Bank Capital and Implicit Government Support:
Sources of Stability for Canadian Banks during the Great Depression*

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Abstract

This paper attributes the stability of Canadian banks during the Great Depression to their recapitalization from 1927 through 1930 and to implicit government support during 1932 and 1933. The recapitalization of 30.50 percent caused the idiosyncratic risk of Canadian banks to decline, preventing an increase in systematic risk after the stock-market crash of 1929. After the abandonment of the gold standard in late 1931, banks became insolvent on a market-value basis leading to implicit government support. To limit the government's loss exposure, banks engaged in reserve-management strategies that increased their reserves to 20.57 percent of demand deposits by 1932.

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Gorton and Huang (2006) present a theoretical model that asserts that as asymmetric information increases between bank managers and depositors, the incentive for managers to engage in moral hazard increases as does the probability of bank runs. Bank runs are labeled efficient (inefficient) if they occur at bad (good) banks, i.e., those with high (low) levels of asymmetric information and managers who are engaged (not engaged) in moral hazard. Efficiency in the banking system is increased by correctly distinguishing between good and bad banks and by creating liquidity so that good banks do not have to liquidate their assets. Three banking structures are modeled: (1) small independent unit banks (least-efficient structure); (2) highly branched, large banks (most-efficient structure); and bank coalitions (medium-efficient structure). [1]

Gorton and Huang (2006) argue that the large-bank structure is more efficient because diversification eliminates information asymmetries. Information asymmetries are reduced when depositors can accurately predict bank-portfolio returns, which are composed of a market and an idiosyncratic premium. Both depositors and managers are aware of the market premium, but managers have better information regarding the unit-bank idiosyncratic premium. However, for diversified banks, the idiosyncratic component is replaced by the "diversified idiosyncratic mean return" (Gorton and Huang, 2006, p. 1620). Because large, highly branched banks diversify away idiosyncratic risk, they provide more transparent information than do unit banks.

Gorton and Huang (2006) further assert that when economies experience macroeconomic downturns, highly branched banks can self-monitor moral hazard by closing branches. Because

[1] Unlike unit banks that are restricted to one geographic area forcing them to be non-diversified in both their asset and liability portfolios, large consolidated banks with extensive branching networks promote liability and asset diversification. Liability diversification results by collecting funds from depositors in different regions of a country and

branch closures are public information and because less-profitable branches are closed first, the quality of bank assets is improved causing depositors to gain confidence thus preventing bank runs. Gorton and Huang (2006) conclude that because diversification eliminates asymmetric-information problems and allows for self-monitoring by closing branches, large, highly branched banks do not need to hold as much in reserves as do unit banks. To bolster this claim, their Table 1 shows that from 1870 through 1919, large, highly branched Canadian banks held fewer reserves as measured by securities-to-assets ratios than did small U.S. unit banks.

In a similar vein, Saunders and Wilson (1999) show that Canadian equity levels declined from approximately 25 percent in 1893 to about 5 percent in 1992. Seventy-five percent of this decline occurred by 1932, a period of time in which the number of banks in Canada also declined from 48 to 10. Because this period was also marked by a steady decline in Canadian bank failures, Saunders and Wilson (1999) conclude that the decline in bank equity occurred because bank consolidation results in more diversified asset and liability portfolios, which makes the provision of large amounts of stockholder equity unnecessary because of the reduction in idiosyncratic risk.[2]

This paper conducts empirical tests of Gorton and Huang's (2006) model by revisiting the issue of Canadian-bank stability during the Great Depression. Gorton and Huang (2006) relate that "In broad outlines, the distinction between the big bank system and the system of small independent unit banks corresponds to the difference between the Canadian and U.S. systems." In

by accepting deposits in both rural and urban areas. Asset diversification results because loans are originated in different regional economies, which also helps increase diversification across industries.

[2] Saunders and Wilson (1999) also argue that the adoption of deposit insurance in the U.S. during the 1930s achieved the same result as did Canadian bank consolidation. Because the number of U.S. bank failures dropped significantly after deposit insurance was implemented, the new safety net "largely supplanted the historical role of high bank capital levels in providing protection to risk-adverse depositors." Furthermore, Saunders and Wilson (1999, p. 537) assert "that bank asset-risk choices in the 1980s are comparable to those observed in the 1890s" in both the U.S. and Canada, which suggests that both deposit insurance and bank consolidation can reduce bank risk without producing moral-hazard incentives. This explanation for the reduction in U.S. bank-capital levels stands in stark contrast to a long line of research starting with Buser, Chen and Kane (1981) and more recently Berger et al. (1995) and Wagster (2007) that

1929, there were eleven chartered banks with extensive branching networks in Canada while in the U.S. there were more than 25,000 unit banks (Walter, 2005). Even though the U.S. and Canada experienced similar declines in economic activity from 1929 to 1933, more than 20 percent of U.S. banks failed amidst widespread depositor runs (Friedman and Schwartz, 1963, p. 299) while no bank failures or runs occurred in Canada.

In addition to structure, there were other differences between these systems during this period: (1) Canada did not have a central bank until 1935, while the U.S. Federal Reserve was established in 1913. Canada did, however, have a "lender-of-last-resort" facility because the Finance Act of 1914 allowed the Canadian Treasury Board to lend reserves to banks in exchange for certain assets that would serve as collateral; [3] (2) Canadian banks issued bank notes that served as Canada's currency while Federal-Reserve notes served as the U.S. currency; (3) shareholders in both countries were subject to double liability[4], however, Kane and Wilson (1998) argue that the effectiveness of double liability in the U.S. had broken down by the 1930s[5]; and (4), while the U.S. adopted a deposit-insurance program in 1933, Canada did not do so until 1967.[6]

Two hypotheses are tested with the first being the "diversification hypothesis." It asserts that the stability of Canadian banks during the Great Depression was because the Canadian banking system had evolved into a relatively small number of large, highly branched, efficient

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argues that bank equity declines when deposit insurance is implemented because bank managers have incentives to shift risk to the deposit guarantor.

[3] Gorton and Huang (2006) define a lender-of-last-resort as "an institution which provides liquidity to banks so that they do not have to liquidate their projects."

[4] Wagster (2007) reports that double liability "meant that stockholders of an insolvent bank undergoing liquidation could lose the par value of their stock twice because the receiver could require them to pay the par value of their holdings to help liquidate the bank's unpaid debts. Hence, stockholders could lose the par value once if their shares became worthless and lose the par value again if the receiver issued a call for the maximum amount. Other bank shareholders relied upon this contingent liability to motivate large-block shareholders to monitor bank managers for them."

[5] Kane and Wilson (1998) assert that double liability in the U.S. became ineffective as banks sought a wider base of capital to fund growth opportunities. When shareholder concentration declines, free-rider problems can decrease the effectiveness of double-liability provisions.

[6] See Wagster (2007) for more about the 1967 adoption of deposit insurance in Canada.

banks.[7] Stock-market and accounting data of eight Canadian banks over the 1926 to 1934 period are studied, and the sample is divided into large- and small-bank portfolios consisting of four banks each (see Appendix 1). There were two exogenous shocks that occurred during the Great Depression with the first being the "Black Tuesday" stock-market crash of October 29, 1929 and the second the abandonment of the gold standard by Great Britain on September 21, 1931. The study's time period is divided by these dates into the pre-stock-market-crash (1926-1929), post-stock-market-crash (1930-1931) and the post-gold-standard periods (1932-1934).

An event study is conducted for each exogenous shock. To support the hypothesis, the large more-diversified banks are expected to have a larger positive (or a less-negative) abnormal return than the smaller less-diversified banks. Additionally, any large-bank risk reductions (increases) should exceed (be less than) that of the small banks. This is not a test of the unit-banking structure versus the large, highly branched banking structure. It is, however, a test of the argument that during a banking crisis, a large, highly branched bank will have less risk than a small less-diversified bank. Consequently, because it is less risky, the large bank requires fewer reserves (Gorton and Huang, 2006) and less stockholder-supplied capital (Saunders and Wilson, 1999) than the small bank.

The event-study results fail to support the diversification hypothesis. The results reveal that shareholders of both portfolios experience wealth losses at the 1 percent level of significance to both events (see Table 1). However, the wealth loss to the stock-market crash for the large-bank portfolio is larger than that of the small-bank portfolio at the 10 percent level, which is the opposite of what the diversification hypothesis requires. Moreover, because no difference is detected

[7] Carr, Mathewson and Quigley (1995) assert that the stability of Canadian banks resulted not only from their large and highly branched structure but also because there was not a deposit-insurance program or a central bank in Canada during this period. This motivated depositors to closely monitor bank managers, which helped them to make prudent

between the shareholder wealth losses of the large- and small-bank portfolios to the abandonment of the gold standard, no benefit to being more diversified is found. Furthermore, the large-bank portfolio has a significant increase in systematic risk at the 10 percent level in the post-stock-market-crash period while no risk increase is detected for the small-bank portfolio, which is contrary to what the hypothesis argues. Finally, both portfolios experience statistically significant increases in systematic risk at the 1 percent level in the post-gold-standard period, but no significant difference is detected. This implies there is not a benefit to being more highly diversified.

To investigate why large banks had an increase in systematic risk during the post-stock-market-crash period while small banks did not, the component parts of the beta coefficients are studied. It is found that the correlation coefficients increased 121.05 percent for the large banks and 203.28 percent for the small banks from the pre- to the post-stock-market-crash periods and remain elevated during the post-gold-standard period (see Table 2). Concurrently, the standard-deviation declined 5.60 percent for the large-bank portfolio and 15.39 percent for the small-bank portfolio from the pre- to the post-stock-market-crash periods, but then increased 132.35 percent for the large-bank portfolio and 180.57 percent for the small-bank portfolio from the post-stock-market-crash to the post-gold-standard periods.

The increase in correlation lowers the degree of diversification throughout the study period making an increase in systematic risk more probable. However, from the pre- to the post-stock-market-crash periods this effect is completely offset by the large decline in the standard deviation of the small-bank portfolio and partly offset by the much smaller decline in the standard deviation of the large-bank portfolio. Between the post-stock-market-crash and the post-gold-standard

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decisions, because their deposits were at risk. Regulators were also motivated because if depositors of failed banks lost their money, they most likely would seek revenge when voting in the next election.

periods, both portfolios experience large increases in systematic risk because they both have large increases in their standard deviations in conjunction with the much higher level of correlation.

The decline in idiosyncratic risk after the stock-market crash was most likely caused by a 30.50 percent increase in the capital base ($71,934,562) of Canadian banks that occurred from 1927 through 1930, which was equivalent to 11.45 percent of demand deposits in 1929 (see Table 3). In 1929 alone, $42,005,327 of this new capital was raised, which is 58.39 percent of the total. This recapitalization of Canadian banks is attributed with producing the unprecedented stability of Canadian banks following the stock-market crash of 1929.

Next, an alternative risk measure is estimated using the methodology of Hovakimian and Kane (2000). The risk-adjusted deposit-insurance premium per dollar of deposits (*IPP*) is the value of a put option on a bank's assets thus it is a comprehensive idiosyncratic measure of bank risk. During the post-stock-market-crash period, the *IPP* of both portfolios are extremely low at 0.00 percent (see Table 4). However, during the post-gold-standard period, the large-bank *IPP* increases to 3.02 percent while the small-bank *IPP* increases to 1.04 percent. The risk increase of the large-bank portfolio is three times that of the small-bank portfolio, which is the opposite of what the diversification hypothesis requires. These findings confirm the earlier results of the event-study and the systematic-risk analysis regarding the stability of Canadian banks after the stock-market crash and their huge increases in risk following the abandonment of the gold standard.

The last hypothesis tested is the "government-guarantee hypothesis" that derives from Kryzanowski and Roberts (1993) who maintain that during the Great Depression Canadian banks were insolvent on a market-value basis. They argue that Canadian banks avoided depositor runs and failure because of regulatory forbearance and a regulatory "policy of encouraging the early merger of troubled banks and healthier banks, standing ready to lend to banks, and providing an *implicit 100 percent guarantee* of bank deposits by effectively guaranteeing all deposits at par." They conclude that even though large, highly diversified banks may be able to withstand local or regional shocks better than unit banks, they may not be able to resist national or international shocks.

Support for this hypothesis is presented by Kane and Wilson (2002) who find a large surge in safety-net capital[8] during the Great Depression. This wealth transfer to stockholders from the Canadian government probably consisted of regulatory forbearance and an implicit guarantee of bank deposits. Kane and Wilson (2002) use Saunders and Wilson's (1999) dataset and conduct an empirical analysis over the same time period and find numerous regulatory and crisis events in Canada and the U.S. where safety-net capital was provided. In Canada, from 1893 through 1936, 30 out of 43 years indicated surges (70 percent) while from 1937 through 1992, 8 out of 55 years indicated surges (15 percent). This suggests that during the period described by Saunders and Wilson (1999) in which Canada's banks were consolidating and their capital levels were dropping, implicit government support was being provided 70 percent of the time.

To test this hypothesis, the methodology of Hovakimian and Kane (2000) is used to calculate debt-to-assets ratios (*B/V*) using market-value estimates. The results show that the large Canadian banks were insolvent on a market-value basis during 1932 and 1933 (see Table 4), the first two years of the post-gold-standard period, while the equity position of the small banks declined to zero. Both large and small banks were solvent in all of the other years studied. These results suggest that the quality of bank assets had declined over the previous two years and had therefore negated the benefit of the earlier recapitalization. This further suggests that safety-net capital may have been provided to the Canadian banks during 1932 and 1933.

[8] Kane and Wilson (2002) define safety-net capital as wealth that is transferred from governments to shareholders because shareholder-contributed capital is not adequate to support bank liabilities.

If the government did provide an implicit guarantee of bank deposits, bank managers could increase their bank's expected returns by shifting risk to the guarantor. Hovakimian and Kane's (2000) methodology is used to test for risk-shifting incentives and, as reported in Table 5, none are found in the pre- and post-stock-market-crash periods but they are detected in the post-gold-standard period. This finding is consistent with our previous result that large and small banks were solvent throughout the study period except during 1932 and 1933, when both probably needed safety-net capital. In summary, the results presented in Tables 4 and 5 provide support for the government-guarantee hypothesis during the post-gold-standard period.

If the Canadian government provided an implicit guarantee for Canadian banks, steps were probably taken to limit their loss exposure. To investigate this possibility, balance-sheet data are used to calculate excess central-gold-reserve deposits and excess contingent-shareholder liability for both the large- and small-bank portfolios. Charter banks could issue bank notes up to the amount of the par value of their outstanding stock, which was also the limit of contingent stockholder liability created by the double liability of shareholders. Above this amount, central-gold reserves (i.e., gold and Dominion notes that were redeemable in gold) were deposited with the government to act as collateral for the issuance of additional bank notes. During the Great Depression the amount of outstanding bank notes declined in lock step with the decline in economic activity. Central-gold reserves that were no longer needed as collateral could be withdrawn or left on deposit and used as reserves making possible an immediate issuance of bank notes. If the amount of outstanding bank notes dropped below the bank's par value, the contingent shareholder liability that was no longer needed to collateralize bank notes became excess reserves too.

The results suggest that bank managers used a combination of excess central-gold-reserve deposits and excess contingent-shareholder liability in conjunction with Finance-Act advances to offset increases in risk thus helping to limit the government's loss exposure. In 1932, the excess central-gold reserves and excess contingent-shareholder liability of the eight banks studied equaled 8.70 percent of their demand deposits while Finance-Act advances had grown to 11.87 percent of demand deposits (see Table 6). Consequently, in the first of the two years in which large Canadian banks were insolvent on a market-value basis and the equity level of small banks had declined to zero, reserves equivalent to 20.57 percent of demand deposits had been secured.[9]

To gain additional insight into these findings, a regression analysis is conducted that uses *IPP* as a dependent variable and the hypothetical reserve ratio ([excess central-gold reserves plus excess contingent-shareholder liability]/demand deposits) and the Finance-Act-advances ratio (Treasury-Board advances/demand deposits) as independent variables. The results indicate that as the risk of the large banks increased, they increased the amount of their excess central-gold-reserve deposits while decreasing their reliance on Finance-Act borrowings (see Table 7). Small banks, however, increased their reliance on Finance-Act borrowings and were not as dependant as the large banks in using excess central-gold-reserve deposits.[10]

Lastly, an analysis is conducted of Gorton and Huang's (2006) argument that bank branches were reserves for Canadian banks during the Great Depression. The results reveal that the average cost of opening a branch was $44,341 from 1927 through 1930 while the average liquidation value of a branch from 1931 to 1934 was $3,471. This suggests that Canadian banks

[9] In 1932 alone, 30 percent of the reserves were raised. The large banks primarily raised excess collateral while the small banks relied more on Finance-Act advances. Table 6 shows that in 1932, excess collateral for the large banks increased $11,147,933 and Finance-Act advances increased $8,214,000. For the small banks, excess collateral increased $999,520 and Finance-Act advances increased $6,000,000. This total one-year increase in reserves of $26,361,183 is equivalent to 6.17 percent of 1932 demand deposits.

[10] The amount of both types of reserves were completely transparent to the public because it could be ascertained from monthly reports published in the *Financial Post* entitled "Return of the Chartered Banks of the Dominion of Canada."

probably closed rented or leased facilities before owned facilities most likely because commercial real estate was difficult to sell during the Great Depression. To sell owned facilities, large price concessions would be necessary which would result in losses. These real-estate losses would reduce the book-value capital of banks, which would already be under pressure from the other asset losses of the banks. Hence, the argument that bank premises can act as reserves for banks during a macroeconomic crisis is suspect.

The remainder of the paper is as follows. Section 1, 2 and 3.A provide tests of the diversification hypothesis. Section 1 details an event study of the stock-market crash of 1929 and the abandonment of the gold standard in 1931. Section 2 presents an in-depth analysis of the changes in systematic risk found by the event study and presents an analysis of the capital positions of the banks. Section 3 provides yearly and period estimates of *IPP*, *B/V* and other risk measures and tests for differences in the means of the variables between periods. These results are used for insights into both the diversification (part A) and the government-guarantee (part B) hypotheses. Section 4 provides further tests of the government-guarantee hypothesis using the methodology of Hovakimian and Kane (2000) to test for risk-shifting incentives for managers of Canadian banks. Section 5 provides balance-sheet data showing the amount of excess bank-note collateral and Finance-Act advances and the ratio of these variables to demand deposits. A regression analysis is then performed to find any correlations between these two ratios and bank risk. Finally, an analysis is conducted of Gorton and Huang's (2006) argument that bank branches acted as reserves for Canadian banks during the Great Depression. Section 6 concludes. Appendix 1 provides details about the bank sample and Appendix 2 describes the system of bank-note issuance used in Canada prior to 1935 and about the provisions of the Finance Act.

1. EVENT-STUDY TEST OF THE DIVERSIFICATION HYPOTHESIS

This section conducts an event study of the two most important events that affected Canadian banks during the Great Depression, namely the “Black-Tuesday” stock-market crash on October 29, 1929 and the abandonment of the gold standard by Great Britain over the weekend of September 19-20, 1931.

1.A. Data

Weekly stock-market prices are gathered from the *Financial Post* from December 28, 1925 to August 13, 1934.[11] When a stock did not trade, the previous week’s price is used for the no-trade week. Some no-trade weeks did occur for a few stocks, but these were infrequent events. There were no stock splits during the time period studied and all prices are in Canadian currency.

Eight chartered banks are studied that are combined into three bank portfolios. The all-banks portfolio consists of all eight banks; the large-bank portfolio consists of the Royal Bank of Canada, Bank of Montreal, Canadian Bank of Commerce, and the Bank of Nova Scotia; the small-bank portfolio consists of the Banque Canadienne Nationale (Canadian National Bank), Dominion Bank, Imperial Bank of Canada and the Bank of Toronto. The banks are segmented by total assets in 1927 (see Appendix 1).[12]

A market index that consists of 20 industrial stocks is gathered from the *Financial Post* for the same time period as the bank-stock prices. While the closing price for the week is given for all of the bank stocks, only the high and low values for the week are given for the market index. This paper uses the weekly low value for the market index because stock prices are declining over the two periods studied thus the low value provides a more conservative estimate of abnormal returns.

[11] Data collection stopped after August 13, 1934 because the *Financial Post* began publishing a new market index that was not comparable to the previous market index.
[12] La Banque Provinciale du Canada (The Provincial Bank of Canada) is not included in the sample even though balance-sheet data is available over the entire time period because its stock prices are not reported in the *Financial*

The test results reported in Table 1 have been replicated using the weekly high value of the index as well as an average of the weekly high and low values. The empirical results are qualitatively the same regardless of the index used.[13]

Staff (May 28, 1932) reports that when Great Britain abandoned the gold standard over the weekend of September 19-20, 1931, "To prevent panic, exchanges all over North America and Europe either closed, declared the last previous prices to be the minimum prices for trading, or forbade short selling." In Canada, minimum prices are established. Shortly thereafter, the minimum prices of internationally traded stocks and all stocks with prices below $3 are eliminated. However, the minimums remain in effect for Canadian banks through the week-ending price of May 16, 1932.

During this eight-month period, the *Financial Post* reports both over-the-counter prices and on-exchange minimum prices for Canadian banks. However, minimum and over-the-counter prices are identical and did not change until the week ending on January 11, 1932. Beginning with this date, prices began declining and the over-the-counter prices changed more frequently than did the minimum prices. Because minimum prices rarely changed, there is a large and abrupt price drop when the minimums are eliminated. The over-the-counter prices also change infrequently until about six weeks before the minimums are ended. The empirical tests have been conducted using both minimum and over-the-counter prices. Minimum prices produce the most dramatic and statistically significant results; however, the qualitative results are unchanged regardless of the prices used. Therefore, in the interest of conservatism, over-the-counter prices are used during this time period.

2.B. Methodology

Post. The lack of stock-market data may be because of the bank's size. Its total assets in 1927 are $50,716,541 while the Bank of Toronto's total assets, the smallest bank studied, are $129,295,378.

To measure the wealth effects of the stock-market crash and the abandonment of the gold standard, this article uses a Multivariate Regression Model (MVRM) similar to that used in Wagster (1996, 2007). The MVRM explicitly incorporates contemporaneous dependence of the disturbances into hypothesis tests, which is important because systematic events in an economy or industry presumably affect firms during the same calendar time period making cross-sectional correlation in the error terms probable thus reducing the power of statistical tests. The MVRM is estimated as a system of seemingly unrelated equations and the return-generating process is explicitly conditioned on the occurrence or nonoccurrence of an event by appending zero-one dummy variables to the market-model equation. Another advantage of this model is in providing a framework for testing highly interesting cross-firm and cross-event coefficient restrictions in hypothesis tests.

Wealth effects and changes in systematic risk are estimated as follows:

$$R_{nt} = \alpha_n + \alpha_n D_{S,1} + \alpha_n D_{S,2} + \beta_n M_t + \beta_n D_{S,1} M_t + \beta_n D_{S,2} M_t + \Sigma D_e \delta_{ne} + \varepsilon_{nt} \qquad (1)$$
$$n = 1, 2, \ldots, N;\; t = \text{Jan. 4, 1926,..., August 13, 1934};\; e = 1, 2;$$

Where

R_{nt} = the weekly rate-of-return of bank n at time t (from January 4, 1926 through August 13, 1934);

α_n = the intercept coefficient for bank n;

$\alpha_n D_{S,1}$ = the first shift in the intercept coefficient for bank n;

$D_{S,1}$ = a shift dummy variable that equals zero from January 4, 1926 to October 28, 1929 (the pre-stock-market-crash period) and 1 from November 4,1929 to January 4, 1932 (the post-stock-market-crash period);

$\alpha_n D_{S,2}$ = the second shift in the intercept coefficient for bank n;

[13] These results are available from the author upon request.

$D_{S,2}$ = a shift dummy variable that equals zero from January 4, 1926 to January 4, 1932 (the last week that banks' minimum and over-the-counter prices were identical) and 1 from January 11, 1932 to August 13, 1934 (the post-gold-standard period);

β_n = the systematic-risk coefficient measuring the sensitivity of bank *n*'s returns to market returns;

$\beta_n D_{S,1}$ = the shift in the systematic-risk coefficient for bank *n* between the pre- and post-stock-market-crash periods;

$\beta_n D_{S,2}$ = the shift in the systematic-risk coefficient for bank *n* between the post-stock-market-crash period and the post-gold-standard period;

M_t = the weekly rate-of-return on an index of 20 industrial stocks reported by the *Financial Post* at time *t*;

δ_{n1} = the effect of the October 29, 1929 stock-market crash on bank *n*;

D_1 = a dummy variable that equals one for the weeks of November 4 through November 25, 1929, thus encompassing the four weekly returns after the stock-market crash;

δ_{n2} = the effect of the abandonment of the gold standard on bank *n*;

D_2 = a dummy variable that equals one for the weeks ending January 11 through June 13, 1932, thus encompassing the period of price variability following the establishment of minimum prices until they are eliminated (January 11, 1932 through May 16, 1932) and the four weekly returns after minimum prices are eliminated;

ε_{nt} = random disturbances assumed to be i.i.d. normal, independent of the return of the market index and the event variables.[14]

1.C. Research Hypotheses

Test 1: H_o: $\Sigma_{n=1,\ldots N}\ \Sigma\delta_{na} = 0\ \forall_a$; *the abnormal return for a bank equal-weighted portfolio to each event a equals zero. This is tested with two F tests per portfolio, one test for each event studied. The results of this test are displayed in columns 8 and 9 of Table 1.*

Test 2: H_o: $\Sigma_{n=1,\ldots N}\ \Sigma_{a=1,\,2}\delta_{na} = 0$; *the cumulative abnormal return for each portfolio over both events a equals zero. The purpose of this F test is to provide information about how the wealth of shareholders of Canadian chartered banks were affected by the two main events of the Great Depression. This is tested with one F test per portfolio, with the results displayed in column 10 of Table 1.*

Test 3: H_o: $\Sigma_{n=1,\ldots N}\ \beta_n D_1 M_t = 0$; *the change in systematic risk of an equally weighted bank portfolio to the stock-market crash of October 29, 1929 equals zero. The results of this test are displayed in column 6 of Table 1.*

Test 4: H_o: $\Sigma_{n=1,\ldots N}\ \beta_n D_2 M_t = 0$; *the change in systematic risk of an equally weighted bank portfolio to the abandonment of the gold standard equals zero. The results of this test are displayed in column 7 of Table 1.*

Test 5: H_o: $\Sigma_{n=1,\ldots 4} - \Sigma_{n=1,\ldots 4} = 0$; *the difference in the coefficients of the large-bank and small-bank portfolios for all regression parameters and events is not significantly different from zero. The results of this test are reported in the bottom row of Table 1.*

1.D. Empirical Results

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[14] Time series autocorrelation is detected and the residuals are transformed using the Prais-Winston methodology (Kmenta 1986).

The results are presented in Table 1. The results for test 1 are displayed in columns 8 and 9 and reveal that shareholders of all three bank portfolios experience significant wealth losses to both events at the 1 percent level. Not surprisingly, the results for test 2 that are displayed in column 10 also show that all three portfolios have significant wealth losses at the 1 percent level cumulated over the two events. The results for test 5 displayed in column 8 indicate that the difference between the large- and small-bank portfolio abnormal returns to the stock-market crash, -2.86 and -1.79 percent, respectively, is significant at the 10 percent level.

Column 6 of Table 1 displays the results of test 3. This test reveals that the large-bank portfolio had a statistically significant increase in systematic risk at the 10 percent level to the stock-market crash. Column 7 displays the results of test 4 and they indicate that all three portfolios had increases in systematic risk at the 1 percent level to the abandonment of the gold standard.

The results to the stock-market crash are the opposite of what the diversification hypothesis requires. The shareholders of large banks had significantly greater wealth losses than did the small-bank shareholders and the systematic risk of the large banks increased while no increase was detected for the small banks. Moreover, no discernable difference between the wealth effects or the changes in systematic risk is found between the large- and small-bank results to the abandonment of the gold standard thus no benefit to being highly diversified is detected. Therefore, no support for the diversification hypothesis is found by these tests.[15]

[15] The event study was replicated using a dummy variable to account for the minimum-price period (September 21, 1931 through May 16, 1932). The ending of the post-stock-market-crash period and the beginning of the post-gold-standard period were adjusted accordingly, as was the second event period (to May 23, 1932 through June 13, 1932). All of the results were qualitatively the same as those reported in Table 1 except for three, none of which affect the interpretation of the results. The differences are the significance of the market-return parameter for the all-banks portfolio increases from the 10 to the 5 percent level, the significance of the market-return parameter for the large-bank portfolio increases from the 5 to the 1 percent level, and the significance level for the difference-of-means test between the cumulative wealth effect of the large- and small-bank portfolios increases from non-significant to showing the large-bank portfolio's wealth loss was greater than the small-bank portfolio's at the 5 percent level. The author thanks James T. Moser for suggesting this modification.

Furthermore, column 5 reveals that the beta coefficient of the large-bank portfolio is 0.07 during the pre-stock-market-crash period while the beta coefficient of the small-bank portfolio is 0.02. This indicates that the systematic risk of the large banks is greater than that of the small banks, which is the opposite of what the diversification hypothesis argues. This relationship also holds for the other two periods. Column 6 reveals that the large-bank beta in the post-stock-market-crash period is 0.15 (.07+.08) while the small-bank beta is 0.06, and column 7 shows that the large-bank beta is 0.28 in the post-gold-standard period while the small-bank beta is 0.18.

In the next section, the component parts of the beta coefficients are studied to ascertain why systematic risk increased at the 1 percent level of significance after the abandonment of the gold standard but did not in the post-stock-market crash period.

2. AN ANALYSIS OF THE CHANGES IN SYSTEMATIC RISK FOUND IN TABLE 1

2.A. Analyzing the Component Parts of Beta

The beta coefficients displayed in Table 1 will be disaggregated into the standard deviation of returns on the large- and small-bank portfolios ($\sigma_{portfolio}$), the standard deviation of returns on the 20 industrial-firm market index (σ_{market}), and the correlation of returns of each portfolio with the market index ($\rho_{portfolio,market}$):

$$\beta = \rho_{portfolio,market} * (\sigma_{portfolio} / \sigma_{market}). \qquad (2)$$

Table 2 presents the results. Columns 1 through 5 report results for the large-bank portfolio. Columns 6 through 10 report results for the small-bank portfolio. Panel A reports results for the pre-stock-market-crash period (1/4/26-10/28/29), Panel B for the post-stock-market-crash period (11/04/29-1/4/32), and Panel C for the post-gold-standard period (1/11/32-8/13/34). Panel D reports the percentage change in the variables between the pre- and post-stock-market crash periods while Panel E reports the percentage change in the variables between the post-stock-market-crash and the post-gold-standard periods.

Equation 2 reveals that in order to have a large increase in beta, either the correlation coefficient or the standard-deviation relative must have an extremely large increase or both must have smaller simultaneous increases. Panel D details that the large-bank correlation coefficient increased 121.05 percent (column 4) and that the small-bank correlation coefficient increased 203.28 percent (column 9). However, as Table 1 reveals, this increase was not sufficient to cause a significant increase in systematic risk, probably because the large-bank standard-deviation relative declined 11.27 percent (column 3) and the small-bank standard-deviation relative declined 20.48 percent (column 8). These large declines were caused by each portfolio's standard deviation decreasing while the standard deviation of the market index increased. Specifically, the standard deviation of the returns on the large-bank portfolio declined 5.60 percent (column 2), the standard deviation of the small-bank portfolio declined 15.39 percent (column 7) while the standard deviation of the market index increased 6.40 percent (column 2 and 7).

The results displayed in Panel E show that the significant increase in systematic risk between the post-stock-market-crash and the post-gold-standard periods detailed in Table 1 were caused by both the standard-deviation relative and the correlation coefficient of the two portfolios simultaneously increasing. Specifically, the correlation coefficient of the small-bank portfolio increased an additional 48.45 percent (column 9) while the correlation coefficient of the large-bank portfolio decreased 10.17 percent (column 4). Even though the large-bank portfolio's correlation coefficient declined from its elevated level in the post-stock-market-crash period, it is still 98.58 percent higher than it was in the pre-stock-market-crash period. The standard-deviation relative of the large-bank portfolio increased 82.74 percent (column 3) because the standard deviation of the portfolio and the market index increased 132.35 and 27.14 percent, respectively (column 2). The standard-deviation relative of the small-bank portfolio increased 120.67 percent (column8), driven by an increase in its standard deviation of 180.57 percent (column 7).

These results reveal that the correlation of the returns on the bank portfolios and the market index increased after the stock-market crash and then stayed at elevated levels throughout the Great Depression. The standard deviations of the portfolios, however, decreased after the stock-market crash and then increased after the abandonment of the gold standard. The next section seeks evidence to help explain why the standard deviations of the portfolios declined after the stock-market crash.

2.B. An Analysis of the Capital Positions of the Canadian Banks

Table 3 provides details about the components of the capital-to-assets ratios of the bank portfolios. Specifically, total assets (column 2), capital stock (column 4), rest account, i.e., retained earnings (column 6), undivided profits (column 8), common equity (column 10) and the capital-to-assets ratio (column 12) are listed by year (column 1) for the all-banks (Panel A), the large-bank (Panel B) and the small-bank portfolios (Panel C). Each odd-numbered column provides the percentage change from one year to the next for the column to its left. Common equity is the sum of columns 4, 6 and 8. The capital-to-assets ratio is column 10 divided by column 2.

Recall that the results displayed in Table 1 show that there was not a significant increase in systematic risk after the stock-market crash of 1929. Moreover, the results displayed in Table 2 indicate that the reason no shift occurred was because the standard deviation of the large- and small-bank portfolios declined. The results displayed in Table 3 suggest that the decline in the standard deviations was because of an increase in common equity of 30.50 percent ($71,934,562) for all of the banks over the 1927 through 1930 period. Even more telling, 58.39 percent

($42,005,327) of this total was raised in 1929 alone. The large banks raised a total of $63,854,729 in new capital of which $34,969,662 was raised in 1929, or 54.76 percent of their total. The small banks raised a total of $8,079,883 in new capital of which $7,035,665 was raised in 1929, or 87.08 percent of their total.

From 1934 to 1969, the average reserve ratio (reserves/insured deposits) of the Bank Insurance Fund in the U.S. was 1.5 percent of insured deposits (U.S. Congressional Budget Office, 2005). To give perspective to the amount of new capital raised by Canada's banks, a ratio will be calculated that substitutes newly raised capital for reserves. Column 8 of Table 6 provides the amount of deposits for the all-banks portfolio (Panel A), the large-bank portfolio (Panel B) and the small-bank portfolio (Panel C) by year. For the all-banks portfolio, the total amount of new capital raised equals 11.45 percent of their demand deposits in 1929 ($71,934,562/$628,040,009) and 13.50 percent in 1930. For the large-bank portfolio, the total amount of new capital raised equals 11.85 percent of their demand deposits in 1929 and 14.01 percent in 1930. For the small-bank portfolio, the total amount of new capital raised equals 9.06 percent of their demand deposits in 1929 and 10.49 percent in 1930. When one considers the fact that the Canadian banks had raised enough new capital to equal 11.45 percent of their 1929 demand deposits when the average reserve ratio of the U.S. Bank Insurance Fund was 1.5 percent, the decline in the standard deviation of the bank portfolios in the post-stock-market-crash period is not surprising.

Column 2 of Table 3 reveals that the total assets of the banks were increasing from 1926 through 1929 while Column 12 shows that the capital-to-assets ratios were decreasing from 1926 through 1928. It appears that the Canadian banks increased their capital over the 1927 through 1930 period in an attempt to bring their capital-to-assets ratios back to their 1926 level. For example, the capital-to-assets ratio for the all-banks portfolio was 8.36 percent in 1926 and was increased from its 1928 low of 7.63 percent to 8.25 percent in 1929. For the large-bank (small-bank) portfolio the 1926 ratio is 7.90 (10.42) percent in 1926 and was increased from its 1928 low of 7.29 (9.24) percent to 7.88 (10.13) percent in 1929.

It is unlikely that any of the additional capital raised was in response to the stock-market crash of 1929. Falconridge (1929, p. 65) reports that capital stock could only be increased after the shareholders passed a by-law at the annual or a special called meeting, both of which required a public announcement one month prior to the date of the meeting. After passing the by-law, the company had to fulfill two requirements. The first was that an application to the Treasury Board for approval had to be made within three months of the by-law passage. The second was that a copy of the by-law and notice that the bank was applying to the Treasury board for its approval had to be published for at least four weeks in the *Canada Gazette* and another newspaper where the bank's head office is located. Finally, new capital stock was offered to the bank's existing shareholders on a *pro rata* allotment basis. They had a minimum of 90 days to decide if they would take the stock. If they did not, the stock could then be offered by subscription to the public. Since the stock market crashed on October 29, 1929, it is unlikely there would not have been enough time to have secured approval and issued new stock in response to the crash.

The results presented in this section fail to provide support for the diversification hypothesis. The large increase in the correlation coefficient and the standard deviation of the bank portfolios after the abandonment of the gold standard negated the benefits of being diversified and led to a large increase in systematic risk. Furthermore, the same result most likely would have occurred after the stock-market crash in 1929 except that the increase in the capital base decreased the idiosyncratic risk of the banks.

Finally, additional evidence discrediting the diversification hypothesis is found in comparing the results displayed in column 2 of Table 2 with those of column 6. The standard deviation of the large-bank portfolio in column 2 is larger in all three periods than that of the small-bank portfolio. It is 31 percent larger in the pre-stock-market-crash period, 46 percent larger in the post-stock-market-crash period, and 21 percent larger in the post-gold-standard period. This is the opposite of what the diversification hypothesis would predict.

In the next section, alternative risk measures are used in the concluding tests of the diversification hypothesis (section 3.A) and in the first tests of the government-guarantee hypothesis (section 3.B).

3. LEVELS AND CHANGES IN *IPP*, σ_V, σ_e and *B/V*

3.A. Additional Evidence Regarding the Diversification Hypothesis

Next, yearly and period estimates are made of the level of the actuarially fair deposit-insurance premium per dollar of deposits (*IPP*), the volatility of assets (σ_V) and the volatility of equity (σ_e) using Hovakimian and Kane's (2000) model (SPM 1). The model requires the use of balance-sheet data, which are found in annual editions of *Moody's Manual of Investments*. The pre-stock-market-crash period encompasses 1926 through 1929, the post-stock-market-crash period encompasses 1930 through 1931, and the post-gold-standard period encompasses 1932 through 1934.

Deposit insurance is modeled as a single-period European put option on a bank's assets (Merton, 1977) with bank debt maturing in one year (the estimated time between bank audits by the insurer, hence t = 1 in the model). Following Giammarino, Schwartz and Zechner (1989) in studying Canadian banks and Ronn and Verma (1986) and Hovakimian and Kane (2000) in studying U.S. banks, regulatory forbearance is modeled by letting asset value decline to 97 percent (ρ = 0.97) of debt value before the equity call kicks in. The model allows shareholders to receive dividends (δ is the fraction of the bank's assets distributed at each interim dividend payment, denoted T) until the next audit occurs, even if, in the interim, the bank becomes insolvent. Bank equity (E) is modeled as the sum of the present value of the dividends distributed before the next audit and a dividend-unprotected European call option.

The variables IPP, V (the market value of assets), and σ_V are not directly observable and must be estimated by solving two simultaneous equations. The first, equation (3), states σ_V as a function of E, V and σ_E via Ito's lemma. The second, equation (4), is the call-option formulation for equity. These solution values are used in equation (5) to find IPP as the value of a put option on bank assets.

$$\sigma_V = \sigma_E (E/V)/(\partial E/\partial V), \tag{3}$$

$$E = V[1-(1-\delta)^T]+V(1-\delta)^T N(x_1) - \rho BN(x_2), \tag{4}$$

$$IPP = N(-x_4) - (1-\delta)^T (V/B)N(-x_3). \tag{5}$$

where

$$x_1 = [ln[V(1-\delta)^T/\rho B] + \sigma_V^2 t/2]/[\sigma_V t^{1/2}],$$

$$x_2 = x_1 - \sigma_V t^{1/2},$$

$$x_3 = [ln[V(1-\delta)^T/B] + \sigma_V^2 t/2]/[\sigma_V t^{1/2}],$$

$$x_4 = x_3 - \sigma_V t^{1/2}.$$

Table 4 presents the results. Each year's results are detailed in columns 2 through 5 for the pre-stock-market-crash period, columns 7 and 8 for the post-stock-market-crash period, and columns 10 through 12 for the post-gold-standard period. Column 6 gives each variable's mean for the pre-stock-market-crash period, column 9 for the post-stock-market-crash period and column 13 for the post-gold-standard period. Column 14 displays the *t*-statistic for difference-of-means tests between the pre- and post-stock-market-crash periods (column 6 – column 9) and column 15 provides the *p*-value and significance level for the test results. Column 16 displays the *t*-statistic for difference-of-means tests between the post-stock-market-crash and the post-gold-standard periods (column 9 – column 13) and column 17 provides the *p*-value and significance level for the test results. The results for the all-banks portfolio are presented in Panel A, the results for the large-bank portfolio in Panel B and the results for the small-bank portfolio in Panel C.

In column 6, the estimate of *IPP* for the large-bank portfolio is 0.01 percent while for the small-bank portfolio the estimate is 0.03 percent. This difference in estimated deposit-insurance premiums suggests that the large banks were less risky than the small banks in the pre-stock-market-crash period. However, both σ_V and σ_e are larger for the large-bank portfolio (1.54 and 11.91 percent, respectively) than for the small-bank portfolio (1.20 and 10.58 percent, respectively), which suggests the small banks had less risk. Hence, the results are mixed regarding which portfolio is more risky in this period.

The mean of these variables in the post-stock-market-crash period are displayed in column 9 and show that *IPP* has declined to 0.00 for both portfolios, and that σ_V and σ_e for the large-bank portfolio are now 1.40 and 11.22 percent, respectively, which is larger than the small-bank portfolio results of 0.89 and 8.28 percent, respectively. These comparisons indicate that while both portfolios are very low risk, the large-bank portfolio appears more risky than the small-bank portfolio.

In comparing the results across time between columns 6 and 9, all three risk variables have declined during the post-stock-market crash period from the pre-stock-market-crash period for both the large-bank and small-bank portfolios. However, columns 14 and 15 indicate that these declines are not statistically significant except for the difference between σ_V and σ_e for the small-bank portfolio that show a significant decline at the 10 percent level. Declining risk in the post-stock-market-crash period confirms our earlier finding that this period was of low risk because of the substantial amounts of capital that had been raised by the banks mostly in 1929.

Column 13 displays the means for the post-gold-standard period. The results reveal that *IPP* has increased to 3.02 percent for the large-bank portfolio and 1.04 percent for the small-bank portfolio. To give perspective to these numbers, Wagster (2007) reports that when Canada adopted a deposit-insurance program in 1967, the required premium was 0.033 percent of insured deposits. Clearly, with the actuarially correct premium for Canada's large banks being 90 times higher than the eventual insurance premium for Canada's deposit insurance program, the post-gold-standard period was one of extreme risk for Canada's banks.

Column 13 also reveals that σ_V and σ_e for the large-bank portfolio are 2.67 and 22.43 percent, respectively, which are larger than the small-bank portfolio results of 2.34 and 19.28 percent, respectively. These comparisons also indicate that both portfolios have had very large increases in risk and that the large-bank portfolio is of higher risk than the small-bank portfolio. Furthermore, columns 16 and 17 show that the increase in risk for all of these variables are statistically significant at the 1 percent level. These results confirm our earlier findings that the post-gold-standard period was one of very high risk.

The results of this section fail to provide support for the diversification hypothesis. During the post-gold-standard period both portfolios experience large increases in risk but the risk level of the large-bank portfolio as measured by all three variables exceeds that of the small-bank portfolio. Moreover, the level of *IPP* for the large-bank portfolio is almost three times higher than that of the small-bank portfolio. This suggests that the benefits to being more diversified dissipated during this period. This conclusion is consistent with our earlier findings displayed in Table 2 that both the correlation coefficient and the standard deviation of both portfolios had greatly increased during this period.

This concludes the test of the diversification hypothesis. The next sub-section presents the first test of the government-guarantee hypothesis.

3.B. The First Test of the Government-Guarantee Hypothesis

The results displayed in Table 4 for the variable B/V (where B is the face value of deposits and other debt and V is the market value of assets) casts doubt on the government-guarantee hypothesis, which maintains that all Canadian banks were insolvent throughout the Great Depression. The results of columns 2 through 5 and columns 7 and 8 indicate that both large and small banks were solvent on a market-value basis during the pre- and post-stock-market-crash periods. However, columns 10 and 11 indicate the large banks were insolvent on a market-value basis during the first two years of the post-gold-standard period and that the small banks market-value equity was reduced to zero during those same two years. By 1934 (column 12), neither the large nor small banks were insolvent.

These results provide support for the government-guarantee hypothesis during 1932 and 1933, which would be the only years that the Canadian government would need to provide safety-net capital to their banks. The next section provides the details of the final test of the government-guarantee hypothesis.

4. TESTS FOR RISK-SHIFTING INCENTIVES

If the provision of an implicit government guarantee is the source of stability for Canadian banks during 1932 and 1933, the guarantee would be expected to create moral-hazard and risk-shifting incentives. To detect for these, single- and three-period models are estimated. The single-period models were developed by Duan, Moreau and Sealey (1992) and expanded by Hovakimian and Kane (2000). These models are then modified for three-period tests using dummy variables. The one-period models are:

$$\Delta(B_{nt}/V_{nt}) = \alpha_{0n} + \alpha_1\Delta\, \sigma_{Vnt} + \varepsilon_{nt}, \tag{6}$$

$$\Delta IPP_{nt} = \beta_{0j} + \beta_1\Delta\, \sigma_{Vnt} + \xi_{nt}. \tag{7}$$

The slope coefficients are interpreted as:

$$\alpha_1 = d(B/V)/d\sigma_V,$$

$$\beta_1 = dIPP/d\sigma_V = \partial IPP/\partial\sigma_V + \partial IPP/\partial(B/V)\alpha_1.$$

Since *IPP* is the value of a put option on a bank's assets, it is a comprehensive idiosyncratic measure of bank risk. Its value increases in σ_V and B/V (Merton, 1977) thus positive partial derivatives for *IPP* with respect to σ_V and B/V imply stockholders can extract value from the government. Therefore, β_1 measures the benefit from increasing the volatility of asset returns while α_1 measures any reduction in financial risk achieved by market forces or government regulators to temper higher asset risk by exerting pressure for lower bank leverage. Consequently, risk-shifting opportunities do not exist if α_1 is negative and β_1 is non-positive, indicating any increase in asset-risk incentives was offset with reductions in financial-risk incentives. Risk-shifting opportunities exist if α_1 is negative (or positive) and β_1 is positive, indicating financial-risk incentives declined (increased) but failed to completely offset increases in asset-risk incentives.

For the three-period model, data in the three periods are pooled. A dummy variable equal to one is used to signify the post-stock-market-crash period (D_1) and the post-gold-standard period (D_2). The equations estimated are:

$$\Delta(B_{nt}/V_{nt}) = \alpha_{0n}+D_1\,\alpha_{0n}+ D_2\,\alpha_{0n}+\alpha_1\Delta\sigma_{Vnt}+D_1\,\alpha_1\Delta\sigma_{Vnt}+ D_2\,\alpha_1\Delta\sigma_{Vnt} + \varepsilon_{nt}, \tag{8}$$

$$\Delta IPP_{nt} = \beta_{0n}+D_1\beta_{0n}+ D_2\beta_{0n}+ \beta_1\Delta\sigma_{Vnt}+D_1\beta_1\Delta\sigma_{Vnt}+ D_2\beta_1\Delta\sigma_{Vnt} + \xi_{nt.} \qquad (9)$$

The results for the single-period and three-period models are displayed in Table 5. The results for Equation (7) are displayed in columns 2 through 4 and the results for Equation (9) are displayed in columns 5 through 9. Because the coefficients for $\Delta\sigma_{Vnt}$ in equations (6) and (8) are positive and statistically significant in the same periods as those displayed in Table 5 for equations (7) and (9), the results for equations (6) and (8) have no effect on the interpretation of our hypotheses and thus are not reported. [16]

Recall that risk-shifting opportunities exist if β_1 is positive. The results for the single-period model that are reported in column 3 suggest that the Canadian government provided deposit guarantees to both large and small banks following the stock-market crash of 1929. The results reported in column 4 indicate that these guarantees were still being extended during the post-gold-standard period. However, the three-period model indicates that banks only had risk-shifting incentives during the post-gold-standard period. The results reported in column 8 indicate there was a significant increase in risk between the post-stock-market-crash and the post-gold-standard periods for both the large and small banks, and the results displayed in column 9 reveal that both the large and small banks had risk-shifting incentives during the post-gold-standard period. The results of the three-period model support the results displayed in Table 4 that indicate government guarantees were only necessary during 1932 and 1933.

In summary, the results displayed in Tables 4 and 5 suggest that Canadian banks received implicit-government support during 1932 and 1933. Because of this support, Canadian-bank managers had incentives to engage in risk-shifting behavior. The next section describes two reserve-management strategies government regulators most likely required banks to use to limit the government's loss exposure.

5. EXCESS BANK-NOTE COLLATERAL AND FINANCE-ACT ADVANCES

5.A. Calculation of the Hypothetical Reserve Ratio (HRR) and the Finance-Act-Advances Ratio (FAR)

Appendix 2 provides details about Canadian bank-note requirements that were in effect during the Great Depression and about the Finance Act. Table 6 presents an analysis of excess-bank-note collateral and Finance-Act advances. Panel A presents the data for the all-banks portfolio, Panel B for the large-bank portfolio and Panel C for the small-bank portfolio. The balance-sheet data primarily comes from issues of *Moody's Manual of Investments* covering 1927 through 1934. However, the 1926, 1927 and 1933 entries for the central-gold-reserve (CGR) deposits for the Canadian Bank of Commerce, as did the 1927 entry for non-interest deposits, came from the *Financial Post*, which published bank-balance-sheet data under the heading "Return of the Chartered Banks of the Dominion of Canada" most months. The data for November of the stipulated years is used because November is the end of the bank's fiscal year. The *Financial Post* was also used to supplement the *Moody's* data for the Canadian National Bank, whose fiscal year also ends in November. The amount of the CGR deposits from 1926 through 1928 and for 1930 came from this source. For the CGR deposits for 1929, the December report was used because a November report was not published.

Column 1 lists the year. Column 2 details the amount of gold and Dominion notes that banks had on deposit at the CGR. Column 3 presents the paid-up value of the banks' outstanding stock, which is also the par value of the outstanding stock if it has been paid-in-full. Column 4 specifies the allowable amount of bank notes that could be issued (column 2 + column 3) before a

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[16] These results are available from the author upon request.

bank would have to start paying 5 percent interest to the Minister of Finance.[17] Column 5 shows the amount of outstanding bank notes. Column 6 reveals the percent of outstanding bank notes to allowable bank notes (column 5 divided by column 4 times 100). Column 7 provides, if the number is positive, the amount of excess bank-note collateral (column 4 less column 5). A negative number would indicate the amount of notes the banks had outstanding using the crop-moving-season provision. Column 8 lists the amount of demand deposits. Column 9 details the hypothetical reserve ratio for each year (column 7 divided by column 8 times 100). Column 10 lists the amount of bank borrowing under the Finance-Act provisions. Column 11 lists the Finance-Act advances as a percent of demand deposits (column 10 divided by column 8 times 100).

Column 5 reveals that bank-note issuance peaked in 1928, and then started decreasing as bank-note demand declined along with economic activity as the Great Depression deepened. For both large and small banks, there was a small decline in 1929 followed by a large decline in 1930. Specifically, from 1928 to 1932, the amount of bank notes in circulation for all banks declined from C$182,946,132 to C$124,220,247 (a 32.10 percent decline). For large banks the decline was from C$143,168,583 to C$96,423,090 (a 32.65 percent decline) and for small banks the decline was from C$39,777,549 to C$27,797,157 (a 30.12 percent decline).

Column 2 reveals that the banks steadily reduced their CGR deposits during this period as these reserves were no longer needed as collateral for bank notes in circulation. For all of the banks the decline in CGR deposits was from C$81,130,867 to C$21,381,733 (a 73.65 percent decline), for large banks the decline was from C$63,900,000 to C$18,250,000 (a 71.44 percent decline) and for small banks the decline was from C$17,230,867 to C$3,131,733 (a 81.82 percent decline). In

[17] The Bank Act of 1908 allowed Canadian banks to increase the circulation of bank notes during the usual crop-moving season, but they had to pay 5 percent interest on the additional amount. One of the banks in our sample used this provision during the time period of this study. The Imperial Bank of Canada's circulation exceeded this amount by 4.15 percent in 1930 and 6.47 percent in 1931.

comparing the percentage changes of the large to the small banks, the large-bank note circulation declined more than that of the small banks, but the small-bank CGR deposits declined more than that of the large banks.

Column 6 makes this comparison more clear. In 1928 the large banks had issued bank notes equivalent to 90.25 percent of their available collateral. By 1932, their outstanding bank notes were only equivalent to 73.47 percent of their available collateral. The small banks, however, had outstanding bank notes equal to 97.66 percent of their available collateral in 1928 and 92.25 percent in 1932. Clearly the small banks were quicker than the large banks to match up their required collateral to the amount of banknotes in circulation.

Column 7 details the amount of excess collateral. When comparing column 2 to 7 in Panel B, note that from 1926 through 1930 the large-bank deposits in the CGR exceed the amount of their excess collateral, which means the excess collateral was completely in the form of gold and Dominion notes. For example, in 1930 there is C$21,903,639 in excess collateral and C$28,500,000 in CGR deposits, which means the excess collateral is composed of C$21,903,639 in gold and Dominion notes. However, from 1931 through 1934, the excess collateral exceeds the amount of CGR deposits, which means that some of the excess collateral is now in the form of contingent shareholder liability. For example, in 1931, the excess collateral is C$23,678,977 while the CGR deposits are C$21,000,000. Therefore, the excess collateral is composed of C$21,000,000 in gold and Dominion notes and C$2,678,977 in contingent shareholder liability. For the small banks, their excess collateral is always in the form of gold and Dominion notes.

There were three types of deposits by the public: deposits payable upon demand, deposits payable after notice (savings deposits), and deposits payable after a fixed date (time deposits). No interest was paid on demand deposits while interest was paid on savings and time deposits

(Falconbridge, 1929, p. 284). If a bank run had developed, non-interest bearing deposits would have been at risk because they were the only deposits available upon demand. For this reason, only demand deposits (called non-interest deposits by *Moody's*) are shown in column 8.

The excess collateral that became available to back demand deposits in Canada during the Great Depression is similar to the reserves of a deposit-insurance fund. Using this comparison, column 9 in panel B shows that this hypothetical reserve ratio for the large banks grew from 1.43 percent in 1926 to 9.59 percent by 1932 (a 570.63 percent increase). Panel C reveals the ratio grew from 2.64 to 3.65 percent (a 38.26 percent increase) for the small banks over these same years. This suggests that excess CGR deposits were more important to the large banks.

To help give perspective to the size of the hypothetical reserve ratios, the U.S. Deposit Insurance Funds Act of 1996 stipulated that once the deposit-insurance-fund reserves were above the Designated Reserve Ratio of 1.25 percent of insured deposits, institutions that were well capitalized and highly rated by supervisors no longer had to pay premiums. According to the Congressional Budget Office (2005) "that provision has exempted the vast majority of depositories from paying premiums."[18] This suggests that the demand deposits of large Canadian banks in 1932 had 7.67 times the backing that the U.S. Deposit Insurance Funds Act of 1996 stipulated was necessary in the U.S. Small Canadian banks held 2.92 times the stipulated U.S. amount.[19]

If a bank run occurred, bank notes could be immediately issued up to the amount of excess collateral. For example, in 1932 the large-bank portfolio could have supplied C$34,826,910 (Table 6, column 7, panel B) in bank notes to meet a sudden surge in depositor withdrawals, which was equivalent to 9.59 percent of demand deposits (column 9). If depositor demand exceeded this

[18] The Deposit Insurance Funds Act of 1996 was replaced by The Federal Deposit Insurance Reform Act of 2005. The 2005 legislation eliminated the restrictions on premium rates based on the Designated Reserve Ratio.

[19] On a total deposits basis (i.e., interest bearing and non-interest deposits), large Canadian banks had a hypothetical reserve ratio of 1.77 percent in 1932 and the small Canadian banks 0.59 percent.

amount, Courchene (1969, p. 369) relates that banks would "have to give up Dominion notes (either directly to the public or to the Central Gold reserve, so that the chartered banks would be able to increase the issue of bank notes)." If the banks needed Dominion notes, they could borrow them under the Finance Act from the Treasury Board at the advance rate by providing the required collateral.

Column 10 shows the amount of Finance-Act borrowings and column 11 expresses these as a percent of non-interest deposits. Column 10 reveals that the largest amount of advances for the large banks were C$53 million in 1928 and C$71 million in 1929, during the height of the run-up in stock prices prior to the stock-market crash. Fullerton (1986) asserts these borrowings were used to fund brokerage loans whose interest rates were higher than the advance rate for Finance-Act borrowings, which was 4.50 percent (Powell, 2005, p. 44). For the small banks, their largest borrowings were also in 1929, when they borrowed C$13.5 million. Column 11 shows that the largest Finance-Act ratio for both the large and small banks was in 1929, at 13.18 and 15.13 percent, respectively.

After the stock-market crash in 1929, the large and small banks paid down their Finance-Act advances. In 1930 the large banks had outstanding advances of C$20 million (a 4.39 percent Finance-Act ratio), while the small banks had outstanding advances of C$2 million (a 2.60 percent Finance-Act ratio). The next surge in Finance-Act advances for the large banks came in 1932 and 1933, when their Finance-Act ratios were 11.90 and 12.40 percent, respectively. The small banks, however, increased their borrowings in 1931, and maintained a balance between C$7 and C$8.6 million through 1934. Their Finance-Act ratio over these four years ranged between 10.43 and 12.29 percent.

Recall from Table 4 that during 1932 and 1933, the large banks were insolvent on a market-value basis and the small banks had zero equity. When combining the large-bank hypothetical reserve ratio with their Finance-Act ratio during these high-risk years, total reserves equal 21.49 percent of large-bank demand deposits in 1932 and 19.53 percent in 1933. For the small banks, their total reserves equal 15.37 percent in 1932 and 15.79 percent in 1933.

In eyeballing columns 9 and 11 in Table 6, it appears that the large banks relied more on maintaining excess CGR deposits than did the small banks. For example, in 1932 the Finance-Act ratio for the large banks is 24 percent larger than their hypothetical reserve ratio, 11.90 percent versus 9.59 percent, respectively. However, for the small banks, their 1932 Finance-Act ratio is 221 percent larger than their hypothetical reserve ratio, 11.72 percent versus 3.65 percent, respectively.

5.B. Regression of IPP on HRR and FAR

To investigate these relationships, the following regression is run using the Multivariate Regression Model (MVRM) detailed in section 1:

$$IPP_{n,t} = \alpha_n + \beta_n HRR_{n,t} + \beta_n FAR_{n,t} + \varepsilon_{n,t} \qquad (10)$$
$$n = 1, 2, \ldots, N; \; t = \text{December 31, 1926,... December 31, 1934.}$$

Where

$IPP_{n,t}$ = each bank's yearly actuarially correct deposit-insurance premium per dollar of deposits calculated using the model of Hovakimian and Kane (2000);

$HRR_{n,t}$ = each bank's yearly hypothetical reserve ratio (excess-central-gold reserves plus excess-contingent-shareholder liability/demand deposits);

$FAR_{n,t}$ = each bank's yearly Finance-Act ratio (Treasury-Board advances/demand deposits);

$\varepsilon_{n,t}$ = random disturbances assumed to be i.i.d. normal.

The research hypotheses are:

Test 1: H_o: $\Sigma_{n=1,\ldots N}\ \Sigma\beta_n = 0$; *the coefficient of the independent variables for an equal-weighted bank portfolio equals zero. This is tested with two F tests per portfolio, one test for each independent variable. The results of this test are displayed in Table 7 in columns 3 (HRR) and 4 (FAR), rows 3 (all-banks portfolio), 4 (large-bank portfolio) and 5 (small-bank portfolio).*

Test 2: H_o: $\Sigma_{n=1,\ldots 4} - \Sigma_{n=1,\ldots 4} = 0$; *the difference in the coefficients of the large-bank and small-bank portfolios for all regression parameters is not significantly different from zero. The results of this test are reported in the bottom row of Table 7 (large-bank coefficient – small-bank coefficient) and in column 5 of Table7 (bank portfolio's HRR coefficient – FAR coefficient).*

Table 7 presents the results. Column 3 reveals there is a positive correlation significant at the 1 percent level between the risk (*IPP*) of the all-banks portfolio and the amount of their excess-bank-note collateral (*HRR*). Column 4 shows a non-significant negative correlation between risk and Finance-Act borrowings (*FAR*). Column 5 shows that these findings for the all-banks portfolio are significantly different at the 1 percent level. Row 4 shows that the large-bank portfolio had a positive correlation, significant at the 1 percent level, between its risk and *HRR*, and a negative correlation, significant at the 5 percent level, between its risk and *FAR*. Column 5 shows that the difference between these variables is significant at the 1 percent level. Row 5 reveals that the small-bank portfolio has a positive correlation, significant at the 10 percent level, between its risk and *HRR*, and a positive correlation, significant at the 1 percent level, between its risk and *FAR*. Column 5 shows that the difference between these variables is not significant. The results displayed in the bottom row indicate that the difference between the findings for the large and small banks for both HRR and FAR is significant at the 1 percent level.

These results confirm the conclusions reached in the discussion of Table 5 that the large banks relied more on maintaining excess-bank-note collateral to control their risk than they did Finance-Act advances. The significantly positive coefficient for *HRR* in Table 7 reflects the distribution of the large-bank HRRs in Table 6 that peaks in the high-risk years of 1932 and 1933. Moreover, the significantly negative coefficient for *FAR* in Table 7 reflects the distribution of the large-bank FARs in Table 6 that peak in the low-risk year of 1929, then decline with only a slight increase in the high-risk years.

The small-bank results in Table 7 also confirm the conclusions reached in the discussion of Table 6 that the small banks relied more on Finance-Act advances to control their risk than they did excess-bank-note collateral. The results in Table 7 for the small banks also reflect the distribution of the small-bank *HRR* and *FAR* in Table 6. The coefficient of *HRR* is only positive at the 10 percent level in Table 7, which matches with the rather flat distribution of *HRR* in Table 6, with only a slight increase in the high-risk years of 1932 and 1933. In Table 7, *FAR* is significant at the 1 percent level, which reflects the large increase in *FAR* displayed in Table 6 over 1931-1934, which contains the riskiest years in the study.

Recall that Gorton and Huang (2006) argue that investment in bank branches is equivalent to bank reserves. Therefore, in a macroeconomic downturn, highly branched banks can close their least profitable branches and hold the proceeds as “liquid” reserves rather than “premise” reserves. Because these reserves are considered to be interchangeable, large, highly branched banks do not need to hold as much in liquid reserves (and, by implication, bank capital) during non-panic time periods. Because unit banks do not have branches to liquidate, they have no premise reserves. Consequently, unit banks must hold higher levels of liquid reserves than large, highly branched banks.

For the eight banks studied in this paper, the number of branches increased from 3,363 in 1927 to 3,567 in 1930, for a total of 204 new branches or a 6.07 percent increase.[20] Over this same time period, investment in bank premises increased from $67,927,638 in 1927 to $76,973,247 in 1930, for a total of $9,045,609 or a 13.32 percent increase. However, from 1930 to 1934, the number of branches declined to 3,017, a decrease of 550 branches or 15.42 percent while investment in bank premises declined to $75,064,116, a decrease of $1,909,131 or 2.48 percent. In sum, when the number of branches was increasing the average investment per branch was $44,341. However, when the number of branches was decreasing only an average of $3,471 was being recovered.[21]

In Gorton and Huang's (2006) model, banks can close branches and receive the liquidation value of *Q*, which is assumed to be the same for all branches. However, if a branch location is rented, leased, or the bank is unable to sell the site there may only be a small liquidation value when the branch is closed. In a macroeconomic crisis like the Great Depression, when commercial real estate would be difficult to sell and would probably have to be sold at a loss thus reducing book-value capital, banks may be more interested in reducing their costs by closing leased and rented facilities. Certainly, in such a bad business environment as the Great Depression, the assumption that liquid and premise reserves are equivalent does not appear to be sound.

5. CONCLUSIONS

[20] The Canadian Bank of Commerce and the Standard Bank of Canada merged in 1928 thus the number of bank branches and the investment in bank premises for 1927 includes the Standard Bank of Canada's. The Weyburn Security Bank was bought by the Imperial Bank of Canada in 1931 thus the number of bank branches and the investment in bank premises for 1927through 1930 includes the Weyburn Security Bank's.

[21] When the change in branches is included as an independent variable in the regression whose results are displayed in Table 7, large-bank branch changes have a positive coefficient and significance at the 1 percent level. Results were not obtained for the small-bank portfolio because of singularity problems with two of the banks. When branch changes are included in the regression, the FAR variable becomes insignificant for the large-bank portfolio. Because only results for one of the portfolios could be obtained and because the data series for branch changes is not as long as that of the other variables in the regression, these results are not displayed in Table 6.

Gorton and Huang's (2006) model is an apt descriptor of the benefits of large, highly branched banks in non-crisis time periods. However, the model is incomplete because it does not consider the effect an exogenous shock can have on the correlations of a bank's asset and liability portfolios and on a bank's idiosyncratic risk. Recall that Table 2 reveals that the correlation coefficient for the returns on both bank portfolios with the returns on the market significantly increase after the stock-market crash of 1929 and stay at an elevated level throughout the post-gold-standard period. Furthermore, the idiosyncratic risk of both bank portfolios more than double to the abandonment of the gold standard.

Diversification lowers non-systematic risk in a stock portfolio when the correlation coefficients of the individual assets are less than 1. Shapiro (2006, p. 534) notes that in the presence of an exogenous, highly volatile event, the correlation coefficients of a portfolio of domestic and international stocks increase thus reducing the benefit of international diversification. Furthermore, this rarely happens when stock prices are increasing but most often occurs when stock prices are declining, the very event from which investors usually want protection. To the extent that the elements of a bank's asset and liability portfolios react in a similar manner, the benefits of diversification for a bank may also disappear just when it's needed the most. [22] The results of this study indicate that this was the case with Canadian banks during the Great Depression.

Gorton and Huang (2006) and Saunders and Wilson (1999) maintain that large banks should not have to hold as much capital and reserves as small banks because of their greater diversification. However, the results of this paper support the argument of Kane (2008) who asserts that large banks should be required to hold more capital and reserves than smaller banks because the benefits of diversification can disappear in the presence of a large, macroeconomic shock. This conclusion becomes even more compelling when one considers the greater risk to the government's safety net when large banks fail and the greater cost of rescuing a large bank.

[22] The author thanks Ed Kane for this insight.

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Appendix 1: Canadian Bank Sample

Large-Bank Portfolio	1927 assets	Canadian branches	Foreign branches	Total branches	Capital and Reserve	Deposits
Royal Bank of Canada	894,663,903	766	108	874	60,000,000	722,636,091
Bank of Montreal	831,548,968	over 600	9	over 609	60,833,400	709,179,698
Canadian Bank of Commerce	558,709,494			575	40,000,000	464,299,000
Bank of Nova Scotia	261,736,980	over 296	over 4	over 300	30,000,000	207,497,249
Small-Bank Portfolio						
Canadian National Bank	148,702,336	255	1	256	11,000,000	121,863,295
Dominion Bank	141,482,753			126	14,000,000	113,881,724
Imperial Bank of Canada	138,899,197	184		184	14,500,000	109,014,919
Bank of Toronto	129,295,378	about 170		about 170	12,000,000	110,302,650

Appendix 2: Bank-Note Issuance and the Finance Act

Bank-note issuance[23]

Canadian bank notes were not legal tender but promissory notes that were payable at par to the bearer on demand at any of the issuing bank's branches, agencies or offices (Falconbridge, 1929, p. 139). Banks earned profits, or seigniorage, on the issue of bank notes because they did not pay interest on these liabilities while they earned interest on the loans and interest-bearing securities they acquired in exchange for their notes. The Bank Act of 1871 gave Canadian chartered banks the exclusive right to issue bank notes, up to the amount of their unimpaired paid-up capital (Falconbridge, 1929, p. 135).[24] This meant that bank notes were not secured by any sort of specific deposit with the government but were credit instruments secured by the general assets of the issuing bank.

The Bank Act of 1871 also introduced the double-liability clause. This clause states that in the event of liquidation, if the assets of the bank are insufficient to pay off the liabilities, shareholders are liable for the shortfall. A shareholder's liability is limited to the par value of their shareholdings in addition to any unpaid amounts for their shares.[25] A bank is declared insolvent if it fails to make payment on any of its liabilities for 90 consecutive days or, as added by the Bank Act of 1890, for multiple intervals of non-payment within 12 months (Falconbridge, 1929, p. 345). These rules are supplemental to the rules of the Winding-up Act, which can also be used to

[23] The source for most of the material concerning bank-note issuance comes from Falconbridge (1929).
[24] Falconbridge (1929, p. 29) reports there is a difference between authorized capital and paid-up capital. The authorized capital of a bank could not be less than $500,000. However, this amount could be raised by subscription of which only 10 percent had to be initially paid by any one subscriber. However, before receiving a banking certificate from Canada's Treasury Board, a minimum of $250,000 had to be remitted to the Minister of Finance.
[25] The par value of Canadian-bank stock during the Great Depression was $100 per share. There was no right of set-off for shareholders (Falconbridge, 1929, p. 441), thus an assessment against a shareholder under the double-liability provisions would not be reduced by the amount of any outstanding claim the shareholder had against the bank.

establish a bank's insolvency.[26] After a bank has become insolvent, and if no proceedings have been initiated under the Winding-up Act, and no payment has been made on any or all of a bank's liabilities for three months, the directors are obligated to make a call on the shareholders for the entire shortfall even if no debts have been collected by the bank or assets sold (Falconbridge, 1929, p. 346).[27]

The Bank Act of 1880 gave bank-note holders first claim on the assets of an insolvent bank (Falconbridge, 1929, p. 135). This made payment in full almost certain in the event of bank failure, however, when failures occurred there were sometimes lengthy delays in redeeming bank notes. The uncertain time of redemption would cause a severe discounting of the notes for anyone requiring liquidity. To address this issue, the Bank Act of 1890 established a bank-circulation-redemption fund that would redeem the notes of failed banks after two months and would pay 6 percent interest from the day of suspension of operations until the payment was made (Falconbridge, 1929, pp. 135-6).[28] The banks funded the redemption fund by depositing with the

[26] Under the Winding-up Act, a bank "is deemed insolvent (a) if it is unable to pay its debts as they come due; (b) if it calls a meeting of its creditors for the purpose of compounding with them; (c) if it exhibits a statement showing its inability to meet its liabilities; (d) if it has otherwise acknowledged its insolvency; (e) if it assigns, removes or disposes of, or attempts or is about to assign, remove or dispose of, any of its property, with intent to defraud, defeat or delay its creditors, or any of them; (f) if, with such intent, it has procured its money , goods, chattels, lands or property to be seized, levied on or taken, under or by any process or execution; (g) if it has made any general conveyance or assignment of its property for the benefit of its creditors, or if, being unable to meet its liabilities in full, it makes any sale or conveyance of the whole or the main part of its stock in trade or assets, without the consent of its creditors, or without satisfying their claims; or, (h) if it permits any execution issued against it, under which any of its goods, chattels, land or property are seized, levied upon or taken in execution, to remain unsatisfied till within four days of the time fixed by the sheriff or proper officer for the sale thereof, or for fifteen days after such seizure (Falconbridge, 1929, pp. 345-6)."

[27] Wagster (2007) reports that bank-note issuance and the double liability of shareholders were phased out in tandem. The Bank Act of 1934 was passed in conjunction with the Bank of Canada Act of 1934. The Bank of Canada Act established the Bank of Canada and its right of note issuance. The Bank Act of 1934 restricted note issuance by banks to their paid-up capital from the day the Bank of Canada began operation (March 11, 1935). It then established a schedule to reduce the amount of notes a bank could circulate by 5 percent of its paid-up capital each year for five years (starting January 1, 1936) and then by 10 percent a year for an additional five years. The double liability of bank stockholders was also reduced according to this schedule. The Bank Act of 1944 specified that the chartered banks had until January 1, 1950 to redeem with the Bank of Canada the remaining bank notes they had in circulation and that the double liability of shareholders would be reduced in lock step with the note redemption.

[28] In 1900, the rate of interest was changed from 6 percent to 5 percent (Falconbridge, 1929, p. 151)

Minister of Finance an amount equal to 5 percent of the average circulation of their bank notes over the previous year (Falconbridge, 1929, p. 137).

The Bank Act of 1908 was amended to allow a temporary issue of bank notes during the usual crop-moving season, which ran from the first day of September to the last day of February. This temporary issue was not to exceed 15 percent of the unimpaired paid-up capital plus the rest account, also called the reserve fund, of the bank (Falconbridge, 1929, p. 143). Banks had to pay interest to the Minister of Finance, not to exceed 5 percent, on the amount of excess circulation.

The Bank Act of 1913 allowed banks to "issue notes in excess of the amount of its unimpaired paid-up capital, to an amount not exceeding the amount of current gold coin and Dominion notes held for the bank in the central gold reserves" (Falconbridge, 1929, p. 138).[29] This Act also stipulated that if the amount of a bank's notes in circulation was less than the amount of its deposits in the central gold reserves, the difference was the bank's property and must be returned to the bank upon application (Falconbridge, 1929, p. 141).

The Finance Act of 1914

Powell (2005, p. 37) relates that in the days leading up to the August 4, 1914 declaration of war in Canada, heavy gold withdrawals from banks occurred causing concerns about the possibility of banking runs by depositors. Because there was not a lender of last resort, bank runs could shut down the banking system because banks were required to close if they could not meet

[29] Falconbridge (1929, p. 436-7) relates that Dominion notes were legal tender issued by the Dominion government. They were redeemable in gold and, by 1927, the first $50 million issued had to have a 25 percent gold backing with the remaining 75 percent backed by approved securities. Issues of Dominion notes exceeding this limit had to be fully backed by gold. Dominion notes would be advanced to the banks in return for "Treasury bills, bonds, debentures or stocks of the Dominion of Canada, Great Britain, any province of Canada and any British possession; Canadian municipal securities; Promissory notes and bills of exchange secured by documentary title to wheat, oats, rye, barley, corn, buckwheat, flax or other commodity; Promissory notes and bills of exchange issued or drawn for agricultural, industrial, or commercial purposes and which have been used or are to be used for such purposes" (Falconbridge, 1929, p. 441). Advances could not exceed one year and repayments by the banks had to be in the form of Dominion notes (Falconbridge, 1929, p. 441-2). In the event of the liquidation of a bank, all advances of Dominion notes were the second charge on the assets of a bank.

depositor demands for gold or Dominion notes. This led to Canada going off the gold standard and the passing of The Finance Act of 1914.[30]

The Finance Act suspended the redemption of Dominion notes into gold, made bank notes legal tender and made the government a "lender-of-last-resort" by allowing the Treasury Board to lend Dominion notes to banks in exchange for collateral in the form of financial securities. The Dominion notes could then be used to increase the amount of bank notes the banks had in circulation (Powell, 2005, p. 38). The Treasury Board set the Advance Rate, which was the cost to the chartered banks to borrow Dominion notes. Dominion notes issued under the Finance Act were not backed by gold, and because the annual limits for borrowing were set very high, there was essentially no limit to the amount that banks could borrow (Powell, 2005, p. 41).

The Finance Act was extended in 1919 and revised in 1923. The 1923 revision made provision for the return to the gold standard in 1926, at which time bank notes lost their legal tender status and Dominion notes regained theirs and they were once again redeemable in gold (Powell, 2005, p. 41). Because the Finance Act was in effect in conjunction with the gold standard after 1926, the government's gold holdings did not limit the amount of Dominion notes that banks could borrow as they did prior to World War I. Treasury-Board lending to the banks was institutionalized until the repeal of the Finance Act in 1935 by the Bank of Canada Act.

[30] The Finance Act (formally known as "An Act to Conserve the Commercial and Financial Interests of Canada") received royal assent on August 22, 1914, eighteen days after Canada entered World War I.

Table 1

Abnormal Return and Change in Systematic Risk for Canadian Banks to the October 29, 1929 "Black Tuesday" Stock-Market Crash and to the September 21, 1931 Ending of the Gold Standard

$R_{nt} = \alpha_n + \alpha_n D_{S,1} + \alpha_n D_{S,2} + \beta_n M_t + \beta_n D_{S,1} M_t + \beta_n D_{S,2} M_t + \Sigma D_e \delta_{ne} + \varepsilon_{nt.}$

$n = 1, 2, \ldots, N$; t = Jan. 4, 1926,..., August 13, 1934; $e = 1, 2$.

$D_{S,1}$ = a shift dummy variable that equals zero from January 4, 1926 to October 28, 1929 (the pre-stock-market-crash period) and 1 from November 4,1929 to January 4, 1932 (the post-stock-market-crash period);

$D_{S,2}$ = a shift dummy variable that equals zero from January 4, 1926 to January 4, 1932 (the last week that banks' minimum and over-the-counter prices were identical) and 1 from January 11, 1932 to August 13, 1934 (the post-gold-standard period);

D_1= a dummy variable that equals one for the weeks of November 4 through November 25, 1929, thus encompassing the four weekly returns after the stock-market crash;

D_2= a dummy variable that equals one for the weeks ending January 11 through June 13, 1932, thus encompassing the period of price variability following the establishment of minimum prices until they are eliminated (January 11, 1932 through May 16, 1932) and the four weekly returns after minimum prices are eliminated.

1 R_{nt}	2 α_n	3 $\alpha_n D_{S,1}$	4 $\alpha_n D_{S,2}$	5 $\beta_n M_t$	6 $\beta_n D_{S,1} M_t$	7 $\beta_n D_{S,2} M_t$	8 $D_1 \delta_{n1}$	9 $D_2 \delta_{n2}$	10 $\Sigma D_e \delta_{ne}$
	Intercept Parameter (*F*-statistic)	First Intercept Shift Parameter (*F*-statistic)	Second Intercept Shift Parameter (*F*-statistic)	Market Return Parameter (*F*-statistic)	First Market Shift Parameter (*F*-statistic)	Second Market Shift Parameter (*F*-statistic)	11/04/1929 through 11/25/1929 Estimate in % (*F*-statistic)	01/04/1932 through 06/13/1932 Estimate in % (*F*-statistic)	Cumulative Estimate in % (*F*-statistic)
All-Banks Portfolio	0.00 (1.45)	-0.00 (1.54)	-0.00 (0.29)	0.05 (3.24)*	0.06 (2.05)	0.12 (13.18)***	-2.32 (11.04)***	-1.35 (17.61)***	-3.67 (22.76)***
Large-Bank Portfolio	0.00 (1.68)	-0.00 (1.99)	-0.00 (0.68)	0.07 (5.21)**	0.08 (2.73)*	0.13 (10.03)***	-2.86 (11.52)***	-1.33 (11.77)***	-4.19 (20.39)***
Small-Bank Portfolio	0.00 (0.73)	-0.00 (0.62)	-0.00 (0.01)	0.02 (0.74)	0.04 (0.79)	0.12 (12.22)***	-1.79 (6.72)***	-1.37 (18.67)***	-3.16 (17.30)***
Large- versus Small-Bank Portfolios	0.00 (0.61)	-0.00 (1.00)	-0.00 (0.98)	0.05 (4.27)**	0.05 (1.47)	1.27 (0.16)	-1.07 (2.77)*	0.04 (0.02)	-1.03 (2.12)

Notes: Table 1 displays results from tests of the diversification hypothesis. When Great Britain abandoned the gold standard over the weekend of September 19-20, 1931, minimum Canadian-bank-stock prices were established by using the previous Friday's closing price. These minimums remained in effect through the week-ending price of May 16, 1932. During this period, the *Financial Post* reported both over-the-counter prices and on-exchange minimum prices. Minimum prices and over-the-counter prices were identical until the week of January 11, 1932. Over-the-counter prices are used to produce the results reported in this table. The first three entries of column 1 list each portfolio studied. The bottom entry is the title of the difference-of-means test between the large-bank and the small-bank portfolios. Columns 2 through 7 display estimations of the regression parameters. Columns 8 through 10 display abnormal returns from the event study. Column 8 displays abnormal returns for the four weeks following the Black-Tuesday (October 29, 1929) stock-market crash. Column 9 displays abnormal returns related to the end of the gold standard by studying the weekly returns from January 11, 1932 (when minimum and over-the-counter prices began to vary) through June 13, 1932 (the fourth week after the elimination of bank-stock price minimums). For each event, the abnormal return is given in percent and its associated *F*-statistic is in parentheses. Column 10 displays the cumulative abnormal return across both events for each portfolio. Columns 6 and 7 display the results of a Chow test for changes in systematic risk. The bottom row of the table displays the results of difference-of-means test between the large-bank and small-bank portfolios for each indicated parameter and return coefficient. *, ** and *** indicate significance at the 10, 5 and 1 percent level, respectively.

Table 2
An Analysis of the Changes in Systematic Risk for the Large-Bank and Small-Bank Portfolios Displayed in Table 1

$\beta = \rho_{portfolio,market} * (\sigma_{portfolio} / \sigma_{market})$.
$\rho_{portfolio,market}$ = the correlation coefficient of returns for each bank portfolio and the market index.
$\sigma_{portfolio}$ = the weekly standard deviation of returns on an equal-weighted Large-Bank and Small-Bank portfolio.
σ_{market} = the weekly standard deviation of returns on the market index.
$\sigma_{portfolio} / \sigma_{market}$ = the standard-deviation relative.

Large-Bank Portfolio					**Small-Bank Portfolio**				
1	2	3	4	5	6	7	8	9	10
	σ_{weekly}	$\sigma_{portfolio} / \sigma_{market}$	$\rho_{portfolio,market}$	B		σ_{weekly}	$\sigma_{portfolio} / \sigma_{market}$	$\rho_{portfolio,market}$	β
Panel A: Pre-Stock-Market-Crash Period (1/4/26-10/28/29)									
Large-bank	0.01251				Small-bank	0.00955			
Market	0.03847	0.32519	0.21055	0.07	Market	0.03847	0.24825	0.08286	0.02
Panel B: Post-Stock-Market-Crash Period (11/04/29-01/04/32)									
Large-bank	0.01181				Small-bank	0.00808			
Market	0.04093	0.28854	0.46541	0.13	Market	0.04093	0.19741	0.25130	0.05
Panel C: Post-Gold-Standard Period (1/11/32-8/13/1934)									
Large-bank	0.02744				Small-bank	0.02267			
Market	0.05204	0.52729	0.41810	0.22	Market	0.05204	0.43563	0.37305	0.16
Panel D: Percentage Change from the Pre- to the Post-Stock-Market-Crash Periods (Comparing Panel A to Panel B)									
Large-bank	-5.60				Small-bank	-15.39			
Market	6.40	-11.27	121.05	85.71	Market	6.40	-20.48	203.28	150.00
Panel E: Percentage Change from the Post-Stock-Market-Crash Period to the Post-Gold-Standard Period (Comparing Panel B to Panel C)									
Large-bank	132.35				Small-bank	180.57			
Market	27.14	82.74	-10.17	69.23	Market	27.14	120.67	48.45	220.00

Notes: Table 2 displays results from tests of the diversification hypothesis. The change in systematic risk of the large-bank and small-bank portfolios displayed in columns 6 and 7 are disaggregated into the weekly standard deviation of returns on an equal-weighted large- and small-bank portfolio ($\sigma_{portfolio}$), the weekly standard deviation of returns on the market index (σ_{market}), proxied by the lowest weekly index value for an index of 20 industrial companies published by the *Financial Post*, and the correlation coefficient of returns ($\rho_{portfolio,market}$) for each portfolio and the market index. Column 2 reports standard deviations of weekly returns on the bank portfolio and the market index. Column 3 reports standard-deviation relatives ($\sigma_{portfolio} / \sigma_{market}$). Column 4 reports the correlation coefficient between market-index returns and returns on the large-bank portfolio ($\rho_{portfolio,market}$). Column 5 reports betas calculated using data from the previous columns. Panel A reports results for the pre-stock-market-crash period, panel B reports results for the post-stock-market-crash period, panel C reports results for the post-gold-standard period, panel D reports the percentage change between the data displayed in panels A and B, while panel E reports the percentage change between the data displayed in panels B and C. The small-bank-portfolio data is reported in the same sequence in columns 6 through 10.

Table 3: Capital Positions and Capital-to-Assets Ratios of the Eight Canadian Banks Studied

Year	Total Assets	% Δ	Capital Stock	% Δ	Rest Account	% Δ	Undivided Profits	% Δ	Common Equity	% Δ	Capital-to-Assets Ratio - %	% Δ
1	2	3	4	5	6	7	8	9	10	11	12	13
Panel A: All-Banks Portfolio												
1926	2,821,665,474		107,816,700		120,816,700		7,203,031		235,836,431		8.36	
1927	3,105,039,009	10.04	113,416,700	5.19	128,916,700	6.70	6,321,299	-12.24	248,654,699	5.44	8.01	-4.19
1928	3,395,482,855	9.35	118,240,100	4.25	134,240,100	4.13	6,637,245	5.00	259,117,445	4.21	7.63	-4.71
1929	3,648,440,267	7.45	137,740,571	16.49	155,742,581	16.02	7,639,620	15.10	301,122,772	16.21	8.25	8.15
1930	3,235,581,719	-11.32	140,000,000	1.64	160,000,000	2.73	7,770,993	1.72	307,770,993	2.21	9.51	15.25
1931	3,071,872,772	-5.06	140,000,000	0	160,000,000	0	8,218,043	5.75	308,218,043	0.15	10.03	5.48
1932	2,898,037,580	-5.66	140,000,000	0	160,000,000	0	5,075,595	-38.24	305,075,595	-1.02	10.53	4.92
1933	2,841,862,941	-1.94	140,000,000	0	131,000,000	-18.13	6,120,365	20.58	277,120,365	-9.16	9.75	-7.37
1934	2,882,859,912	1.44	140,000,000	0	131,000,000	0	6,776,598	10.72	277,776,598	0.24	9.64	-1.19
Panel B: Large-Bank Portfolio												
1926	2,307,227,221		84,316,700		93,816,700		4,116,878		182,250,278		7.90	
1927	2,546,659,345	10.38	89,916,700	6.64	100,916,700	7.57	3,867,762	-6.05	194,701,162	6.83	7.65	-3.21
1928	2,807,364,093	10.24	94,740,100	5.36	105,740,100	4.78	4,293,937	11.02	204,774,137	5.17	7.29	-4.59
1929	3,042,246,920	8.37	110,746,551	16.90	122,746,551	16.08	6,250,697	45.57	239,743,799	17.08	7.88	8.04
1930	2,667,119,998	-12.33	113,000,000	2.03	127,000,000	3.47	6,105,007	-2.33	246,105,007	2.65	9.23	17.09
1931	2,523,507,646	-5.38	113,000,000	0	127,000,000	0	6,353,849	4.08	246,353,849	0.10	9.76	5.80
1932	2,399,908,430	-4.90	113,000,000	0	127,000,000	0	3,513,535	-44.70	243,513,535	-1.15	10.15	3.94
1933	2,342,309,233	-2.40	113,000,000	0	102,000,000	-19.69	4,268,347	21.48	219,268,347	-9.96	9.36	-7.74
1934	2,373,421,788	1.33	113,000,000	0	102,000,000	0	4,678,455	9.61	219,678,455	0.19	9.26	-1.13
Panel C: Small-Bank Portfolio												
1926	514,438,253		23,500,000		27,000,000		3,086,153		53,586,153		10.42	
1927	558,379,664	8.54	23,500,000	0	28,000,000	3.70	2,453,537	-20.50	53,953,537	0.69	9.66	-7.24
1928	588,118,762	5.33	23,500,000	0	28,500,000	1.79	2,343,308	-4.49	54,343,308	0.72	9.24	-4.37
1929	606,193,347	3.07	26,994,020	14.87	32,996,030	15.78	1,388,923	-40.73	61,378,973	12.95	10.13	9.58
1930	568,461,721	-6.22	27,000,000	0.02	33,000,000	0.01	1,665,986	19.95	61,665,986	0.47	10.85	7.14
1931	548,365,126	-3.54	27,000,000	0	33,000,000	0	1,864,194	11.90	61,864,194	0.32	11.28	4.00
1932	498,129,150	-9.16	27,000,000	0	33,000,000	0	1,562,060	-16.21	61,562,060	-0.49	12.36	9.55
1933	499,553,708	0.29	27,000,000	0	29,000,000	-12.12	1,852,018	18.56	57,852,018	-6.03	11.58	-6.29
1934	509,438,124	1.98	27,000,000	0	29,000,000	0	2,098,143	13.29	58,098,143	0.43	11.40	-1.52

Notes: Table 3 provides data to help explain why the portfolio standard deviations declined in Panel D of Table 2. Balance-sheet data is provided to show the amount of capital by category and the capital-to-assets ratios of each portfolio. The "rest account" is equivalent to retained earnings. Columns 3, 5, 7, 9, 11 and 13 show the percentage change by year of the data in the column to its left. Column 10 = column 4 + column 6 + column 8. Column 12 = (column 10/column 2) * 100. The large amount of new capital that had been raised by 1929 is attributed with the decline in the standard deviations of the bank portfolios detailed in Table 2.

Table 4

Difference-of-Means Tests for *B/V*, *IPP*, σ_V and σ_e between the Pre-Stock-Market-Crash Period (1926-1929) and the Post- Stock-Market-Crash Period (1930-1931); and the Post-Stock-Market Crash Period (1930-1931) and the Post- Gold-Standard Period (1932-1934).

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Variable	1926	1927	1928	1929	**26-29 Mean**	1930	1931	**30-31 Mean**	1932	1933	1934	**32-34 Mean**	Diff.-of-Means: col. 6 – col. 9		Diff.-of-Means: col. 9 – col. 13	
Panel A: All-Banks Portfolio													*t* stat	Pr > |*t*|	*t* stat	Pr > |*t*|
B/V	0.93	0.93	0.92	0.93	0.93	0.92	0.93	0.92	1.02	1.00	0.96	0.99	0.53	0.60	-5.66	<.0001***
IPP (%)	0.00	0.00	0.06	0.02	0.02	0.00	0.00	0.00	3.23	2.28	0.59	2.03	0.86	0.40	-4.07	0.0005***
σ_V (%)	0.61	1.69	1.72	1.47	1.37	1.19	1.10	1.14	2.93	2.49	2.10	2.51	1.41	0.17	-6.19	<.0001***
σ_e (%)	6.00	13.32	13.44	12.22	11.25	9.88	9.62	9.75	24.05	21.63	16.89	20.85	1.43	0.16	-6.92	<.0001***
Panel B: Large-Bank Portfolio																
B/V	0.93	0.92	0.91	0.93	0.92	0.91	0.92	0.92	1.03	1.01	0.97	1.00	0.36	0.72	-4.10	0.0011***
IPP (%)	0.00	0.00	0.00	0.03	0.01	0.00	0.00	0.00	4.78	3.11	1.17	3.02	0.72	0.48	-3.48	0.0051***
σ_V (%)	0.58	1.88	1.87	1.85	1.54	1.46	1.34	1.40	3.10	2.50	2.41	2.67	0.60	0.56	-4.28	0.0005***
σ_e (%)	5.60	14.11	13.47	14.47	11.91	11.39	11.05	11.22	25.72	22.17	19.39	22.43	0.47	0.64	-4.88	0.0002***
Panel C: Small-Bank Portfolio																
B/V	0.93	0.93	0.94	0.93	0.93	0.93	0.93	0.93	1.00	1.00	0.94	0.98	0.49	0.63	-4.28	0.0006***
IPP (%)	0.00	0.00	0.12	0.00	0.03	0.00	0.00	0.00	1.68	1.44	0.00	1.04	0.70	0.49	-3.16	0.0092***
σ_V (%)	0.63	1.50	1.57	1.10	1.20	0.92	0.86	0.89	2.77	2.48	1.78	2.34	1.82	0.08*	-4.78	0.0003***
σ_e (%)	6.40	12.53	13.42	9.98	10.58	8.38	8.19	8.28	22.38	21.08	14.38	19.28	1.74	0.10*	-5.19	<.0001***

Notes: Table 4 provides results from tests of both the diversification hypothesis (*IPP*, $\boldsymbol{\sigma_V}$ and $\boldsymbol{\sigma_e}$) and the government-guarantee hypothesis (*B/V*). Variables are estimated using the methodology of Hovakimian and Kane (2000). *B* is the face value of deposits and other debt, *V* is the market value of assets, σ_V is the volatility of asset returns, σ_e is the volatility of equity returns, and *IPP* is the risk-adjusted deposit-insurance premium per dollar of deposits. Each year's results are detailed in columns 2 through 5 for the pre-stock-market-crash period (1926-1929), columns 7 and 8 for the post-stock-market-crash period (1930-1931), and columns 10 through 12 for the post-gold-standard period (1932-1934). Column 6 gives each variable's mean for the pre-stock-market-crash period, column 9 for the post-stock-market-crash period and column 13 for the post-gold-standard period. Column 14 displays the *t*-statistic for difference-of-means tests (column 6 – column 9) and column 15 provides the *p*-value and significance level for the test results. Column 16 displays the *t*-statistic for difference-of-means tests (column 9 – column 13) and column 17 provides the *p*-value and significance level for the test results. *, ** and *** indicate significance at the 10, 5 and 1 percent level, respectively.

Table 5
Tests for Risk-Shifting Opportunities by Managers of Canadian Charter Banks

$\Delta IPP = \beta_0 + \beta_1 \Delta\sigma_V + \varepsilon$				$\Delta IPP = \beta_0 + D_1\beta_0 + D_2\beta_0 + \beta_1\Delta\sigma_V + D_1\beta_1\Delta\sigma_V + D_2\beta_1\Delta\sigma_V + \varepsilon$				
1	2	3	4	5	6	7	8	9
	1926-1929	1930-1931	1932-1934	1926-1929	$D_S\,\beta\Delta$	1930-1931	$D_S\,\beta\Delta$	1932-1934
Panel A: All-Banks Portfolio								
Constant	-0.0002	-0.0001	-0.0035	-0.0001	0.0001	0.0000	-0.0034	-0.0034
Pr > |t|	0.6375	0.7499	0.4244	0.9630	0.9866	0.9868	0.3813	0.5011
$\Delta\sigma_V$	0.0610	0.0832	1.6381	0.0610	-0.0511	0.0099	1.5769	1.5868
Pr > |t|	0.1078	0.0217**	<.0001***	0.8534	0.9361	0.9855	0.0001***	0.0198**
R^2	0.11	0.22	0.56	0.56				
No. Obs.	24	24	24	64				
Panel B: Large-Bank Portfolio								
Constant	0.0001	0.0001	-0.0023	0.0001	-0.0002	-0.0001	-0.0022	-0.0023
Pr > |t|	0.5210	0.6004	0.8258	0.9912	0.9821	0.9840	0.8092	0.8435
$\Delta\sigma_V$	0.0054	0.0415	2.2551	0.0053	-0.0090	-0.0037	2.2724	2.2687
Pr > |t|	0.6705	0.0502**	0.0111***	0.9944	0.9943	0.9971	0.0151**	0.0984*
R^2	0.02	0.33	0.49	0.5035				
No. Obs.	12	12	12	32				
Panel C: Small-Bank Portfolio								
Constant	-0.0002	-0.0001	-0.0036	-0.0001	0.0000	-0.0001	-0.0034	-0.0035
Pr > |t|	0.7009	0.9055	0.1727	0.9413	0.9980	0.9562	0.1282	0.2380
$\Delta\sigma_V$	0.1265	0.1842	1.1525	0.1277	-0.1158	0.0119	1.0188	1.0307
Pr > |t|	0.1137	0.0495**	<.0001***	0.5356	0.8404	0.9823	0.0002***	0.0871*
R^2	0.23	0.33	0.81	0.81				
No. Obs.	12	12	12	32				

Notes: Table 5 provides results from tests of the government-guarantee hypothesis. Single-period and three-period models are estimated using the methodology of Hovakimian and Kane (2000) to estimate σ_V and *IPP*. σ_V is the volatility of bank-asset returns and *IPP* is the actuarially fair deposit-insurance premium per dollar of deposits. Δ signifies the data are first-differenced. The results displayed in columns 8 and 9, which show there were risk-shifting incentives for Canadian-bank managers during the post-gold-standard period, support the findings for *B/V* in Table 4, which indicates that large Canadian banks were insolvent during 1932 and 1933 and the small banks' equity positions had declined to zero. *, ** and *** indicate significance at the 10, 5 and 1 percent level, respectively.

Table 6: Excess-Bank-Note Collateral and Finance-Act Advances: Calculating the Hypothetical Reserve Ratio and Finance-Act Ratio

Year	CGR deposits	Paid-up Capital	Maximum Circulation	Actual Circulation	Actual-to-Maximum	Excess Collateral	Demand (non-interest) deposits	Hypothetical reserve ratio (*HRR*)	Finance-Act advances	Finance-Act ratio (*FAR*)
1	2	3	4	5	6	7	8	9	10	11
Panel A: All-Banks Portfolio										
1926	68,060,334	107,816,700	175,877,034	167,840,034	95.43%	8,037,000	501,464,357	1.60%	6,500,000	1.30%
1927	70,370,334	113,416,700	183,787,034	171,065,382	93.08%	12,721,652	630,725,530	2.02%	9,000,0000	1.43%
1928	81,130,867	118,240,100	199,370,967	182,946,132	91.76%	16,424,835	616,707,798	2.66%	55,000,000	8.92%
1929	59,130,867	137,740,571	196,871,438	178,778,670	90.81%	18,092,768	628,040,095	2.88%	84,500,000	13.45%
1930	36,630,867	140,000,000	176,630,867	153,041,307	86.64%	23,589,560	532,796,853	4.43%	22,000,000	4.13%
1931	27,030,867	140,000,000	167,030,867	142,016,834	85.02%	25,014,033	521,690,327	4.79%	43,000,000	8.24%
1932	21,381,733	140,000,000	161,381,733	124,220,247	76.97%	37,161,486	427,090,586	8.70%	50,714,000	11.87%
1933	15,681,866	140,000,000	155,681,866	126,191,988	81.06%	29,489,878	450,153,408	6.55%	55,804,000	12.40%
1934	21,382,000	140,000,000	161,382,000	135,485,825	83.95%	25,896,175	467,589,624	5.54%	35,304,000	7.55%
Panel B: Large-Bank Portfolio										
1926	52,000,000	84,316,700	136,316,700	130,177,807	95.50%	6,138,893	429,457,795	1.43%	5,000,000	1.16%
1927	53,000,000	89,916,700	142,916,700	132,021,738	92.38%	10,894,962	543,155,868	2.01%	9,000,000	1.66%
1928	63,900,000	94,740,100	158,640,100	143,168,583	90.25%	15,471,517	521,655,805	2.97%	53,000,000	10.16%
1929	45,500,000	110,746,551	156,246,551	140,259,338	89.77%	15,987,213	538,833,209	2.97%	71,000,000	13.18%
1930	28,500,000	113,000,000	141,500,000	119,596,361	84.52%	21,903,639	455,783,418	4.81%	20,000,000	4.39%
1931	21,000,000	113,000,000	134,000,000	110,321,023	82.33%	23,678,977	445,007,976	5.32%	35,000,000	7.87%
1932	18,250,000	113,000,000	131,250,000	96,423,090	73.47%	34,826,910	363,103,605	9.59%	43,214,000	11.90%
1933	12,250,000	113,000,000	125,250,000	98,115,461	78.34%	27,134,539	380,810,251	7.13%	47,214,000	12.40%
1934	17,750,000	113,000,000	130,750,000	106,773,202	81.66%	23,976,798	400,230,071	5.99%	28,214,000	7.05%
Panel C: Small-Bank Portfolio										
1926	16,060,334	23,500,000	39,560,334	37,662,227	95.20%	1,898,107	72,006,562	2.64%	1,500,000	2.08%
1927	17,370,334	23,500,000	40,870,334	39,043,644	95.53%	1,826,690	87,569,662	2.09%	0	0.00%
1928	17,230,867	23,500,000	40,730,867	39,777,549	97.66%	953,318	95,051,993	1.00%	2,000,000	2.10%
1929	13,630,867	26,994,020	40,624,887	38,519,332	94.82%	2,105,555	89,206,886	2.36%	13,500,000	15.13%
1930	8,130,867	27,000,000	35,130,867	33,444,946	95.20%	1,685,921	77,013,435	2.19%	2,000,000	2.60%
1931	6,030,867	27,000,000	33,030,867	31,695,811	95.96%	1,335,056	76,682,351	1.74%	8,000,000	10.43%
1932	3,131,733	27,000,000	30,131,733	27,797,157	92.25%	2,334,576	63,986,981	3.65%	7,500,000	11.72%
1933	3,431,866	27,000,000	30,431,866	28,076,527	92.26%	2,355,339	69,343,157	3.40%	8,590,000	12.39%
1934	3,632,000	27,000,000	30,632,000	28,712,623	93.73%	1,919,377	67,359,553	2.85%	7,090,000	10.53%

Notes: Table 6 details reserve-management strategies used to limit the governments loss exposure because of its implicit guarantee of Canadian banks as indicated by the results of Tables 4 and 5. CGR deposits are gold and Dominion notes deposited by banks with the Central Gold Reserve (column 2). Bank stock could be bought by subscription when issued, and only 10 percent had to be initially paid by any one subscriber (column 3). The maximum circulation of bank notes (columns 2 plus 3) is the amount allowed before any penalty interest charges to the banks would apply (column 4). Column 6 = columns 5/4. Column 7 = columns 4 - 5. Column 9 = columns 7/8. Column 11= columns 10/8.

Table 7
Regression of *IPP* on the Hypothetical Reserve Ratio (*HRR*) and the Finance-Act Ratio (*FAR*)

$IPP_{n,t} = \alpha_n + \beta_n HRR_{n,t} + \beta_n FAR_{n,t} + \varepsilon_{n,t}$
$n = 1, 2, \ldots, N$; t=December 31, 1926,... December 31, 1934.
$IPP_{n,t}$ = each bank's yearly actuarially correct deposit-insurance premium per dollar of deposits calculated using the model of Hovakimian and Kane (2000);
$HRR_{n,t}$ = each bank's yearly hypothetical reserve ratio (excess-central-gold reserves plus excess-contingent-shareholder liability/demand deposits);
$FAR_{n,t}$ = each bank's yearly Finance-Act ratio (Treasury-Board advances/demand deposits);
$\varepsilon_{n,t}$ = random disturbances assumed to be i.i.d. normal.
The research hypotheses are:
Test 1: H_o: $\Sigma_{n=1,\ldots N}\ \Sigma\beta_n = 0$; *the coefficient of the independent variables for a equal-weighted-bank portfolio equals zero. This is tested with two F tests per portfolio, one test for each independent variable (i.e., HRR and FAR). The results of this test are displayed in columns 3 (HRR) and 4 (FAR), rows 3 (all-banks portfolio), 4 (large-bank portfolio) and 5 (small-bank portfolio).*
Test 2: H_o: $\Sigma_{n=1,\ldots 4} - \Sigma_{n=1,\ldots 4} = 0$; *the difference in the coefficients of the large-bank and small-bank portfolios for all regression parameters is not significantly different from zero. The results of this test are reported in the bottom row(large-bank coefficient – small-bank coefficient) and in column 5 (bank portfolio's HRR coefficient – FAR coefficient).*

1	1 *IPP*	2 α	3 *HRR*	4 *FAR*	5 *HRR - FAR*
2	Actuarially Fair Deposit- Insurance Premium	Intercept Parameter	Hypothetical Reserve Ratio	Finance-Act Ratio	Difference-of-Means Test
3	All-Banks Portfolio N=72	-0.724 (0.0001)***	0.0352 (.0001)***	-0.0004 (0.5840)	0.0348 (0.0001)***
4	Large-Bank Portfolio N=36	-0.0709 (0.0001)***	0.0323 (0.0001)***	-0.0012 (0.0357)**	0.0311 (0.0001)***
5	Small-Bank Portfolio N=36	-0.0015 (0.8887)	0.0029 (0.0729)*	0.0008 (0.0119)***	0.0021 (0.2427)
6	Difference-of-Means Test: Large- versus Small-Bank Portfolios	-0.0694 (0.0001)***	0.0294 (0.0001)***	-0.0020 (0.0018)***	

Notes: These results support the results of Table 6 that imply the large banks relied more on maintaining excess-bank-note collateral to control risk than Finance-Act advances. The significantly positive coefficient for *HRR* reflects the distribution of the large-bank HRRs in Table 6 that peaks in the high-risk years of 1932 and 1933. The significantly negative coefficient for *FAR* reflects the distribution of the large-bank FARs in Table 6 that peak in the low-risk year of 1929, then decline with only a slight increase in the high-risk years. The small-bank results also support the results of Table 6 that the small banks relied more on Finance-Act advances to control risk than excess-bank-note collateral. The small-banks results reflect the distribution of the small-bank *HRR* and *FAR* in Table 6. The coefficient of *HRR* is only positive at the 10 percent level, which matches with the rather flat distribution of *HRR* in Table 6. In Table 7, *FAR* is significant at the 1 percent level, which reflects the large increase in *FAR* displayed in Table 6 over 1931-1934, which contains the riskiest years in the study.
*, ** and *** indicate significance at the 10, 5 and 1 percent level, respectively.