Profit Differentials Between Canadian and U.S. Commercial Banks: 
the Role of Regulation

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Using annual data on nationally chartered U.S. and Canadian banks from 1929 to 1989, this article empirically evaluates the impact of various regulations on bank profitability. An intercountry comparison reveals that the less restrictive regulatory environment in Canada has historically resulted in higher bank profits. Specifically, higher leverage, greater securities investment and lending opportunities, and the freedom to establish branch units all significantly contribute to higher bank profitability in Canada. Evidence presented also shows that U.S. banks would have been more profitable over the sample period in a regulatory environment similar to Canada’s.

From their inceptions both state and nationally chartered banks in the United States operated under a set of restrictions established by their respective regulatory agencies. The earliest restrictions included minimum reserve requirements, limitations on lending activity, and a prohibition on interstate branching. Growth and frequent instability in the banking industry, the creation of a central bank, and the Great Depression all served as catalysts for regulatory change or expansion. Indeed, for most of the postwar period the U.S. banking industry operated under a set of regulatory conditions constructed during the Great Depression. More recently, however, a trend of deregulation and increased concentration through mergers is taking hold. Deregulation began with federal regulatory agencies authorizing commercial banks and thrifts to issue money market certificates in 1978, and continues today as Congress contemplates removing regulatory restrictions that separate commercial from investment banking. With this changing face of the U.S. banking industry, it begins to resemble more closely the Canadian banking sector that historically has operated with fewer, larger banks in a less restrictive regulatory environment.

The purpose of this article is twofold. The first goal is to empirically test and explain why Canadian banks have historically been more profitable than U.S. banks.1 In particular, to determine what role, if any, a less restrictive
regulatory environment had in explaining the higher profit levels in Canada. The second objective is to infer what U.S. banks' profit would have been had they operated in an environment similar to Canada's. That is, had U.S. banks operated in Canada's less restrictive regulatory environment, would their profit have been higher? The answers to these questions have important implications for the appropriate role of government in regulating the banking sector and the ability of banks to best provide financial intermediary services to customers.

HISTORIC PROFIT VARIABILITY

Canada

Profitability, as measured by the return on equity (ROE), has fluctuated greatly in both Canada and the United States over the sample period 1929 to 1989. As shown in Figure 1, the profitability of Canadian banks is discussed in three general stages: stable profits, from 1929 to 1965; increasing profits, from 1966 to 1975; and decreasing profits, from 1976 to 1989.

Stage 1 reflects a policy agenda of promoting stability through an increased role for government in the banking industry. In the early 1930s implicit deposit insurance was used to maintain bank solvency and minimize disruptions to the system. Further, the 1935 creation of the Bank of Canada established an effective lender of last resort. Policy objectives, however, moved towards placing commercial banks in a more competitive position with nonbanks in the mid-1960s.

The new public policy course in Canada was primarily the result of recommendations by the Royal Commission on Banking and Finance (RCBF) that was established in 1962. Its findings focused on the growth of near banks (trust companies, credit unions, mortgage lease companies, and so on) during the 1950s and early 1960s and the inability of chartered commercial banks to compete with these institutions. Both the recommendations of the RCBF and the provisions of the Bank Act of 1967 improved the competitive position of commercial banks. For example, provisions of the act authorized banks to extend mortgage loans, eliminated a loan interest rate ceiling of 6

2See also Bordo, Rockoff, and Redish, “U.S. Banking System,” who suggest that the impressive bank performance record is the result of differences in regulatory environments, low failure risk in Canada, and economies of scale enjoyed by Canadian banks.

3Bank regulation has historically taken one of two forms. Some regulations operate to create a safety net under banks, for example, lender of last resort. Others, however, operate to change bank activity or the cost of bank activity, for example, reserve requirements, capital minimums, or limitations on asset and liability activity. The hypothesis advanced in this article primarily focuses on the second form of regulation, suggesting that bank profit is hurt by regulation that limits bank activity or increases operating costs.

4The rapid growth in near banks reflects the less burdensome regulation of provincial regulators who possess jurisdiction over most near banks.
percent in effect since 1944, prohibited entry of foreign-controlled banks, and restructured reserve requirements to reduce average reserve holdings. The result of these regulatory changes was an increase in Canadian bank profitability, shown as stage 2 in Figure 1.

Institutional and regulatory changes explain the decreasing profitability of Canadian banks during stage 3. Institutional structures became more volatile in the mid-1970s when inflation and rising interest rates created greater uncertainty in the economy. Further, the only post-Depression bank failures occurred during this period; two in 1985 and one in 1986. Also taking place was the increasing internationalization of the Canadian financial system. Between 1970 and 1980 domestic banks rapidly increased their foreign currency deposits, from 45 percent of Canadian dollar deposits in 1970, to 84 percent by 1980.\(^5\) These deposits were a desirable source of funds to the banker because they did not have required reserve minimums. Despite the 1967 bank act prohibition of foreign-controlled banks, provincial regulators allowed for foreign ownership of near banks, and these insti-

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\(^5\) Shearer, Chant, and Bond, *Economics*, p. 368.
Institutions were often able to compete with banks by offering traditional commercial bank products. These institutional developments were, in part, the impetus for the regulatory changes introduced by the 1980 bank act.

Provisions of the Bank Act of 1980 increased bank cost, competition, and uncertainty, further contributing to the lower profits witnessed in stage 3 of Figure 1. Costs were increased by provisions that placed a 3 percent required reserve ratio on all foreign currency deposits and allowed the Inspector General to increase capital requirements.

Several provisions of the bank act increased competition. First, the act created the Canadian Payments Association that allowed all financial institutions access to the check clearing mechanism. Prior to this commercial banks were said to have an advantage over near banks in the check clearing process because near banks lacked direct access to the previous system operated by the Canadian Bankers’ Association. Competition was also increased by the act’s development of Schedule A and Schedule B banks. Schedule A banks are widely held (no single owner may control more than 10 percent of the bank’s voting stock) whereas Schedule B banks are closely held, though subject to other regulation (for example, asset and branching restrictions). The creation of Schedule B banks facilitated the conversion of near banks to commercial banks and increased domestic competition. Finally the 1980 act increased foreign competition by reversing the 1967 prohibition of foreign-owned banks operating branches in Canada.

The regulatory changes of 1980 also increased the uncertainty of banks’ operating environment. Prior to 1980 legislation directing bank operations came from bank acts which were revised every ten years. In this sense the legislation was what Ronald Shearer et al. refer to as “self-contained.” Bankers knew the legislative rules because they were advanced in the bank act, and they did not worry about changes except for once every decade. The Bank Act of 1980, however, allowed for several provisions (for example, reserve calculations and permissible subsidiary activity) to be altered by regulating authorities without having to wait for bank act revisions.

United States

Figure 1 also shows the historic variability of U.S. bank profitability. Relative to Canada, U.S. profits have been more stable. We discuss U.S. profit in two general stages: stable and increasing profits, from 1929 to 1960; and stable and decreasing profits, from 1961 to 1989.

The stability in stage 1 is credited to Depression-era legislation. In response to the banking crisis, a set of regulatory provisions was established.

\footnote{The reader no doubt notices that the Bank Acts are not in ten year intervals. This reflects the fact that there are delays due to disagreements over appropriate policy among bank legislators.}

\footnote{Shearer, Chant, and Bond, Economics, p. 368.}
by the Banking Acts of 1933 and 1935. These acts created federal deposit insurance, minimized competition between commercial banks and other financial institutions, and created a stronger lender of last resort by centralizing Federal Reserve functions with the Board of Governors. Collectively these regulatory measures created a federal safety net under the U.S. banking system and paved the way for a period of stable, improving bank performance.

However, the success of the Depression-era regulation hinged upon a stable institutional environment. The 1960s proved to be a destabilizing time for banks as interest rates increased and fluctuated. As market interest rates rose, depositors moved their funds from commercial banks to Treasury bills and other market instruments. With their shrinking deposit base, banks were forced to reduce financial intermediation activities, and in 1966 were unable to accommodate business loan demand. This led to the credit crunch of 1966. Business borrowers lost faith in the banks’ ability to serve as a reliable source of funds and turned to commercial paper as an alternative to bank loans. This development was the beginning of new competition for commercial banks and certainly contributed to their lower profits during this stage in history.

Also increasing competition during this time were technological advances that reduced information barriers and lowered costs of financial intermediation. Money market mutual funds, pensions, and nonbank financial conglomerates emerged to compete with commercial banks for deposits and loans. However, commercial banks were unable to respond to the new competition because of the constraints posed by the Depression-era regulation, and ultimately U.S. bank profitability suffered.

Regulators finally responded to the growing instability in the commercial banking and thrift industries with the passage of the Depository Institutions Deregulation and Monetary Control Act (DIDMCA) in 1980. Many of the provisions (for example, phaseout of interest rate ceilings and liberalized lending and deposit liability powers) contained in the act were actually recommendations from the 1971 Hunt Commission which warned of potential problems if the regulatory regime remained intact. The 1980 regulation was intended to stem the outflow of deposits and allow commercial banks and thrifts to compete in a rapidly changing financial environment.

U.S. bank profitability fell precipitously at the end of stage 2, due primarily to deteriorating performances in certain industries (energy, agriculture, and real estate) as well as to massive defaults on outstanding loans to less
developed countries. These developments required banks to make provisions for loan losses and severely hurt profitability. Furthermore, the number of annual bank failures during this period increased to levels not seen since the Great Depression.

Finally, the end of stage 2 shows a rather volatile situation as profits rebounded in 1988 only to fall slightly in 1989. The 1988 rebound reflects the lowest level of loss provisions for the five previous years and higher net interest income due to strong credit demand. The 1989 drop in profitability reflects another increase in loan loss provisions, particularly at large banks with substantial loans to less developed countries.

Comparison

Figure 2 graphs the ROE in Canada less the ROE in the United States, thereby illustrating the historic difference in bank profitability. It clearly
reveals the higher profits enjoyed by Canadian banks over nearly all of the sample period. The large increase between 1965 and 1975 is primarily the result of increasing loan returns in Canada, whereas the decrease between 1976 and 1980 corresponds to a period of falling profits in Canada, reflecting, in part, rising interest rates on deposits. Such anecdotal evidence suggests that regulation and changes in regulatory structure strongly impact bank performance. Moreover, it suggests the hypothesis that the regulatory environment in Canada was more conducive to bank efficiency and prosperity, and that under such a system U.S. banks may have likewise been more profitable.

DATA AND METHODOLOGY

Annual balance sheet and expense and income data for the sample period from 1929 to 1989 were collected. Data on Canadian commercial banks comes from three sources: Canada Year Book, Bank of Canada Review, and Historical Statistics of Canada for various years. The United States data represents nationally chartered commercial banks found in the Annual Reports of the Comptroller of the Currency for various years. Because U.S. nationally chartered banks most closely resemble the Canadian banking system, they are a natural choice for comparison. All data are adjusted for inflation using each country's GNP deflator and expressed in 1989 U.S. dollars.

The basic model for explaining profitability differences is linear and contains a differenced dependent variable, a set of differenced explanatory variables reflecting the regulatory differences between the two countries, and a set of general control variables:

\[
ROE\ GAP_t = \beta_0 + \beta_1 (ASSET/CAPITAL\ GAP)_{t-1} + \beta_2 (SECURITY\ GAP)_{t-1} + \beta_3 (LOAN\ GAP)_{t-1} + \beta_4 (DEPOSIT\ GAP)_{t-1} + \beta_5 (BANK\ SIZE)_{t-1} + \beta_6 (RESERVES\ GAP)_{t-1} + \beta_7 (DEPOSIT\ INSURANCE)_{t-1} + \beta_8 (BIND)_{t} + \beta_9 (CEILING)_{t} + \beta_{10} (BANK\ ACT\ 67)_{t} + \beta_{11} (BANK\ ACT\ 80)_{t} + \beta_{12} (TIME\ TREND)_{t} + \beta_{13} (GNP\ GROWTH\ GAP)_{t} + \epsilon_t
\]

The inclusion of a broader sampling of U.S. banks, for example, national and state chartered banks, was considered, but such a comparison was precluded due to the absence of a complete data set for the period under consideration. Only the Comptroller's national bank data is consistent throughout the sample period for providing balance sheet and expense and income data.

Given historically comparable levels of economic development and similar social and political environments, the Canadian and U.S. financial systems are comparable for study. Nonetheless, the model does control for differences in economic growth between these two countries. Further, interest rates between the two countries may differ, though several studies (see, for example, Baghestani, "Covered Interest Parity"; Gregory, "Testing"; Boothe, "Interest Parity"; and London, "Stability") find no systematic interest rate differential.
Canadian and U.S. Regulation and Bank Profits

Table 1
DESCRIPTIVE STATISTICS OF REGULATORY VARIABLES
FOR CANADA, UNITED STATES, AND GAP*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Canada</th>
<th>United States</th>
<th>Gap (Canada – United States)</th>
</tr>
</thead>
<tbody>
<tr>
<td>RETURN ON EQUITY</td>
<td>0.1905</td>
<td>0.1137</td>
<td>0.0768</td>
</tr>
<tr>
<td></td>
<td>(0.081)</td>
<td>(0.034)</td>
<td>(0.078)</td>
</tr>
<tr>
<td>ASSET/CAPITAL</td>
<td>22.9210</td>
<td>13.5390</td>
<td>9.3820</td>
</tr>
<tr>
<td></td>
<td>(8.278)</td>
<td>(2.998)</td>
<td>(6.699)</td>
</tr>
<tr>
<td>RETURN ON SECURITIES</td>
<td>0.0628</td>
<td>0.0405</td>
<td>0.0223</td>
</tr>
<tr>
<td></td>
<td>(0.043)</td>
<td>(0.022)</td>
<td>(0.024)</td>
</tr>
<tr>
<td>RETURN ON LOANS</td>
<td>0.0669</td>
<td>0.0689</td>
<td>-0.0020</td>
</tr>
<tr>
<td></td>
<td>(0.029)</td>
<td>(0.037)</td>
<td>(0.013)</td>
</tr>
<tr>
<td>INTEREST PAID ON DEPOSITS</td>
<td>0.0493</td>
<td>0.0204</td>
<td>0.0289</td>
</tr>
<tr>
<td></td>
<td>(0.058)</td>
<td>(0.021)</td>
<td>(0.039)</td>
</tr>
<tr>
<td>REQUIRED RESERVES (average)</td>
<td>0.0797</td>
<td>0.1400</td>
<td>-0.0604</td>
</tr>
<tr>
<td></td>
<td>(0.029)</td>
<td>(0.040)</td>
<td>(0.060)</td>
</tr>
<tr>
<td>BANK SIZE (average bank size in billions of U.S. dollars)</td>
<td>14.9560</td>
<td>0.1767</td>
<td>14.7790</td>
</tr>
<tr>
<td></td>
<td>(14.159)</td>
<td>(0.142)</td>
<td>(14.049)</td>
</tr>
<tr>
<td>GNP GROWTH</td>
<td>0.0396</td>
<td>0.0322</td>
<td>0.0074</td>
</tr>
<tr>
<td></td>
<td>(0.070)</td>
<td>(0.066)</td>
<td>(0.061)</td>
</tr>
</tbody>
</table>

* Variable means.

Note: Standard deviations are in parentheses.

Source: See the “Data and Methodology” section of the text.

Explanatory variables are lagged one year to minimize any simultaneity problems. A complete description of the variables is provided in Appendix Table 1.

The dependent variable, ROE GAP, captures differences in profitability as measured by the difference, or gap, in the return on equity between Canadian and U.S. commercial banks for the sample period from 1929 to 1989. Its pattern over time is shown in Figure 2. On average the difference in the return on equity is 0.0768 (see Table 1).

The explanatory variables that follow were chosen to capture regulatory differences between the two countries.

ASSET/CAPITAL GAP, the asset to capital ratio in Canada minus the asset to capital ratio in the United States, captures differences in capital requirements. In the past minimum capital requirements for U.S. banks were determined by regulatory agencies’ examination of individual banks. The regulatory agency would compare a bank’s capital level with those found in other banks possessing similar characteristics, for example, asset size. If the examined bank’s asset to capital ratio was greater than this benchmark, it was required to increase its capital. To arrest the increase in risk-taking and exposure to the insurance system, risk-based capital require-
ments were codified in December of 1981. ¹⁶

In contrast, until 1980 Canadian bank management was responsible for making decisions regarding the appropriate asset to capital ratio. This flexibility resulted in greater leverage (debt to capital ratio) than in the United States. For example, between 1929 and 1989 Canadian leverage averaged 9.4 percent greater than U.S. leverage. The Bank Act of 1980 in Canada removed this discretionary decision-making responsibility from management and empowered the Inspector General to set maximum asset to capital ratios.¹⁷ In 1983 asset to capital ratio maximums were set at 20 to 25, still higher than average U.S. leverage.

The U.S. asset to capital ratio regulation places a limit on asset growth, and consequently on revenue and profitability growth. The fact that the acceptable asset to capital ratio has historically been lower in the United States is tantamount to placing a lower relative limit on asset, and hence, profitability growth. Thus we expect \( \text{ASSET/CAPITAL}_{t-1} \) to widen the gap in ROE between Canada and the United States (\( \beta_1 \) greater than zero).

\( \text{SECURITY GAP}_{t-1} \) is the difference in return on securities between the two countries and attempts to capture restrictions that allow U.S. banks to hold only investment grade securities. Provisions of the Banking Act of 1933 prohibited commercial banks from underwriting or distributing corporate securities either directly or indirectly through affiliated brokerage firms.¹⁸

Canadian commercial banks, in comparison, are allowed to directly underwrite and distribute government securities and to underwrite and distribute corporate securities through wholly owned subsidiaries.¹⁹ Though U.S. commercial bankers have circumvented some of the 1933 regulation, Canadian bankers continue to enjoy greater investment banking opportunities.²⁰ Thus, even though \( \text{SECURITY GAP}_{t-1} \) is unable to distinguish between differences in underwriting and distribution activity, it is expected to positively impact \( \text{ROE GAP}_{t}, (\beta_2 \) greater than zero), because it captures the more liberal investment activities in Canada.

¹⁶See Keeley, “Bank Capital Regulation,” p. 147, for rate schedules and risk measurements.
¹⁷Kryzanowski and Roberts, “Bank Structure.”
¹⁸Banks were, in effect, permitted to underwrite corporate debt and certain equity instruments under the National Banking Act of 1864, but this ability was removed with the 1933 act. See Kelly, “Legislative History”; and White, “Before the Glass-Steagall Act,” p. 34, for a detailed history of bank securities activity in the United States.
¹⁹Until the Bank Act of 1980, commercial banks were permitted to directly deal in the underwriting and distribution of corporate securities. This authority was removed by the 1980 act (Kryzanowski and Roberts, “Bank Structure”).
²⁰The Banking Act of 1933 does allow banks to underwrite federal government securities and state and municipality bonds. More recently, however, the Comptroller of the Currency and the Federal Reserve Board approved the execution of securities trading provided banks did not also provide investment advice. Moreover, a 1986 ruling allows banks to place commercial paper for a fee. See Litan, “Reuniting Investment,” for a more thorough discussion of the erosion of the 1933 regulation.
LOAN GAP \(_{t-1}\) represents differences in the return on loans and captures differences in regulation on permissible lending activity. The National Banking Act of 1864 restricted the lending scope of national banks to loans directly related to the process of production and exchange, or what we refer to as commercial loans.\(^{21}\) Though some of these restrictions were liberalized in a slow, piecemeal fashion (for example, the Federal Reserve Act of 1913 granted national banks the right to extend farm mortgages), it was not until 1980, in partial response to the savings and loan crisis, that these lending restrictions were lifted to increase permissible lending activity for all types of financial institutions.

Canadian commercial banks were also restricted to primarily making commercial loans. Additionally, they were subject to loan ceiling rates of 6 percent from 1944 through 1967. However, more liberalized lending rights arrived earlier for Canadian banks as the Bank Act of 1967 made permissible the extension of conventional mortgage loans and lifted the loan ceilings. This suggests that ROE GAP, would favor the Canadian system. However, the fact that a Canadian loan ceiling existed for over 20 years suggests that Canadian Banks’ ROE may have been reduced relative to what it could have been in the loan rate market in the United States, especially prior to 1967.\(^{22}\)

Nevertheless, LOAN GAP \(_{t-1}\) is expected to increase the gap in ROE, (\(\beta_3\) greater than zero), because Canadian banks were generally less regulated on loan types than U.S. banks and usury ceilings were lifted sooner.

DEPOSIT GAP \(_{t-1}\) captures the difference in the percentage paid on deposits and primarily reflects regulation Q in the United States. Regulation Q, a provision of the Banking Act of 1933, prohibited interest payments on demand deposits and initially placed a 3 percent ceiling on time and savings accounts. Authority to change the ceiling maximums was given to the regulatory agencies. In the mid-1960s the ceiling was adjusted upwards in response to bank disintermediation, but the regulated rates frequently remained binding. Finally, the 1980 DIDMCA mandated a six year phase out of Regulation Q.

Prior to 1967 Canadian banks faced a 6 percent interest rate ceiling on deposits. This regulation was infrequently binding, however, due to low market interest rates. Following the Bank Act of 1967, Canadian banks paid market interest rates on deposits. Because Canadian banks were paying a higher (both regulated and unregulated) deposit interest rate than U.S. banks, DEPOSIT GAP \(_{t-1}\) is expected to negatively impact ROE GAP, (\(\beta_4\) less than zero).

\(^{21}\)White, “Before the Glass-Steagall Act,” p. 34.

\(^{22}\)This last argument holds only if the loan ceiling rates in Canada were actually binding, which is doubtful as the regulated time frame was generally a period of low and stable interest rates.
Despite the potential cost savings of Regulation Q, the binding U.S. interest rate ceiling also forced bankers to hold excess reserves due to the threat of disintermediation. $BIND_t$ controls for the period of time in the United States in which regulated deposit interest rates were sporadically binding and, consequently, disintermediation a problem. In particular $BIND_t$ is equal to one for years 1966 to 1986 and zero otherwise. Thus, $BIND_t$ will help determine to what extent, if any, disintermediation was responsible for the growing gap in ROE shown in Figure 2 beginning in 1967. $BIND_t$ is expected to have a positive impact, ($\beta_8$ greater than zero), because the threat of disintermediation and holding of excess reserves may have imposed a greater cost than paying higher market deposit rates in Canada.

$BANK \ SIZE_{t-1}$ is a proxy variable designed to capture differences in branch banking and the effect of economies of scale that result when establishing branch units lead to lower overhead, labor, and other costs.\(^{23}\) Due to regulatory constraints on branching, the U.S. banking system has long been primarily composed of single unit banks.\(^{24}\) In 1864 the National Banking Act created a system of nationally chartered banks. This act was interpreted to limit national banks to a single location. Branch banking restrictions were further clarified in the 1927 McFadden Act that gave national banks the right to branch within the city of the parent bank, provided state banks were afforded the same opportunity. With the passage of the Banking Act of 1933, national banks were allowed to open branches within a state where state laws allowed intrastate branching, effectively providing both state and nationally chartered banks equivalent branching freedom. Nonetheless, because of restrictions on branching, U.S. banks developed costly strategies for circumventing geographic restraints. For example, banks established Edge Act Corporations and sold large CDs in an effort to obtain out-of-state deposits. Because banks faced a host of ever changing regulations and restrictions, these circuitous routes to reach larger markets were more costly than

\(^{23}\)There is no consensus in the banking literature on economies of scale due primarily to uncertainty regarding the appropriate definition of bank output as well as methodological differences. Bordo et al., “U.S. Banking System”; Krzyzanowski and Roberts, “Bank Structure”; and Nathan and Neave, “Operating Efficiency” find scale economies. Clark, “Economies,” surveys the literature and reports that of 13 studies, two find economies in large (over $100 million in deposits) banks. Benston, Hancock, and Humphrey, “Scale Economies,” find U shaped average cost curves suggesting diseconomies for both very small and very large banks. Doukas and Switzer, “Economies,” find that many Canadian branches operate at levels in which returns are increasing.

\(^{24}\)Two banks, the First Bank of the United States in 1791 and the Second Bank of the United States in 1816, had charters that allowed nationwide branching. Their charters were never renewed, however, which temporarily put an end to nationally chartered banks. The 1994 passage of the Riegle-Neal Interstate Banking and Branching Efficiency Act, however, allows bank holding companies (effective 29 September 1995) and commercial banks (effective 1 June 1997) to establish branch units across state lines. State banks may choose not to participate in these federal branching provisions by having their state legislatures enact appropriate state legislation by 1 June 1997. See Maggs and Pate, “New Federal Stance,” for a thorough discussion of these provisions.
unrestricted branching. Consequently, U.S. banks attempting to achieve geographical expansion and diversification did so at a greater cost than their Canadian counterparts.

In sharp contrast Canadian banks were always allowed to establish a nationwide network of branches. This produced a more concentrated industry composed of a few large banks. Therefore, the existence of scale economies in Canada's branching environment should result in lower costs and higher profit, ceteris paribus, thereby positively contributing to profit differences between the two countries.

RESERVES GAP captures differences in required reserve regulation. The passage of the Banking Act of 1935 gave the Federal Reserve Board the authority to set reserve requirement ratios. For approximately the next 15 years, required reserve ratios varied little from year to year before declining in 1953. In 1966 the Federal Reserve Board made required reserves a function of the amount of demand deposits held by a bank. Finally the 1980 DIDMCA made reserve requirements uniform for both member and non-member banks and for a range of other financial institutions including commercial banks, savings and loans, credit unions, and mutual savings banks.

Though Canadian banks voluntarily held reserves for most of their history, reserve requirements were not legally implemented in Canada until 1935 with the creation of the Canadian central bank. Between 1935 and 1954 Canadian banks faced a 5 percent required reserve ratio. Although this was increased to 8 percent between 1955 and 1967, it was not until the Bank Act of 1967 that required reserves were effectively equal to those in the United States. Consequently reserve ratios have been substantially higher in the United States over the sample period (see Table 1). Lower U.S. reserve requirements would therefore increase U.S. bank profitability and cause ROE GAP to fall. Therefore, \( \beta_g \) less than zero is expected.

The impact of variations in deposit insurance is captured by DEPOSIT INSURANCE, a dummy variable equal to one when U.S. banks had explicit deposit insurance but Canadian banks did not. Explicit federal deposit insurance has been a part of the U.S. banking structure much longer than explicit Canadian deposit insurance. Federal deposit insurance was first

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25Ibid., p. 20.

26Although the question of market power naturally arises, several scholars have not found monopoly power to exist in Canada (see Nathan and Neave, "Competition"; Shaffer, "Test"; and Bordo et al., "U.S. Banking System") or in the United States (see Shaffer, "Competition"). However, Gilbert, "Bank," surveys the literature and reports that of 45 market concentration studies in banking, 18 find market power for all measures of bank performance tested.

27Prior to this reserve requirements were established under the National Banking Act of 1864. At that time banks were classified as either central reserve city banks (New York, St. Louis, or Chicago), reserve city banks, or country banks. Reserve requirements were determined according to bank and deposit type. See Horwitz, Monetary Evolution, p. 154, for specific reserve requirements.

28Board of Governors of the Federal Reserve System, Banking, p. 608.
implemented by the Banking Act of 1933 that established the Federal Deposit Insurance Corporation (FDIC).\(^{29}\) FDIC coverage for deposits was mandatory for member banks and optional for nonmember banks, though most chose to purchase the insurance.

Explicit deposit insurance was not established in Canada until the 1967 bank act created the Canada Deposit Insurance Corporation (CDIC). Despite the late arrival of explicit deposit insurance, Canadian banks had enjoyed an implicit deposit guarantee since the early 1920s.\(^{30}\) With a banking structure of a few large banks, regulators and government officials were quick to arrange mergers of, or lend to, insolvent banks.\(^{31}\) Indeed, the Canadian government's policy of guaranteeing all deposits at par efficaciously created publicly recognized, implicit deposit insurance. Canadian bankers did not pay insurance premiums, but benefited nonetheless from a government policy that provided deposit insurance.

The consequence of the Canadian situation was depositor and borrower confidence. This confidence allowed Canadian banks to hold relatively fewer non-interest bearing assets and focus on extending loans and increasing equity. By contrast U.S. bankers may have had a greater fear of disintermediation resulting from their own failure or the failure of another institution. Indeed, unlike their Canadian counterparts, since the mid-1980s U.S. bankers have increasingly feared the potential contagion of other bank failures.\(^{32}\) For these reasons, the authors agree with Lawrence Kryzanowski and Gordon Roberts who argue that implicit insurance encouraged the high leverage ratios in Canada and contributed to higher bank profitability.\(^{33}\) Thus, the absence of insurance premiums and high leverage induced by this implicit insurance should increase Canadian profits relative to American, thereby expanding the gap in ROE (\(\beta_f\) greater than zero).

Finally, general control variables were created to capture significant regulatory developments introduced by the Canadian and U.S. bank acts. The Canadian Bank Act of 1944 placed a 6 percent ceiling rate on commercial bank loans that remained effective through 1967. \(\text{CEILING}\), controls for this and is expected to have a negative impact on \(\text{ROE GAP}_f\) (\(\beta_9\) less than zero) as the ceiling limited loan profitability.

\(^{29}\)Federal deposit insurance was not an entirely new idea. As early as 1829 state representatives in New York attempted to insure deposits through state insurance. As many as eight states created insurance systems shortly after the turn of the century. See Calomiris, "Is Deposit Insurance," p. 286, for details.

\(^{30}\)Kryzanowski and Roberts, "Bank Structure."

\(^{31}\)See Drummond, "Why Canadian Banks," for an account of the role of the Dominion Department of Finance and government in protecting Canadian banks in the 1930s.

\(^{32}\)This fear of contagion has led to the use of the Federal Reserve and FDIC's "too-big-to-fail" policy of protecting all depositors, including those exceeding the $100,000 limit.

\(^{33}\)Kryzanowski and Roberts, "Bank Structure."
In Canada the 1967 bank act liberalized commercial bank lending activity, created deposit insurance, and increased required reserves to levels in line with the United States. Although BANK ACT 67, controls for these developments, their impact on ROE GAP, is ambiguous as some of the changes (for example, liberalized lending) enhance Canadian ROE while others (for example, higher required reserves) place downward pressure on profitability.

The DIDMCA of 1980 in the United States drastically changed the regulatory landscape by phasing out Regulation Q, increasing deposit insurance from $40,000 to $100,000, and liberalizing lending activity. The revisions to the Canadian Bank Act in 1980, among other things, extended bank powers to the activities of leasing and factoring, further reduced required reserves, eased industry entry requirements, and, in an exception to these liberalizing changes, removed securities underwriting. The 1980 regulatory changes in both countries are controlled for with BANK ACT 80,, which also has an ambiguous impact on ROE GAP,, depending on which set of changes impact profitability the most.

In terms of the remaining control variables, TIME TREND, controls for macroeconomic or other exogenous shocks that may have affected ROE GAP,, GNP GROWTH GAP,, the difference in real GNP growth, controls for profit fluctuations caused by cyclical variability.

ESTIMATED RESULTS

Before subjecting the equation to estimation techniques, a test was made for stationarity, or the presence of a unit root, in each individual series. If series are nonstationary, it can lead to spurious results when the levels of variables are used for estimation. However, Clive Granger notes that nonstationary variables may have linear combinations that are stationary without differencing. If so, the series are said to be cointegrated.

Each series is tested for stationarity using the augmented Dickey-Fuller test to determine the order of integration. As shown in the first two columns of Table 2, each series is nonstationary. All series, however, are stationary in first differences, as shown in the last two columns of the same table.

To determine if a cointegrating relationship exists among the series we apply Søren Johansen’s multivariate cointegration test. The results of this

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34Leasing and factoring may be viewed as close substitutes for bank lending. With factoring, banks purchase accounts receivable from sellers of goods and services thereby extending indirect credit. Leasing refers to transactions in which the bank purchases capital equipment and then leases the equipment to the firm. (See Shearer, Chant, and Bond, Economics, p. 372.)

35Granger, “Some Properties.”

36See Johansen, “Statistical Analysis.” For an excellent overview of the various cointegration tests, see Hamilton, Time Series Analysis, chaps. 19, 20; and Davidson and MacKinnon, Estimation, chap. 20.
Table 2
AUGMENTED DICKEY-FULLER (ADF) TEST FOR A UNIT ROOT

<table>
<thead>
<tr>
<th>(1) Variables (levels)</th>
<th>(2) ADF Test Statistic (1 lag)</th>
<th>(3) Variables (first differenced)</th>
<th>(4) ADF Test Statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROE GAP</td>
<td>-1.503</td>
<td>∆ROE GAP</td>
<td>-5.101*</td>
</tr>
<tr>
<td>ASSET/CAPITAL GAP</td>
<td>-1.252</td>
<td>∆ASSET/CAPITAL GAP</td>
<td>-4.169*</td>
</tr>
<tr>
<td>SECURITY GAP</td>
<td>-1.892</td>
<td>∆SECURITY GAP</td>
<td>-5.945*</td>
</tr>
<tr>
<td>LOAN GAP</td>
<td>-1.971</td>
<td>∆LOAN GAP</td>
<td>-5.468*</td>
</tr>
<tr>
<td>DEPOSIT GAP</td>
<td>-1.519</td>
<td>∆DEPOSIT GAP</td>
<td>-5.913*</td>
</tr>
<tr>
<td>BANK SIZE</td>
<td>0.936</td>
<td>∆BANK SIZE</td>
<td>-4.009*</td>
</tr>
<tr>
<td>RESERVES GAP</td>
<td>-0.584</td>
<td>∆RESERVES GAP</td>
<td>-5.736*</td>
</tr>
</tbody>
</table>

*Indicates rejection of the null hypothesis of unit root at the 95 percent confidence level with critical value of -2.9118.

Source: See the “Data and Methodology” section of the text.

The test, provided in Table 3, strongly support a cointegrating, or long run, relationship between the variables. Hence, estimation in levels is used rather than first differences. This avoids the loss of valuable long-run information resulting from first differencing.

Table 4 reports results from estimating the equation. Ordinary least squares (OLS) and generalized least squares (GLS) estimates corrected for serial correlation using the Prais-Winsten method are both reported. Most of the explanatory variables are statistically significant at the 5 percent or 10 percent level with coefficients of the expected sign. Overall, the model captures most of the variation in ROE GAP, as indicated by the high adjusted $R^2$.

The results suggest that regulatory differences play a significant role in determining profit differentials. The higher leverage and greater flexibility...
in securities investment of Canadian banks increased their return on equity relative to U.S. banks. The elasticities of ROE Gap, with respect to ASSET/CAPITAL GAP, and SECURITY GAP, evaluated at sample means, are 0.470 and 0.481 respectively, implying that a 1 percent change in either variable increases ROE GAP, by approximately one-half percent. Similarly, the significance of BANK SIZE and its elasticity of 0.421 suggest that branch banking and diversification increase profits of Canadian banks relative to their U.S. counterparts. Although the coefficient on LOAN GAP is
positive and highly significant, the nearly equal loan returns between the two countries (see Table 1) results in an elasticity of only 0.032, suggesting that different rates of return on loans contributed little to the historical gap in ROE. In fact securities regulation, leverage, economies of scale, and restrictions on deposit interest rates were the largest contributing factors to the gap in ROE, with the elasticity for deposit interest rates equaling -0.367.

Estimation results also indicate that the higher U.S. reserve requirements interfere with the intermediation process and widen the profit gap between the two countries. A 1 percent increase in U.S. required reserves, for example, increases $ROE_{t-1}$ by 0.226 percent. As mentioned previously, the restrictions on deposit interest rates were a significant contributing factor to the historical profit differences. Although Regulation Q allowed U.S. banks to pay lower relative interest rates on deposits and increase their profit ($DEPOSIT\ GAP_{t-1}$ less than zero), the positive and significant coefficient on $BIND_{t-1}$ is consistent with the hypothesis that disintermediation imposed a cost on U.S. banks, particularly during the late 1960s and through the early 1980s, expanding $ROE_{t-1}$, as consumers demanded their funds. Table 4 also reveals that the imposed ceiling on Canadian loans from 1944 to 1967 caused $ROE_{t-1}$ to narrow, ceteris paribus. Finally, the existence of explicit deposit insurance in the United States, $DEPOSIT\ INSURANCE_{t-1}$, has no significant influence on $ROE_{t-1}$.

These results suggest that the less stringent regulatory environment in Canada was a significant contributor to the higher profits enjoyed by that country's banking industry. Higher leverage, more liberal investment opportunities, and economies of scale achieved through an extensive branch network were the predominant factors contributing to the difference in ROE between Canada and the United States illustrated in Figure 2.

Knowing which regulatory variables impacted relative profits allows us to move on to the second goal of this article: which is to approximate how well U.S. banks might have done had they operated in a regulatory environment more similar to Canada's. That is, what would the gap in ROE given in Figure 2 have been if U.S. and Canadian banks operated in a similar regulatory environment? To address this issue, the fitted values for $ROE_{t-1}$ were calculated using the equation and the coefficient estimates given in Table 4. That is, $PREDICTED\ ROE\ GAP = X\hat{\beta}$ is calculated, where $X$ is the matrix of independent variables given in the equation and $\hat{\beta}$ is the estimated GLS coefficient vector given in Table 4. To determine the impact of a specific regulation, $PREDICTED\ ROE\ GAP$ is recalculated restricting the value of the regulatory variable to zero. For example, to determine what the gap in ROE would have been if both countries had equal leverage ratios, $ASSET/CAPITAL\ GAP$, the asset to capital ratio in Canada minus the asset to capital ratio in the United States, is simply restricted to be zero when
TABLE 5
FITTED VALUES OF RETURN ON EQUITY GAP WHEN IMPOSING IDENTICAL
REGULATORY STRUCTURES

<table>
<thead>
<tr>
<th>Variable (Regulatory Variable Set Equal Between Canada and the United States)</th>
<th>PREDICTED ROE GAP (Fitted Value of ROE GAP when Regulatory Variable Set Equal Between Canada and the United States)</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>0.0797</td>
</tr>
<tr>
<td>ASSET/CAPITAL GAP</td>
<td>0.0437**</td>
</tr>
<tr>
<td>SECURITY GAP</td>
<td>0.0404**</td>
</tr>
<tr>
<td>LOAN GAP</td>
<td>0.0835</td>
</tr>
<tr>
<td>DEPOSIT GAP</td>
<td>0.1090**</td>
</tr>
<tr>
<td>RESERVES GAP</td>
<td>0.0627</td>
</tr>
<tr>
<td>BANK SIZE</td>
<td>0.0453**</td>
</tr>
<tr>
<td>All</td>
<td>-0.0131**</td>
</tr>
</tbody>
</table>

1Regulatory structures are held equal by imposing the restriction that the difference between the Canadian and U.S. regulatory variable is zero. For example, to impose equal leverage ratios in both countries, ASSET/CAPITAL GAP, the asset to capital ratio in Canada minus the asset to capital ratio in the United States, is set equal to zero.

**Indicates rejection of the null that the value is equal to PREDICTED ROE GAP when no regulatory variables are held equal (that is, 0.0797), based on the t-test statistic with 59 degrees of freedom.

Source: See the “Estimated Results” section of the text.

Recalculating PREDICTED ROE GAP. This new value can then be compared with the unrestricted PREDICTED ROE GAP, and inferences about the impact of specific regulations on relative profits can be made.

Table 5 summarizes the results from this procedure for the six regulatory variables that are statistically significant in Table 4. The average value of the unrestricted PREDICTED ROE GAP given in the first row of Table 5 is 0.0797. This is nearly identical to the average value of ROE GAP given in Table 1 (see also, Figure 2 where both are plotted). On examining Table 5, it is evident that the gap in ROE would generally have been smaller if the two countries had more similar regulatory environments. This is consistent with the hypothesis that U.S. profitability would have been higher in a less-regulated environment.

The value of 0.0437 in row 2 of Table 5 is the average value of PREDICTED ROE GAP when ASSET/CAPITAL GAP is restricted to zero. This clearly shows that the average gap in relative profits would have been considerably narrower had leverage ratios been equal between the two countries, although Canadian profits would still have exceeded those in the United States. Similar values exist for SECURITY GAP and BANK SIZE, which suggests that limited investment activity and restrictions on branching hurt U.S. banks relative to their Canadian counterparts. All three values are statistically lower than 0.0797, the value of unrestricted PREDICTED ROE GAP.

In contrast, the value of 0.1096 for DEPOSIT GAP suggests that despite the potential costs of disintermediation, Regulation Q reduced deposit costs
in the United States. Had deposit interest rates been equal between the two
countries, the gap in the return on equity would have exceeded its historic
values. Similarly, the slightly larger value for \textit{LOAN GAP} suggests that
identical loan rates in Canada and the United States would have increased
the gap. The value of 0.0835 is not statistically different than 0.0797, how-
ever, reflecting the nearly identical loan rates paid in both countries. Finally,
although the value for \textit{RESERVES GAP} is slightly smaller, suggesting that
the higher reserve requirements imposed on U.S. banks increased banking
costs, it too is insignificant. Driving this result is the fact that Canada in-
creased its reserve requirements after the Bank Act of 1967 to levels much
more in line with the United States. The value prior to 1967, however, is
only 0.0244, which more clearly illustrates the substantially higher costs
imposed on U.S. banks by higher reserve requirements.

The previous discussion refers to the change in relative ROE if each regu-
latory variable were \textit{individually} restricted. The last row in Table 5 shows
the average value of \textit{PREDICTED ROE GAP} if \textit{all six} regulatory variables
were restricted to zero. The value of $-0.0131$ suggests that, on average, U.S.
profits would have exceeded those in Canada. To further explore specific
values at various points in history, Figure 2 plots the series when all regula-
tory variables are restricted to zero against the series when none are
restricted.

Several points are immediately obvious upon examining Figure 2. First,
the gap in ROE would have been much smaller under identical regulatory
structures, indicating that the United States and Canada would have had
profit levels much nearer to each other. Secondly, and perhaps most impor-
tantly, the profit in the United States would have been \textit{higher} than Canada’s
for much of the sample period. For example, between 1943 and 1966, the
ROE gap with no regulatory differences is negative, indicating that U.S.
profits would have exceeded Canadian profits over this time period. U.S.
profits would have been below Canadian levels between 1966 and 1979
when Canadian profits were increasing due to the changes in the 1967 bank
act described previously, but the gap is much less pronounced for that pe-
riod. Moreover, this reverses in the 1980s when U.S. profits once again rise
above Canadian levels. One implication, of course, is that the predicted
higher U.S. profits in the 1980s may have reduced the large number of fail-
ures occurring over that time period.

In addition to the changes in the level of relative ROE, Figure 2 also
reveals that under similar regulatory structures relative profits would have
generally been more stable over the period. This is perhaps most noticeable
between 1967 and 1980 when \textit{PREDICTED ROE GAP} increases to a value
above 0.25 before returning to a level around 0.05. In contrast under similar
regulatory structures the value of ROE would have fluctuated less, from
Examining the period between 1967 and 1975 reveals that increases in leverage and rising returns on securities and loans in Canada were the key contributing factors to the growing gap in relative profitability. Although the average value of predicted ROE gap over this period is 0.1962, holding the above variables constant results in values of 0.1345, 0.1411, and 0.1711. Similarly, the decline after 1975 is primarily explained by rising deposit interest rates in Canada. The average value of predicted ROE gap between 1976 and 1980 is 0.1527, under equal deposit rates, however, the value is 0.2240.

In summary higher reserve requirements in the United States as well as restrictions on leverage, allowable investment activity, and branching reduced the profits of U.S. banks relative to their Canadian counterparts. On the other hand deposit interest ceilings appear to have reduced costs significantly enough to result in higher profits for U.S. banks. Taken together, however, not only would the gap in ROE have been significantly narrowed, in many years U.S. profits would have actually exceeded Canadian levels. This is perhaps especially important during the 1980s when there were a large number of failures relative to earlier years. To the extent that a more profitable banking industry is more stable, these results suggest that bank failures could have been reduced. Moreover, the higher profits in the industry would have allowed banks to more adequately perform their duty as financial intermediaries, potentially reducing or eliminating the 1966 credit crunch and its negative impact on economic activity.

CONCLUSION

A comparison of U.S. and Canadian commercial bank profitability suggests that higher asset to capital ratios, more permissible security and loan investment activity, higher deposit interest ceilings, branch banking rights, and lower required reserve ratios all contributed to the higher returns on equity in the Canadian banking system. It was further shown that had similar regulatory environments existed between the two countries, the difference in relative profits would have been smaller. In fact U.S. profits would have been greater than Canada's between 1944 and 1967 and throughout the 1980s.

The results of this study suggest that a regulatory structure more similar to Canada's would have increased U.S. profits, ceteris paribus. Of course other factors, such as risk taking, also change when regulation such as allowable investment activity or higher leverage are permitted. It is possible that such increases in risk offset the advantages of deregulation. This is especially true under a flat-rate deposit insurance system where insurance premiums are independent of bank risk. Nevertheless, it does suggest that,
relative to the Canadian regulatory system, regulation in the United States was excessive and that appropriate deregulation in conjunction with deposit insurance reform will increase profitability. Recent policy proposals, such as the 1994 Riegle-Neal Interstate Banking and Branching Efficiency Act and proposals to eliminate the Glass-Steagall provisions of the Bank Act of 1933 in conjunction with deposit insurance reform making premiums a function of risk, confirm this speculation.

Appendix

APPENDIX TABLE I

<table>
<thead>
<tr>
<th>VARIABLE DEFINITIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Variable</strong></td>
</tr>
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<td><strong>ROE GAP</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>ASSET/CAPITAL GAP</strong></td>
</tr>
<tr>
<td></td>
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<tr>
<td><strong>SECURITY GAP</strong></td>
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<td></td>
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<tr>
<td><strong>LOAN GAP</strong></td>
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<tr>
<td><strong>DEPOSIT GAP</strong></td>
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<td></td>
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<tr>
<td><strong>RESERVES GAP</strong></td>
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<td></td>
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<tr>
<td></td>
</tr>
<tr>
<td><strong>BANK SIZE</strong></td>
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<td></td>
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<tr>
<td><strong>DEPOSIT INSURANCE</strong></td>
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<tr>
<td><strong>CEILING</strong></td>
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<tr>
<td><strong>BIND</strong></td>
</tr>
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<td><strong>BANK ACT 67</strong></td>
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<tr>
<td><strong>BANK ACT 80</strong></td>
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<tr>
<td><strong>TIME TREND</strong></td>
</tr>
<tr>
<td><strong>GNP GROWTH GAP</strong></td>
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</table>
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