Wealth and Risk Effects of Adopting Deposit Insurance in Canada: Evidence of Risk Shifting by Banks and Trust Companies

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ABSTRACT

This paper confirms that adopting explicit deposit insurance expanded risk-shifting incentives for Canadian Banks and Trust Companies. By transferring responsibility for monitoring non-systematic risk to the Canadian Deposit Insurance Corporation (CDIC), deposit insurance eliminated the compensation previously paid to large-block stockholder monitors. This transfer fueled a redistribution of insured-institution stock from poorly diversified large-block shareholders to diversified investors. Also, subsequent changes in market volatility support the hypothesis that CDIC insurance and the absorption of catastrophic risk it provided reduced systematic risk in the stock market as a whole even as it increased non-systematic risk in the banking and trust-company sector.

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Prior to the U.S. Banking Act of 1933 and the Canadian Bank Act of 1934, bank stockholders in both countries were subject to double liability.[1] This 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 stakeholders relied upon this contingent liability to motivate large-block stockholders to monitor bank managers for them.

Kane and Wilson (1998) argue that the compensation paid by creditors to large-block stockholders for their monitoring and loss-control services must exceed the monitors' cost of performing these services for double liability to be effective. Thus a creditor might accept a lower rate of interest from a bank with a high-quality, reliable monitor whose efforts maintain an acceptable level of risk. Expenses incurred are direct costs of monitoring, which are a function of the complexity of a bank's assets; free-rider problems if stock ownership becomes less concentrated and stock trading becomes more anonymous; and opportunity costs of missed growth opportunities because of limitations on acceptable sources of bank capital because of closely held and illiquid stock. Kane and Wilson (1998) assert that these costs will be higher at large banks because their assets are more complex and harder to value, their stockholders are more numerous and diffuse, and their growth opportunities are more abundant.

Kane and Wilson (1998) maintain that as U.S. banks began seeking a broader base of capital during the 1920s to take better advantage of growth opportunities, stockholder concentration at large banks declined making double liability inefficient in controlling incentive conflict among large-bank stakeholders.[2]

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[1] Double liability applied to all Canadian chartered banks. Winton (1993) reports "double liability was the rule for nationally chartered banks in the United States from the mid 19th century until the early 20th century…"

[2] Macey and Miller (1992, p.37) report that "the dispersal of bank shares among the public, which had progressed rapidly during the economic boom of 1923-1929, meant that many of the shareholders being assessed (during the bank failures of 1929 through 1933) had no insider connection with the failed bank, either by way of family relationships or

The Banking Act of 1933, by establishing Federal deposit insurance and breaking the link between bank stock and double liability for national banks, helped restore investor confidence by asking government officials to take over and bond the task of monitoring managerial performance and solvency at U.S. banks.[3]

This explanation for the adoption of deposit insurance in the U.S. stands in stark contrast to the conventional wisdom that holds it was established to restore liquidity to bank deposits and help small banks. Even though Congressional representatives of urban areas in eastern states began to support deposit insurance by late 1931, Calomiris and White (1994) argue it was because of political pressure from small creditors. They assert that the severe depositor losses during the Great Depression motivated small depositors to become a political force strong enough to overcome large-bank opposition to deposit insurance. However, Kane and Wilson (1998) contend the rebalancing of Congressional support was motivated by "changes in the funding-cost benefits that deposit insurance could offer stockholders in a substantial number of large banks." To support their argument, Kane and Wilson (1998) conduct an event study of the passage of the Banking Act of 1933 and find that stockholders of large urban U.S. banks benefited more than stockholders of small national and New York state-chartered banks.

In Canada, rather than addressing double liability and deposit insurance in the same legislation, separate legislation was used to address these issues. The Bank Act of 1934 phased out 75 percent of double liability over a 10-year period (1936-1945) with The Bank Act of 1944 scheduling its end by January 1, 1950.[4] Seventeen years later, the Canada Deposit Insurance Corporation Act of 1967 established a national deposit-insurance program. Conducting an event study of the adoption of deposit insurance in Canada

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employment status. Many had purchased their shares in prosperous times without serious consideration of their potential liability in the event of bank failure."

[3] Macey and Miller (1992, p.38) relate, "Federal double liability was all but moribund after 1934."

[4] Specifically, the Bank Act of 1934 (Chapter 24 of the Acts of the Parliament of the Dominion of Canada) was passed in conjunction with the Bank of Canada Act of 1934 (Chapter 43). Unlike the U.S. in 1934, Canadian charter banks issued currency and bank-note holders had first priority against the assets of a bank in the event of liquidation. 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.

provides several empirical advantages over Kane and Wilson's (1998) study. One advantage is that any confounding effects between double-liability and deposit-insurance issues that may be present in U.S. data should be absent in Canadian data because these issues were addressed in separate legislation and implemented during different time periods. Another advantage is that contrary to the situation in the U.S., there was not a severe banking crisis in Canada when its deposit-insurance program was adopted. This makes it easier to isolate news events that only pertain to issues surrounding the adoption of deposit insurance. A final advantage is that daily stock prices were recorded for Canadian banks during the 1960s but only weekly prices were recorded for U.S. banks during the 1930s. Empirical tests using daily data should be more powerful than tests using weekly data. A disadvantage in studying the Canadian experience is that returns from only five bank and five trust-company stocks are available for study.

This paper tests the "moral-hazard" and the "risk-transfer" hypotheses. Consider the following equation for the expected price [$E(P_s)$] of a stock:

$$E(P_s) = \sum_{t=1, \ldots, \infty} E(CF)^t / (1+k_s)^t. \quad (1)$$

Expected future cash flow [$E(CF)$] equals the net cash flows from the activities of a bank or trust company [*ncf*] minus its deposit cost [*dc*]. Before deposit insurance, *dc* is positively correlated with the firm-specific risk of the bank or trust company, which the large-block shareholder monitors. This means that firm-specific risk is priced for large-block shareholders through adjustments in *dc*. Moreover, because the large-block shareholder maintains a non-diversified position in the bank or trust-company stock, the cost of equity [k_s] contains premiums for both non-systematic and systematic risk.

After the imposition of deposit insurance, *dc* primarily consists of the risk-free rate of interest and an underpriced flat-rate deposit-insurance premium.[5] Because non-systematic risk is no longer being priced for insured deposits, and because the risk premium paid for uninsured deposits and non-deposit liabilities has most likely declined to virtually zero (Kane and Wilson, 1998), bank and trust-company managers are

[5] Demirgüç-Kunt and Huizinga (2000) study interest rates and deposit growth at banks in 43 countries over 1990-1997. They find that explicit deposit insurance lowers the interest expenses of banks and makes interest rates less sensitive to bank risk, especially liquidity risk.

motivated to increase firm-specific risk and thus increase *ncf*.[6] Furthermore, the premium in k_s for non-systematic risk has been reduced to nearly zero because the consequences of firm-specific risk have been transferred to the deposit guarantor. This risk-reduction process is similar to that of a diversified stock investor who ignores the non-systematic risk of a stock because its consequences are washed out across a diversified portfolio and whose price is thus determined by only systematic risk. The non-systematic risk of the stock remains, but it is ignored because its consequences have been negated and it is therefore no longer priced.

The moral-hazard hypothesis seeks evidence to support the argument given above that "bank and trust-company managers are motivated to increase firm-specific risk and thus increase *ncf*." It asserts that deposit guarantees create moral hazard and incentives for banks to create risk unless appropriately priced and administered. This hypothesis would be supported if implicit and explicit forms of deposit insurance create risk-shifting incentives for Canadian bank and trust companies. The methodology of Hovakimian and Kane (2000) is used to test this hypothesis, and the empirical results indicate Canadian banks had risk-shifting incentives both before and after deposit insurance was adopted while trust companies only had risk-shifting incentives after adoption. This suggests Canadian banks received implicit deposit guarantees in the pre-deposit-insurance period with regulators most likely pursuing a "too-big-to-fail" policy.[7]

Difference-of-means tests are also conducted to determine the magnitude of the change in the risk incentives between the pre- and post-deposit-insurance periods. The results indicate a significant increase in the incentives for bank managers to increase financial leverage and asset volatility, which, in turn, produces a significant increase in the banks' actuarially fair deposit-insurance premium. Incentives for trust-company managers to increase financial leverage also significantly increased, which produces a concurrent increase in

[6] Kane and Wilson (1998, p. 576) argue that "federal guarantees pass through an indirect blessing to most of an insured bank's other contractual obligations." This argument suggests that the risk, and thus the cost, of uninsured deposits and non-deposit liabilities of the bank may be reduced by deposit insurance too.
[7] Even with broad and deep implicit deposit guarantees, it is doubtful banks would pay the risk-free rate for deposits because there is still a positive probability of depositor losses. Milhaupt (1999) relates that in an implicit system, government intervention is ad hoc and discretionary (Tally and Mas, 1990) and that assurances are derived from depositor estimates of the government's intentions to safeguard the financial system. This system allows governments the flexibility not to protect each and every bank, but only those that might precipitate a systemic crisis (Mishkin, 1996).

the trust-companies' actuarially fair deposit-insurance premium.[8] While deposit insurance is underpriced for both banks and trust companies, the increase in the actuarially fair deposit-insurance premium for banks is 53 percent higher than the increase for trust companies.[9] Most likely, this is because banks had greater incentives to increase asset risk than did the trust companies.

Managers increase non-systematic risk in order to increase expected future cash flows because the deposit-insurance premium is a flat rate and thus insensitive to changes in risk. Therefore, since the deposit-insurance program has virtually eliminated the pricing of non-systematic risk, an event-study test of the adoption of deposit insurance should find positive abnormal returns for both bank and trust-company shareholders. The results show that bank stockholders experience a statistically significant 3.67 percent wealth gain while trust-company stockholders experience a non-significant 1.33 percent gain. Moreover, because the wealth increase of bank shareholders is greater than that of trust-company shareholders, this result not only supports the moral-hazard hypothesis but also the finding of Kane and Wilson (1998) that large U.S. banks benefited more than did small U.S. banks from the imposition of deposit insurance. This result is also consistent with the earlier finding that Canadian banks were more successful than trust companies in increasing their non-systematic risk.

The risk-transfer hypothesis seeks evidence to support the argument given in the discussion of equation (1) that "the premium in k_s for non-systematic risk has been reduced to virtually zero because the consequences of firm-specific risk have been transferred to the deposit guarantor." If no evidence of a reduction in the premium for non-systematic risk is found, equation (1) suggests that the wealth increase detected by the event study is only driven by the hypothesized increase in expected future cash flows. However, if evidence of a reduction in the premium for non-systematic risk is found, the wealth increase is probably driven by a combination of an increase in expected future cash flows and the transference of the consequences of non-systematic risk to the deposit insurer. An increase in systematic risk between the pre-

[8] The results also show that bank and trust-company leverage significantly increased at the 1 percent level on a book-value basis between the pre- and post-deposit insurance periods.
[9] Laeven (2002) overviews the literature pertaining to the pricing of deposit insurance and finds the empirical evidence indicates deposit insurance is underpriced in most countries.

and post-deposit-insurance periods for the bank portfolio is found, which suggests that most of the non-systematic risk is no longer being priced. After analyzing the variables that produced this increase, it is found that the covariance of the returns on the bank portfolio with the market increased 52.52 percent and the covariance of the returns on the trust-company portfolio with the market increased 61.23 percent.

The increases in covariance reflect the strengthening of the relationship between the size and direction of returns on the bank and trust-company portfolio with the returns on the market, which results from the deposit-insurance guarantees absorbing most of the firm-specific risk previously faced by shareholders. Because the consequences of firm-specific risk have been almost completely negated for stockholders, it is for all intents and purposes no longer priced and thus the bank and trust-company stock returns more closely match the market's returns.[10]

Lastly, the payment of the risk-free rate and a flat-rate deposit-insurance premium for deposits has eliminated most of the compensation formerly paid to large-block stockholders to monitor management and thus to maintain a non-diversified position in bank or trust-company stock. Consequently, large-block stockholders would be expected to diversify their bank or trust-company stock holdings since they are no longer adequately compensated for bearing non-systematic risk. Diversified investors, however, who only price systematic risk, will buy the bank and trust-company stock if the provision of deposit insurance has caused expected returns to exceed required returns. As argued earlier, expected returns have probably increased because *E(CF)* in Equation (1) is expected to be larger and k_s is expected to be smaller.

An analysis of the changes in the number of shareholders and trading volumes for both trust companies and banks demonstrates that shareholder distribution increased because of the provision of deposit insurance. Increases in the number of trust-company shareholders started three-years prior to the adoption of deposit insurance and concluded two-years later, while increases in the number of bank shareholders began upon the adoption of deposit insurance and concluded three-years later. Finally, the

[10] If a reduction in non-systematic risk is driving the increase in covariance, it should be reflected in the R^2 of the regression model. Using OLS, R^2 for the bank portfolio in the pre-deposit-insurance period is .1108 and in the post-deposit-insurance period it is .2216, which is the expected result.

volume of trading substantially increased for both banks and trust companies upon the adoption of deposit insurance, which also provides support for the risk-transfer hypothesis.

The remainder of the paper is organized as follows. Section 1 describes the adoption of national deposit insurance in Canada. Sections 2, 3 and the first part of 4 present tests of the moral-hazard hypothesis. Specifically, section 2 presents tests for risk-shifting opportunities, section 3 presents difference-of-means tests to determine the magnitude of the change in the risk-shifting opportunities brought about by deposit insurance and the first part of section 4 presents an event-study test to detect shareholder wealth changes from the adoption of deposit insurance. The last part of section 4, section 5 and section 6 present tests of the risk-transfer hypothesis. Specifically, the last part of section 4 presents tests of changes in systematic risk, section 5 presents an analysis of the change in the components of systematic risk; and section 6 presents an analysis of the change in the number of shareholders and trading volumes. Section 7 concludes.

1. THE ADOPTION OF DEPOSIT INSURANCE IN CANADA

The Canada Deposit Insurance Corporation (CDIC) Act was approved by Parliament on February 17th, 1967 and came into force on April 17th, 1967 (CDIC 1967 Annual Report). Banks and all federally incorporated trust and loan companies were required to join, which initially was twenty-eight institutions, while provincially incorporated trust and loan companies were invited to apply with the consent of the appropriate province, which led to forty-one additional institutions being accepted.[11] The CDIC insured deposits up to $20,000 per individual per institution and the required premium was 1/30th of 1 percent of insured deposits.

Canadian banks are federally chartered and regulated under Canada's Bank Act, which is revised by Parliament every ten years. Finance and trust companies, however, could choose between federal or provincial incorporation, with most choosing the latter (Nankivell, 1965). A Royal Commission on Banking

[11] Provincial permission was required for all non-federally chartered institutions to participate in the deposit-insurance program to prevent the possibility that its implementation could be held up by the courts.

and Finance (known as the Porter Commission) recommended in 1964 that the regulation and supervision of trust companies, known as "near banks" because they offered a number of banking services, also come under the Bank Act (Bean, 1966).[12] The Porter Commission had earlier considered recommending a deposit-insurance program as a means of expanding federal regulation over trust companies but decided that it would not be necessary if its recommendation for comprehensive federal supervision via the Bank Act were carried out (Riddell, 1965).

Concern had been growing in Canada about the large number of newly chartered trust companies at the provincial level. According to MacGregor (1996), chartering provisions were weak in the provinces, provincial supervision was not as stringent as federal supervision, and regulatory and supervisory standards varied substantially from province to province. The Porter Commission believed the answer was to require all deposit-taking institutions to be subject to uniform federal regulation through the Bank Act regardless of how they were chartered. However, many believed this course of action was a violation of the Canadian constitution, which clearly gave the provinces jurisdiction in this matter.[13] Finance Minister Walter Gordon dropped the issue from the 1966 revision to the Bank Act because of the touchy federal-provincial situation (Nankivell, 1965).

However, a large finance company named Atlantic Acceptance Corporation failed in 1965 and British Mortgage & Trust Company, which had invested and lent heavily to Atlantic Acceptance Corporation, almost failed. This kept interest in a deposit-insurance program alive because many felt a "run" on British Mortgage would have occurred except the Ontario government arranged to lend money if necessary to make sure that no depositors suffered losses (Riddell, 1965). Realizing that the explicit backing of the Ontario government had prevented a run that possibly could have spread to other trust companies, many began to admit they would like to see deposit insurance in Canada.

[12] Nankivell (1965) reports the Porter Commission found "the supervision and inspection of the banks … 'good and thorough' and 'contributes so much to the soundness of our chartered and savings banks.'" However, the commission complained about a "'mixed and confused pattern' of provincial-federal regulation," which results in "unevenness and inadequacies in the regulation and supervision (of trust banks)…"

Prior to this, there had been scant support for deposit insurance within the trust and banking industries. Many in the trust industry pointed out that no depositors had ever lost money in a trust company, including depositors in British Mortgage & Trust. They also argued "deposit insurance could encourage unsound investment policies under the 'protective umbrella' of insurance" (Staff, 1966). Some advocates for deposit insurance for the trust industry did not believe it was necessary for Canadian banks because of their size, nationwide network of branches and strong federal supervision. Moreover, they also argued the last Canadian bank to fail had been in 1923, which subsequently led to better federal supervision being adopted.

The 1965 revision to the Bank Act died in Parliament. The next year the new Finance Minister, Mitchell Sharp, prepared new Bank-Act amendments that contained many of the Porter Commission's key recommendations. According to Baxter (1966), Sharp recognized that to produce a federal bill that "legislated the activities of provincially incorporated companies in this field was to court a political crisis that could damage the whole Canadian banking structure." His solution was to copy the U.S. deposit-insurance system that uses a federal agency to insure deposits. By setting up a Crown Corporation to provide deposit insurance instead of using a regular government agency "it is thought in Ottawa it could be the answer to imposing federal standards within provincial jurisdiction--without causing an explosion in the process." This agency would provide insurance to all federally or provincially chartered deposit-taking institutions. In return, they would have to meet the agency's standards and be subject to its supervision. Those that qualify would then be able to offer their depositors federally backed deposit insurance, which would give them a competitive edge over institutions without federal-deposit-insurance coverage.

2. TESTS FOR RISK-SHIFTING INCENTIVES

This section conducts tests of the moral-hazard hypothesis. If the Canadian government did not provide implicit deposit guarantees before adopting deposit insurance, the flat-rate-premium program adopted in Canada would be expected to create moral-hazard and risk-increasing incentives. However, if a

[13] Others argued: “Although the federal government constitutionally has the right to legislate over banking, the word “banking” has never been defined. Federal legal advisers believe an attempt by Ottawa to assert its jurisdiction over

broad implicit guarantee was provided in the pre-deposit-insurance period, it is possible the explicit program reduced moral-hazard and risk-taking incentives.[14] This could result if the explicit deposit-insurance program reduced the scope of the safety net by imposing coverage limits and excluding from coverage non-depositor creditors. On the other hand, moral-hazard and risk-taking incentives could increase even if a broad implicit guarantee was provided if the explicit program improved or expanded the conjectural guarantees and/or improved the credibility of projections of additional implicit support.

To determine if the adoption of a deposit-insurance program provided incentives for Canadian banks and trust companies to shift risk to the deposit insurer, single-period and two-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 two-period tests using dummy variables. The one-period models are:

$$\Delta(B_{jt}/V_{jt}) = \alpha_{0j} + \alpha_1 \Delta\, \sigma_{Vjt} + \varepsilon_{jt}, \tag{2}$$

$$\Delta IPP_{jt} = \beta_{0j} + \beta_1 \Delta\, \sigma_{Vjt} + \xi_{jt}. \tag{3}$$

The slope coefficients are interpreted as:

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

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

B is the face value of deposits and other debt, V is the market value of a bank or trust-company's assets, σ_V is the volatility of asset returns, IPP is the risk-adjusted deposit-insurance premium per dollar of deposits and Δ signifies the data are first-differenced.[15]

The value of deposit insurance increases in σ_V and B/V (Merton, 1977) thus, holding the deposit-insurance premium fixed, positive partial derivatives for IPP with respect to σ_V and B/V imply stockholders

near banks might be challenged successfully in the courts" (Staff, 1967).

[14] Kryzanowski and Roberts (1993) argue that the lack of bank failures in Canada during the Great Depression of the 1930s was because the government implicitly guaranteed all deposits. Additionally, Kane and Wilson (2002) find that transfers in safety-net capital (defined as wealth transfers bank stockholders receive because of opportunities bankers have to shift uncompensated risks onto unwary counter parties) in Canada broadly correspond to three periods when at least one bank failed (1896-1899, 1903-1905, and the mid-1920s) and in the mid-1960s and early 1970s when national deposit insurance was introduced. Finally, Saunders and Wilson (1999) argue that the Canadian government provided implicit deposit guarantees and a too-big-to-fail policy potentially as early as the 1930s.

can extract value from the deposit insurer. 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 and/or bank regulators who should 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 and β_1 is positive, indicating financial-risk incentives declined but failed to completely offset increases in asset-risk incentives, or if α_1 and β_1 are positive indicating both financial-risk and asset-risk incentives increased.

Estimates of σ_V, B/V and *IPP* are obtained 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 Bank and Finance Manual*. The pre-deposit-insurance period encompasses 1962 through 1966 and the post-deposit-insurance period 1967 through 1972. Trust-company monthly returns are calculated using the weekly close reported in the *Financial Post* for the last Friday in each month. Eastern and Chartered Trust Company is discarded from the trust-company sample because its balance-sheet data are only available for part of the period. Monthly returns for bank stocks are extracted from the *TSE Western Database* maintained by the University of Western Ontario, Canada.

Deposit insurance is modeled as a single-period European put option on the 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

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

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, and σ_V are not directly observable and must be estimated by solving two simultaneous equations. The first, equation (4), states σ_V as a function of E, V and σ_E via Ito's lemma. The second, equation (5), is the call-option formulation for equity. These solution values are used in equation (6) to find IPP as the value of a put option on bank assets.

$$\sigma_V = \sigma_E\,(E/V)/(\partial E/\partial V), \tag{4}$$

$$E = V[1-(1-\delta)^T]+V(1-\delta)^T N(x_1) - \rho B N(x_2), \tag{5}$$

$$IPP = N(-x_4) - (1-\delta)^T (V/B)N(-x_3). \tag{6}$$

where

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

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

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

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

For the two-period model, data in the pre- and post-deposit-insurance periods are pooled. A dummy variable equal to one is used to signify the post-deposit-insurance period. The equations estimated are[16]:

$$\Delta(B_{jt}/V_{jt}) = \alpha_{0j} + D_S\alpha_{0j} + \alpha_1\Delta\sigma_{Vjt} + D_S\alpha_1\Delta\sigma_{Vjt} + \varepsilon_{jt}, \tag{7}$$

$$\Delta IPP_{jt} = \beta_{0j} + D_S\beta_{0j} + \beta_1\Delta\sigma_{Vjt} + D_S\beta_1\Delta\sigma_{Vjt} + \xi_{jt}. \tag{8}$$

The results for the single-period and two-period models are displayed in Table 1. The results for Equation (2) are displayed in columns 2 and 3 and the results for Equation (3) are displayed in columns 7 and 8. The results for Equation (7) are displayed in columns 4, 5 and 6 and the results for Equation (8) are displayed in columns 9, 10 and 11. The bank results are displayed first and the trust-company results are displayed beneath the bank results.

Recall that risk-shifting opportunities exist if α_1 is negative and β_1 is positive, indicating financial-risk incentives declined but failed to completely offset increases in asset-risk incentives, or if α_1 and β_1 are positive, indicating both financial-risk and asset-risk incentives increased. The results for the single-period and two-period models are qualitatively the same for both banks and trust companies for equations (2) and (7). Banks had incentives to increase their financial leverage on a market-value basis at the 1 percent level in the pre-deposit-insurance period using the single-period model (column 2) and at the 10 percent level using the two-period model (column 4). Trust companies did not have significant results with either model during the pre-deposit-insurance period. Banks had incentives to increase their financial leverage on a market-value basis at the 1 percent level in the post-deposit-insurance period with both the single-period model (column 3) and the two-period model (column 6). Trust companies had the same results except their significance level was at 5 percent.

Banks had incentives to increase asset risk at the 5 percent level during the pre-deposit-insurance period using the single-period model (column 7) but not with the two-period model (column 9). Trust companies did not have risk-increasing incentives with either model during this period. Finally, banks had incentives to increase asset risk at the 1 percent level during the post-deposit-insurance period using both models (columns 8 and 11).[17, 18] Trust companies also had incentives to increase asset risk during this

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[16] The author thanks Ed Kane for suggesting this model.

[17] Gueyie and Lai (2003) use non-pooled data to test for risk-shifting opportunities with Ronn and Verma's (1986) model using the same Canadian banks as this study. When estimating equation (3), they find β_1 is significantly negative at the 5 percent level for Canadian banks in the post-deposit-insurance period, which is contrary to this study's finding. In an attempt to reconcile this discrepancy, Ronn and Verma's (1986) model is used to replicate the test of equation (3) using this study's data. The unreported results show β_1 is positive and significant at the 1 percent level in the post-deposit-insurance period, which supports the results reported by this paper using Hovakimian and Kane's (2000) model. Further attempts at reconciliation are not possible as the exact source of Gueyie and Lai's (2003) data is not specified.

[18] Gueyie and Lai (2003) find that the adoption of deposit insurance in Canada caused increases in the total risk, market risk, and asset volatility of banks; and decreases in their capital ratios. They next estimate an equation similar to equation (2) above except that rather than regressing B/V on changes in asset risk (σ_V), they regress B/V on changes in market- and book-capital ratios. Gueyie and Lai (2003) argue that when using the capital ratios, testing $\alpha_1 >= 0$ is the same as testing $\alpha_1 < 0$ in equation (2). Their estimates find a positive and significant relation between the capital ratios and asset risk, and they find that the banks with the largest increases in capital were also the ones with the largest increases in risk. These results led them to conclude that the self-discipline shown by Canadian banks in increasing their capital holdings in step with increases in their risk ruled out the possibility that Canadian banks engaged in risk-shifting behavior.

Gueyie and Lai's (2003) model is improperly specified because their capital ratios require the institutions to always be solvent. In equation (2) above, if the market value of assets (V) becomes less than the face value of bank debt (B), B/V is larger than 1, which indicates insolvency (Table 2 in this paper shows that both banks and trust companies are insolvent on a market-value basis in most years during the post-deposit-insurance period). However, if the market value (number of outstanding shares times stock price) or book value of equity is substituted for the book value of debt, as in Gueyie and Lai's (2003) model, the capital ratio will always be positive, hence precluding insolvency. Moreover, period, at the 5 percent level with the single-period model (column 8) and at the 1 percent level with the two-period model (column 11).

In summary, the empirical results displayed in Table 1 provide strong support for the moral-hazard hypothesis by indicating that Canadian banks had risk-shifting incentives before deposit insurance was adopted and that banks and trust companies had risk-shifting incentives after adoption. This suggests that Canadian banks received implicit deposit guarantees in the pre-deposit-insurance period and that the explicit program probably improved or expanded the conjectural guarantees and/or improved the credibility of projections of additional implicit support. Moreover, because it was only the banks that received implicit support before deposit insurance was adopted, it appears regulators were pursuing a too-big-to-fail policy.[19] The next section presents difference-of-means tests between the pre- and post-deposit-insurance periods to determine if the magnitude of increases in the risk incentives differs between the banks and trust companies.

3. LEVELS AND CHANGES IN B/V, B/V_{book}, IPP and σ_V

Yearly and period estimates are made of a market-value leverage ratio B/V (B is the face value of deposits and other debt and V is the market value of assets), a book-value leverage ratio B/V_{book} (V_{book} is the book value of assets), the level of IPP to see if the premium charged by the Canadian government for deposit insurance seems actuarially correct, and the volatility of assets (σ_V). V, IPP and σ_V are estimated using Hovakimian and Kane's (2000) model.

Table 2 presents the results. Each year's results are detailed in columns 2 through 6 for the pre-deposit-insurance period and columns 8 through 13 for the post-deposit-insurance period. Column 7 gives

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as V declines, the book-value-of-equity capital ratio would become larger (as would the market-value-of-equity capital ratio if the stock price did not decrease). Thus, as the bank approaches insolvency because of a decline in the market value of its assets, the capital ratios of Gueyie and Lai (2003) would indicate a higher level of capitalization. To illustrate, assume a bank's total assets equal \$100 with \$10 of book-value equity and \$90 of book-value debt. Its capital ratio is 10/100 or 0.10 and its debt ratio is 90/100 or 0.90. If the market value of the bank's assets decline to \$80, the book-capital ratio is now 10/80 or 0.125 while its debt ratio is 90/80 or 1.125. The new equity ratio indicates the capitalization of the bank has increased while the debt ratio indicates the bank is insolvent.

Another possible problem with Gueyie and Lai's (2003) model is that Saunders and Wilson (1995) cast doubt on the validity of the Ronn and Verma (1986) model noting that it does not satisfy put-call parity.

[19] See O'Hara and Shaw (1990) for more information regarding a too-big-to-fail policy. They study large U.S. banks that were identified as being too-big-to-fail in September 1984 Congressional testimony.

each variable's mean for the pre-deposit-insurance period and column 14 for the post-deposit-insurance period. Column 15 displays the *t*-statistic for difference-of-means tests (column 7 – column 14) and column 16 provides the *p*-value and significance level for the test results.

The difference-of-means tests for the bank portfolio show each variable has a statistically significant increase at the 1 percent level from the pre- to the post-deposit-insurance period. The trust-company results reveal B/V, B/V_{book} and *IPP* have significant increases at the 1 percent level, however, contrary to the bank result, σ_V has an insignificant decline. The results support the earlier findings displayed in Table 1, except for the asset risk of the trust companies. Regarding this difference, note that Table 1 reports results of tests using changes in variables while Table 2 reports results using levels of variables. While changes in asset risk became more positively correlated with changes in the actuarially correct deposit-insurance premium in the second period (as reported in Table 1), the level of asset risk in the two periods was similar (as reported in Table 2).

The results for B/V in columns 2 through 6 indicate both banks and trust companies were solvent on a market-value basis during the pre-deposit-insurance period (1962-1966), with the equity ratio of the trust-company portfolio exceeding that of the bank portfolio in every year. However, columns 8 through 13 indicate the bank portfolio was insolvent on a market-value basis in each year of the post-deposit-insurance period (1967-1972) except for 1971, as were the trust companies except in 1971 and 1972. Contrary to the pre-deposit-insurance period where trust companies were better capitalized than banks in all years, in the post-deposit-insurance period the trust companies' level of insolvency exceeds the banks in two of the six years. Moreover, in column 7 the spread between the means of B/V is wider (0.98 for banks versus 0.91 for trust companies) than the spread between these variables in column 14 (1.03 for banks versus 1.02 for trust companies). This suggests that trust companies had greater incentives to increase financial leverage than did banks in trying to maximize the deposit-insurance subsidy. Indeed, the percentage increase for banks in B/V between the periods is 5.1 percent and for the trust companies it is 12.1 percent.

To an unknown extent, the change in B/V may be driven by changes in market conditions rather than by active management. Therefore, to provide additional supporting evidence that the increase in leverage is being driven by management incentives, a regression of the yearly change (1962 through 1972) in the market index on the yearly change in *B/V* is conducted. While not reported in Table 2, for the bank portfolio the *t*-statistic is 0.37 and the R^2 of the model is 0.0172. For the trust-company portfolio, the *t*-statistic is -0.84, and the R^2 is 0.0811. Because these regressions indicate that changes in leverage do not reflect changes in market valuation, it is highly probable the changes in leverage noted in Table 2 are because of management incentives to increase risk. Further bolstering this interpretation is the fact that the results for B/V_{book} show the same trend in leverage changes as noted for *B/V*. Both banks and trust companies added debt faster than equity on a book-value basis after the adoption of deposit insurance.

Table 2 also shows that from the pre- to the post-deposit insurance periods, the bank portfolio has a significant increase in asset risk (σ_V) at the 1 percent level, from 1.30 to 2.19 percent, while the trust-company portfolio had an insignificant decrease, from 2.80 to 2.71 percent.[20] In the pre-deposit-insurance period, trust-company asset risk greatly exceeds bank asset risk in every year, ranging from 35 percent higher in 1965 to 185 percent in 1963. In the post-deposit insurance period, bank asset risk exceeds trust-company asset risk by 12 percent in 1968, while, in the remaining years, trust-company asset risk exceeds bank asset risk, ranging from 8 percent higher in 1967 to 101 percent in 1970.

To determine if the change in σ_V might reflect changes in market risk rather than management incentives, a regression of the change in σ_V on the change in the beta coefficient (i.e., the slope of the relationship between the change in portfolio returns and the change in market returns) is conducted. While not reported in Table 2, for the bank portfolio the *t*-statistic is 0.45 and the R^2 is 0.0280. For the trust-company portfolio, the *t*-statistic is –0.48 and the R^2 is 0.1413.[21] These results suggest that changes in market risk are not causing the changes in asset risk, which bolsters the argument that changes in asset risk are being driven by management incentives.

[20] The results reported in Table 2 for Canadian trust companies are similar to pooled results reported by Hovakimian, Kane and Laeven (2003, page 185) for banks from eight countries that adopted explicit deposit insurance in the 1990s. In their paper, columns 3 and 4 of Table 2 show the level of *B/V*, σ_V and *IPP* in the years before explicit deposit insurance and the years after its adoption. Using three different models including the one used in this paper, they find a significant increase in *B/V* and *IPP* between these two periods, but insignificant results for σ_V.

[21] For the trust companies, the yearly price used is the average of the highest and lowest price for each year.

The premium assessed by the new deposit-insurance program was a flat-rate 0.033 percent per dollar of insured deposits. The results for *IPP* displayed in Table 2 show that only in 1963 and 1964 would this premium have been actuarially fair. The mean *IPP* displayed in column 7 for the pre-deposit-insurance period shows the actuarially fair premium was higher for trust companies (0.28) than banks (0.23). Column 14 shows this relationship had reversed in the post-deposit-insurance period, with the bank-portfolio's premium exceeding the trust-company's 3.69 to 3.04 percent. The banks' actuarially fair premium increased 53 percent more than did the trust companies,' suggesting banks were more successful in increasing their non-systematic risk.

The results of this section also provide strong support for the moral-hazard hypothesis by demonstrating that the imposition of deposit insurance significantly increased the incentives for bank and trust-company managers to increase financial risk and, for the banks, asset risk. This, in turn, caused the actuarially fair deposit-insurance premium to greatly exceed the actual premium charged. The next section presents an event study, which is the last test of the moral-hazard hypothesis. Following that, a test to detect any changes in systematic risk is conducted, which is the first test of the risk-shifting hypothesis.

4. EVENT-STUDY AND CHANGE-IN-SYSTEMATIC-RISK TESTS

As argued in the introduction to this paper, the moral-hazard hypothesis maintains that an event study of the adoption of deposit insurance in Canada should find positive abnormal returns for shareholders because managers increase firm-specific risk to increase expected future cash flows. Moreover, because the deposit-insurance guarantees have transferred the consequences of the non-systematic risk that was previously faced by shareholders to a deposit guarantor, the risk-transfer hypothesis maintains that the sensitivity of bank and trust-company stock returns to systematic risk should increase.

4.A. Data

Candidates for announcements are found using Carr, Mathewson, and Quigley (1966), the 1965 through 1967 *Wall Street Journal Index* and the *Canadian Periodical Index,* which indexes the *Financial Post.* Following Cornett and Tehranian (1990) and Wagster (1996), only announcements referring to major changes in the regulation, creating or resolving stumbling blocks to its acceptance or dealing with its acceptance by a key group are analyzed. No significant concurrent announcements regarding Canadian banks, trust companies or Canadian-bank and trust-company regulation occur during any of the event windows.

Daily stock-market prices from the Toronto Stock Exchange (quoted in Canadian currency) are gathered from the *New York Times* for the Bank of Nova Scotia, Canadian Imperial Bank of Commerce, Toronto-Dominion Bank, Bank of Montreal and the Royal Bank of Canada from December 31, 1964 to June 29, 1967.[22] The value of the Toronto Stock Exchange 300 Composite Index (TSE 300) is gathered for the same time period. Weekly stock-market prices are found in the *Financial Post* for thirteen of the sixty-nine trust companies originally covered by the deposit-insurance program. However, as shown in Appendix 2, seven of these firms cannot be used because their stocks did not trade during at least 10 percent of the weeks. When a stock did not trade, the previous week's price is used for the no-trade week. Appendix 2 also shows that the trust companies are much smaller than the chartered banks and that their trading volume is substantially lower.

Daily Canadian interest-rate data are not available, therefore daily changes in the U.S. Treasury constant-maturity 10-year bond yield are used to study the chartered banks (Federal Reserve Board of Governors' H.15 release). The daily changes are adjusted to weekly changes when studying trust companies.

4.B. Methodology

Schwert (1981) argues stock-market data measure the impact of regulatory change better than other measures, such as accounting or macroeconomic data, because asset prices incorporate all relevant information as soon as it becomes available. Consequently, a growing literature uses financial theory to study the ramifications of new regulations.

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[22] After June 29, 1967, there is a period of several weeks when the *New York Times* did not report Canadian share prices, followed by several more periods like this through out the remainder of 1967. Therefore, the gathering of daily data stopped after June 29, 1967.

To measure the wealth effects of the implementation of deposit insurance in Canada, this article uses a Multivariate Regression Model (MVRM) similar to that used in Cornett and Tehranian (1990) and Wagster (1996). The MVRM explicitly incorporates contemporaneous dependence of the disturbances into hypothesis tests, which is important because regulatory events 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.

The wealth effects and the change in systematic risk of the chartered banks and trust companies are estimated with the following model:

$$R_{nt} = \alpha_n + \alpha_n D_s + \beta_n M_t + \beta_n D_s M_t + \beta_n I_t + \beta_n D_s I_t + \Sigma D_a \delta_{na} + \varepsilon_{nt}, \qquad (9)$$

$$n = 1, 2, \ldots, N; \ t = 1, 2, \ldots, T; \ a = 1, 2 \ldots, 6.$$

Where

R_{nt} = the daily rate-of-return (chartered banks, N=5) or weekly rate-of-return (trust companies, N=6) of firm *n* at time *t* (from December 31, 1964 through June 29, 1967);

α_n = the intercept coefficient for firm *n*;

$\alpha_n D_s$ = the shift in the intercept coefficient for firm *n*;

D_s = a shift dummy variable that equals zero from January 4, 1965 to March 31, 1966 (the midpoint of the range of dates of the announcements listed in Appendix 1) and 1 from April 1, 1966 to June 29, 1967;

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

$\beta_n D_s$ = the shift in the systematic-risk coefficient for firm *n*;

M_t = the daily rate-of-return (chartered banks) or weekly rate-of-return (trust companies) on the Toronto Stock Exchange 300 Composite Index at time t;

I_t = the daily change (chartered banks) or weekly change (trust companies) in the yield of the 10-year U.S. Treasury constant-maturity bond;

D_a = a dummy variable that equals one the day before and the day of announcement a (chartered banks) or one for the week in which an announcement was made (trust companies) and zero otherwise;

δ_{na} = the effect of regulatory change a on firm n;

ε_{nt} = random disturbances assumed to be i.i.d. normal, independent of the return of the market indexes and the announcement variables.[23]

4.C. Research Hypotheses

Tests 1 and 2 are the final tests of the moral-hazard hypothesis. Test 3 is the first test of the risk-shifting hypothesis.

Test 1: H_o: $\Sigma_{n=1, \ldots N}\, \Sigma\delta_{na} = 0\ \forall_a$; *the abnormal return for the bank and trust-company equal-weighted portfolio to each event-day a equals zero. This is tested with six F tests, one for each event studied. The results of this test are displayed in columns 8 through 13 of Table 3.*

Test 2: H_o: $\Sigma_{n=1, \ldots N}\, \Sigma_{a=1, \ldots,6}\delta_{na} = 0$; *the cumulative abnormal return for each portfolio over all six event-days a equals zero. The purpose of this F test is to provide valuable information about how the implementation of deposit insurance in Canada impacted the wealth of shareholders of Canadian chartered banks and trust companies. This is tested with two F tests, with results displayed in column 14 of Table 3.*

Test 3: H_o: $\Sigma_{n=1, \ldots N}\, \beta_n D_s M_t = 0$; *the change in systematic risk of the bank and trust-company equal-weighted portfolio because of the implementation of an explicit deposit-insurance program equals zero. The results of this test are displayed in column 5 of Table 3.*

4.D. Empirical Results

The results are presented in Table 3, which consists of fourteen columns. Column 1 lists each portfolio studied. Columns 2 through 7 display estimations of the regression parameters while columns eight through fourteen display abnormal returns from the event study. For each abnormal return, its associated *p* value is displayed in parentheses.

The results for test 1 are displayed in columns 8 through 13 and reveal that only the bank portfolio experiences a significant abnormal return. Column 9 reveals a 1.11 percent wealth increase for Canadian-bank shareholders at the 1 percent level of significance to the September 4, 1965 announcement. This announcement reports opposition to a deposit-insurance program within the trust industry is eroding. It also states officials are considering a broad-based deposit-insurance program that includes Canadian banks. The results for test 2 are displayed in column 14 and show the Canadian-bank portfolio has a significant abnormal return of 3.67 percent over all six announcements while the trust-company portfolio has an insignificant abnormal return of 1.33 percent. The significant wealth increase for bank shareholders provides support for the moral-hazard hypothesis. However, while the sign of the wealth effect for trust-company shareholders is the hypothesized result, the wealth effect is not significant.

Because the wealth increase of bank stockholders is larger than that of trust-company stockholders, the results of the event-study test support the results reported by Kane and Wilson (1998) that large U.S. banks benefited more than did small U.S. banks from the imposition of deposit insurance. This finding also supports the results of the difference-of-means tests reported earlier. Recall that the moral-hazard hypothesis implies that the wealth gains of bank shareholders should exceed those of trust-company shareholders because the increase in the banks' actuarially fair deposit-insurance premium exceeded the increase of the trust companies by 53 percent. This most likely occurred because the incentive to increase both asset risk and financial risk increased for bank managers while only the incentive to increase financial risk increased for trust-company managers.

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

Column 5 of Table 3 displays results of test 3, which is the first test of the risk-shifting hypothesis. The results indicate the adoption of deposit insurance significantly increased the systematic risk of the bank portfolio, but did not affect the return-generating process of the trust-company portfolio. The bank result provides support for the risk-transfer hypothesis that argues the sensitivity of bank and trust-company stock returns to systematic risk should increase because the consequences of non-systematic risk that were previously faced by shareholders have been transferred to a deposit guarantor. The next section seeks additional evidence about this hypothesis by disaggregating the increase in systematic risk into its component parts.

5. AN ANALYSIS OF THE CHANGES IN SYSTEMATIC RISK

The changes in systematic risk displayed in Table 3 will be disaggregated into the standard deviation of returns on the bank and trust-company portfolios, the standard deviation of returns on the market index, and the correlation coefficient and the covariance of returns for each portfolio and the market index. Table 4 presents the results.

The components of beta are:

$$\beta = \rho_{\text{portfolio, market}} * (\sigma_{\text{portfolio}} / \sigma_{\text{market}}). \tag{10}$$

Where $\rho_{portfolio,\ \text{market}}$ is the correlation coefficient of the returns on an equal-weighted bank or trust-company portfolio against the TSE 300, $\sigma_{\text{portfolio}}$ is the standard deviation of returns on the bank or trust-company portfolio, and σ_{market} is the standard deviation of returns on the TSE 300. Column 2 reports standard deviations of returns on the market index and the bank portfolio. Column 3 reports these standard deviations on an annual basis. Column 4 reports correlation coefficients of the returns on the bank portfolio against the returns on the market index. Column 5 reports standard-deviation relatives. Column 6 reports the covariance between market-index returns and returns on the bank portfolio. Column 7 reports betas calculated using equation (10). Panel A reports results for the pre-deposit-insurance period (1/4/65-3/31/66), panel B reports results for the post-deposit-insurance period (4/1/66- 6/29/67), and panel C reports the percentage change between the pre- and post-deposit-insurance periods. The trust-company information is reported in the same sequence in columns 8 through 14. Daily data is used to calculate the bank results while weekly data is used to calculate the trust-company results.

Column 3 of panel C reveals that the annualized standard deviation of the bank portfolio increases 27.73 percent between the pre- and post-deposit-insurance periods, while column 10 reveals that the annualized standard deviation of the trust-company portfolio decreases 3.24 percent. These results suggest that the standard deviations were more sensitive to changes in asset risk over this period than they were to changes in financial leverage. Indeed, the results displayed in Table 2 show that the yearly changes in asset risk are more variable than are the changes in leverage for both the banks and the trust companies, and that the increase in average asset risk between the periods was 68 percent for the banks while it declined 3 percent for the trust companies. These changes in asset risk between the periods have the same sign and share a similar magnitude of change with the standard deviations displayed in Table 4.

The standard-deviation relative, displayed for banks in column 5 and for trust companies in column 12, shows the total change in non-systematic risk by taking into account not only the change in the standard deviation of the portfolio but also the change in the standard deviation of the market. The standard-deviation relative for banks increased 58.63 percent between the pre- and post-deposit-insurance periods while the trust-company standard-deviation relative declined 32.34 percent. The trust-company result would have been different if the standard deviation of the market had not increased 43.01 percent when calculated with weekly data, as displayed in column 10 of panel C. When calculated with daily data, the standard deviation of the market declines 19.48 percent, as displayed in column 3 of panel C.[24]

The correlation coefficient measures the strength of the relationship between market returns and the returns on the bank or trust-company portfolio. Column 4 indicates that the correlation coefficient for the bank portfolio increases 48.44 percent between the periods while column 11 indicates that the increase for the trust companies is 16.62 percent.

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[24] The sign and magnitude of the change in the standard deviation of the market between the pre- and post-deposit-insurance periods is different depending on whether daily or weekly data is used. This is probably why Table 3 reports different test results for the bank- and trust-company portfolios. Recall that the bank portfolio experiences a significant

The equation for the correlation coefficient is:

$$\rho_{\text{portfolio, market}} = cov(p,m) / (\sigma_p^2 * \sigma_m^2)^{1/2}. \quad (11)$$

Covariance, *cov(p,m),* between the periods increased 52.52 percent for the banks, as displayed in column 6, and 61.23 percent for the trust companies, as displayed in column 13. The denominator in the equation is calculated using the standard deviation given in column 2 for the banks and in column 9 for the trust companies. The changes between the periods for the denominators, which are not displayed in Table 4, are 3.47 percent for the banks and 21.38 percent for the trust companies. Because both denominators increased, the increase in the correlation coefficient for the banks and the trust companies is driven exclusively by the increase in covariance.

The substantial increase in positive covariance for both banks and trust companies provides support for the risk-transfer hypothesis. The covariance increase suggests that the provision of deposit insurance has helped to better align the size and direction of returns of each portfolio with the returns on the TSE 300 because the deposit-insurance guarantees absorbed much of the firm-specific risk previously faced by bank and trust-company shareholders. The next section seeks additional support for the risk-transfer hypothesis by analyzing the impact that the adoption of deposit insurance had on the number of shareholders and trading volumes.

6. CHANGES IN THE NUMBER OF SHAREHOLDERS AND AVERAGE TRADING VOLUMES

Because deposit insurance substitutes the payment of the risk-free rate of interest and a flat-rate deposit insurance premium for market-determined deposit cost, large-block stockholders are no longer adequately compensated for bearing non-systematic risk and they will thus diversify their holdings. Diversified investors, however, will only buy bank and trust-company stock if their expected returns exceed their required returns.

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wealth and systematic-risk increase while the trust-company portfolio experiences a non-significant wealth increase and a non-significant decrease in systematic risk.

The results of several tests suggest that expected returns increased because of the adoption of deposit insurance. The results of the risk-shifting tests in section 2 indicate that bank managers significantly increased leverage and asset risk and that trust-company managers significantly increased leverage. Their purpose was to take advantage of the deposit-insurance subsidy and thus increase stock price by increasing *E(CF)* in equation (1). Moreover, because the large increase in covariance found in section 5 indicates that the pricing of non-systematic risk is probably near nonexistent; k_s in equation (1) should be smaller, which would also increase expected returns. Finally, the event study of section 4 detects a significant wealth increase for bank shareholders and a non-significant wealth increase for trust-company shareholders, which indicates expected returns increased for at least the bank shareholders.

The effect of deposit insurance on required returns, however, is ambiguous. The results reported in Table 3 suggest that the provision of deposit insurance has increased the systematic risk of bank investors, which, according to the Capital Asset Pricing Model (CAPM), should increase required returns.[25] However, any increase in required returns brought about by higher systematic risk could be offset by a decline in the market-risk premium. Indeed, in comparing the four-month period prior to the passage of the deposit-insurance legislation, October 17, 1966 through February 16, 1967, to the four-month period after the passage of the deposit-insurance legislation, February 17 through June 29, 1967, the average daily return on the market changed from 0.33 percent to –0.27 percent. If the risk-free rate remains unchanged, this suggests that the market-risk premium declined, which makes the impact of deposit insurance on required returns ambiguous.[26]

If expected returns exceed required returns after deposit insurance is adopted, the number of bank and trust-company shareholders should increase as non-diversified large-block shareholders distribute their stock holdings to diversified investors. Panel A of Table 5 reports the results of difference-of-means tests between the pre- and post-deposit-insurance periods regarding the average number of shareholders of banks

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[25] For example, the Capital Asset Pricing Model suggests that if the risk-free rate is 6 percent, the market return is 15 percent, and a stock's beta is 0.5, an investor's required return on the stock is 10.5 percent. If the stock's beta increases to 1.0, the required return becomes 15 percent.

and trust companies. The time periods used are the same as those in Tables 1 and 2. Columns 2 through 6 report the number of shareholders for each year of the pre-deposit-insurance period while columns 8 through 13 report this data for the post-deposit-insurance period. Column 7 provides the mean number of shareholders for the pre-deposit-insurance period and column 14 provides the mean for the post-deposit-insurance period. Column 15 displays the net difference in the means of the periods (column 7 – column 14), column 16 provides the *t*-statistic of the difference-of-means tests and column 17 provides the *p*-value. Underneath the number of shareholders for each year is the percentage change in shareholders from the prior year. For column 14, the percentage displayed is the change in the average number of shareholders from the pre- to the post-deposit-insurance period.

Column 14 shows that the average number of bank shareholders increased 31.92 percent between the periods and that the average number of trust-company shareholders increased 63.73 percent. Column 17 indicates the difference in the means is significant at the 1 percent level for both the banks and trust companies.

While the number of bank shareholders increased 5.97 percent in 1965, during the rest of the pre-deposit-insurance period there was little or no change. However, in 1967 there was a 13.53 percent increase in the number of bank shareholders. Besides being the year deposit insurance was adopted, the Bank Act of 1967 was also passed, which allowed the banks to split their stocks.[27] Two sample banks did so in May, two in June, and one in August of 1967, all 5-for-1.[28] The increase in the number of bank shareholders was also high in 1968 and 1969, 5.58 and 10.54 percent respectively, but a much smaller increase occurred in 1970 of 2.92 percent. In 1971 and 1972 the number of shareholders declined in both years.

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[26] The decline in market returns is consistent with the finding displayed in column 3 of Table 4 that the standard deviation of market returns declined 19.48 percent. Lower returns are generally associated with lower risk.

[27] Kane and Wilson (1998) argue that stock splits make it easier for low-wealth individuals to trade in round lots. This, in turn, increases trading liquidity, the number of shareholders (Lamoreux and Poon, 1987) and the ratio of household investors to institutional investors (McNichols and Dravid, 1990). Kane and Wilson (1998) argue that an increase in stockholder distribution decreases the size of large-block shareholder holdings.

[28] Prior to 1967, the par value of Canadian bank stock was ten dollars. The Bank Act of 1967 stipulated, "… the authorized capital stock of the bank … shall be divided into shares each having a par value of one dollar or any multiple thereof not exceeding ten dollars (Chapter 87, section 9)."

The trust-company results show that in 1964 and 1965, the increase in trust-company shareholders was 9.41 and 5.71 percent, respectively. However, in 1966, the number of shareholders increases 45.68 percent. This dramatic increase in 1966 follows 5-for-1 stock splits in late 1965 by the four nationally chartered trust companies in the sample. The two provincially chartered trust companies had also split their shares 5-for-1, but they did so in July of 1962 and February of 1963. In 1967, the increase in the number of shareholders was 7.36 percent, followed by an increase of 0.30 percent in 1968 and 14.94 percent in 1969. Small decreases in the number of shareholders are recorded for 1970, 1971 and 1972.

Panel B of Table 5 reports the results of difference-of-means tests between the periods regarding the average trading volumes of bank and trust-company stock. The time period studied is the same as that of Table 3. The pre- and post-deposit-insurance periods are divided into five quarters-of-a-year. The number listed in columns 2 through 6 for the pre-deposit-insurance period, and columns 8 through 12 for the post-deposit-insurance period, is the average daily trading volume for that quarter. Column 7 displays the average daily trading volume for the pre-deposit-insurance period, while the post-deposit-insurance period is displayed in column 13. Column 14 displays the difference between column 7 and 13. Column 15 provides the *t*-statistic for a test of the difference-of-means and column 16 the *p*-value. Underneath the volume number for each quarter is the percentage change in volume from the prior quarter. For column 13, the percentage displayed is the change in the average daily trading volume from the pre- to the post-deposit-insurance periods.

The difference-of-means tests show a significant increase in trading volume between the pre- and the post-deposit-insurance periods at the 1 percent level for both banks and trust companies. Bank volume increased 19.31 percent and trust-company volume increased 40.83 percent. However, the percentage change from quarter-to-quarter exhibits no consistent trend of increases or decreases except for the last two quarters of the post-deposit-insurance period. Column 11, representing the January to March quarter of 1967, shows an increase in volume for the banks of 59.08 percent and an increase of 69.17 percent for the trust companies. Column 12, representing the April to June quarter of 1967, shows an increase in volume for the banks of 95.96 percent and an increase of 10.84 percent for the trust companies. These increases correspond to the passage of the deposit-insurance legislation in February, which occurred during the former quarter, while four of five Canadian banks split their stocks 5-for-1 during the latter quarter. In summary, the trading-volume results support the shareholder-dispersion results displayed in panel A for 1967, the year deposit-insurance legislation was finalized and the banks split their stocks.

In conclusion, for both the banks and the trust companies, the difference-of-means tests and the trends of changes in the number of shareholders provide support for the risk-transfer hypothesis. The results suggest that the portfolio adjustments for the banks began in 1967 and ended in 1970. For the trust companies, the portfolio adjustments began in 1964 and ended in 1969.

6. CONCLUSIONS

Laeven (2004) argues, "Since large banks typically do not consider deposit insurance to be in their best interest, they will (typically successfully) lobby for low premiums." One problem that causes large banks to consider deposit insurance not to be in their best interest is that the reduction in deposit cost that underpriced deposit insurance provides will cause safe institutions to subsidize risky institutions. Without deposit insurance, a high-risk institution pays a higher rate for deposits than a low-risk institution. After deposit insurance is adopted, the high-risk institution achieves the greatest savings because the deposit cost of both declines to the risk-free rate of interest and an underpriced flat-rate deposit-insurance premium. Therefore, even though underpriced deposit insurance gives all covered institutions an incentive to increase risk, the solution to this problem for the large banks, which are typically considered to be low-risk institutions, is to increase their risk to at least the level of their smaller high-risk competitors. Table 2 shows that the Canadian banks addressed this problem by increasing their average actuarially correct deposit-insurance premium (*IPP*) from 0.23 to 3.69 percent from the pre- to the post-deposit-insurance period, while the increase for the trust companies was from 0.28 to 3.04 percent.

Another problem for the banks is that the investment of their large-block shareholders is probably much greater than that of the trust-company large-block shareholders because the average Canadian bank, according to Appendix 2, is fourteen times the size of the average trust company. Consequently, it is more difficult for the large-block shareholders of banks to diversify their stock holdings without depressing the stock's price. Therefore, large banks lobby for underpriced deposit insurance so that *E(CF)* in equation (1) will increase, which will concurrently increase expected returns and thus stimulate buying by diversified investors. Lobbying for inclusion in the deposit-insurance program and for underpriced deposit insurance probably accounts for why the large-block shareholders of banks started diversifying three years after the large-block shareholders of trust companies.

Recall that the impetus for deposit insurance was the growing concern about the safety and soundness of the trust companies. These concerns suggest that monitoring by large-block shareholders of trust companies had eroded, which would account for the high level of trust-company asset risk during the pre-deposit-insurance period. Table 2 reveals that during this period, the average asset risk of the trust companies was 2.80 percent, while the average asset risk of the banks was 1.30 percent. In addition to this erosion in trust-company monitoring, no indication of implicit support was revealed in Table 1 for the trust companies during the pre-deposit-insurance period.

This is not surprising considering the concerns being expressed about trust-company regulatory standards during this period. Provincial chartering provisions and supervision were believed to be weak and there appeared to be wide variation in the regulatory and supervisory standards from province to province. A deposit-insurance program for only the trust companies seemed likely because many Canadians did not believe that deposit insurance was necessary for the banks because of their size, nationwide network of branches, strong federal supervision and because the last bank failure had been in 1923. Therefore, the trust companies with national charters were allowed to split their shares in 1965, probably in anticipation of a trust-company deposit-insurance program.

The banks began lobbying for inclusion in the deposit-insurance program probably because they wanted to neutralize the emerging competitive threat of federally insured and regulated trust companies. However, before being included they needed to insure that deposit insurance would be sufficiently underpriced so that their large-block shareholders could diversify their stock holdings without adversely affecting the stock's price. Consequently, when officials announced on September 4, 1965, that deposit insurance would also be beneficial for Canadian banks, this indicated that the large-bank lobbying efforts were yielding results. This announcement, which produced a significant wealth gain for bank shareholders, is the only announcement detailed in Table 3 for which an abnormal return is detected. By 1967, both banks and trust companies were included in the new program and, as indicated by the empirical results of Table 2, deposit insurance was significantly underpriced.

From the government's perspective, the cost of assuming responsibility for the non-systematic risk of the banks and trust companies without receiving adequate compensation may be offset in whole or in part by a reduction in the systematic risk of the Canadian economy. Recall that Table 4 reveals that the standard deviation of market returns declined 19.48 percent between the periods, and, as revealed in Section 6, the return on the market also declined. These results suggest that the systematic risk of the Canadian economy declined because deposit insurance reduced the threat of loss to depositors and because it expanded the role of bank monitors to include both non-systematic and systematic risk.[29]

Binding government regulators to rules that clearly define the maximum possible loss of depositors reduces the threat of loss and thus the need for depositors to run a bank. Recall that in 1965, two years before deposit insurance was adopted, the failure of a large Canadian finance company almost caused a trust company to fail. Many felt a run would have occurred except that the Ontario government arranged to lend money to make sure that no depositors suffered losses (Riddell, 1965). Indeed, this event caused support for deposit insurance in Canada to increase because the explicit backing of the Ontario government was credited with preventing a run that possibly could have spread to other trust companies.

Furthermore, deposit insurance expands the role of monitors. Before deposit insurance, monitors were large-block stockholders focused on firm-specific risk. Even if this monitor is highly competent and effective, capably controlling firm-specific risk, a depositor run precipitated by some exogenous event outside the large-block monitor's control could still place the bank or trust company under great financial

[29] Table 4 reveals that the standard deviation of market returns increased 43.01 percent when calculated with weekly data, in contrast to a 19.48 percent decrease when calculated with daily data. The results based upon daily data are used in formulating the conclusions because weekly data should produce less precise results and thus less powerful tests.

stress. After deposit insurance, public-sector monitors who have the responsibility and tools to monitor both non-systematic and systematic risk replaced the private-sector monitors.

Having a more stable and reliable financial-intermediation system for the Canadian economy reduces systematic risk. Hence, the deposit-insurance program may have allowed the government to reduce its exposure to systematic risk at the expense of increasing its exposure to non-systematic risk in the banking and trust-company sector. While beyond the scope of this paper, this may have allowed the Canadian government to lower its overall risk profile.

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Appendix 1: Announcements

Date	Announcement
July 17, 1965	Because the failure of the Atlantic Acceptance Corporation has produced fears of runs on smaller trust and loan companies, legislators might call for some form of deposit insurance.
Sept. 4, 1965	Even within the trust industry, many officials now admit they would like to see deposit insurance in Canada. Observers claim present legislation does not guarantee adequate safety or the strictest and most thorough supervision. Officials state that deposit insurance would also be beneficial for Canadian banks, and prevent panic in case one company runs into trouble.
Feb. 12, 1966	In an effort to influence expected legislation, the Trust Companies Association of Canada has put forth proposals to achieve uniform legislation across Canada, strengthen existing acts and outline minimum standards. The proposals are seen as a concession to negate the need for a deposit-insurance program, which many in the trust industry do not support.
July 5, 1966	Finance Minister Sharp outlined in the Canadian Parliament proposed revisions to the Bank Act. The revisions would introduce compulsory deposit insurance for chartered banks and other federally incorporated deposit-taking institutions, such as trust companies. Other changes would increase loan interest-rate ceilings, allow banks to invest in conventional mortgages, require banks to account for inner reserves and prohibit foreign control of Canadian banks.
Jan. 20, 1967	In response to pressure that deposit insurance should be broadened to cover finance companies and all deposit-taking institutions regardless of charter, Finance Minister Sharp said the proposed corporation would have lender-of-last-resort power for member institutions facing temporary cash shortages. Mr. Sharp said the government would consider making loans available to financially pressed finance companies too.
Feb. 14, 1967	The Canadian government's deposit insurance bill passed its third reading by the House of Commons. Insurance will be compulsory for banks and federally chartered trust and loan companies and optional for provincially chartered trust and loan companies with consent of the provincial government. The bill will become law on signature of the governor general in a few days, but won't go into effect until the cabinet specifies a date.

Note: Only announcements referring to major changes in the regulation, creating or resolving stumbling blocks to its acceptance, or dealing with its acceptance by a key group are analyzed.

Appendix 2: Canadian Deposit-Insurance Member Institutions with Available Stock-Market Data

	January 1965 to July 1967		Sample firm's
	no-trade weeks	avg. weekly volume	1965 Total Assets*
I. Chartered Banks			
Bank of Montreal	0%	445,000	$4,997,145,367
The Bank of Nova Scotia	0%	382,500	$3,287,708,973
The Toronto-Dominion Bank	0%	418,500	$2,857,990,581
Canadian Imperial Bank of Commerce	0%	793,000	$6,208,405,418
The Royal Bank of Canada	0%	433,500	$6,571,055,243
II. Loan and Trust Companies			
A. Federally Incorporated Loan and Trust Companies			
Canada Permanent Mortgage Corporation	3%	3,941	$474,143,591
Eastern and Chartered Trust Company	9%	1,108	$302,920,103
Guaranty Trust Company of Canada	1%	2,298	$391,783,476
The Huron and Erie Mortgage Corporation	1%	3,237	$376,555,235
The Premier Trust Company	83%		
The Sterling Trust Company	38%		
B. Provincially Incorporated Loan and Trust Companies			
Commonwealth Savings and Loan Corporation	22%		
Crown Trust Company	30%		
The Lambton Loan and Investment Company	29%		
National Trust Company Limited	4%	1,453	$315,985,032
North West Trust Company	25%		
The Ontario Loan and Debenture Company	95%		
Victoria and Grey Trust Company	2%	2,466	$237,212,834

*Not including trust assets.

Table 1

Tests for Risk-Shifting Opportunities By Managers of Canadian Banks and Trust Companies Because of the Adoption of Deposit Insurance in 1967

Canadian Charter Banks						**Canadian Charter Banks**				
$\Delta B/V = \alpha_0 + \alpha_1 \Delta\sigma_V + \varepsilon$			$\Delta B/V=\alpha_0+D_S\alpha_0+\alpha_1\Delta\sigma_V+D_S\alpha_1\Delta\sigma_V+\varepsilon$			$\Delta IPP = \beta_0 + \beta_1\Delta\sigma_V + \varepsilon$		$\Delta IPP=\beta_0+D_S\beta_0+\beta_1\Delta\sigma_V+D_S\beta_1\Delta\sigma_V+\varepsilon$		
1	2	3	4	5	6	7	8	9	10	11
	1963-1966	1967-1972	1963-1966	$D_S\alpha\Delta$	1967-1972	1963-1966	1967-1972	1963-1966	$D_S\beta\Delta$	1967-1972
	$\Delta\ (B/V)$	$\Delta\ (B/V)$	$\Delta\ (B/V)$	$\Delta\ (B/V)$	$\Delta\ (B/V)$	$\Delta\ IPP$	$\Delta\ IPP$	$\Delta\ IPP$	$\Delta\ IPP$	$\Delta\ IPP$
Constant	0.0094	-0.0035	0.0092	-0.0129	-0.0037	0.0017	-0.0027	0.0019	-0.0047	-0.0028
Pr > |t|	0.0011***	0.6398	0.2549	0.2033	0.5418	0.2258	0.6520	0.7614	0.5531	0.5600
$\Delta\sigma_V$	1.7948	2.1470	1.7515	0.3418	2.0934	0.4232	1.8362	0.3524	1.4619	1.8143
Pr > |t|	0.0001***	0.0033***	0.0916*	0.7676	0.0003***	0.0262**	0.0018***	0.6606	0.1119	0.0001***
R^2	0.65	0.27	0.28			0.25	0.30	0.29		
No. Obs.	20	30	50			20	30	50		
Canadian Trust Companies						**Canadian Trust Companies**				
$\Delta B/V = \alpha_0 + \alpha_1\Delta\sigma_V + \varepsilon$			$\Delta B/V=\alpha_0+D_S\alpha_0+\alpha_1\Delta\sigma_V+D_S\alpha_1\Delta\sigma_V+\varepsilon$			$\Delta IPP = \beta_0 + \beta_1\Delta\sigma_V + \varepsilon$		$\Delta IPP=\beta_0+D_S\beta_0+\beta_1\Delta\sigma_V+D_S\beta_1\Delta\sigma_V+\varepsilon$		
1	2	3	4	5	6	7	8	9	10	11
	1963-1966	1967-1972	1963-1966	$D_S\alpha\Delta$	1967-1972	1963-1966	1967-1972	1963-1966	$D_S\beta\Delta$	1967-1972
	$\Delta\ (B/V)$	$\Delta\ (B/V)$	$\Delta\ (B/V)$	$\Delta\ (B/V)$	$\Delta\ (B/V)$	$\Delta\ IPP$	$\Delta\ IPP$	$\Delta\ IPP$	$\Delta\ IPP$	$\Delta\ IPP$
Constant	0.0113	-0.0062	0.0084	-0.0154	-0.0070	0.0003	-0.0043	-0.0005	-0.0038	-0.0043
Pr > |t|	0.2500	0.4704	0.4118	0.2412	0.3918	0.9074	0.5285	0.9458	0.6673	0.4422
$\Delta\sigma_V$	-0.1382	1.7291	-0.1972	1.9142	1.7170	-0.0555	1.2904	-0.1064	1.3809	1.2745
Pr > |t|	0.7152	0.0297**	0.6213	0.0247**	0.0217**	0.6241	0.0403**	0.6928	0.0168**	0.0121***
R^2	0.01	0.16	0.13			0.01	0.14	0.13		
No. Obs.	20	30	50			20	30	50		

Notes: Table 1 displays results from tests of the moral-hazard hypothesis. Single-period and two-period models are estimated using the methodology of Hovakimian and Kane (2000) to determine if the adoption of a deposit-insurance program provided incentives for Canadian banks and trust companies to shift risk to the deposit insurer. *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, *IPP* is the risk-adjusted deposit-insurance premium per dollar of deposits and Δ signifies the data are first-differenced.*, ** and *** indicate significance at the 10, 5 and 1 percent level, respectively.

Table 2

Difference-of-Means Tests Between the Pre-Deposit-Insurance Period (1962-1966) and the Post-Deposit-Insurance Period (1967-1972) for B/V, B/V_{book}, IPP and σ_V.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Variable	1962	1963	1964	1965	1966	**62-66 mean**	1967	1968	1969	1970	1971	1972	**67-72 mean**	Difference-of-Means Test: col. 7 – col. 14	
Canadian Bank Portfolio														*t* stat	Pr > |*t*|
B/V	0.98	0.96	0.96	0.98	1.00	0.98	1.07	1.03	1.02	1.03	1.00	1.05	1.03	-7.85	0.00**
B/V_{book}	0.95	0.95	0.95	0.95	0.96	0.95	0.96	0.96	0.96	0.97	0.97	0.97	0.97	-4.33	0.00**
IPP (%)	0.48	0.00	0.00	0.14	0.53	0.23	6.31	3.36	2.71	3.15	0.78	4.92	3.69	-6.67	0.00**
σ_V (%)	2.36	1.07	0.92	1.31	0.85	1.30	2.14	2.92	2.07	1.50	1.30	2.98	2.19	-4.94	0.00**
Canadian Trust-Company Portfolio															
B/V	0.89	0.87	0.89	0.95	0.97	0.91	1.03	1.01	1.03	1.07	0.99	0.97	1.02	-8.14	0.00**
B/V_{book}	0.94	0.95	0.95	0.96	0.96	0.95	0.97	0.97	0.97	0.97	0.97	0.97	0.97	-4.81	0.00**
IPP (%)	0.07	0.03	0.03	0.89	0.40	0.28	3.67	2.02	3.71	6.89	1.25	0.72	3.04	-4.48	0.00**
σ_V (%)	5.20	3.05	2.44	1.77	1.54	2.80	2.31	2.60	2.28	3.01	2.35	3.70	2.71	0.21	0.81

Notes: Table 2 displays results from tests of the moral-hazard hypothesis. Yearly and period estimates are made of the variables defined under Table 1 in addition to a book-value leverage ratio B/V_{book} (V_{book} is the book value of assets). Each year's results are detailed in columns 2 through 6 for the pre-deposit-insurance period and columns 8 through 13 for the post-deposit-insurance period. Column 7 gives each variable's mean for the pre-deposit-insurance period and column 14 for the post-deposit-insurance period. Column 15 displays the *t*-statistic for difference-of-means tests (column 7 – column 14) and column 16 provides the *p*-value and significance level for the test results. * and ** indicate significance at the 5 and 1 percent level, respectively.

Table 3

Event Study Abnormal Returns and Systematic-Risk Changes for the Canadian-Bank and the Trust-Company Portfolio

$R_{nt} = \alpha_n + \alpha_n D_s + \beta_n M_t + \beta_n D_s M_t + \beta_n I_t + \beta_n D_s I_t + \Sigma D_a \delta_{na} + \varepsilon_{nt},$
$n = 1, 2, \ldots, N;$ t = Jan. 4, 1965,..., June 29, 1967; $a = 1, 2..., 6;$
D_s = a shift dummy variable that equals zero from January 4, 1965 to March 31, 1966 (the midpoint of the range of dates of the announcements listed in Appendix 1) and 1 from April 1, 1966 to June 29, 1967.

1 R_{nt}	2 α_n	3 $\alpha_n D_s$	4 $\beta_n M_t$	5 $\beta_n D_s M_t$	6 $\beta_n I_t$	7 $\beta_n D_s I_t$	8 $D_1 \delta_{n1}$	9 $D_2 \delta_{n2}$	10 $D_3 \delta_{n3}$	11 $D_4 \delta_{n4}$	12 $D_5 \delta_{n5}$	13 $D_6 \delta_{n6}$	14 $\Sigma D_a \delta_{na}$
	Intercept Parameter (*p* value)	Intercept Shift Parameter (*p* value)	Market Return Parameter (*p* value)	Market Shift Parameter (*p* value)	Interest Rate Parameter (*p* value)	Interest Shift Parameter (*p* value)	7/17/65 Estimate in % (*p* value)	9/4/65 Estimate in % (*p* value)	2/12/66 Estimate in % (*p* value)	7/5/66 Estimate in % (*p* value)	1/20/67 Estimate in % (*p* value)	2/14/67 Estimate in % (*p* value)	Cumula-tive Estimate (*p* value)
Bank Portfolio	-0.03 (0.33)	0.03 (0.51)	0.27 (0.00)**	0.38 (0.00)**	-0.23 (0.03)*	0.14 (0.23)	0.70 (0.12)	1.11 (0.01)**	0.60 (0.19)	0.65 (0.14)	0.30 (0.50)	0.31 (0.49)	3.67 (0.00)**
Trust-Company Portfolio	-0.00 (0.20)	-0.00 (0.70)	0.60 (0.00)**	-0.12 (0.52)	0.04 (0.86)	0.07 (0.77)	0.94 (0.48)	0.33 (0.80)	-0.79 (0.55)	-0.80 (0.54)	1.31 (0.33)	0.34 (0.80)	1.33 (0.68)

Notes: The moral-hazard hypothesis maintains that the adoption of deposit insurance in Canada should find positive abnormal returns for shareholders because managers increase firm-specific risk to increase expected future cash flows. Moreover, because the deposit-insurance guarantees have transferred the consequences of the non-systematic risk that was previously faced by shareholders to a deposit guarantor, the risk-transfer hypothesis maintains that the sensitivity of bank and trust-company stock returns to systematic risk should increase. * and ** indicate significance at the 5 and 1 percent level, respectively. Abnormal returns are given in percent.

Table 4

An Analysis of the Changes in Systematic Risk Found in Table 3

Canadian Charter Banks							**Canadian Trust Companies**						
Panel A: Pre-deposit-insurance period (1/4/65-3/31/66) = 1.25 years													
1	2	3	4	5	6	7	8	9	10	11	12	13	14
	σ_{daily}	σ_{annual}[1]	$\rho_{ann, mkt}$	$\sigma_{ann}/\sigma_{mkt}$	*cov(p,m)*	Cal. B		σ_{weekly}	σ_{annual}[2]	$\rho_{ann., mkt}$	$\sigma_{ann}/\sigma_{mkt}$	*cov(p,m)*	Cal. β
TSE 300	0.0071	0.1013	1.0000				TSE 300	0.0113	0.0729	1.0000			
Banks	0.0060	0.0845	0.3128	0.8337	0.00001329	0.2608	Trust Co.	0.0142	0.0916	0.4435	1.2566	0.00007116	0.5573
Panel B: Post-deposit-insurance period (4/1/66-6/29/67) = 1.25 years													
TSE 300	0.0058	0.0816	1.0000				TSE 300	0.0162	0.1042	1.0000			
Banks	0.0076	0.1079	0.4643	1.3226	0.00002027	0.6141	Trust Co.	0.0137	0.0886	0.5168	0.8503	0.00011472	0.4394
Panel C: Percentage change from the pre- to the post-deposit-insurance period													
TSE 300		-19.48	0.00				TSE 300		43.01	0.00			
Banks		27.73	48.44	58.63	52.52	135.48	Trust Co.		-3.24	16.52	-32.34	61.23	-21.16

1. $\sigma_{annual} = (\sigma_{daily} * 260^{1/2})/1.25^{1/2}$
2. $\sigma_{annual} = (\sigma_{weekly} * 52^{1/2})/1.25^{1/2}$

Notes: The results of Table 4 concern the risk-transfer hypothesis. The changes in systematic risk displayed in column 5 of Table 3 are disaggregated into the standard deviation of returns on an equal-weighted bank and trust-company portfolio (σ_{annual}), the standard deviation of returns on the market index (σ_{mkt}), and the correlation coefficient ($\rho_{ann, mkt}$) and the covariance of returns (*cov(p,m)*) for each portfolio and the market index (TSE 300). Column 2 reports standard deviations of returns on the market index and the bank portfolio. Column 3 reports these standard deviations on an annual basis. Column 4 reports correlation coefficients of the returns on the bank portfolio against the returns on the market index. Column 5 reports standard-deviation relatives. Column 6 reports the covariance between market-index returns and returns on the bank portfolio. Column 7 reports betas calculated as follows: $\beta = \rho_{ann, mkt} * (\sigma_{annual} / \sigma_{mkt})$. Panel A reports results for the pre-deposit-insurance period, panel B reports results for the post-deposit-insurance period, and panel C reports the percentage change between the pre- and post-deposit-insurance periods. The trust-company information is reported in the same sequence in columns 8 through 14. Daily data is used to calculate the bank results while weekly data is used to calculate the trust-company results.

Table 5

Changes in the Number of Shareholders and in Average Trading Volumes

Panel A: Change in the Number of Shareholders																
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	1962	1963	1964	1965	1966	62-66 mean	1967	1968	1969	1970	1971	1972	67-72 mean	Differ-ence	*t*-statistic	*p* value
Banks	101077	101077	101620	107688	107783	103849	122362	129190	142801	146969	140362	140266	136992	-33143	-7.49	<.0001
% change		0.00	0.54	5.97	0.09		13.53	5.58	10.54	2.92	-4.50	-0.07	31.92			
Trust Co[1]	6375	6375	6975	7373	10741	7568	11532	11567	13295	12739	12670	12543	12391	-4823	-6.02	0.0002
% change		0.00	9.41	5.71	45.68		7.36	0.30	14.94	-4.18	-0.54	-1.00	63.73			
Panel B: Change in Average Trading Volumes[2]																
	Jan.-Mar. 1965	Apr.-Jun. 1965	Jul.-Sep. 1965	Oct.-Dec. 1965	Jan.-Mar. 1966	1/65 – 3/66 mean	Apr.-Jun. 1966	Jul.-Sep. 1966	Oct.-Dec. 1966	Jan.-Mar. 1967	Apr.-Jun. 1967	4/66 – 6/67 mean	Differ-ence	*t*-statistic	*p* value	
Banks	4318	5230	3332	4753	4945	4511	3283	3548	3517	5595	10964	5382	-871	-2.56	0.0108	
% change		21.12	-36.29	42.65	4.04		-33.61	8.07	-0.87	59.08	95.96	19.31				
Trust Co.	92	80	145	120	166	120	136	166	120	203	225	169	-49	-3.21	0.0017	
% change		-13.04	81.25	-17.24	38.33		-18.07	22.06	-27.71	69.17	10.84	40.83				

1. Canada Permanent and Eastern and Chartered Trust Companies were omitted because they merged and post-merger data was not available.
2. Bank data are daily; trust company data are weekly.

Notes: The results of Table 5 concern the risk-transfer hypothesis. Panel A reports the results of difference-of-means tests between the pre- and post-deposit-insurance periods regarding the average number of shareholders of banks and trust companies. Columns 2 through 6 report the number of shareholders for each year of the pre-deposit-insurance period while columns 8 through 13 report this data for the post-deposit-insurance period. Column 7 provides the mean number of shareholders for the pre-deposit-insurance period and column 14 provides the mean for the post-deposit-insurance period. Column 15 displays the net difference in the means of the periods (column 7 – column 14), column 16 provides the *t*-statistic of the difference-of-means tests and column 17 provides the *p*-value. Underneath the number of shareholders for each year is the percentage change in shareholders from the prior year. For column 14, the percentage displayed is the change in the average number of shareholders from the pre- to the post-deposit-insurance period. Panel B of Table 5 reports the results of difference-of-means tests regarding the average trading volumes of bank and trust-company stock. The pre- and post-deposit-insurance periods are divided into five quarters-of-a-year. The number listed in columns 2 through 6 for the pre-deposit-insurance period, and columns 8 through 12 for the post-deposit-insurance period, is the average daily trading volume for that quarter. Column 7 displays the average daily trading volume for the pre-deposit-insurance period, while the post-deposit-insurance period is displayed in column 13. Column 14 displays the difference between column 7 and 13. Column 15 provides the *t*-statistic for a test of the difference-of-means and column 16 the *p*-value. Underneath the volume numbers for each quarter is the percentage change in volume from the prior quarter. For column 13, the percentage displayed is the change in the average daily trading volume from the pre- to the post-deposit-insurance periods.