistically and economically insignificant. The pre-tax, pre-provision earnings of US banks are significantly greater than that of Canadian banks and US banks also have a higher Tier 1 capital to total assets ratio.[15]

[14] Some of the Canadian banks report that they made changes in response changes in Canadian GAAP in 1996. For example, the Bank of Nova Scotia (Scotiabank) reported "Under these guidelines, there is a requirement to measure impairment by discounting the expected future cash flows associated with the impaired loan at the effective interest rate inherent in the loan at the date of impairment." The number of pre-1996 observations from Canada is too small to allow estimation of the effect of these changes.

[15] The primary difference between the tier 1 risk-based capital ratio and the equity to capital ratio is that the tier one ratio uses risk weighted exposure rather than total assets. Canadian, US and many other bank supervisors used the tier 1 ratio rather than the equity capital ratio during the 1990s. This ratio was not used in the other models because more of the banks in Bank Scope report equity and assets than report their tier 1 capital ratio.

### 5.2.2 Estimation results

The coefficient estimates for the sample of US, Canadian and combined samples are presented in Table 6. The coefficients on three variables (the non-performing loan ratio, the charge-off ratio, and the pre-tax, pre-provision earnings) are significant with the expected signs for the US banks. Only the coefficient on the non-performing loan ratio s significant for the Canadian banks,. Unlike the results of Naciri (2002), the results in Table 6 reject the hypothesis that Canadian banks are using loan loss accounting to manage earnings. The differences in findings could be due to a either difference in sample periods, Naciri uses data from 1980 to 1996, or a difference in the methodology.[16]

Some of the differences in coefficients between the two samples are economically large, however, given the imprecision of the coefficient estimates, none of the differences are statistically significant. Thus, we cannot reject that the US and Canadian banks are following a similar approach to their loan loss accounting.

# 6 Conclusion

How banks account for their impaired loans has a potentially large impact on their reported earnings and capital. While many studies have examined the loan loss accounting of US banks, banks outside the US have received much less attention. This paper uses data from the BankScope database, the Compustat database and from Canadian banks financial statements to provide empirical evidence on loan loss accounting in other countries.

The results suggest that while banks outside the US share many similarities with US banks, they also differ in some important ways. An important, albeit not surprising, similarity is that the loan loss reserve ratio in all samples is significantly related to the non-performing loan ratio. While the coefficients on this ratio vary across the samples, the differences may merely reflect cross-

[16] One hypothesis that could explain the difference in results is that Canadian banks were focused on rebuilding their tier 1 capital ratios early in the period, and focused on earnings management only after their tier 1 capital approached the banks' target levels. In order to check this possibility, we reran the regressions estimating a set of earnings and capital coefficients for banks below some presumed target level and coefficients for banks above some presumed target level. Some evidence was found supporting the existence of a capital target at low capital levels and earnings targets at higher capital target levels when we arbitrarily set the tier 1 capital target at 9 percent. The coefficient on capital is positive and marginally significant (10 percent) for banks below the 9 percent target, the coefficient on earnings is positive and marginally significant for banks above the target. The other earnings and the other capital coefficients are both insignificant.

country differences in expected losses on non-performing loans. However, the results for the other two "non-discretionary" explanatory variables are different between the US and non-US samples. The loan charge-off ratio is statistically significant for every sample of US banks and statistically insignificant for all non-US samples. The loan to asset ratio is significant for two of the three US samples but never significant for the non-US samples. This raises the question of whether these variables proxy for non-discretionary determinants of loan loss reserves in the US sample. Perhaps these are better seen as measures of US banks desire to maintain some discretionary minimum ratios of loan loss reserves to loans. Alternatively, these variables may not be the best proxies for underlying non-discretionary determinants of the loan loss reserve for banks outside the US.

In terms of the discretionary determinants of the loan loss reserve, the coefficients on the pre-tax pre-provision earnings ratio are generally significant with a positive sign, with the exception of the Canadian bank sample. The coefficients on the earnings ratio are significantly lower for US banks than for the non-US bank sample, and for the Japanese bank sample. These differences may reflect differences in the financial market benefits of managing earnings or in the flexibility that management has to manage earnings (ie, the cost of managing earnings). However, in at least some cases, the results may also reflect banks' determination to artificially boost reported net income, such as by realizing capital gains, in those periods where they need to increase their LLA.

The coefficients on the lagged measures of capital adequacy, equity capital to assets and tier 1 risk-based ratio, are rarely significant with the correct sign. These coefficients are usually insignificant, but when significant they are negative rather than positive. These results suggest the need to better model banks' target capital ratios.

Finally, the non-US samples generally produce different results from the US, suggesting that research on loan loss accounting practices by banks outside the US may add not only to our insight about accounting outside the US but also accounting practices in the US. However, this study also illustrates the limits of using the same model for the US and non-US banks. The next logical place for research is more in-depth analysis that takes account of special factors and regulatory practices in individual countries.

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Table 1. **Descriptive statistics of bank scope banks (1994–2000) US and rest of the world**

| Variables and ratios (all ratios are relative to total assets) | US Banks | | Rest of world banks | | US vs. world |
|---|---|---|---|---|---|
| | Mean | Standard deviation | Mean | Standard deviation | difference in means |
| Total assets (in thousands) | $17,936,774 | $58,346,221 | $48,566,975 | $102,412,151 | $30,600,000** |
| Loan loss reserve ratio ($LLA_t$) | 0.0103 | 0.0061 | 0.0129 | 0.0077 | 0.0026** |
| Nonperforming loan ratio ($NPL_t$) | 0.0050 | 0.0060 | 0.0236 | 0.0210 | 0.0186** |
| Charge-off ratio ($NC_t$) | 0.0036 | 0.0075 | 0.0044 | 0.0054 | 0.0008** |
| Loan ratio ($LOAN_t$) | 0.6391 | 0.1201 | 0.6596 | 0.1430 | 0.0204** |
| Past year's return ($RETN_t$) | 0.0227 | 0.0150 | 0.0135 | 0.0088 | –0.0090** |
| Past year's equity ratio ($ER_{t-1}$) | 0.0865 | 0.0230 | 0.0591 | 0.0347 | –0.0270** |
| Number of observations | 2620 | | 871 | | |

Note: ** = significantly different for the same variable between the US and rest of world at the 5% significance levels.

Table 2. **Estimation of loan loss allowance, US versus rest of world, using bank scope data**

| Variables/Ratios | Regression 1 USA sample parameters | t-statistics | Regression 2 World sample parameters | t-statistics | Regression 3 Combined sample parameters | t-statistics |
|---|---|---|---|---|---|---|
| Intercept | 0.0041*** | 5.32 | 0.0110*** | 7.73 | 0.0110*** | 7.80 |
| Nonperforming loan ratio ($NPL_t$) | 0.1461*** | 10.31 | 0.2517*** | 25.55 | 0.2517*** | 25.80 |
| Charge-off to asset ratio ($NC_t$) | 0.1768*** | 9.48 | 0.0483 | 1.42 | 0.0483 | 1.43 |
| Loan ratio ($LOAN_t$) | 0.0104*** | 14.44 | 0.0010 | 0.68 | 0.0010 | 0.69 |
| Deviation from average pre-tax, pre-provision earnings $RETN_t$ ($DRETN_t$) | 0.1684*** | 17.82 | 0.2385*** | 8.14 | 0.2385*** | 8.22 |
| Deviation from average lagged equity ratio $ER_{t-1}$ ($DER_{t-1}$) | –0.0068* | –1.84 | 0.0004 | 0.06 | 0.0004 | 0.06 |
| USA sample dummy (DUMMY) | – | – | – | – | –0.0069*** | –4.26 |
| $NPL_t$·DUMMY | – | – | – | – | –0.1056*** | –6.12 |
| $NC_t$·DUMMY | – | – | – | – | 0.1284*** | 3.33 |
| $LOAN_t$·DUMMY | – | – | – | – | 0.0094*** | 5.89 |
| $DRETN_t$·DUMMY | – | – | – | – | –0.0702** | –2.30 |
| $DER_{t-1}$·DUMMY | – | – | – | – | –0.0072 | –0.93 |
| Adjusted $R^2$ | 0.5233 | | 0.6933 | | 0.5939 | |
| F-statistics | 262.37*** | | 64.45*** | | 119.68*** | |
| Number of observations | 2620 | | 871 | | 3491 | |

Note: ***, **, * = significant at 1%, 5% and 10% significance levels respectively.
All three regressions included annual fixed-effects variables. Regressions 2 and 3 also include country fixed-effects variables

Table 3. **Descriptive statistics (1994–2000) – US and Japan**

| Variables and ratios (all ratios are relative to total assets) | Banks in US | | Banks in Japan | | US vs Japan |
|---|---|---|---|---|---|
| | Mean | Standard deviation | Mean | Standard deviation | Difference in means |
| Total assets (in thousands) | $14,452,460 | $59,654,010 | $29,744,487 | $103,385,455 | $15,300,000.00** |
| Loan loss reserve ratio ($LLA_t$) | 0.0101 | 0.0043 | 0.0113 | 0.0058 | 0.0012** |
| Nonperforming loan ratio ($NPL_t$) | 0.0071 | 0.0081 | 0.0258 | 0.0195 | 0.0186** |
| Charge-off ratio ($NC_t$) | 0.0020 | 0.0031 | 0.0039 | 0.0052 | 0.0019** |
| Loan ratio ($LOAN_t$) | 0.6302 | 0.1055 | 0.7280 | 0.0627 | 0.0978** |
| Pre-tax, pre-provision earnings ($RETN_t$) | 0.0182 | 0.0075 | 0.0076 | 0.0032 | -0.0110** |
| Past year's tier 1 capital to risk assets ratio ($ER_{t-1}$) | 0.0886 | 0.0272 | 0.0394 | 0.0081 | -0.0490** |
| Number of observations | 1871 | 1871 | 321 | 321 | |

Note: ** = significantly different for the same variable between the U.S. and Japanese banks at the 5% significance levels.

Table 4. **Estimation of loan loss allowance – US and Japan**

| Variables/Ratios | Regression 1 US sample parameters | t-statistics | Regression 2 Japan sample parameters | t-statistics | Regression 3 Combined sample parameters | t-statistics |
|---|---|---|---|---|---|---|
| Intercept | 0.0021*** | 3.24 | –0.0034 | –1.30 | –0.0034 | –1.24 |
| Nonperforming loan ratio ($NPL_t$) | 0.1874*** | 16.11 | 0.2042*** | 13.01 | 0.2042*** | 12.35 |
| Charge-off to asset ratio ($NC_t$) | 0.2987*** | 10.08 | –0.0221 | –0.52 | –0.0221 | –0.49 |
| Loan ratio ($LOAN_t$) | 0.0075*** | 9.40 | 0.0115*** | 3.50 | 0.0115*** | 3.32 |
| Pre-tax, pre-provision earnings ($RETN_t$) | 0.1078*** | 9.39 | 0.4179*** | 6.12 | 0.4179*** | 5.81 |
| Average lagged equity ratio ($ER_{t-1}$) | 0.0042 | 1.32 | –0.0583** | –2.34 | –0.0583** | –2.22 |
| US sample dummy (DUMMY) | – | – | – | – | 0.0055* | 1.95 |
| $NPL_t$·DUMMY | – | – | – | – | –0.0168 | –0.83 |
| $NC_t$·DUMMY | – | – | – | – | 0.3208*** | 6.01 |
| $LOAN_t$·DUMMY | – | – | – | – | –0.0040 | –1.12 |
| $RETN_t$·DUMMY | – | – | – | – | –0.3101*** | –4.26 |
| $DER_{t-1}$·DUMMY | – | – | – | – | 0.0625** | 2.36 |
| Adjusted $R^2$ | 0.2901 | | 0.6606 | | | |
| F-statistics | 70.48*** | | 57.63*** | | 50.00*** | |
| Number of observations | 1871 | | 321 | | 871 | |

Note: ***, **, * = significant at 1%, 5% and 10% significance levels respectively.

Table 5. **Descriptive statistics (1994–2000) – US and Canada**

| Variables and ratios (all ratios are relative to total assets) | Banks in US Mean | Banks in US Standard deviation | Banks in Canada Mean | Banks in Canada Standard deviation | US vs Canada Difference in means |
|---|---|---|---|---|---|
| Total assets (in thousands) | $US 113,789,018 | $US 132,860,006 | $CA 208,750,512 | $CA 84,708,550 | $94,800,000 |
| Loan loss reserve ratio ($LLA_t$) | 0.0114 | 0.0029 | 0.0084 | 0.0035 | –0.0030** |
| Nonperforming loan ratio ($NPL_t$) | 0.0050 | 0.0022 | 0.0089 | 0.0045 | 0.0038** |
| Charge-off ratio ($NC_t$) | 0.0035 | 0.0023 | 0.0030 | 0.0019 | –0.0004 |
| Loan ratio ($LOAN_t$) | 0.6459 | 0.0825 | 0.5808 | 0.0733 | –0.0650** |
| Pre-tax, pre-provision earnings ($RETN_t$) | 0.0238 | 0.0058 | 0.0126 | 0.0025 | –0.0110** |
| Past year's tier 1 capital to risk assets ratio ($ER_{t-1}$) | 0.0851 | 0.0162 | 0.0767 | 0.0092 | –0.0080** |
| Number of observations | 147 | 147 | 43 | 43 | |

Note: ** = significantly different for the same variable between U.S. and Canadian banks at the 5% significance levels.

Table 6. **Estimation of loan loss allowance – US and Canada**

| Variables/Ratios | Regression 1 US sample parameters | t-statistics | Regression 2 Canada sample parameters | t-statistics | Regression 3 Combined sample parameters | t-statistics |
|---|---|---|---|---|---|---|
| Intercept | 0.0017 | 0.76 | 0.0008 | 0.21 | 0.0008 | 0.13 |
| Nonperforming loan ratio ($NPL_t$) | 0.7049*** | 6.09 | 0.8243*** | 11.32 | 0.8243*** | 6.63 |
| Charge-off to asset ratio ($NC_t$) | 0.4385*** | 4.32 | 0.0439 | 0.28 | 0.0439 | 0.16 |
| Loan ratio ($LOAN_t$) | 0.0021 | 0.83 | –0.0023 | –0.60 | –0.0023 | –0.35 |
| Pre-tax, pre-provision earnings ($RETN_t$) | 0.0808** | 2.18 | –0.0085 | –0.11 | –0.0085 | –0.07 |
| Past year's tier 1 capital to risk assets ratio ($ER_{t-1}$) | –0.0151 | –1.26 | 0.0277 | 0.69 | 0.0277 | 0.40 |
| US sample dummy (DUMMY) | – | – | – | – | 0.0009 | 0.13 |
| $NPL_t$·DUMMY | – | – | – | – | –0.1195 | –0.73 |
| $NC_t$·DUMMY | – | – | – | – | 0.3946 | 1.39 |
| $LOAN_t$·DUMMY | – | – | – | – | 0.0043 | 0.63 |
| $RETN_t$·DUMMY | – | – | – | – | 0.0893 | 0.67 |
| $ER_{t-1}$·DUMMY | – | – | – | – | –0.0429 | –0.62 |
| Adjusted $R^2$ | 0.4797 | | 0.8870 | | 0.6403 | |
| F-statistics | 11.35*** | | 28.46*** | | 13.94*** | |
| Number of observations | 147 | | 43 | | 190 | |

Note: ***, **, * = significant at 1%, 5% and 10% significance levels respectively.

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