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WHY DID THE BANK OF  
CANADA EMERGE IN 1935?

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ABSTRACT

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## Why Did the Bank of Canada Emerge in 1935?

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### I. Introduction

The Bank of Canada began operations in March 1935, considerably later than the central banks of most other Western industrial economies. This paper examines the two questions suggested by this event, why did Canada not develop a central bank earlier, and, that given, why did the central bank evolve at all?

The current debate over regulatory reform of the banking system has led to a re-examination of the need for government intervention in the monetary sector. One of the central issues in this debate is the role of central banks, and the historical evidence on the circumstances leading to their establishment is crucial. On the one hand there are economists who argue that in every case central banks were imposed by revenue seeking or power hungry governments while, on the other hand, there are those who argue that central banks, specifically in their role as lender of last resort, evolved naturally from a

fractional reserve banking system.<sup>1</sup>

The relatively late appearance of central banking in Canada suggests that her experience may shed some light on the debate. In this paper we examine three competing hypotheses concerning the introduction of central banking in Canada. The first is that the Bank evolved naturally as a lender of last resort to the fractional reserve banking system. The second is that the bank was introduced to provide an anchor for a largely unregulated monetary system that had just left the certainties of the gold standard, and the final hypothesis is that the Bank's emergence was prompted primarily by political factors independent of the preceding two hypotheses.<sup>2</sup> We find most support for the third alternative.

Part II of the paper develops the natural evolution hypothesis and argues that by 1935, the Canadian banking system had developed alternative institutions to perform the functions traditionally associated with a central bank. Part III argues that the Bank of Canada was considered by its framers to be a complement to, not a substitute for, the gold standard, and supports this position with econometric analysis. Part IV discusses the political forces favoring the emergence of the Bank, and Part V briefly discusses the conclusions.

## II: The Natural Evolution Hypothesis.

The traditional approach to the origins of central banking views it as part of the natural evolution of a modern banking system. A competitive banking system, with bank money convertible into gold or some other dominant (outside) money, will periodically face the problem of runs on individual banks reflecting the public's fear for the solvency of a particular institution; because of the inability of the non-bank public to distinguish between the liquidity and solvency of related banks a liquidity crisis and a banking panic often will follow. Goodhart effectively argues that because of an information asymmetry, a central bank is

necessary to act as lender of last resort, and cannot be operated on profit maximizing lines because of potential conflicts of interest between the competitive central bank and other banks in the system.<sup>3</sup>

Goodhart's explanation for the evolution of central banking in England as well as other European countries is that the first central banks evolved from commercial banks which had the special privilege of being the government's bank. Because such banks generally had a sound reputation, because of the economies of pooling reserves through a correspondent banking system, because of their position as holder of the nation's central gold reserve, and because of their ability to provide extra cash by rediscounting, such banks evolved into bankers' banks and lenders of last resort in a liquidity crisis. Once such banks began to perform the role of lender of last resort, 'moral hazard' on the part of member banks (following a more risky strategy) provided a rationale for some form of supervision or legislation. Further Goodhart argues that the conflict between the public functions of such an institution and satisfying the shareholders made the transition from a competitive bank to a central bank lengthy and painful.

The counter argument has been put most clearly by Vera Smith who rests the case on the fact that central banks did not, in historical fact, evolve naturally but were established as favors to the government of the day. Friedman and Schwartz, while agreeing with Smith, suggest that the case against some form of government role as a lender of last resort is inconclusive.<sup>4</sup> While private insurance schemes could handle bank insolvency, federal deposit insurance has been necessary in the U.S. to allay incipient liquidity crises in the unit banking system.

The structure of the Canadian banking system changed considerably between the emergence of the first chartered bank in 1822 and the 1930s, but this process of evolution did not result in the introduction of central banking.

At the beginning of the twentieth century the Canadian banking system was comprised of 36 competitive fractional reserve banks, each permitted to operate branches nationwide. The banks required a government charter to commence operations, and some minimum level of paid-up capital. There were no required reserves but banks usually kept quite high levels of reserves since the refusal to convert their notes and demand deposits into specie (or Dominion Notes see below) would result in suspension or forfeit of the charter.

The government's involvement in the monetary sector was through regulation of financial institutions and the issue of convertible, and, in part fiduciary, Dominion Notes. Dominion Notes were legal tender and were generally issued in small denominations for hand-to-hand currency, (the government had a monopoly over the issue of notes of \$5 or less) and large denominations (\$10,000+) used as reserves by the banks. The government held a fractional reserve against its notes, up to a limit above which 100% reserves were required to be held. (The limit rose from \$9 million to \$50 million between 1860 and 1930.)

Although Canada had a competitive fractional reserve banking system throughout the nineteenth century, no central bank evolved. However, virtually all the elements of traditional central banking had emerged by the beginning of the twentieth century, undertaken either by private institutions or directly by the government.

First, the Canadian banking system had developed an efficient (bank notes generally traded at par throughout the country) and elastic note issue. The Clearing House in Montreal was maintained by the Canadian Bankers' Association (CBA), which in 1901 was recognized by the Bank Act as "an agency for the supervision and control of certain activities of the banks."<sup>5</sup> Second, the nationwide branch system avoided the problem of seasonal liquidity crises so evident in the

United States after the Civil War, lessening the need for a lender of last resort.

Third, the Bank of Montreal (founded in 1817) emerged very early as the government's bank performing many central bank functions. However, the Bank of Montreal never evolved into a full-fledged central bank as did the Bank of England (or the government's bank in other countries) perhaps because of the rivalry of other large Canadian banks (e.g. the Royal Bank). Fourth, the Canadian banks kept most of their reserves on 'call' in the New York money market. Such outside reserves were used on occasion to satisfy the public's demand for liquidity, again precluding the need for a central bank. However, on two occasions, 1907 and 1914, these reserves proved inadequate to prevent a liquidity crisis and the Government of Canada had to step in to provide adequate reserves.

Fifth, the Finance Act, passed in 1914 to facilitate wartime finance, provided the chartered banks with a liberal rediscounting facility. This Act included a clause that permitted the issue of unbacked Dominion Notes. By pledging appropriate collateral (and this was broadly defined) banks could borrow Dominion Notes from the Treasury Board. This clause, which was extended after the Wartime emergency by the Amendment of 1923, provided a discount window/lender of last resort for the Canadian banking system.

### III. Providing a substitute for the gold standard.

The key macro function for a central bank under the Classical gold standard was to maintain convertibility into gold. In Canada, overissue by individual banks was prevented through the operation of the clearing mechanism while convertibility for the system as a whole was maintained through the holding of outside reserves. Discretionary monetary policy (for debt management purposes and to finance the government's bonds) rarely conflicted with the gold standard constraint and was carried out by the Government of Canada using the Bank of

Montreal as its fiscal agent. Thus, under the Classical gold standard which prevailed before 1914, there seemed to be little need for a central bank for Canada.<sup>6</sup>

In 1926 Canada had returned to the gold standard which had been abandoned in November 1914. In December 1928 Canada *de facto* suspended the gold standard. The banks "co-operated" with the government by suspending gold exports on their own account and by raising the price of gold for U.S. banks. Because Dominion notes were *de facto* inconvertible, the Canadian exchange rate was no longer constrained at par. On the other hand, and in contrast to the nineteenth century suspension of convertibility, internal convertibility was maintained i.e. Canadian banks were still required to convert their notes into Dominion notes on demand. The informal suspension continued (more or less) until October 1931 when, following the British suspension of the gold standard, a formal embargo was placed on gold exports. Consequently, one possible rationale for the establishment of a central bank was to provide an anchor to the money supply, the price level, and hence the exchange rate, in the absence of gold convertibility, that is, to prevent unregulated private banks acting as profit maximizers from expanding their money issues without limit.<sup>7</sup>

There is considerable evidence that this hypothesis is at best incomplete. We have argued elsewhere that the suspension of the gold standard did not create an explosion of the price level as a consequence of profit maximizing banks expanding their money issues, as suggested by traditional models of inflationary finance, because expectations by the banks that the gold standard would be resumed at some traditional par constrained the issue of bank money.<sup>8</sup> This view is supported by the almost identical deflationary behaviour of the Canadian and the U.S. price level during the period 1929 to 1933, and the tendency of the exchange rate to stay close to par for three years *after* Canada



had left the gold standard.

In addition, the qualitative evidence of statements by contemporaries suggests that they did not see the central bank as an alternative to the international gold standard, but rather as a necessary institution in a gold standard world. Evidence of the opinions of the various interest groups is available in the records of the Macmillan Commission. Established by an Order-in-Council (P.C.1562) on July 31, 1933, the five-man Macmillan Commission, investigated the desirability and potential structure of a central bank in Canada. The Commission conducted hearings across Canada before reporting on September 27, 1933, in favor of the establishment of a central bank, with two dissenting opinions.

The evidence presented to the Commission shows that it was widely believed that the suspension of the gold standard was temporary. Jackson Dodds, speaking for the CBA, stated: "It is logical to assume that the gold standard (perhaps with modifications) will be resumed in due time by the great trading nations and that the Dominion would naturally desire to follow suit." While Frank Knox, a leading academic economist, stated:

It may be assumed that sooner or later the major trading countries of the world will have to come to some agreement as to a common monetary standard and that they will stabilize their several currencies with respect to each other probably by making them convertible once more into gold. Supposing this to have taken place Canada's monetary policy is clearly to join such a group.<sup>10</sup>

The debate about the need for a central bank therefore focussed on the need for central banking in a gold standard world, and the argument that the automatic gold standard of the pre-1914 era had been replaced by a managed gold standard. Macmillan's Report stated his position: "The gold standard was

restored in a world which called for continuous direction and co-operation on the part of the various national authorities".<sup>11</sup> Indeed the dissenting commissioners felt strongly enough that, while they accepted that at some future date a central bank might be appropriate, they felt that it should wait until the international gold standard was re-established. Macmillan, on the other hand, argued that the present was a particularly advantageous time to establish the bank, as it would not be subject to the day to day discipline of the gold standard until the central bankers had developed some experience.

An empirical analysis of the impact of the establishment of the Bank of Canada on key macro variables such as the price level, exchange rates and interest rates can provide indirect evidence on the reasons for the Bank's emergence. The hypothesis that the bank was necessary to substitute for the gold standard implies that the introduction of a central bank with the power to control the money supply would lead to very different price level behaviour than under a regime where monetary variables were determined by a private banking system.

In the absence of sufficient data to estimate a structural model of the macroeconomy that would permit identification of the channels and magnitude of the Bank's impact, time series models are used to examine the Bank's effect on the macroeconomy. The impact of the Bank's formation on the level of the money stock itself is difficult to gauge as the definition of such variables as currency in the hands of the public and reserves changed the day the Bank began operations. The nature of the demand for reserves was altered by the introduction of a required reserve ratio, and the high-powered money component of currency in the hands of the public changed from Dominion Notes in circulation to Bank of Canada notes in active circulation.<sup>12</sup> Thus, though the impact of the Bank's emergence on monetary variables is of great interest, our serious doubts about the consistency of the measurement of high-powered money lead us to restrict

our analysis to the behaviour of such nominal variables as the price level and exchange rate.

We estimate univariate models of the price level and the exchange rate, (data on Canadian interest rates are not available). We also estimate two multivariate models of the price level, in which the independent variables are the U.S. price level, and the money stock - variables which economic theory suggests would affect the price level. In each case, the impact of the formation of the Bank is tested by an analysis of the stability of the regression and by an examination of the regression residuals.

A univariate model of the Canadian price level was estimated using monthly seasonally adjusted price data.<sup>11</sup> Using Box Jenkins methods the data generating process was identified as an ARIMA (1,1,0) suggesting the following estimating equation:

$$P_t - P_{t-1} = a (P_{t-1} - P_{t-2}) + \epsilon_t$$

where  $\epsilon_t$  is a white noise error term. The estimated value of  $a$  was 0.48 with a  $t$  statistic of 6.98.

The objective of the estimation was to examine whether the evolution of the price series changed after the introduction of the Bank of Canada. The first test was to examine the structural stability of the equation. Three potential structural breaks were examined: January 1929, when Canada suspended gold convertibility; March 1933 when the U.S. suspended gold convertibility; and March 1935. If the Bank of Canada had created a new monetary regime the equation would have a structural break in 1935. Chow tests for the three periods showed that the null hypothesis of no break should be accepted for each of the three periods.

An alternative method of determining the stability of the regression is to examine the regression residuals, and to find those residuals that have a

disproportionate influence on the estimated model. Figure 1a presents the "studentized" residuals for the model.<sup>14</sup> If the formation of the Bank of Canada altered the monetary regime, then the month when the Bank began business, or when the Bill establishing the Bank was passed (June 1934) would have a studentized residual greater than 1.97 in absolute value. In the equation for the entire period, four residuals were significant; July 1929, July, August 1933 and September 1939. The first date marks the peak of the business cycle in the late twenties; the months of 1933 are part of the brief hiatus from March 1933 to January 1934 when the gold price of the U.S. dollar fluctuated; the last date marks the beginning of World War II. The absence of a significant residual in March 1935 (or in June 1934) provides evidence that the Bank of Canada had little effect on macroeconomic variables.

Similar analysis was conducted for the behaviour of the exchange rate between the Canadian dollar and the U.S. dollar. The data again did not reject the hypothesis that the equation was stable throughout the period. The results of the influence tests are shown in Figure 1b. All the significant residuals (other than that for September 1939) lie within the period, from September 1931 to November 1933, when the normal relationship between the pound and the U.S. dollar was disrupted, while there is no evidence of a change in the relationship in March 1935.

The third model is a multivariate model including lagged and contemporaneous U.S. price level terms as well as lagged Canadian price level terms as determinants of the Canadian price level. Since the Canadian dollar was very close to par with the U.S. dollar for the period July 1926 to September 1939, (with the exception of the period October 1931 to March 1933) we would expect Canadian prices to be strongly correlated with U.S. prices. Furthermore, since Canada had many of the features of a small open economy, we would

expect the world price level to be exogenous for the Canadian economy. The independent variables of the estimating equation were the contemporaneous U.S. price level and six lags of the Canadian price level and of the U.S. price level.<sup>15</sup> The Chow tests suggested a structural break only in March 1933 and the analysis of the residuals (Figure 1c) again showed no significant residual in March 1935.

Finally a multivariate model in which the current price level depends on lagged prices, and lagged and contemporaneous money stock was estimated separately with M1 and M2. The same methodology was used to determine lag length as in the previous model, and twelve lagged values of the dependent variable and six of the money stock variable were included. When the M2 definition of money was used, the results were quite similar to those of the other models. The only structural break occurred in March 1933, and again there was no significant residual in March 1935 (Figure 1e).

When the M1 definition of money was employed, no structural break was found in January 1929 or March 1933, although a structural break was found in March 1935. We suspect that this break reflects the change in reporting techniques of the currency-in-the-hands-of-the-public component of high powered money discussed above. We therefore re-estimated the model using as the monetary variable M1 less the high-powered currency component. In this model the hypothesis of structural stability could not be rejected. The studentized residuals are similar to those for M2 (see Figure 1d).

Despite the one anomalous significant residual in the M1 model, this battery of tests largely supports the conclusion that the introduction of the Bank of Canada did not alter the money supply process in Canada, and did not affect the evolution of the key nominal variables in the economy.

The annual reports of the Governor of the Bank (1935-39) suggest that this result was not unintentional. In the first annual report the Governor described the

functions of the Bank, and how they were being implemented.<sup>16</sup> The five functions listed were: to manage domestic credit; to manage the exchange rate; to advise the government; to co-operate with other central banks, and to manage the Bank rate. The Bank, however, took a rather agnostic approach to these activities. After admitting that since the Canadian dollar was inconvertible, the Bank could control the level of domestic credit, the Governor argued that the objective of such control was the level of income, which "can grow and does grow without any definite connection between such growth and a growth in bank deposits or notes in circulation" (p. 12).

With respect to the exchange rate, the Governor noted that "the Canadian dollar has exhibited a remarkable tendency, when not at parity with the pound or U.S. dollar to take up an intermediate position" (p. 13). But he took no credit for the level of the exchange rate and rather attributed it to institutional arrangements: "The existence of so many Canadian bonds payable in 2 or 3 currencies .... has had a tendency to restrict fluctuations" (p. 13). Finally, with respect to the Bank rate "It is quite out of touch with Treasury Bill rates, but this fact is not at present of any significance" (p. 16).

The governor's report reflects more concern with the housekeeping details of the transfer to the Bank of various activities previously managed by the government (the issue of currency, and the management of the government debt) than with macroeconomic objectives. This is consistent with our econometric analysis which finds that the formation of the Bank had virtually no macroeconomic impact.

#### IV. The Political Forces.

Canada's central bank was not intended to replace the gold standard, and it was not considered a necessary part of a fractional reserve banking system. The

emergence of the Bank of Canada, we believe, reflected a conjuncture of political imperatives. Domestically, in an environment where traditional trust in the beneficial nature of the market system was eroding, and a spirit of nationalism was rising, political pressure was mounting to halt the deflation which was frequently blamed on the concentrated banking industry. Internationally, monetary co-operation was said to depend on a system of central banks.

The demand for inflation, while clearly important, is rather ambiguous. The popular demand is succinctly expressed in an article in Maclean's Magazine:

The point which our bankers seem to miss is that what the Canadian people want in a central bank is not to supply the other banks with rediscount facilities which they already have or to save us from future panics, [as, it is previously noted, U.S. experience shows they don't] but they do want an institution that will effectually control the whole of the money and credit of the nation, now under the control of the other banks and which will somehow be able to make that money and credit available in sufficient volume wherever legitimately needed, and on terms much more fair and equitable than at present.<sup>17</sup>

The ambiguity arises because there was no stated desire to abandon the gold standard. In addition, the deflation and failure to depreciate the Canadian dollar were clearly phenomena not opposed by the Canadian government and it should have been clear that a central bank would not diverge from such a policy. The government had frequently stated that it would not depreciate the dollar although it had attempted a monetary expansion in late 1932 by forcing the banks to borrow under the Finance Act. The new borrowing was primarily used to pay off older borrowings and had little inflationary impact. The government continued to refuse to undertake the direct inflationary policies of either increasing the fiat limit on Dominion Notes or reducing the gold backing of notes beneath the limit,

The demand for inflation was often not separated from attacks on the monopoly power of the banking system. In 1930 there were only ten banks and of these three owned 75% of industry assets. The CBA provided a forum for explicit collusion and the collusion was admitted on occasion in such areas as western branch closures.<sup>18</sup> In the Parliament, opposition members complained that "farmers were innocent victims of the policy of deflation instituted by the banks".<sup>19</sup>

These attacks came at the same time as more general attacks on the efficacy of the market system. Historian Donald Creighton noted that "A fairly large and increasing number of Canadians were rapidly reaching the conclusion that positive action by the state must remedy the admitted weakness of economic liberalism".<sup>20</sup> The political manifestation of this sentiment was the CCF (Co-operative Commonwealth Federation), a socialist party, created in 1932 which had by 1934 become the official opposition in the Provincial governments of Ontario and Saskatchewan. A central platform of the CCF was the nationalization of all financial institutions. Schemes for increased government intervention also appeared from the right - the Social Credit party founded on the doctrines of Major Douglas, and the Bloc Populaire, a proto-fascist party, in Quebec.

There were, in addition, more subtle political pressures. The Canadian government had been a party to the International Financial Conference in Brussels in 1920 which had issued a statement urging all countries without a central bank to establish one. More recently the World Monetary and Economic Conference in 1933 had stated that all developed countries without a central bank should create them to facilitate monetary co-operation and recovery. In an article analyzing the need for a central bank, Queen's University economists had stressed the need for a central bank to send representatives to world monetary conferences: "There are few countries ... more vitally interested in international cooperation in the



monetary and economic fields than Canada and yet we lack any institution which would permit effective participation in such cooperation".<sup>21</sup>

The establishment of the Bank was also part of a more general programme to create sovereign institutions. It was not until 1931 that Canada's independence from Britain was solidified by the Statute of Westminster, which gave her Dominion status, and authority over her own external affairs.<sup>22</sup> In laying the foundation for a national airline, Prime Minister Bennett remarked, "The Americans can fly on their side of the line but we are quite capable of doing all the flying in or over Canada".<sup>23</sup> The Canadian Radio Broadcasting Commission was also established in 1932. Speaking in December 1933, Bennett stated that he had decided in December 1931, after Britain left gold, to establish a central bank:

I learned to my surprise that there was no direct means of settling international balances between Canada and London, that the only medium was New York, and the value of the Canadian dollar would have to be determined in Wall Street. I made up my mind then and there that this country was going to have a central bank because there must be some financial institution that can with authority do business for the whole of the Dominion with the other nations of the World. If Canada was to be financially independent there had to be a means of determining balances, of settling international accounts; and a central bank would furnish this.<sup>24</sup>

Whether or not Bennett was speaking with hindsight, there is considerable evidence that the decision to introduce a central bank was made before the Macmillan Commission handed down its Report. Bryce states that W.C. Clark "agreed to become deputy minister of finance [in late 1932] only when he had found out that the Prime Minister was prepared to accept in principle the establishment of a central bank for Canada."<sup>25</sup> Indeed, the appointment of Lord

Macmillan (a staunch advocate of central banking) as head of the Commission left little doubt about the outcome of the investigation. The President of the CBA writing in August to a colleague stated "Confidentially, I think it was decided before Lord Macmillan left London that some kind of a central organization should be established in Canada".<sup>26</sup> One week after the MacMillan Commission handed down its Report, P.M. Bennett announced that he would introduce a Bill to establish a central bank, "to regulate credit and currency in the best interests of the economic life of the nation, to control and protect the external value of the national monetary unit and to mitigate by its influence fluctuations in the general level of production, trade, prices and employment".

#### V: Conclusion.

Examination of the available evidence has led us to reject the hypotheses that the Bank of Canada's emergence merely reflected evolutionary necessity or the need to anchor a monetary system cast adrift by the suspension of the gold standard. The qualitative evidence suggests that the emergence of the Bank reflected political, rather than economic, imperatives. Domestically, the government needed to be seen to take some active measures to respond to the Depression, and the reduced faith in the omnipotence of the market system, coupled with public hostility towards the banking system, meant that the introduction of a central bank was politically popular. Internationally, foreign governments and international organizations were urging nations to create central banks to facilitate international monetary co-operation. It was these factors rather than strict economic efficiency that prompted the establishment of the Canadian central bank.

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<sup>1</sup> See V. Smith, The Rationale for Central Banking, (London, 1936) and Hayek, F. Denationalization of Money, (London, 1976) for the view that governments imposed central banks, and Goodhart, C.A.E. "The Evolution of Central Banks: A Natural Development?" (London, 1985) for the natural evolution hypothesis.

<sup>2</sup> The traditional explanation given for the establishment of the Bank of Canada in the 1930's is the failure of the prevailing set of monetary arrangements to increase the money supply during the Great Depression. See for example, S.R. Noble, "The Monetary Experience of Canada during the Depression," in A.D. Gayer, ed., The Lessons of Monetary Experience (New York, 1937).

<sup>3</sup> Goodhart, "The Natural Evolution".

<sup>4</sup> Smith, The Rationale and Milton Friedman and Anna J. Schwartz, "Has Government any role in Money?" Journal of Monetary Economics, 17, (1986), pp. 37-62.

<sup>5</sup> G.S. Watts, "The Origins and Background of Central Banking in Canada" Bank of Canada Review, (1972), p. 18.

<sup>6</sup> D. Chisholm, "La Banque du Canada était-elle nécessaire?," L'actualité économique, 59 (1983), pp. 551-574, argues that the Bank of Canada was equally

unnecessary in the 1930s, since the government of Canada had shown that it could manage the Canadian currency both before and after the suspension of free gold convertibility.

<sup>7</sup> See Milton Friedman, A Program for Monetary Stability, (New York, 1959). For the counter argument that competing banks would provide a determinant price level, see B. Klein, "The Competitive Supply of Money," Journal of Money, Credit and Banking, 6 (1974), pp. 423-53.

<sup>8</sup> M. Bordo and A. Redish, "The Supply of Inconvertible Money in the Absence of a Central Bank: Canada's Interwar Experience" mimeo, University of British Columbia.

<sup>9</sup> Royal Commission on Banking and Currency: Evidence, (henceforth RCBC), p. 3225.

<sup>10</sup> RCBC, p. 3063.

<sup>11</sup> Report, p. 59. This view found support from both bankers and academics. See, for example, the evidence of Gregory, (RCBC, p. 2995) and MacLeod, (RCBC, p.50).

<sup>12</sup> The active circulation of Bank of Canada notes in March 1935 was double the Dominion Notes in the hands of the public in February 1935, which we attribute primarily to a change in measurement rather than a doubling of currency holdings.

<sup>13</sup> The data sources are as follows: Canadian wholesale price index Prices and Price Indexes, Dominion Bureau of Statistics, Canada; the exchange rate - monthly average noon buying rate for the Canadian dollar in New York from, U.S. Board of Governors of the Federal Reserve, Federal Reserve Bulletin; U.S. wholesale price index - Department of Commerce, Statistical Abstract of the U.S., Washington; M1 and M2 - calculated from the returns published in the Canada Gazette (available from the authors on request). All data were seasonally adjusted

using the SAS X-11 program.

<sup>14</sup> One interpretation of the "studentized" residuals is as follows: If the regression were rerun with a dummy variable for the  $i$ th observation, the  $t$  statistic on the coefficient of the dummy variable, would be the same as the "studentized" residual for that observation. See D.A. Belsley, E. Kuh and R.E. Welsch, Regression Diagnostics, (New York, 1980), p. 20.

<sup>15</sup> The lag lengths were determined by the method of F. Mishkin, A Rational Expectations Approach to Macroeconometrics, (Chicago, 1983), p. 22.

<sup>16</sup> Bank of Canada, Annual Report of the Governor of the Bank of Canada (Ottawa, 1935). Page numbers in the text refer to this Report.

<sup>17</sup> Maclean's Magazine, 1 July 1933.

<sup>18</sup> Vancouver Province, 30 December 1935.

<sup>19</sup> M. Stokes, The Bank of Canada, (Toronto, 1939), p. 62.

<sup>20</sup> D. Creighton, Canada's First Century, (Toronto, 1970), p. 215.

<sup>21</sup> "The Proposal for a Central Bank" Queens Quarterly 40, (1933), 439.

<sup>22</sup> We would like to thank historian Fred Armstrong at the University of Western Ontario for pointing out this argument.

<sup>23</sup> Cited in D. Creighton, Canada's First Century, p. 215.

<sup>24</sup> Cited in Stokes, Bank of Canada, p. 65.

<sup>25</sup> R.B. Bryce, Maturing in Hard Times, (Montreal, 1986), p. 82.

<sup>26</sup> Letter from J. MacLeod to MacInnes 25/8/33. Archives of the Bank of Nova Scotia. B.N.S. docs Sec.#8, File 3. Earlier in August a newspaper report stated that Eastern financial circles were taking it for granted that a central bank would be created and that the banks would lose their rights to note issue. Vancouver Sun, 11 August 1933.

# FIGURE 1

## STUDENTIZED RESIDUALS

