RISK ASSESSMENT IN HOMEOWNERSHIP MARKETS

Prepared for:

CANADA MORTGAGE AND HOUSING CORPORATION

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Canada Mortgage and Housing Corporation, the Federal Government's housing agency, is responsible for administering the National Housing Act.

Under the provisions of the National Housing Act, administered by CMHC, there is continuing federal involvement in many aspects of urban development through program administration.

Through Operations Support the Corporation undertakes research aimed at improving the quality of the administration and management of existing procedures and programs. Where possible CMHC publishes and distributes the results of this research.

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I. INTRODUCTION

One aspect of risk assessment in homeownership markets faced by residential mortgage insurers, such as the Mortgage Insurance Fund (MIF) administered by Canada Mortgage and Housing Corporation (CMHC), is risk associated with the cyclical behaviour of the housing sector, especially in specific local areas in the country. The credit risk facing mortgage insurers is obviously greater during a recessionary period in the economy as homeowners encounter unemployment and a lower level of economic activity within their local region. Conversely, during expansionary periods the credit risks drop substantially as employment and incomes rise in response to the upswing in economic activity within a region. The cyclical elements are only one aspect of credit risk assessment, with a number of elements being associated with specific borrowers, but they do provide the overall background environment for credit risk assessment against which the other more specific borrower risks can be assessed. As a result, it would be useful for CMHC to have at its disposal a relatively simple system of determining the cyclical turning points in both the national economic cycle and the related home-ownership cycle, preferebly at the local level, so that differences in risk assessment among local regions could be determined and taken into account in their local insurance activities.

The purpose of this study then is to study and document any relationship between national economic cycles and the pattern of home-ownership loan approvals at the national, provincial and local levels. The need for such a study arises because of:

- a lack of a clearly documented framework for forecasting levels of mortgage loan approvals at the national and local levels.

- persistent high insurance claims in certain lines of business in markets where the economy is in a protracted recession.

- a paucity of any evidence identifying turning points in homeownership housing cycles.

- a lack of knowledge about the existing homeownership business volume and potential market share.

In order to assist CMHC in dealing with these problems and issues this study will attempt to document the relationship of homeownership mortgage loan approvals to the national economic cycle, determine the elements that affect these cycles, examine the elements that could be used as potential indicators of the relationship and develop a method of interpreting these indicators in the local housing markets. This will involve a review of current literature on identifying cycles in homeownership loan approvals and the economy and an examination of readily available data at the national and provincial level to identify the recent Canadian experience with these cycles. From this examination the critical factors which affect the timing, amplitude and duration of the cycles at the national and provincial levels will be identified and a checklist of pertinent indicators for the homeownership housing cycle will be developed. In developing this check-list the reliability of the indicators, along with their lags in availability, lags in impact, strength of impact and direction of impact, will be assessed.

This national and provincial analysis of the homeownership loan approval cycle will be extended, wherever possible, to a number of local city (CMA) markets in various regions of the country. This will involve the extension of the checklist of national indicators to available local indicators and the testing of their usefulness at that local level. An attempt will then be made to interpret and correlate the local checklist with the local homeownership markets for a number of selected CMA areas, with particular emphasis on existing mortgage loan approvals.

II The Relationship Between Economic and Homeownership Housing Cycles

In the examination of post-war economic cycles in Canada it is apparent that residential construction has been one of the most volatile activities in the economy. This high degree of volatility has also been present in the overall homeownership housing cycle which involves both the production of new homeownership units and the purchase and sale of existing homeownership units in the secondary housing market. From a mortgage insurance point of view both aspects of the homeownership housing cycle must be examined since a high proportion of insurance activities involve mortgages on existing housing units. In this section of the study a review of the current relevant literature will be undertaken with a view to determining the critical factors which affect the timing, amplitude and duration of homeownership housing cycles. This will provide the basis for choosing the indicators to be examined in later sections of the study in our attempt to develop a checklist of indicators for the homeownership housing cycle at the national, provincial and local level. This review, however, will not attempt to outline all of the housing sector characteristics or determinants but instead will concentrate on those elements that affect the cyclical behaviour of housing activities.

1. Review of Current Literature

In Canada there have been two major and comprehensive studies of the post-war housing market and residential construction sector undertaken, one by Lawrence B. Smith[1] and the other by Joseph H. Chung[2]. Both of these studies developed econometric models to analyze the relationships between the factors determining the demand for and supply of housing in Canada from 1951 to 1966 in the case of the Smith study and from 1956 to 1975 in the Chung study. These studies were mainly concerned with analyzing the new residential construction

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1. Smith, Lawrence B., The Post-war Canadian Housing and Residential Mortgage Markets and the Role of Government, Toronto: University of Toronto Press, 1974

2 Chung, Joseph H. Cyclical Instability in Residential Construction in Canada, Ottawa: Economic Council of Canada, 1976

sector of the housing market and the impact of government policy on that sector. However, it would seem reasonable to assume that most of their findings regarding the cyclical behaviour of new residential construction would also apply to the activity in the existing housing market since in the eyes of consumers new and existing houses are substitutes for each other in the consumer's decision-making process. As a result, the cyclical behaviour of new residential construction activity is probably very similar to the cyclical behaviour of the overall homeownership housing market. This was also concluded by Smith,

> ".....despite their differences, the institutional arrangements, the behaviour of the participants, and the forces operating upon all forms of housing are sufficiently similar to allow a substantial degree of aggregation"[3]

According to Smith "the basic forces underlying the demand for housing accommodation are.....essentially the same as for other goods - demographic, income, price, the cost and availability of credit, and consumer preference"[4]. From a cyclical point of view income, price and credit factors would be expected to exert the major influence in determing the cyclical pattern of housing activity. In fact, Smith concluded that:

> "Credit variables.....exert a vital impact upon the demand for the ownership of single-family and rented dwellings. These variables affect the demand for..... home ownership by affecting the affordability of these homes"[5]

Smith goes on to state that:

"The mortgage market is also an important determinant of the cyclical behaviour of new residental construction because of the high sensitivity of the cost and availability of mortgage credit to general economic and monetary conditions. The importance of mortgage

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3. Smith, op. cit., p.5
4. Ibid, p.10
5. Ibid, p.10

credit in the construction decision together with the interrelationship between the mortgage market and other financial markets has meant not only that the majority of fluctuations in the volume of new residential construction in the post-war period is attributable to fluctuations in the availability and cost of mortgage credit, but also that many government policies designed to influence residential construction activity have operated via the mortgage market"[6].

In Smith's assessment of the factors that affect the housing market from both long-term and cyclical viewpoints, the major cyclical factors, that are readily available, would be:

1) Income variables - personal disposable income, employment and unemployment.

2) Price variables - housing prices and rents and other consumer good prices.

3) Cost variables - construction costs.

4) Financial variables - mortgage rates and mortgage availability.

In his study Chung found that residential construction in Canada went through four complete cycles between 1949 - 1972 while the Canadian economy went through five complete cycles. The average duration of the expansion phase was about the same for the economic and residential construction cycles (11.0 and 11.8 quarters respectively) but the contraction phase of the residential cycle (6.7 quarters) was longer than that of the business cycle (5.2 quarters).[7] He also found that all five regions of Canada experienced the four residential construction cycles but that the Atlantic provinces, Quebec and Ontario also had additional minor cycles between 1951 and 1956. The amplitude of the cyclical fluctuations in residential construction decreased somewhat in the 1960's and was found to be greater in fast-growing than in slow-growing regions of the country. Although some counter-

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6 Ibid, p. 4
7 For greater detail on these cyclical patterns see Appendix A.

cyclical tendencies were found - whereby residential construction increased during a general business contraction and decreased in a business expansion - these variations decreased notably between 1950 and 1970.

In assessing the determinants of cyclical fluctuations in residental construction, Chung concluded that,

"....there is a consensus for one determinant: the cyclical instability of the flow of savings into financial intermediaries and the flow of mortgage loans. Because of the nature of mortgage loan business and behaviour of the major lenders, mortgage interest rates and medium-and long-term savings deposit interest rates react more slowly than long-term bond yields to monetary policy shocks and general economic conditions.....The mortgage interest rate rises less during tight-money periods than the long-term bond yield; conversely, during easy-money periods, the mortgage rate falls less than the same bond yield. Hence the differential margin between mortgage rate and long-term bond yield tends to increase during easy-money periods and to fall during tight-money periods. This explains the tendency of private mortgage loans to increase during easy-money periods and to decrease during tight-money periods. Since tight-money policy is usually in effect when business is expanding, while easy-money policy expands in periods of business recession, the mortgage loans and hence dwelling construction tend to be countercyclical to business cycles"[8]

Chung, however, goes on to explain why this counter-cyclicality has been reduced since 1966:

"This may be explained by the fact that, compared to previous periods, tight money periods have since 1966 coincided more with periods of business contraction than with periods of expansion."[9]

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8. Chung, op. cit. p.XlV

9. Ibid, p. 48

As a result, in his view, the relationship between the new residential construction cycle and the general economic cycle depends largely on the timing of monetary policy.

Chung also discussed two other categories of determinants for the cyclical fluctuations in residential construction: the nature of the house building industry, particularly the presence of small builders; and demand variables. In analyzing the impact of the house building industry characteristics he concluded that,

".....while the very nature of the house-building industry may have contributed to cyclical instability in residential construction, its net impact is not likely to be of a major magnitude because of the relatively minor share of total output accounted for by small builders".[10]

Similarly, in the case of the demand variables he pointed out that,

"The impact of demand variables on cyclical fluctuations in residential construction is felt through resulting changes in expected profit of the builder, subject to the availability of mortgage loans and the per-loan-dollar amount of new dwelling construction. Therefore, even if income increases so that rent and price of existing dwellings rise, unless construction cost rises less rapidly and unless mortgage loans are available, the resulting increase in new dwelling construction would be minor".[11]

As a result, Chung ascribes the major cause of cyclical fluctuations in residental construction to the credit variables, particularly the inter-action of mortgage interest rates with other interest rates resulting from monetary policy changes and the resulting impact of this on the flow and availability of mortgage funds.

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10. Ibid, p.31

11. Ibid, p.33

Similar conclusions were drawn in a U.S. study by William W. Alberts[12] for the 1948-1959 period as follows:

".....four conditions have linked the post-war fluctuations in aggregate spending with fluctuations in the output of single-family houses....:(a) a high cross elasticy of demand for mortgages with respect to yields on competing investments on the part of lenders; (b) a demand schedule for mortgage funds that has been relatively stable over the course of each recession and recovery; (c) an elastic supply schedule of new houses; and (d) an elastic demand schedule for mortgage funds."[13]

Further conclusions about the cyclical nature of housing in the United States were reached by Jack M. Guttentag regarding the 1946 - 1959 period:

"The reason for the strategic role of mortgage credit in the short cycle is not far to seek. Demographic factors and the relative price of housing, which must be crucially important determinants of housing demand and construction in the long run, ordinarily do not change very much in the short run. The demand for housing, moreover, apparently is not very sensitive to short-run changes in income, so long as such changes are fairly moderate and do not generate sharp swings in consumers' expectations....."[14]

"At the same time housing demand is extremely sensitive to changes in the supply of mortgage credit.....It is this greater sensitivity of housing demand to changes in the supply of mortgage credit than to changes in the flow of current income, and the considerable short-run volatility in the former, that underlie the counter-cyclical tendency of residential construction."[15]

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12. Alberts, William W. "Business Cycles, Residential Construction Cycles, and the Mortgage Market." Journal of Political Economy, LXX(1962)

13. Ibid, p. 281

14. Jack M. Guttentag, "The Short Cycle in Residential Construction, 1946-59" The American Economic Review, LI (1961). p. 286

15. Ibid, p.287

Guttentag also pointed out the reasons for the counter-cyclical nature of housing activities and why this occurred with the following example:

"Assume that an expansion in general business occurs, initiated we may suppose by an upsurge in corporate investment..... As expansion develops and spreads, however, the demands upon the capital markets are enlarged, liquidity positions generally are eroded and as capacity ceilings are approached Federal Reserve policy shifts from ease to restraint; interest rates rise and borrowing terms tighten.

"Of course, the expansion in general economic activity leads to an increase in disposable income, but the demand for housing is expanded only slightly as a result. At the same time the demand for housing is extremely sensitive to the terms on which mortgage credit is available. After a certain stage of tightness is reached in the capital market, therefore, the reduction in housing demand consequent upon the tightening of credit more than offsets the expansion in demand resulting from the increasing flow of income. While most sectors continue to expand, residential construction turns down.

"During a contraction the reverse process occurs. After some point, the easing of credit terms consequent upon a decline in the demand for credit from other sectors (and the easing of monetary policy) has an expansionary effect on housing demand sufficient to offset the effect of the decline in income. Hence, residential construction turns up while other sectors continue to decline. In this way, the residential construction sector acts as a sort of counter-cyclical buffer."[16]

On the basis of this review of post-war literature concerning both Canadian and U.S. experience, it is apparent that a combination of credit variables, income variables and price variables has been the major factors in determining the short cycle in housing

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16. Ibid, p. 291.

markets. Among these variables credit variables were found to be, by far, the most important influences on the cyclical pattern of housing activities. In effect, their impact on the housing sector swamped the income and price effects to the point where a number of studies could not find any evidence of a relationship between income and price variables and housing activities in the short-run. However, part of this was due to the relatively moderate nature of income and price changes through the post-war period, particularly during the early part of this period when most of these studies were undertaken. The more recent 1968-1982 experience involved much sharper changes in income and price variables and evidence should be sought as to whether or not those variables had a greater impact during this period than in previous post-war periods.

In the next section of the study, therefore, the following types of variables found in the literature to be the most significant indicators of housing market cycles will be analyzed as indicators of these cycles during the 1968-1982 period at the national and provincial levels in Canada:

1) financial variables

2) income variables, and

3) price variables.

III. NATIONAL AND PROVINCIAL HOUSING MARKET INDICATORS

This section of the study will attempt to determine and analyze a number of indicators at the national and provincial levels that will identify the Canadian housing market cycle and its relationship to the overall economic cycle over the 1968-1982 period. From this analysis a checklist of indicators will be developed aimed at determining the timing, amplitude and duration of the housing market cycles. These indicators will then be assessed in terms of their reliability, lags in availability, lags in impact, strength of impact and duration of impact. The choice of these indicators will be constrained to readily available data at the national and provincial level through the Cansim data bank at Statistics Canada and the housing statistics available through the resources of Canada Mortgage and Housing Corporation.

In addition, the indicators examined will be primarily external to the housing sector as the main task of the analysis is to develop a series of broad economic indicators that reflect the overall economic cycle and impact specifically on the housing market cycle. As a result, indicators internal to the housing sector which provide indicators of how the individual components within the housing sector react during the housing cycle will not be examined in this study. Another constraint on the analysis results from the attempt to start at the national and provincial levels and then extend the indicators determined at these levels down to the local level. This means that the indicators investigated at the federal and provincial levels must have counterparts or proxies at the local level that can also be obtained from readily available sources.

1. The Economic and Housing Market Cycles 1968-1982

During the 1968-82 period the Canadian economy, according to the Statistics Canada cyclical dating, has experienced four

recessionary periods - from the 1st quarter of 1969 to 4th quarter of 1970; from the 3rd quarter of 1974 to the 1st quarter of 1975; from the 4th quarter of 1979 to the 2nd quarter of 1980; and from the 3rd quarter of 1981 to the 4th quarter of 1982. In determining the housing market cycles during this period this study uses seasonally-adjusted total national mortgage loan approvals (including both NHA and conventional) to represent activity in the housing sector. This variable was chosen instead of housing starts or building permits because it more accurately reflects the level total activity in the housing market, both new construction and existing housing, which is the determinant of mortgage insurance activity levels. The relationships between the housing market cycles, based on total mortgage loan approvals, and the Canadian economic cycles during the 1968-82 period are illustrated in Tables III-1 and III-2 and Chart III-1.

TABLE III-1

The Duration of Economic and Mortgage Loan Approval Cycles in Canada, 1968 - 1982.

Economic Cycle Date		Duration (quarters)	
Expansion	Contraction	Expansion	Contraction
1967(4)-1969(1)	1969(1)-1970(4)	5	7
1971(1)-1974(2)	1974(3)-1975(1)	13	2
1975(2)-1979(3)	1979(4)-1980(2)	16	2
1980(3)-1981(2)	1981(3)-1982(4)	3	5
Average		9.25	4

Mortgage Loan Approval Cycle Date		Duration (quarters)	
Expansion	Contraction	Expansion	Contraction
1967(1)-1968(3)	1968(4)-1970(1)	6	5
1970(2)-1973(4)	1974(1)-1974(4)	13	3
1975(1)-1979(1)	1979(2)-1980(1)	13	3
1980(1)-1980(2)	1980(3)-1982(1)	1	6
Average		8.25	4.25

TABLE III - 2

Turning-Point Dates - Economic and Mortgage Loan Approval Cycles in Canada 1968-1982

		Economic Cycles	Mortgage Loan Approval Cycles
Trough	- 1st cycle	1967(4)	1967(1)
Peak		1969(1)	1968(3)
Trough	- 2nd cycle	1970(4)	1970(1)
Peak		1974(2)	1973(4)
Trough	- 3rd cycle	1975(1)	1974(4)
Peak		1979(3)	1979(1)
Trough	- 4th cycle	1980(2)	1980(1)
Peak		1981(2)	1980(2)
Trough		1982(4)	1982(1)

The cyclical behaviour of the Canadian economy during the 1968-82 period was also somewhat different from that experienced in previous post-war periods and was affected by a number of external factors and policy responses as well as by normal cyclical forces. The 1967-70 cycle was a relatively typical post-war cycle that reflected primarily the cyclical forces that were operating in the economy over that period. On the other hand the 1970-74 cycle resulted from a combination of cyclical forces and external shocks - namely, the international oil embargo and the resulting sharp increase in the price of oil initiated by the OPEC countries. Canada, however, experienced a relatively mild recession in 1974 relative to other countries due to the strong fiscal and monetary response by the federal government and the policy decision to insulate Canadians from the sharp oil price increases. These policy responses

not only protected the Canadian economy from the international shocks but also quickly counteracted the normal cyclical forces in the economy to produce an early recovery from the mild recession experienced during the last quarter of 1974 and the first quarter of 1975. This mild recession, however, did not result in a significant improvement in the inflation performance and, as a result, Canada entered a recovery period with relatively high inflation rates.

During the 1975-79 expansion phase of the cycle substantial inflationary pressures developed which eventually forced a major move towards restrictive monetary policy in the U.S. and Canada. As a result, the Canadian economy went into a short contraction phase in early 1980 which was again interrupted by a sharp election-oriented reversal of monetary policy in the U.S. in mid-1980 which was duplicated in Canada. As a result, the Canadian economy entered another expansion phase with an even higher level of inflation which had to be dealt with in early 1981 after the U.S. federal election. This was accomplished by another move towards restrictive monetary policy which forced U.S. and Canadian interest rates to record high levels through 1981 and into early 1982. This resulted in a considerably larger contraction phase than in the previous two cycles as policy-makers attempted to reduce inflation and inflationary expectations through the extended application of restrictive monetary policy. In fact, this contraction phase could be classified as a continuation of the contraction that began in early 1980 but which had been interrupted by an inappropriate easing of monetary policy during 1980. This extended contraction phase, however, came to an end in late 1982 and a new expansion phase was initiated in early 1983 in response to an easing of monetary policy in mid-1982.

From this comparison of the economic and mortgage loan approvals cycles in Canada for the period 1968-1982 it is apparent that these cycles followed very similar paths with the mortgage loan approval cycles leading the economic cycles in each case,

Except for the 1979-80 cycle when the turning points coincided. In effect, mortgage loan approvals displayed a modest counter-cycle pattern when compared to the economic cycles during this period. However, this counter-cyclical behaviour declined throughout the period with the 3rd and 4th cycles being much more coincident than the 1st and 2nd cycles. As a result, during this period indicators that accurately reflected the turning points of the economic cycles would also be relatively accurate indicators for the turning points in the mortgage loan approvals cycles. The indicator that is used widely for determining economic cycle turning points in Canada is the composite index of 10 leading indicators prepared by Statistics Canada which, because of the similarities between the economic and mortgage loan approval cycles, should also be an accurate indicator of the turning points for the mortgage loan approvals cycle. The relationship between the composite index of 10 leading indicators and total mortgage loan approvals in Canada for the 1968-1982 period is illustrated in Chart III-1. This indicator, however, because it is a leading indicator of the economic cycle will tend to be a coincident indicator for the mortgage loan approval cycle which tends to lead the economic cycle. As a result, other indicators of the mortgage loan approval cycle should be explored that are more closely related to that cycle.

2. The Choice of National Indicators

On the basis of the literature review[17] undertaken in the preceding section of the study a number of broad categories of indicators were chosen and examined in order to determine their relationship to the mortgage loan approvals cycles, as follows:

i) Income variables - the industrial composite employment index, the unemployment rate, and the help wanted index all seasonally adjusted.

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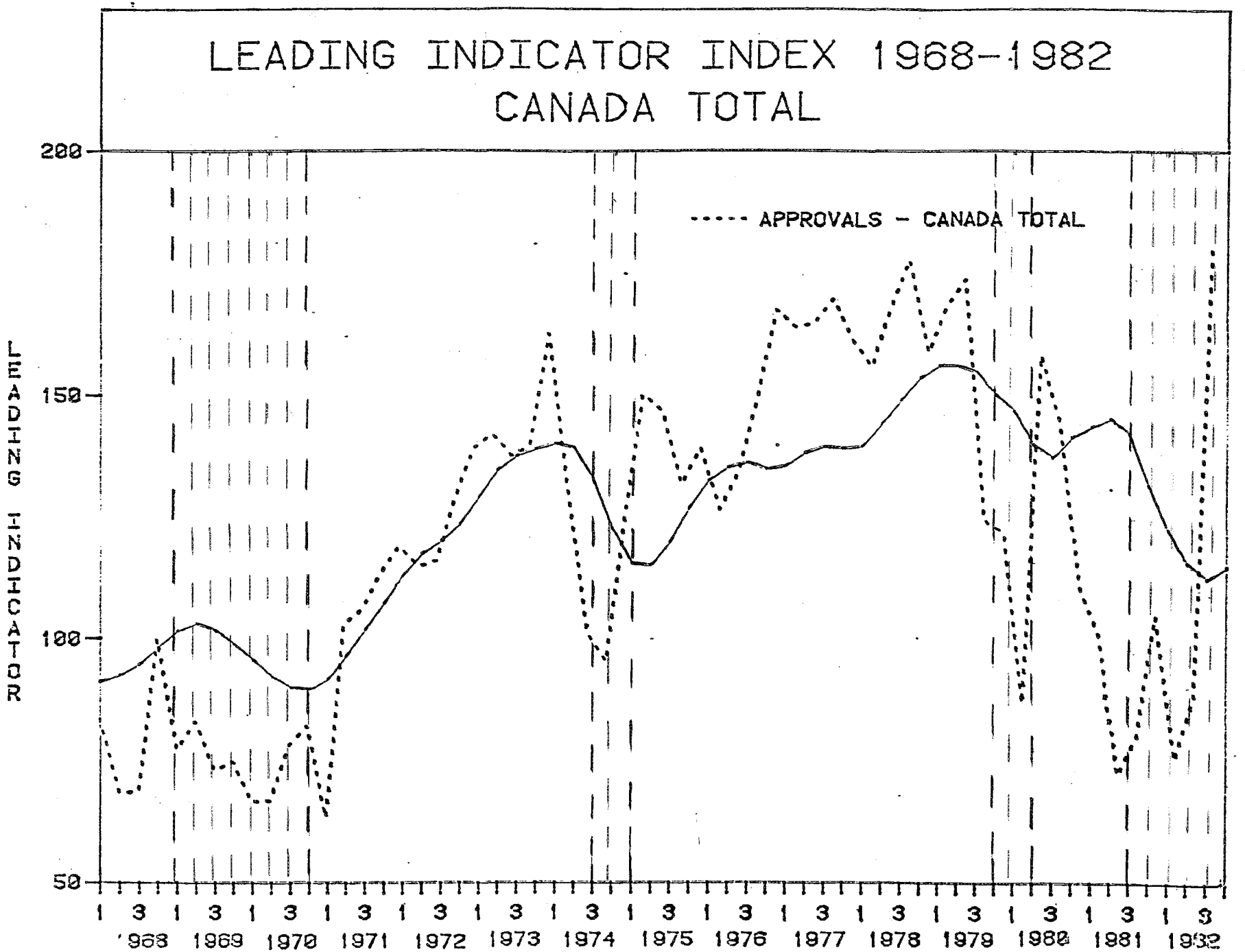
17. The chosen indicators were also discussed with CMHC analysts in a number of regional and CMA offices, who, in turn, suggested additional indicators that were then included in the analysis.

CHART III - 1


LEADING INDICATOR INDEX 1968-1982
CANADA TOTAL
APPROVALS - CANADA TOTAL
LEADING INDICATOR
200
150
100
50
1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3
1968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982

ii) Price variables - consumer price index, the shelter component of consumer prices and the average value of units sold through multiple listing services (MLS).

iii) Cost variables - residential construction cost index.

iv) Financial variables - the 5 year conventional mortgage rate, the differential between the 5 year conventional mortgage rate and 5-10 year Government of Canada bond yield, and the chartered bank holdings of conventional residential mortgages.

v) Consumer spending variables - new passenger car sales and value of retail trade, both seasonally adjusted.

vi) Housing variables - housing starts and building permits, both seasonally adjusted and MLS sales to listings ratios.

vii) General economic variables - composite index of 10 leading indicators, the value of cheques cashed in clearing centres, and personal savings.

3. Analysis of the National Indicators

The analysis of the national housing market indicators was undertaken in two phases. First, the indicators were collected in tabular form and charted directly from the CANSIM data bank and CMHC sources for the period 1968-1982 inclusive. The cyclical behaviour of each indicator, as displayed in the charts, was compared to the cyclical behaviour shown in the charts of national mortgage loan approvals - total, conventional and NHA. The similarities and differences between these cyclical patterns were visually assessed and preliminary conclusions were drawn about the cyclical relationships between these indicators and mortgage loan approvals. On this basis a number of indicators were abandoned as no significant

relationship could be determined from an examination of the charts. Next the relationships between the remaining indicators and mortgage loan approvals were analyzed through a series of statistical testing techniques in order to estimate the strength and importance of these relationships. These statistical test results were then combined with the initial assessment from the charts to make a final decision on the choice of indicators that acted as the best housing market indicators at the national level.

a) Chart Analysis

From the charts of the national indicators the following assessment of the chosen indicators was made:

i) Income Variables

The industrial composite employment index, the unemployment rate and the help wanted index all displayed similar cyclical patterns in their charts, especially during the 1981-82 recession period when large movements occurred in all three indicators. This cyclical pattern corresponded relatively closely to the housing market cycle, as represented by mortgage loan approvals, with the employment-unemployment variables acting as lagging indicators. On the basis of these chart patterns it was concluded that all three indicators should be tested statistically.

ii) Price variables

The consumer price index and the shelter component of this index displayed similar chart patterns but from the charts there did not appear to be a significant relationship between these price indices and mortgage loan approvals. However, because of the concern about price variables it was decided to test the shelter component of the CPI statistically. MLS average house value data was also obtained and tested statistically in an attempt to obtain a price variable related specifically to ownership housing.

iii) Cost variables

The only cost variable charted was the residential construction cost index which did not show a significant relationship to mortgage loan approvals in the chart comparisons. Even so, it was decided to test the relationship statistically.

iv) Financial variables

The five year conventional mortgage rate and the differential between the 5 year conventional mortgage rate and the 5-10 year Government of Canada bond yield both displayed a strong relationship with mortgage loan approvals on a chart basis. The cyclical patterns displayed on these charts were very similar to those on the mortgage loan approval charts with both interest rate variables appearing to be leading indicators of mortgage loan approvals. It was concluded that both of these relationships should be tested statistically. The chartered bank holdings of conventional residential mortgages, on the other hand, did not display a significant cyclical pattern relative to that of mortgage loan approvals and this indicator was abandoned.

v) Consumer spending variables

Two consumer spending variables, new passenger car sales and the value of retail trade were charted. Passenger car sales showed a significant cyclical pattern that was similar to the pattern displayed by mortgage loan approvals but the value of retail trade did not display a significant cyclical pattern. However, it was decided to pursue both indicators in the statistical testing phase of the analysis.

vi) Housing variables

As would be expected, housing starts and building permits displayed a close cyclical relationship with mortgage loan approvals and statistical testing of these relationships was undertaken in order to provide a more precise measure of these relationships. MLS sales to listing ratios were also tested statistically.

vii) General economic variables

The composite index of 10 leading indicators and the value of cheques cashed in clearing centres were charted with the leading indicators displaying a strong cyclical pattern and cheque cashings only a moderate cyclical pattern. The cyclical pattern of the leading indicator index, which reflects the economic cycle closely, also displayed similar cyclical patterns to those of mortgage loan approvals. It was decided to apply statistical testing to both of these indicators. In addition personal savings was introduced as a variable and tested.

On the basis of this visual analysis of the national indicator charts it appeared that the income and financial variables - employment and unemployment variables and interest rate variables had the strongest cyclical relationships with total mortgage loan approvals at the national level. New passenger car sales and the composite index of 10 leading indicators also displayed similar cyclical patterns to those experienced in the mortgage loan approvals cycles but the strength of the relationships did not seem as great as in the case of the income and financial variables. The other housing sector variables - housing starts and building permits - displayed similar cyclical patterns but this is primarily due to the fact that they are closely related to mortgage loan approvals and could be considered as alternate variables for defining the housing market cycles.

b) Statistical Analysis

In order to assess the strength and importance of the relationships between these various indicator variables (independent variables) and total mortgage loan approvals at the national level (dependent variable) a series of tests and estimations were undertaken using a stepwise multiple regression technique. Stepwise multiple regression is a form of multiple regression that adds one variable at a time to the "best fit" regression equation. Under this procedure, variables are added in the order which makes the

greatest improvement in the goodness of fit. In an early stage, a variable may enter the regression equation but as other variables are added the initial variable may be removed from the equation if its contribution is indicated to be insignificant. As a result, the final regression equation will only include statistically significant variables.[18]

A number of analytical runs were made, using the stepwise multiple regression technique, on the national indicators chosen for the analysis. First, all dependent variables, except the shelter component of CPI, cheques cashed, retail trade, and the residential construction cost index (none of which showed strong cyclical patterns in the chart analysis), were tested for significance against total national mortgage loan approvals for the entire 1968-1982 period. On an unlagged basis the regression analysis indicated that the conventional 5 year mortgage rate, the unemployment rate, the help wanted index, and passenger car sales were the strongest indicators. When lags (2 quarters) were introduced for the employment variables the statistical results improved moderately and the employment index substituted for the help wanted index. Next these same variables were run on a lagged basis with the addition of the shelter component of CPI and cheques cashed. This did not improve the statistical results materially but building permits replaced car sales on a significant variable. In an attempt to determine whether or not the composite leading index would be a satisfactory substitute for all the other indicators except the mortgage rate it was run along with the 5 year conventional rate. The statistical results obtained were much weaker in this case thereby indicating that the specific variables were more useful and significant than the leading index.

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18. For details of this statistical technique and the results obtained from the statistical analysis of the national indicator variables using this technique see Appendix B.

Because of the length of the 1968-1982 period the statistical analysis was next applied to four segments of this overall time period: 1968(2) to 1975(1); 1975(2) to 1979(3); 1979(4) to 1982(4) and 1968(2) to 1979(3).[19] For the 1968-1975 period good statistical results were obtained for the conventional 5 year mortgage rate, unemployment rate and the help wanted index; while for the 1975-1979 period only the mortgage rate and the employment index were significant with a poorer statistical result. For the 1979-82 period only the mortgage rate proved to be significant and only with a very poor statistical result. Over the 1968-79 period, however, the statistical result was good for the mortgage rate, employment index, unemployment rate, and housing starts. These results indicated that the financial and employment variables had a relatively strong relationship with mortgage loan approvals during the more stable segments of the time period (1968-75 and 1968-79) but were much less useful in the highly volatile 1979-82 period when only the mortgage was significant in the statistical testing. The inclusion of the CPI shelter component, cheques cashed, retail trade and the residential cost index did not materially improve the statistical results for any of these time period segments.

Although the indicators resulting from these regression analyses had a relatively high degree of significance in the regression results, the predictive capacity of a number of regression equations was not very satisfactory during certain time periods. This was especially so during the very volatile 1979 - 1982 period when the predicted results were substantially different from the actual mortgage loan approvals for that period. In the other more stable periods the predictive ability of the regression equations was considerably greater. As a result, it appeared that the good statistical fit over the entire period was largely due to the relatively long and stable period up to 1979 after which the fit was much worse as indicated by the tests run on the data during the segmented time

19. These time segments were selected to reflect the major economic cycles experienced during the 1968-82 period.

periods. This led to the conclusion that other variables than those used in the testing to this point must be important, particularly during the latter part of the period when there was much greater volatility in all the variables.[20]

In response to this concern the MLS average house values and the MLS sales to listing ratios (which only became available after the initial regression runs) were added to the variables being tested statistically. In addition, personal savings was also introduced as a further variable to be tested. In the next set of runs four different types of regression equations were used - linear, semi-logarithmic, double logarithmic and inverse semi-logarithmic equations - to determine if the fit could be improved by the use of different equation forms. In these runs a number of variables used in the previous runs which did not appear to be very significant or useful were dropped from the analysis - including passenger car sales, the composite index of leading indicators, housing starts, building permits, retail trade and the residential construction cost index. Although passenger car sales had appeared as a significant variable in a number of previous runs it was dropped from the analysis because it is a parallel variable to mortgage loan approvals rather than a predictive variable for approvals. Housing starts and building permits were eliminated from the analysis because they are substitutes for mortgage loan approvals in the housing sector and are not independent predictive variables for approvals. The other two variables were not pursued further as they showed very little significance in the previous regression analyses. The mortgage rate-bond rate differential was also eliminated as the mortgage rate was more significant.

Regression analyses were run, using the four types of equations, for the entire 1968 - 1982 period and the four segmented periods used in the previous regression runs. Although the variables showing the greatest significance in these runs varied somewhat depending upon the time period and form of regression equation used, the overall results indicated that the following variables had the most significant relationships to mortgage loan approvals:

20. For details of the predictive results for the final series of regression analyses at the national, provincial and local levels see Appendix C.

1) the conventional five-year mortgage rate;
2) a price variable - either the CPI shelter component or the MLS average house value;
3) an employment variable - either the unemployment rate or the employment index; and
4) the MLS sales to listing.

Personal savings and cheque cashings also appeared as significant variables in particular runs but their relationship to approvals appeared to be considerably weaker and less consistent than the relationships of the main variables.

The use of the various log regression equations, in virtually all cases, did not improve the regression results over those obtained by using the linear equations. As a result the use of the linear equations provided the best fit for these variables and the results of these runs were used as the conclusive results. In terms of the time periods used the best regression results were found for the entire 1968 - 1982 period and for the 1968 - 1979 segment of the total time period. Relatively good results were also obtained for the 1968 - 1975 segment but poorer results occurred in the 1975 - 1979 period. The results for the very volatile 1979 - 1982 period were very poor both in terms of the variables found to be significant (only the conventional 5 year mortgage rate and cheque cashings) and the very low degree of significance for these variables. This was consistent with the previous runs for the time period segment and confirms that the regression analysis using the chosen variables does not provide an adequate explanation for this volatile period and could not have predicted the mortgage loan approvals for this period. This is not surprising given the fact that all forecasting models proved to be inadequate during this turbulent period. In general, however, the fit obtained for the entire period was better using this limited group of variables than that obtained from the initial group of variables used in the previous runs.

4. The Choice of Provincial Indicators

At the provincial level the choice of indicators was made on the same basis as that at the national level with comparable provincial data being obtained in the major categories of indicators. For two provinces - Ontario and British Columbia, other indicators were obtained that were specific to particular industrial sectors that were dominant in these provinces. For example, seasonally-adjusted employment indexes were examined for forestry, mining and manufacturing in an effort to determine the impact of employment changes in these large industrial sectors on the housing market cycles in these particular provinces - forestry and mining in B.C. and manufacturing in Ontario. This was attempted in order to determine whether or not there were differential income effects on the housing cycle in particular provinces arising from the differential cycles in these specific industrial sectors and whether or not there was a different degree of reaction in the provincial housing markets to these specific factors from that experienced in the national housing market. Upon examination of the charts of these specific employment indexes and a comparison with the industrial composite employment indexes for these provinces, however, it was decided that the specific index cyclical patterns were not different enough from the industrial composite patterns to warrant separate statistical analyses of these specific indexes. In addition, these specific indexes were national in scope and did apply only to the two provinces concerned.

In addition, the choice of provincial indicators for statistical testing was narrowed even further by the statistical testing results obtained for the national indicators. The provincial indicators comparable to the national indicators that did not prove to be significant in the statistical analysis at the national

level were eliminated before applying the statistical testing techniques at the provincial level. As a result, only the provincial indicators comparable to the indicators that were found to be significant at the national level were tested statistically at the provincial level. In other words, the main purpose of the statistical testing at the provincial level was to confirm that the results of the national testing held at the provincial level and to determine the relative significance of the indicators at the provincial level compared to their significance at the national level.

5. Statistical Analysis of the Provincial Indicators

Regression analyses, using the same types of equations and variables as used in the analyses of the national indicators, were undertaken for Ontario and British Columbia.[21] Again, these runs were made for the entire time period and the four segments of this period. The same variables found to be most significant at the provincial level corresponded closely with those found to be significant at the national level, namely the mortgage interest rate, a price variable, employment variable, and the MLS sales to listing ratio. Other variables were significant from time to time in the runs but were not consistently significant. The best results were again obtained for the entire time period and the 1968-79 segment of the period. Generally, the linear equations provided the best regression results but occasionally one of the log equations improved the results modestly. The overall levels of significance for the variables, however, was somewhat lower than those obtained for the same variables at the national level. Overall, though, the statistical results from these provincial runs were very similar to those obtained for the national variables and confirmed that the same indicators apply to both the national and provincial levels.

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21. For details of these analyses and their results see Appendix B.

6. Interpretation of the Results

The indicators of the mortgage loan approvals cycles generated by the statistical analyses of the national and provincial indicator variables undertaken in this section of the study support the view that the consumer makes his house-purchasing decision on the basis of a number of affordability criteria. These criteria include the mortgage interest rate; the price of housing units; family disposable income; the terms attached to mortgage loans, such as term, down-payment and amortization; and expectational factors regarding prices, interest rates and income. As these criteria fluctuate during a cyclical period the consumer adjusts his house-purchasing plans in accordance with the movement of the elements determining his affordability equation. If these elements move cyclically in a way that reduces his affordability of housing the consumer will postpone his house-purchasing plans; while if they move in a manner that increases his affordability, the consumer will move ahead with his purchasing plans. The most volatile elements over a cyclical period are the mortgage interest rate, house prices and family disposable income. As a result, it would be these elements that would primarily determine the house market cycle. Mortgage terms and expectational factors can also be important at certain times during a cyclical period but their impacts are much more difficult to quantify.

Housing affordability is usually calculated by relating the annual carrying costs associated with a particular level of interest rates and house prices to family disposal income in the form of a ratio or percentage, as follows:

1) Annual carrying costs = House price less down-payment x mortgage interest rate + principal repayment (amortised over the term of the mortgage).

2) Affordability = $\frac{\text{Annual carrying costs x 100}}{\text{Annual Family disposable income}}$

As a result, any change in the factors making up the annual carrying costs will affect affordability either negatively or positively as will a change in family disposable income. An increase in house prices and mortgage rates and a shortening of the mortgage amortization period would reduce affordability while movements in the opposite direction would increase affordability. On the other hand, an increase in family disposable income would increase affordability and a decrease would reduce affordability. In the expansion phase of the economic cycle house prices, mortgage rates and family disposable income all tend to rise and the impact on the consumer depends on the relative movements of these factors. As long as family disposable income is growing rapidly enough to off-set the increased carrying costs arising from the higher house prices and interest rates, affordability will be maintained. However, near the top of the cycle inflationary pressures increase significantly and tend to increase house prices and, especially, interest rates more rapidly than family disposable income. At that point, affordability is reduced and house purchasing plans are postponed. Similarly, at the bottom of the economic cycle deflationary pressures on house prices and interest rates exceed those on family disposable income and affordability increases leading to an increase in house-purchasing plans.

At times, however, the consumer's perception of affordability can be distorted by his expectations regarding prices, interest rates and income growth. If the consumer is operating under the influence of strong inflationary expectations his decision-making process can be influenced by the belief that house prices and interest rates will move still higher and, hence, reduce affordability in the future. At the same time, the consumer may also believe that inflationary trends will increase his future family

disposable income at a high rate and, therefore, increase affordability in the future. Under these conditions, the consumer is tempted to purchase a house on the basis that price and interest rate trends will reduce his affordability in the future while his expected rising income will increase his affordability of housing at current prices and interest rates in the future. Conversely, if the consumer expects house prices and interest rates to drop in the future he will tend to delay his house-purchasing decision until affordability improves. This reaction would be further enhanced if he also expected a lower income growth rate in the future. These expectational factors probably explain much of the increased volatility in the housing market during the 1979-82 period when interest rates had to rise to extreme levels before the consumer's perception of affordability was affected negatively by the combination of rapidly rising house prices and interest rates. The rapid reversal of the expectations also probably extended and intensified the contraction phase of the housing cycle during this period.

The statistical analysis undertaken in this section provides further proof that this decision-making process was operational during the housing market cycles experienced in Canada during the 1968-82 period. The indicators with the strongest relationship to national and provincial mortgage loan approvals determined by this analysis were: the 5 year conventional mortgage rate, the MLS average value for housing units and the employment-unemployment variables used in the analysis as income proxies. Although a satisfactory overall income indicator could not be obtained the employment-unemployment variables are the major cyclical determinants of personal income and, therefore, were used to bring an income element into the analysis. As a result, the statistical analysis has confirmed the significance of two major components of affordability - the mortgage interest rate and house prices - in determining the housing

market cycle. It has also suggested that the income variable is important in this cyclical process but only partial indicators - employment and unemployment variables - could be obtained to represent this influence on the housing market cycles.

The employment and unemployment variables, however, could also be of considerable importance as indicators of housing market activity in particular provinces because of their relationship to population migration between provinces and regions of the country. As employment prospects improve in a province a net inward migration is likely to occur that would increase the demand for housing within the receiving province. Similarly, if employment falls in a province an outward migration is likely to occur with a resulting decline in housing demand. As a result, the importance of the employment variables is not simply restricted to their impact on incomes within a province but also involves their impact on population migration into and out of particular provinces. This impact is not significant at the national level because these inter-provincial population movements are averaged out in their impact on housing on the national scale. This means that changes in provincial (and local) employment variables could be significant indicators of forthcoming migration trends between provinces and local regions. Because of the more transient nature of their populations, this impact of employment changes is likely to be more important in the Western provinces (Alberta and B.C.) and Ontario than in the Maritimes and Quebec where migration traditionally has not been very significant.

7. Checklist of Indicators

On the basis of both statistical analysis and theoretical interpretation, the following variables would appear to be useful indicators of the national and provincial home-ownership mortgage loan approvals cycles:

1) A financial variable - the 5-year conventional mortgage rate.

2) A price variable - the MLS average sales value.

3) An income or employment variable - the industrial composite employment index, and

4) A housing sector variable - the MLS sales to listing ratio.

IV. LOCAL HOUSING MARKET INDICATORS

In this section the analysis undertaken at the national and provincial levels to determine a number of variables that would act as indicators of the homeownership mortgage loan approvals cycle will be extended to three local metropolitan areas (CMA's) - Vancouver, Toronto, and London - in the two provinces that were studied in the previous section. This analysis will attempt to determine whether or not the checklist of indicators developed at the national and provincial levels will also perform as indicators of the local housing markets in these selected CMA's. Fortunately, the indicators included in the national and provincial checklist are also available at the local level and, therefore, will be tested statistically at the local level in the same manner as the testing undertaken at the national and provincial levels. The major problem facing this analysis at the local level is the unavailability of data for conventional homeownership mortgage loan approvals at the CMA level and, hence, the absence of a data series for total homeownership mortgage loan approvals comparable to the series used in the national and provincial statistical analysis. As a result, estimates for these series had to be developed before undertaking the statistical testing analyses.

1. Estimation of Total Homeownership Mortgage Loan Approvals

The only data available at the local CMA level for homeownership mortgage loan approvals are those covering the NHA portion of the market. This means that some estimation method must be developed to determine total homeownership mortgage loan approvals at the local level based on the available provincial data for total approvals. In order to attempt this two estimating approaches were developed using the following equations:

a) $\frac{\text{NHA Approvals (local)}}{\text{NHA Approvals (provincial)}}$ x Total Approvals (Provincial)

and b) $\frac{\text{MLS sales (local)}}{\text{MLS sales (Provincial}}$ x Total Approvals (Provincial)

The first approach is based on the assumption that the ratio of NHA local approvals to total local approvals is equal to the ratio of NHA provincial approvals to total provincial approvals; while the second approach makes a similar assumption about the local and provincial ratios of MLS sales to total approvals. It is likely that neither of these assumptions accurately reflects the relationships between the local and provincial data because of the different levels of NHA activity and degree of MLS penetration in various local CMA markets. Under these circumstances the local NHA approvals and MLS sales are likely to result in different ratios to total local approvals than the average ratios of provincial data to total provincial approvals. In addition, quarterly MLS sales data were not available at the local level and these had to be estimated from the annual data available with the effect that all seasonal patterns in these data were removed.

Finally, after calculating total approvals at the local level under these two approaches there was no independent source of data on total approvals against which these estimates could be checked and compared. This meant that there was no clear way of making a choice between these two estimates and, consequently, it was decided to use both estimates in the statistical testing analyses. By doing this, the statistical results obtained when compared to the national and provincial results may make it possible to determine which of these two estimates most accurately reflects total homeownership mortgage loan approvals at the local level for the CMA's chosen for the analysis.

2. Statistical Analysis of the Local Indicators

The statistical analysis of the local indicators was undertaken using the same four types of regression equations as those used in the national and provincial analyses. However, in the case of the local analysis a more limited number of variables were tested in accordance with their availability at the local level - namely the 5 year conventional mortgage rate, the MLS average sale value, the MLS sales to listing ratio and the industrial composite employment index. In fact, these variables constituted the check-list of housing market indicators determined from the national and provincial statistical analyses. Because of the absence of data for total homeownership mortgage loan approvals at the local level the local regression analyses used both of the estimates for total approvals developed in this study using local and provincial NHA approvals and MLS sales data.

The regression equations were run for both approvals estimates for the entire 1968-82 period and it was found that the fit was not very satisfactory for either of the approvals estimates during that period. However, the estimate using MLS sales data did give a considerably better fit than the estimates using NHA approvals data for each of the CMA's analyzed. Even this fit, though, was considerably poorer than the fits achieved at the national and provincial levels. There would appear to be two major reasons for this: (1) the number of independent variables included in the regression analyses was smaller at the local level than at the national and provincial levels; and (2) the probability that even the best estimate of total local approvals (using MLS data) was not an accurate measure of total approvals in the CMA's studied.

The final regression runs for the three local areas were then undertaken, using the MLS estimate of local approvals, for the entire 1968-82 period and for the 1968-79 period, which eliminated the very volatile 1979-82 period. The best fits for all three CMA areas were obtained for the shorter and more stable 1968-79 period with very little difference arising between the various equation forms used. Among the cities the best regression fits were obtained for London, followed by Toronto and then Vancouver, for which the results were much weaker. In addition, the results obtained for all the local areas were much poorer than those obtained for the same variables at the provincial and national levels in both time periods analyzed. However, the results were sufficiently similar to those obtained at the provincial and national levels to indicate that the variables included in the local analysis were also operative and could act as indicators at the local level as well as at the provincial and national level. This conclusion could be even stronger if satisfactory data had been available for total mortgage loan approvals at the local level.

3. Checklist of Local Indicators

Despite the weaker statistical results obtained in the local analyses of indicator variables, it would appear that the following indicators, found to be useful at the national and provincial levels, would also be applicable as indicators of the local homeownership mortgage loan approvals cycles:

1) A financial variable - the five year conventional mortgage rate.
2) A price variable - the MLS average sales value.
3) An income variable or employment variable - the industrial composite employment index, and
4) A housing variable - the MLS sales to listing ratio.

V. ASSESSMENT OF THE INDICATORS

In this section the indicators that provided the best results in the statistical analyses, especially those that make up the checklist of indicators at the national, provincial and local levels, will be assessed as to their usefulness in determining housing market cycles in terms of their reliability, lags in availability, lags in impact, strength of impact and duration of impact. This assessment will be based on both the statistical analysis results and a series of charts plotting each indicator against total mortgage loan approvals at the national, provincial and local levels.[22.]

1. The Financial Variable

The five year conventional mortgage rate proved to be the most consistent and reliable variable in the statistical analyses at all three levels - national, provincial and local. It appeared as a significant variable in virtually every regression run at all levels and for all time segments analyzed. These results confirm the importance of the financial variable as outlined in the literature review in Chapter II of this study. From the charts in Appendix D it is apparent that the 5 year conventional mortgage rate is a coincident indicator of mortgage loan approvals with approvals being immediately responsive (downward) to increases or (upward) to declines in the mortgage rate throughout the 1968-82 period. It is also clear from the charts that relatively small changes in the interest rate can have a substantial impact on mortgage loan approvals, thereby displaying a strong and immediate impact during all the cyclical periods. The impact on approvals continues until the next change in the interest rate trend. Finally, the 5 year conventional mortgage rate is useful as an indicator since it is readily available on a daily basis and is the same for all three levels.

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22. These charts for the national, provincial and local indicators are presented in Appendix D.

2. The Price Variable

Two price variables were employed in the statistical analysis - the shelter component of CPI and the MLS average selling price for housing units, both of which are charted against approvals at the national level in Appendix D. However, only the MLS average selling price was charted against approvals at the provincial and local levels. In the statistical analysis at the national level these two variables appeared to be interchangeable in their impact on approvals but from the charting of these variables against approvals the MLS average selling price appeared to have a stronger and more reliable pattern. This was the main reason why this particular variable was pursued in the provincial and local statistical analyses. The MLS average selling price appeared from the charts to be a lagging indicator of approvals during contractionary periods as it reached a peak after approvals had been declining for a number of quarters (especially in the 1979-82 period when the peak selling price coincided with the trough in mortgage loan approvals). However, in the expansionary phase the average selling price declined prior to the recovery in approvals and, therefore, acted as a leading indicator of approvals in 1981-82. The strength of this impact on approvals, from the charts, would appear to be much less than that of the mortgage rate impact with a shorter duration. As far as availability is concerned the MLS average selling price is available monthly at all three levels.

3. The Employment Variable

At the national and provincial levels two variables - the unemployment rate and the industrial composite employment index - were used as employment indicators. Since these indicators are essentially mirror images of the same trends in employment they were interchangeable in the statistical

analyses with both appearing throughout the regression analyses. However, it was decided that the employment index was a better indicator from a conceptual point of view and it was used at the local level as the only employment indicator. In the statistical analyses at all levels both indicators displayed a positive relationship with approvals, i.e. a rise in the unemployment rate or a decline in the employment index coincided with a rise in approvals and vice versa. This was also confirmed in the charts of these indicators against approvals. This phenomenon primarily reflects the fact that approvals increase or decrease very early in the economic cycle while the employment variables do not change until relatively late in the cycle. As a result, when approvals are declining employment is still increasing (unemployment declining) and does not start declining (unemployment increasing) until approvals are again starting to rise in the initial recovery phase of the next cycle. This means that the employment variable is not a very useful indicator for the contractionary phase of the approvals cycle but could be more useful as an indicator of the expansionary phase i.e. when employment starts to decline (unemployment to rise) approvals begin to recover. The strength of the impact on approvals would appear to be weaker than the impact of interest rates given the perverse behaviour of approvals to movements in the employment indicators. This again confirms the findings in the literature review section of the study. The employment index is readily available monthly at all three levels.

4. The Housing Variable

The housing variable that gave good statistical results at all three levels was the MLS sales to listings ratio. This variable appeared in many of the regression solutions and had a relatively high degree of significance in the equations. The charts of this indicator against approvals show a strong coincident pattern with approvals at all levels

with the sales to listings ratio moving closely with approvals during all periods except the 1975-79 period when the indicator declined in 1975 and followed a flat pattern until 1979 compared to a rise in approvals in 1975 followed by a flat pattern until 1979. In general, the sales to listings ratio appeared to lag approvals modestly through the cyclical periods during both the contractionary and expansionary phases. As a result, it could be useful as a confirmation of other indicators such as the mortgage rate with sales to listings ratios declining and rising with approvals during the cycle. For example, if a rise in interest rates coincides with a decline in approvals and this is followed by a decline in the sales to listings ratio it would be strong confirmation of a cyclical downturn in approvals. Sales to listings ratios are also available on a monthly basis through MLS at all three levels.

5. Other Variables

Two other variables - personal savings and cheques cashed in clearing centres - were also used in the statistical analyses at the national level with only cheques cashed used at the provincial level. Neither of these variables were used at the local level. At the national level the chart of personal savings against approvals shows that savings rose during the contractionary phase of the approvals cycle in all cyclical periods and then levelled off as approvals began to recover. However, since personal savings is a residual type of statistic it is not clear how significant this pattern is in terms of acting as an indicator of approvals. In addition, it is not available at either the provincial or local level and, therefore, would not be a very useful indicator. Cheques cashed displayed a relatively flat and stable pattern until 1978 when it began to rise very strongly just prior to the volatile pattern of approvals through the 1979-82 period. However, it is difficult to draw any significance

from this pattern in terms of causation and, as a result, cheques cashed would not appear to be a useful indicator of mortgage loan approvals.

TABLE V - 1

Comparison of Checklist Indicators

	Financial (1)	Employment (2)	Price (3)	Housing (4)
Reliability	Strongest	Weaker	Weaker	Strong
Availability	Daily	Monthly	Monthly	Monthly
Impact				
Timing				
Peak	Coincident	Lagging	Lagging	Lagging
Trough	Coincident	Lagging	Coincident	Lagging
Strength	Strongest	Weaker	Weaker	Strong

(1) Five year conventional mortgage rate
(2) Industrial composite employment index
(3) MLS average selling price
(4) MLS sales to listings ratio

VI. CONCLUSIONS

This study has been a first attempt at developing a checklist of indicators that would be useful in determining the mortgage loan approval cycles at the national, provincial and local levels in Canada. The results of the statistical and charting analyses indicate that a short list of indicators available at all levels - namely, the 5 year conventional mortgage rate, the MLS average selling price, the industrial composite employment index and the MLS sales to listings ratio - could be useful indicators of approvals at all three levels. However, these analyses were not exhaustive and other variables could be useful if different or more extensive analyses were undertaken. On the other hand, the indicators suggested by the study largely coincide with those that have been outlined in theoretical analyses of the housing markets in both Canada and the United States and, therefore, have relatively strong theoretical credibility. The analyses in this study were also limited by the limitations imposed by the terms of reference in that the indicators to be considered had to be readily available at all three levels and that the analysis must start at the national level and move down to the local level. An alternative approach to developing local indicators would be to start at the local level using indicators that may not be available or applicable at the provincial or national levels. In any case, this type of local analysis would be a useful supplement to the broader approach used in this study and could result in further indicators that would be useful at the local level, along with the indicators provided by this study.

APPENDIX A

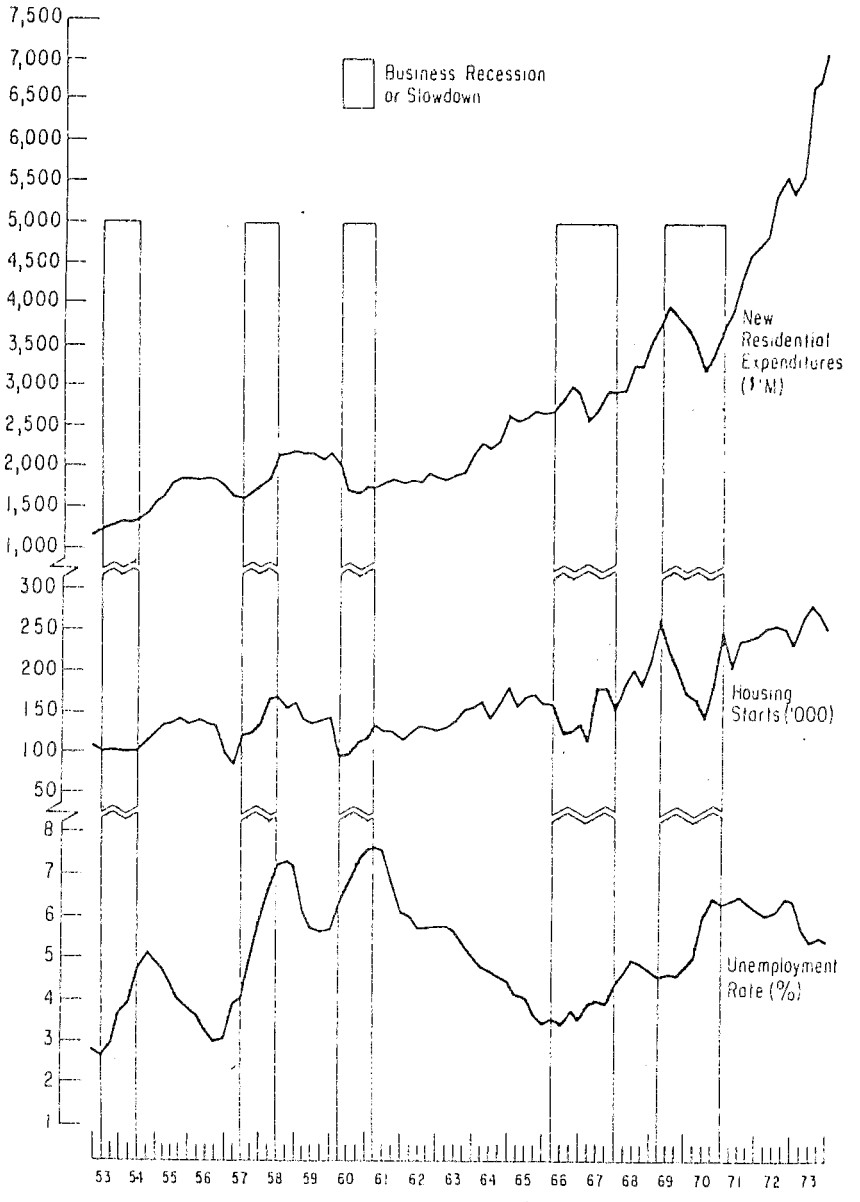
The Cyclical Behaviour of the Housing Sector in Canada - 1949-1970

APPENDIX A.

The following chart (1.1) and Tables (1.1 and 1.2) illustrate the cyclical behaviour of the overall economy and housing sector in Canada and the United States for the period 1949-1970 as developed by Chung[17]

Chart 1-1

Deseasonalized New Residential Expenditures ($ 'M),
Housing Starts ('000) and
the Rate of Unemployment (%)



17. Chung, op. cit., p.9-11.

Table 1-1

Turning-Point Dates: Business and Housing-Starts Cycles, United States and Canada, 1949-1970

		Turning Point Dates	
		Canada[1]	U.S.A.[2]
Business Cycles			
Trough	1st cycle	1949(3)	1949(4)
Peak		1953(2)	1953(3)
Trough	2nd cycle	1954(2)	1954(3)
Peak		1957(2)	1957(3)
Trough	3rd cycle	1958(2)	1958(2)
Peak		1960(1)	1960(2)
Trough	4th cycle	1961(1)	1961(1)
Peak		1966(1)	1966(3)
Trough	5th cycle	1967(4)	1967(2)
Peak		1969(1)	1969(4)
Trough		1970(4)	1970(4)
		Canada	U.S.A.[3]
Housing-Starts Cycles			
Trough	1st cycle	1951(4)	1951(3)
Peak		1955(3)	1955(2)
Trough	2nd cycle	1957(1)	1957(1)
Peak		1958(2)	1959(1)
Trough	3rd cycle	1960(1)	1960(4)
Peak		1964(4)	1965(4)
Trough	4th cycle	1967(1)	1966(4)
Peak		1969(1)	1969(1)
Trough		1970(2)	1970(1)

Table 1-2

Duration: Business and Housing-Starts Cycles, Canada, 1949-1970

Business Cycle Date		Duration (Quarters)	
Expansion	Contraction	Expansion	Contraction
1949(4) – 1953(2)	1953(2) – 1954(2)	11	4
1954(2) – 1957(2)	1957(2) – 1958(2)	12	4
1958(2) – 1960(1)	1960(1) – 1961(1)	7	4
1961(1) – 1966(1)	1966(1) – 1967(4)	20	7
1967(4) – 1969(1)	1969(1) – 1970(4)	5	7
Average		11.0	5.2

Housing-Starts Cycle Date		Duration (Quarters)	
Expansion	Contraction	Expansion	Contraction
1951(4) – 1955(3)	1955(3) – 1957(1)	15	6
1957(1) – 1958(2)	1958(2) – 1960(1)	5	7
1960(1) – 1964(4)	1964(4) – 1967(1)	19	9
1967(1) – 1969(1)	1969(1) – 1970(2)	8	5
Average		11.8	6.7

APPENDIX B

ANALYSIS OF RELATIONSHIPS BETWEEN MORTGAGE APPROVALS AND POSSIBLE INDICATORS

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I. DISCUSSION OF THE ANALYSIS

A. INTRODUCTION

This technical appendix presents an analysis of relationships between mortgage approvals and a number of possible explanatory variables (indicators). The analysis focusses on data at the national, provincial, and local levels. Provincial data analysed are for Ontario and British Columbia. Local data are for Toronto, London, and Vancouver. It should be emphasized that the analysis is explorative and very preliminary. Much work remains to be done to arrive at solid conclusions about reliable indicators for mortgage approvals, particularly at the local level.(1) The reader is referred to the cautionary notes in Section F below.

B. METHOD

The statistical method used to relate mortgage approvals to a set of possible indicators is multiple regression. Specifically, stepwise multiple regression is used. Stepwise regression is a form of multiple regression that enables the analyst to add one variable at a time to the "best fit" regression equation. If there are "n" potential independent variables and we know that all "n" variables will be in the best fit equation, then we would not want to use a stepwise regression procedure. However, often the problem is to determine which of the independent variables is statistically significant and should be included in the equation. This can be complicated by the fact that some of the independent variables may be highly correlated (that is, not independent).(2) One possible approach is to investi-

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(1) TEEGA Research Consultants was asked to prepare this technical appendix over 10 working days. The terms of TEEGA's contract, therefore, precluded a more rigorous treatment of the issues.

(2) The computer program used, for relating mortgage approvals to a number of explanatory variables, automatically checks for independence.

gate all possible combinations of a set of independent variables. This approach rapidly becomes computationally unattractive because of the many combinations of variables involved. The stepwise regression procedure is an answer to this problem.

Using a stepwise regression procedure, variables are added in the order which makes the greatest improvement in the goodness of fit (reduction of the variance). In an early stage, a variable may enter the regression equation; however, as other variables are added, the initial variable may be removed from the equation if its contribution is indicated to be insignificant. Consequently, the final regression equation will only include statistically significant variables.

C. EQUATION FORMS TESTED

The problem of determining which indicators best explain the pattern of homeownership mortgage approvals is partly a problem of identifying the appropriate mathematical form of the equation which relates indicators to approvals. However, in the present state of the art, it is not possible to accurately specify the equation form *a priori*. It is therefore advisable to try out different forms, especially those obtainable by logarithmic transformations of one or more of the variables. The following four forms of the regression equation were used in the analysis:

linear: $Y = b_0 + b_1 X_1 + \ldots + b_n X_n$

semi-logarithmic: $Y = b_0 + b_1 \log X_1 + \ldots + b_n \log X_n$

double logarithmic: $\log Y = b_0 + b_1 \log X_1 + \ldots + b_n \log X_n$

inverse semi-logarithmic: $\log Y = b_0 + b_1 X_1 + \ldots + b_n X_n$

Y is mortgage approvals, X are the independent variables, and b are coefficients. Logarithmic transformations were

made to base e (i.e., natural logarithms). It should be noted that for the various applications at the national, provincial, and local levels, no one mathematical form consistently gives the best fit to the respective data observations. **More empirical and conceptual work is needed to identify the correct underlying theoretical framework which best captures the relationships between homeownership mortgage approvals and the variety of possible indicators.** Other equation forms which could be tested are of the polynomial variety. Also, simultaneous equation models could be explored to the extent that data permit.

D. SEGMENTATION OF THE DATA

Data included in the analysis were compiled for the period from the first quarter of 1968 to the fourth quarter of 1982.(1) This involves 60 observations and spans economically stable as well as volatile times. To begin with, regression estimations were made for this 1968-1982 period. Taking into account recessionary periods, various peaks and troughs in the leading economic indicators of the country, and the trends in mortgage approvals over the years, it was decided that it would also be useful to explore the influence of specific sub-periods of 1968-1982 on the performance of the regression equations.

Three sub-periods were identified for separate regression estimations. These are as follows:

(a) 1968 quarter 1 to 1975 quarter 1
(b) 1975 quarter 2 to 1979 quarter 3
(c) 1979 quarter 4 to 1982 quarter 4

A fourth period combining (a) and (b) (i.e., 1968 quarter 1 to 1979 quarter 3) was also used in the estimation of the regression equations.(2)

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(1) The variables included in all regressions were seasonally adjusted.

(2) See text in the main report for the rationale behind the choice of interval points.

E. INITIAL EXPLORATIVE REGRESSIONS

Initially, a number of variables were identified as potentially appropriate indicators of patterns in mortgage approvals.(1) These variables included the following:

CPSHELTR	=	shelter component of consumer price index
CHQCSHNG	=	cheques cashed (value) in clearing centres
CONV5YR	=	conventional 5 year mortgage rate
DIF5YRCB	=	differential between 5 year conventional mortgage rate and 5 year government of Canada bond yield
EMPLINDX	=	employment index - industrial composite
UNEMPRT	=	unemployment rate
HLPWINDX	=	help wanted index
PCARSALS	=	passenger car sales
LDNGINDX	=	leading indicator index - filtered
HSTARTS	=	housing starts
BLDNGPRM	=	building permits
RTRADE	=	retail trade
RCOSTNDX	=	residential cost index
AVSALPR	=	average sale price of properties as reported by MLS annual reports
SALTOLIS	=	sale to listing ratios of MLS properties
SAVINGS	=	personal savings

A series of stepwise regressions were tried, using various combinations of lags and inclusions/exclusions of variables. In addition, various time period segmentations of the data and mathematical forms (as indicated in Sections C and D) were tested. These initial explorative regressions were done for the national and provincial (Ontario and British Columbia) data.(2)

The conclusion of these initial regressions is that the variables, of the above listed, which yield the most meaningful and statistically significant results are as follows:

CONV5YR	=	conventional 5 year mortgage rate
AVSALPR	=	average sale price of properties as reported by MLS annual reports
SALTOLIS	=	sale to listing ratios of MLS properties
SAVINGS	=	personal savings
CPSHELTR	=	shelter component of consumer price index
CHQCSHNG	=	cheques cashed (value) in clearing centres
EMPLINDX	=	employment index - industrial composite
UNEMPRT	=	unemployment rate

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(1) See text in main report for a review of the literature on this subject.

(2) See text in main report for a discussion on the results of the initial regressions.

Results of the final stepwise regressions, which include these variables, are presented in Part III of this Appendix.

F. CAUTIONARY NOTES

The regressions for the national and provincial data are encouraging, particularly for the 1968-1979 category of estimations. However, different sets of variables appear in the best fit final results of the stepwise procedure utilized in the various categories presented in Part III. This makes it difficult to rank the indicators in terms of relative importance.

The influence of the different quarterly periods on the performance of the regression equations is significant, particularly the more volatile time of 1980-1982 for which separate regression runs show consistently low coefficients of determination. This suggests that other explanatory variables, equation forms, and/or model structures are needed to more fully explain the patterns of homeownership mortgage approvals.

The results of regressions using local data (Toronto, London, and Vancouver) are less reliable than the results of the national and provincial regressions. The dependent variable in the local data regressions is a derived variable. Total mortgage approvals (i.e., NHA plus conventional) is not available at the local level. Therefore, this variable was estimated using the ratio of local MLS sales to provincial MLS sales. This ratio was multiplied by provincial total mortgage approvals to derive local approvals.(1) While this resulted in approval estimates which appear intuitively correct, there was no readily available empirical way of checking the accuracy of the estimates. This is a serious deficiency which confounds the interpretation of the regression results at the local level.

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(1) The ratio of local NHA approvals to provincial NHA approvals was also used, but this resulted in clearly unrealistic estimates of total local approvals.

II. LIST OF VARIABLES USED IN THE FINAL STEPWISE REGRESSIONS

A. INDEPENDENT VARIABLES

FOR CANADA

CONV5YR	=	conventional 5 year mortgage rate
AVSALEPR	=	average sale price of properties as reported by MLS annual reports
SALTOLIS	=	sale to listing ratios of MLS properties
SAVINGS	=	personal savings
CPSHELTR	=	shelter component of consumer price index
CHQCSHNG	=	cheques cashed (value) in clearing centres
EMPLINDX	=	employment index - industrial composite
UNEMPRT	=	unemployment rate

FOR ONTARIO AND BRITISH COLUMBIA

CONV5YR	=	conventional 5 year mortgage rate
AVSALEPR	=	average sale price of properties as reported by MLS annual reports
SALTOLIS	=	sale to listing ratios of MLS properties
CHQCSHNG	=	cheques cashed (value) in clearing centres
EMPLINDX	=	employment index - industrial composite
UNEMPRT	=	unemployment rate

FOR TORONTO, LONDON AND VANCOUVER

CONV5YR	=	conventional 5 year mortgage rate
AVSALEPR	=	average sale price of properties as reported by MLS annual reports
SALTOLIS	=	sale to listing ratios of MLS properties
EMPLINDX	=	employment index - industrial composite

B. DEPENDENT VARIABLE

APPROVLS	=	mortgage approvals (NHA plus conventional)

III. STEPWISE REGRESSION RESULTS

A. CANADA

Independent variables included in stepwise regressions:

AVSALEPR	CHQCSHNG
SALTOLIS	CONV5YR
$SAVINGS_{-1}$	EMPLINDX
CPSHELTR	UNEMPRT

1. CANADA: 1968 quarter 2 to 1982 quarter 4

a. Best fit linear model:

$$APPROVLS = -107836 + 476.2088\ SALTOLIS + .8337705\ SAVINGS_{-1} - 7221.981\ CONV5YR + 1269.355\ EMPLINDX + 4210.812\ UNEMPRT$$

$R\text{-}SQ = .88 \qquad \bar{R}\text{-}SQ = .87 \qquad DW = 1.60$

b. Best fit semi-logarithmic model:

$$APPROVLS = -60090.4 + 15066.05\ SAVINGS_{-1} + 18221.92\ CHQCSHNG - 112469.7\ CONV5YR$$

$R\text{-}SQ = .87 \qquad \bar{R}\text{-}SQ = .86 \qquad DW = 1.66$

c. Best fit double-logarithmic model:

$$APPROVLS = 2.732062 + .7553913\ AVSALEPR + .5315879\ SALTOLIS + .2850203\ SAVINGS_{-1} - 2.200121\ CONV5YR + .3445498\ UNEMPRT$$

$R\text{-}SQ = .87 \qquad \bar{R}\text{-}SQ = .86 \qquad DW = 1.78$

d. Best fit inverse semi-logarithmic model:

$$APPROVLS = 5.102762 + 1.838604E\text{-}02\ SALTOLIS - .13371\ CONV5YR + 3.755845E\text{-}02\ EMPLINDX + .1594749\ UNEMPRT$$

$R\text{-}SQ = .87 \qquad \bar{R}\text{-}SQ = .86 \qquad DW = 1.79$

2. CANADA: 1968 quarter 2 to 1975 quarter 1

a. Best fit linear model:

APPROVLS = -87962.51 +979.3124 CPSHELTR +1036.702 EMPLINDX
+ 436.6687 SALTOLIS - 8023.925 CONV5YR

R-SQ = .93 $\bar{R}$-SQ = .92 DW = 2.04

b. Best fit semi-logarithmic model:

APPROVLS = -728620.2 +43642.78 CPSHELTR + 140085.5 EMPLINDX
+ 21040.41 SALTOLIS - 73107.41 CONV5YR

R-SQ = .93 $\bar{R}$-SQ = .92 DW = 2.01

c. Best fit double-logarithmic model:

APPROVLS = .3354386 + 2.51484 CPSHELTR + .8423318 SALTOLIS
- 1.236373 CONV5YR

R-SQ = .89 $\bar{R}$-SQ = .88 DW = 2.13

d. Best fit inverse semi-logarithmic model:

APPROVLS = 8.608338 + 5.509306E-02 CPSHELTR
+ 1.669696E-02 SALTOLIS - .1611812 CONV5YR

R-SQ = .89 $\bar{R}$-SQ = .87 DW = 2.14

3. CANADA: 1975 quarter 2 to 1979 quarter 3

a. Best fit linear model:

APPROVLS = 107332.7 +2.919324E-02 CHQCSHNG - 6214.278 CONV5YR

R-SQ = .80 $\bar{R}$-SQ = .77 DW = 1.91

b. Best fit semi-logarithmic model:

APPROVLS = -79219.53 + 21705.28 CHQCSHNG - 63908.31 CONV5YR

R-SQ = .78 $\bar{R}$-SQ = .75 DW = 1.79

c. Best fit double-logarithmic model:

APPROVLS = 8.820151 + .3695302 CHQCSHNG - 1.169192 CONV5YR

R-SQ = .78 $\bar{R}$-SQ = .75 DW = 1.74

d. Best fit inverse semi-logarithmic model:

APPROVLS = 11.88235 + 4.979731E-07 CHQCSHNG - .1131909 CONV5YR

R-SQ = .80 $\bar{R}$-SQ = .78 DW = 1.86

4. CANADA: 1979 quarter 4 to 1982 quarter 4

a. Best fit linear model:

APPROVLS = 100806.6 + 4.194939E-02 CHQCSHNG - 7744.395 CONV5YR

R-SQ = .75 $\bar{R}$-SQ = .71 DW = 2.40

b. Best fit semi-logarithmic model:

APPROVLS = -554080.5 + 68047.28 CHQCSHNG - 134923 CONV5YR

R-SQ = .76 $\bar{R}$-SQ = .72 DW = 2.38

c. Best fit double-logarithmic model:

APPROVLS = -.8565101 + 1.446759 - 3.317701 CONV5YR

R-SQ = .77 $\bar{R}$-SQ = .72 DW = 2.47

d. Best fit inverse semi-logarithmic model:

APPROVLS = 12.2685 + 8.836222E-07 CHQCSHNG - .1914976 CONV5YR

R-SQ = .76 $\bar{R}$-SQ = .72 DW = 2.48

5. CANADA: 1968 quarter 2 to 1979 quarter 3

a. Best fit linear model:

APPROVLS = -86020.28 + 1978.359 CPSHELTR -4.667221E-02 CHQCSHNG
+ 890.0288 SALTOLIS

R-SQ = .93 $\bar{R}$-SQ = .92 DW = 1.81

b. Best fit semi-logarithmic model:

APPROVLS = -375568.8 +17134.52 CHQCSHNG + 28155.58 AVSALEPR
+ 20506.67 SALTOLIS - 73236.28 CONV5YR

R-SQ = .95 $\bar{R}$-SQ = .94 DW = 1.66

c. Best fit double-logarithmic model:

APPROVLS = -20.93198 + 6.416321 EMPLINDX + .657263 UNEMPRT
+ .6908775 SALTOLIS - 1.604602 CONV5YR

R-SQ = .93 $\bar{R}$-SQ = .92 DW = 1.79

d. Best fit inverse semi-logarithmic model:

APPROVLS = 4.491533 + 4.395143E-02 EMPLINDX + .1158674 UNEMPRT
+ 1.794885E-02 SALTOLIS - .1304777 CONV5YR

R-SQ = .92 $\bar{R}$-SQ = .91 DW = 1.71

B. ONTARIO

Independent variables included in the stepwise regressions:

AVSALEPR	CONV5YR
SALTOLIS	EMPLINDX
CHQCSHNG	UNEMPRT

1. ONTARIO: 1968 quarter 1 to 1982 quarter 4

a. Best fit linear model:

APPROVLS = -764.9324 - 2269.866 CONV5YR + 2618.744 UNEMPRT
+ .6109674 AVSALEPR + 282.2294 SALTOLIS
- 1.576967E-02 CHQCSHNG

R-SQ = .88 $\bar{R}$-SQ = .86 DW = 1.51

b. Best fit semi-logarithmic model:

APPROVLS = -188660.2 - 36683.66 CONV5YR + 13301.37 UNEMPRT
+ 28882.38 AVSALPR + 8444.335 SALTOLIS
- 5030.819 CHQCSHNG

R-SQ = .88 $\bar{R}$-SQ = .87 DW = 1.34

c. Best fit double-logarithmic model:

APPROVLS = -1.11299 - 1.859121 CONV5YR + .7035258 UNEMPRT
+ 1.42034 AVSALEPR + .54858 SALTOLIS
- .2277305 CHQCSHNG

R-SQ = .89 $\bar{R}$-SQ = .87 DW = 1.55

d. Best fit inverse semi-logarithmic model:

APPROVLS = 8.591893 - .1107673 CONV5YR + .1363232 UNEMPRT
+ 3.153866E-05 AVSALEPR + 1.701752E-02 SALTOLIS
- 8.48223E-07 CHQCSHNG

R-SQ = .87 $\bar{R}$-SQ = .86 DW = 1.66

2. ONTARIO: 1968 quarter 1 to 1975 quarter 1

a. Best fit linear model:

APPROVLS = - 64507.43 - 4308.925 CONV5YR + 1744.29 UNEMPRT
+ 815.8916 EMPLINDX + 145.845 SALTOLIS

R-SQ = .94 $\bar{R}$-SQ = .93 DW = 1.72

b. Best fit semi-logarithmic model:

APPROVLS = - 356749.8 - 57250.58 CONV5YR + 83867.97 EMPLINDX
+ 7442.931 CHQCSHNG

R-SQ = .91 $\bar{R}$-SQ = .90 DW = 1.65

c. Best fit double-logarithmic model:

APPROVLS = - 19.66352 - 3.338795 CONV5YR + .5012216 UNEMPRT
+ 7.391169 EMPLINDX

R-SQ = .93 $\bar{R}$-SQ = .92 DW = 2.02

d. Best fit inverse semi-logarithmic model:

APPROVLS = 5.064504 - .336447 CONV5YR + .1181159 UNEMPRT
+ 5.496291E-02 EMPLINDX

R-SQ = .93 $\bar{R}$-SQ = .92 DW = 1.99

3. ONTARIO: 1975 quarter 2 to 1979 quarter 3

a. Best fit linear model:

APPROVLS = 72841.2 - 3902.714 CONV5YR

R-SQ = .57 $\bar{R}$-SQ = .54 DW = 1.42

b. Best fit semi-logarithmic model:

APPROVLS = 133294.3 - 43143.54 CONV5YR

R-SQ = .57 $\bar{R}$-SQ = .54 DW = 1.42

c. Best fit double-logarithmic model:

APPROVLS = 13.87319 - 1.491189 CONV5YR

R-SQ = .56 $\bar{R}$-SQ = .53 DW = 1.46

d. Best fit inverse semi-logarithmic model:

APPROVLS = 11.78496 - .1350027 CONV5YR

R-SQ = .57 $\bar{R}$-SQ = .54 DW = 1.46

4. ONTARIO: 1979 quarter 4 to 1982 quarter 4

a. Best fit linear model:

APPROVLS = 35092.04 - 2753.064 CONV5YR + 2.659193E-02 CHQCSHNG

R-SQ = .72 $\bar{R}$-SQ = .66 DW = 2.51

b. Best fit semi-logarithmic model:

APPROVLS = - 222860.7 - 48113.28 CONV5YR +27070.37 CHQCSHNG

R-SQ = .70 $\bar{R}$-SQ = .64 DW = 2.42

c. Best fit double-logarithmic model:

APPROVLS = - .2870068 - 2.593662 CONV5YR + 1.244704 CHQCSHNG

R-SQ = .67 $\bar{R}$-SQ = .60 DW = 2.53

d. Best fit inverse semi-logarithmic model:

APPROVLS = 10.89575 - .1492629 CONV5YR + 1.209496E-06 CHQCSHNG

R-SQ = .68 $\bar{R}$-SQ = .61 DW = 2.58

5. ONTARIO: 1968 quarter 1 to 1979 quarter 3

a. Best fit linear model:

APPROVLS = 3295.464 - 2667.101 CONV5YR + 2493.766 UNEMPRT
+ .6253231 AVSALEPR + 270.949 SALTOLIS
- 1.235186E-02 CHQCSHNG

R-SQ = .93 $\bar{R}$-SQ = .92 DW = 1.07

b. Best fit semi-logarithmic model:

APPROVLS = - 179974.2 - 32755.19 CONV5YR + 9873.956 UNEMPRT
+ 21920.11 AVSALEPR + 8485.289 SALTOLIS

R-SQ = .92 $\bar{R}$-SQ = .91 DW = 1.03

c. Best fit double-logarithmic model:

APPROVLS = - .6506206 - 1.409703 CONV5YR + .6072976 UNEMPRT
+ 1.02433 AVSALEPR + .5653813 SALTOLIS

R-SQ = .92 $\bar{R}$-SQ = .91 DW = 1.23

d. Best fit inverse semi-logarithmic model:

APPROVLS = 3.851114 - .102735 CONV5YR + .1965006 UNEMPRT
+ .0408448 EMPLINDX + 1.421866E-02 SALTOLIS
- 9.047411E-07 CHQCSHNG

R-SQ = .93 $\bar{R}$-SQ = .92 DW = 1.38

C. BRITISH COLUMBIA

Independent variables included in the stepwise regressions:

AVSALEPR	CONV5YR
SALTOLIS	EMPLINDX
CHQCSHNG	UNEMPRT

1. B.C.: 1968 quarter 1 to 1982 quarter 4

a. Best fit linear model:

APPROVLS = -10502.44 - 920.5171 CONV5YR + 810.1124 UNEMPRT
+ 80.80325 EMPLINDX + .1512723 AVSALEPR
+ 128.8429 SALTOLIS - 5.504224E-02 CHQCSHNG

R-SQ = .86 $\bar{R}$-SQ = .85 DW = 1.66

b. Best fit semi-logarithmic model:

APPROVLS = - 63485.64 - 11044.01 CONV5YR + 3803.712 UNEMPRT
+ 6718.262 AVSALEPR + 5231.321 SALTOLIS

R-SQ = .82 $\bar{R}$-SQ = .81 DW = 1.65

c. Best fit double-logarithmic model:

APPROVLS = - 6.977854 - 1.662066 CONV5YR + .7646068 UNEMPRT
+ 1.924364 EMPLINDX + .579176 AVSALEPR
+ .6636848 SALTOLIS

R-SQ = .85 $\bar{R}$-SQ = .84 DW = 1.78

d. Best fit inverse semi-logarithmic model:

APPROVLS = 5.217436 - .1168721 CONV5YR + .1326958 UNEMPRT
+ 1.756139E-02 EMPLINDX + 2.180756E-05 AVSALEPR
+ 1.738625E-02 SALTOLIS - 1.214943E-05 CHQCSHNG

R-SQ = .88 $\bar{R}$-SQ = .86 DW = 1.93

2. B.C.: 1968 quarter 1 to 1975 quarter 1

a. Best fit linear model:

APPROVLS = 8287.865 - 1114.856 CONV5YR + 371.4768 UNEMPRT
+ 113.2192 EMPLINDX + 84.57079 SALTOLIS
+ .1409909 CHQCHSNG

R-SQ = .94 $\bar{R}$-SQ = .92 DW = 1.99

b. Best fit semi-logarithmic model:

APPROVLS = - 90483.48 - 9617.464 CONV5YR + 2047.441 UNEMPRT
+ 13009.3 EMPLINDX + 3619.17 SALTOLIS
+ 3712.968 CHQCSHNG

R-SQ = .93 $\bar{R}$-SQ = .91 DW = 1.80

c. Best fit double-logarithmic model:

APPROVLS = - 7.954118 - 3.041783 CONV5YR + .3831048 UNEMPRT
+ 3.215461 EMPLINDX + .6903426 CHQCSHNG

R-SQ = .92 $\bar{R}$-SQ = .90 DW = 2.00

d. Best fit inverse semi-logarithmic model:

APPROVLS = 6.464073 - .3172575 CONV5YR + 7.338523E-02 UNEMPRT
+ 2.994093E-02 EMPLINDX + 2.05482E-05 CHQCSHNG

R-SQ = .92 $\bar{R}$-SQ = .90 DW = 2.17

3. B.C.: 1979 quarter 4 to 1982 quarter 4

a. Best fit linear model:

APPROVLS = 30793.13 - 2052.708 CONV5YR + .1027277 CHQCSHNG

R-SQ = .75 $\bar{R}$-SQ = .70 DW = 1.72

b. Best fit semi-logarithmic model:

APPROVLS = - 38924.27 - 36216.26 CONV5YR + 12795.01 CHQCSHNG

R-SQ = .77 $\bar{R}$-SQ = .73 DW = 1.70

c. Best fit double-logarithmic model:

APPROVLS = - .8512677 - 5.384578 CONV5YR + .5494155 UNEMPRT
+ 2.076077 AVSALEPR

R-SQ = .88 $\bar{R}$-SQ = .83 DW = 2.35

d. Best fit inverse semi-logarithmic model:

APPROVLS = 15.20638 - .2942512 CONV5YR - 1.840047E-02 EMPLINDX
+ 2.155653E-05 AVSALEPR

R-SQ = .87 $\bar{R}$-SQ = .83 DW = 2.29

4. B.C.: 1968 quarter 1 to 1979 quarter 3

a. Best fit linear model:

APPROVLS = - 24287.12 + 569.5056 UNEMPRT + 146.9686 EMPLINDX
+ 121.8644 SALTOLIS

R-SQ = .88 $\bar{R}$-SQ = .87 DW = 1.64

b. Best fit semi-logarithmic model:

APPROVLS = - 134301.8 + 3562.206 UNEMPRT + 23256.93 EMPLINDX
+ 4811.968 SALTOLIS

R-SQ = .88 $\bar{R}$-SQ = .87 DW = 1.57

c. Best fit double-logarithmic model:

APPROVLS = - 13.204 - . 6799531 CONV5YR + .744781 UNEMPRT
+ 3.900858 EMPLINDX + .680737 SALTOLIS

R-SQ = .90 $\bar{R}$-SQ = .89 DW = 1.74

d. Best fit inverse semi-logarithmic model:

APPROVLS = 3.77952 + .1165474 UNEMPRT + 2.213168E-02 EMPLINDX
+ 1.924453E-02 SALTOLIS

R-SQ = .89 $\bar{R}$-SQ = .88 DW = 1.68

D. TORONTO

Independent variables included in stepwise regressions:

AVSALEPR
SALTOLIS
EMPLINDX
CONV5YR

1. TORONTO: 1968 quarter 1 to 1979 quarter 3

a. Best fit linear model:

APPROVLS = 17117.34 - 1783.384 CONV5YR + .2310375 AVSALEPR

R-SQ = .75 $\bar{R}$-SQ = .74 DW = .65

b. Best fit semi-logarithmic model:

APPROVLS = - 63156.48 - 19743.36 CONV5YR + 11098.72 AVSALEPR

R-SQ = .81 $\bar{R}$-SQ = .80 DW = .87

c. Best fit double-logarithmic model:

APPROVLS = - 4.181641 - 2.063166 CONV5YR + 1.558482 AVSALEPR
+ .3695285 SALTOLIS

R-SQ = .82 $\bar{R}$-SQ = .80 DW = .91

d. Best fit inverse semi-logarithmic model:

APPROVLS = 9.899686 - .1961161 CONV5YR + 2.610834E-05 AVSALEPR

R-SQ = .73 $\bar{R}$-SQ = .72 DW = .60

2. TORONTO: 1968 quarter 1 to 1982 quarter 4

a. Best fit linear model:

APPROVLS = - 3812.822 - 1445.106 CONV5YR + 8.264503E-02 AVSALEPR
+ 166.0852 EMPLINDX

R-SQ = .68 $\bar{R}$-SQ = .67 DW = .73

b. Best fit semi-logarithmic model:

APPROVLS = - 95891.99 - 18842.43 CONV5YR + 7257.16 AVSALEPR
+ 14382.55 EMPLINDX

R-SQ = .75 $\bar{R}$-SQ = .74 DW = .89

c. Best fit double-logarithmic model:

APPROVLS = - 4.109993 - 2.226866 CONV5YR + .7739391 AVSALEPR
+ 2.029995 EMPLINDX

R-SQ = .75 $\bar{R}$-SQ = .74 DW = .95

d. Best fit inverse semi-logarithmic model:

APPROVLS = 7.385266 - .1699499 CONV5YR + 8.783693E-06 AVSALEPR
+ 2.082308E-02 EMPLINDX

R-SQ = .70 $\bar{R}$-SQ = .68 DW = .76

E. LONDON

Independent variables included in stepwise regressions:

AVSALEPR
SALTOLIS
EMPLINDX
CONV5YR

1. LONDON: 1968 quarter 1 to 1979 quarter 3

a. Best fit linear model:

APPROVLS = 2192.583 - 208.3934 CONV5YR + 3.429541E-02 AVSALEPR

R-SQ = .76 $\bar{R}$-SQ = .75 DW = .68

b. Best fit semi-logarithmic model:

APPROVLS = - 2021.388 - 2399.049 CONV5YR + 1004.478 AVSALEPR
- 401.529 SALTOLIS

R-SQ = .79 $\bar{R}$-SQ = .78 DW = .84

c. Best fit double-logarithmic model:

APPROVLS = 1.31142 - 2.029517 CONV5YR + 1.010033 AVSALEPR

R-SQ = .73 $\bar{R}$-SQ = .72 DW = .74

d. Best fit inverse semi-logarithmic model:

APPROVLS = 7.846865 - .1804222 CONV5YR + 3.104862E-05 AVSALEPR

R-SQ = .69 $\bar{R}$-SQ = .68 DW = .60

2. LONDON: 1968 quarter 1 to 1982 quarter 4

a. Best fit linear model:

APPROVLS = 3285.589 - 150.3595 CONV5YR + 3.636441E-02 AVSALEPR
- 13.42054 EMPLINDX

R-SQ = .71 $\bar{R}$-SQ = .69 DW = .80

b. Best fit semi-logarithmic model:

APPROVLS = 2251.775 - 1977.879 CONV5YR + 1276.009 AVSALEPR
- 1975.673 EMPLINDX

R-SQ = .77 $\bar{R}$-SQ = .75 DW = 1.01

c. Best fit double-logarithmic model:

APPROVLS = 7.278786 - 2.041471 CONV5YR + 1.197799 AVSALEPR
- 1.613651 EMPLINDX

R-SQ = .74 $\bar{R}$-SQ = .73 DW = 1.10

d. Best fit inverse semi-logarithmic model:

APPROVLS = 7.701217 - .1574652 CONV5YR + 2.787539E-05 AVSALEPR

R-SQ = .68 $\bar{R}$-SQ = .66 DW = .79

F. VANCOUVER

Independent variables included in stepwise regressions:

AVSALEPR
SALTOLIS
EMPLINDX
CONV5YR

1. VANCOUVER: 1968 quarter 1 to 1979 quarter 3

a. Best fit linear model:

APPROVLS = - 2444.53 - 350.0261 CONV5YR + 31.80608 SALTOLIS
+ 48.46789 EMPLINDX

R-SQ = .60 $\bar{R}$-SQ = .57 DW = 1.15

b. Best fit semi-logarithmic model:

APPROVLS = - 31350.82 - 3889.392 CONV5YR + 1204.127 SALTOLIS
+ 7683.422 EMPLINDX

R-SQ = .61 $\bar{R}$-SQ = .58 DW = 1.18

c. Best fit double-logarithmic model:

APPROVLS = - 5.830422 - 1.522668 CONV5YR + .4053157 SALTOLIS
+ 3.126677 EMPLINDX

R-SQ = .60 $\bar{R}$-SQ = .58 DW = 1.17

d. Best fit inverse semi-logarithmic model:

APPROVLS = 5.781579 - .1362238 CONV5YR + 1.088476E-02 SALTOLIS
+ 1.971073E-02 EMPLINDX

R-SQ = .59 $\bar{R}$-SQ = .56 DW = 1.12

2. VANCOUVER: 1968 quarter 1 to 1982 quarter 4

a. Best fit linear model:

APPROVLS = 1587.367 + 29.29187 SALTOLIS

R-SQ = .11 $\bar{R}$-SQ = .09 DW = .92

b. Best fit semi-logarithmic model:

APPROVLS = - 8152.281 - 3317.972 CONV5YR + 1345.904 AVSALEPR
+ 1185.794 SALTOLIS

R-SQ = .38 $\bar{R}$-SQ = .34 DW = 1.08

c. Best fit double-logarithmic model:

APPROVLS = 6.353479 - .1031079 CONV5YR + 8.314293E-03 SALTOLIS
+ 1.458354E-02 EMPLINDX

R-SQ = .39 $\bar{R}$-SQ = .36 DW = .99

d. Best fit inverse semi-logarithmic model:

APPROVLS = 6.353479 - .1031079 CONV5YR + 8.314293E-03 SALTOLIS
+ 1.458354E-02 EMPLINDX

R-SQ = .39 $\bar{R}$-SQ = .36 DW = .99

APPENDIX C

Predictive Results of Selected Relationships Between Mortgage Approvals and Possible Indicators

CANADA: 1968 Quarter 2 to 1982 Quarter 4

FINAL SOLUTION

REGRESSION NUMBER 6

APPROVLS = -107836
+ 476.2088 SALTOLIS
+ .8337705 SAVINGS
+ -7221.981 CONV5YR
+ 1269.355 EMPLINDX
+ 4210.812 UNEMPRT

COEFFICIENT OF DETERMINATION = .8821354

STD DEVIATION OF ESTIMATE = 5856.993

ACTUAL	PREDICTED	DIFFERENCE	%DIFFERENCE
18810	21134.59	-2324.588	-12.35826
19080	25522.41	-6442.41	-33.76525
33500	29873.19	3626.809	10.82629
22980	23433.68	-453.6836	-1.974254
25640	26014.36	-374.3594	-1.46006
21010	20600.31	409.6934	1.949992
21870	21098.71	771.293	3.526717
18010	14889.13	3120.873	17.32856
18130	18572.9	-442.9004	-2.442915
23370	23146.12	223.8848	.9580008
25210	26043.87	-833.8691	-3.307692
16480	28222.57	-11742.57	-71.25345
34750	37135.8	-2385.797	-6.865603
36190	35917.89	272.1094	.7518911
39690	37962.33	1727.676	4.352925
42260	39051.96	3208.039	7.591195
40320	41966.85	-1646.844	-4.084434
40940	44865.3	-3925.301	-9.587936
46900	48949.84	-2049.836	-4.370652
51650	50403.9	1246.106	2.412595
52930	51736.81	1193.191	2.254282
50850	48714.02	2135.985	4.200559
51800	55181.64	-3381.641	-6.528264
62450	53860.24	8589.762	13.75462
47560	39818.79	7741.211	16.27673
33930	32528.73	1401.272	4.12989
31210	37545	-6335	-20.29798
44930	45935.51	-1005.504	-2.237934
56680	52230.1	4449.906	7.850928
54990	49425.69	5564.309	10.11877
48090	47987.76	102.2383	.2125978
51560	44808.46	6751.539	13.09453
45680	44630.94	1049.059	2.296538
49230	45418.49	3811.512	7.742254
56450	48632.76	7817.242	13.84808
64690	57200.06	7489.946	11.57421
63030	58836.04	4193.965	6.653919
63400	63234.37	165.6328	.2612506
65720	63226.97	2493.031	3.793414
61710	63254.93	-1544.926	-2.503526
59200	68769.08	-9569.078	-16.16398
64700	69569.65	-4869.649	-7.526505
69330	65336.39	3993.613	5.760296
60540	63322.65	-2782.652	-4.596387
65020	66654.82	-1634.82	-2.514335
67490	65954.85	1535.149	2.274631
44570	50146.12	-5576.117	-12.51092
43410	52364.87	-8954.868	-20.62858
27260	45231.51	-17971.5	-65.92628
60290	59820.57	469.4336	.778626
53750	51422.77	2327.231	4.329731
38100	47347.31	-9247.309	-24.27115
33600	31706.16	1893.838	5.636422
20370	11447.5	8922.501	43.80217
23950	26782.2	-2832.197	-11.82546
35460	25869.14	9590.865	27.047
21830	27688.27	-5858.266	-26.83585
27750	35085.21	-7335.207	-26.43318
71090	57857.99	13232.01	18.61304

DURBIN-WATSON = 1.597008

R-SQ UNADJUSTED = .882135570049285 9

R-SQ ADJUSTED = .871016263961792

CANADA: 1968 Quarter 2 to 1975 Quarter 1

FINAL SOLUTION

REGRESSION NUMBER 5
APPROVLS = -87962.51
+ 979.3124 CPSHELTR
+ 1036.702 EMPLINDX
+ 436.6687 SALTOLIS
+ -8023.925 CONVSYR
COEFFICIENT OF DETERMINATION = .9333341
STD DEVIATION OF ESTINATE = 3691.815

ACTUAL	PREDICTED	DIFFERENCE	%DIFFERENCE
18810	20983.41	-2173.408	-11.55454
19080	24521.47	-5441.473	-28.51925
33500	29474.59	4025.412	12.01616
22980	24120.81	-1140.813	-4.964371
25640	27035.8	-1395.795	-5.443818
21010	21827.92	-817.916	-3.892985
21870	20974.68	895.3203	4.093829
18010	15254.87	2755.127	15.29776
18130	15310.13	2819.869	15.55361
23370	19736.61	3633.395	15.54726
25210	22985.68	2224.32	8.823167
16480	25996.74	-9516.734	-57.74718
34750	34025.47	724.5351	2.084993
36190	34173.82	2016.18	5.571096
39690	37168.66	2521.344	6.352592
42260	39355.22	2904.781	6.873595
40320	40872.45	-552.4531	-1.370171
40940	42284.23	-1344.231	-3.283416
46900	47358.44	-458.4336	-.9774703
51650	51173.62	476.3828	.9223288
52930	54429.97	-1499.965	-2.833865
50850	49598.55	1251.453	2.461068
51800	55279.25	-3479.246	-6.716692
62450	59820.59	2629.414	4.210431
47560	41773.01	5786.992	12.16777
33930	35685.59	-1755.586	-5.174141
31210	38208.15	-6998.145	-22.42277
44930	43020.42	1909.586	4.250136

DURBIN-WATSON = 2.04271

R-SQ UNADJUSTED = .9333341271309672

R-SQ ADJUSTED = .9217404127130972

CANADA: 1975 Quarter 2 to 1979 Quarter 3

FINAL SOLUTION

REGRESSION NUMBER 5

```
     APPROVLS = -87962.51
  +   979.3124 CPSHELTR
  +   1036.702 EMPLINDX
  +   436.6687 SALTOLIS
  + -8023.925 CONVSYR
```

COEFFICIENT OF DETERMINATION = .9333341

STD DEVIATION OF ESTIMATE = 3691.815

ACTUAL	PREDICTED	DIFFERENCE	%DIFFERENCE
18810	20983.41	-2173.408	-11.55454
19080	24521.47	-5441.473	-28.51925
33500	29474.59	4025.412	12.01616
22980	24120.81	-1140.813	-4.964371
25640	27035.8	-1395.795	-5.443818
21010	21827.92	-817.916	-3.892985
21870	20974.68	895.3203	4.093829
18010	15254.87	2755.127	15.29776
18130	15310.13	2819.869	15.55361
23370	19736.61	3633.395	15.54726
25210	22985.68	2224.32	8.823167
16480	25996.74	-9516.734	-57.74718
34750	34025.47	724.5351	2.084993
36190	34173.82	2016.18	5.571096
39690	37168.66	2521.344	6.352592
42260	39355.22	2904.781	6.873575
40320	40872.45	-552.4531	-1.370171
40940	42284.23	-1344.231	-3.283416
46900	47358.44	-458.4336	-.9774703
51650	51173.62	476.3828	.9223288
52930	54429.97	-1499.965	-2.833865
50850	49598.55	1251.453	2.461068
51800	55279.25	-3479.246	-6.716692
62450	59820.59	2629.414	4.210431
47560	41773.01	5786.992	12.16777
33930	35685.59	-1755.586	-5.174141
31210	38208.15	-6998.145	-22.42277
44930	43020.42	1909.586	4.250136

DURBIN-WATSON = 2.04271

R-SQ UNADJUSTED = .9333344+019+5823

R-SQ ADJUSTED = .9217404+27120972

CANADA: 1979 Quarter 4 to 1982 Quarter 4

FINAL SOLUTION

REGRESSION NUMBER 3
APPROVLS = 100806.6
+ 4.194939E-02 CHQCSHNG
+ -7744.395 CONV5YR
COEFFICIENT OF DETERMINATION = .7540349
STD DEVIATION OF ESTIMATE = 8480.514

ACTUAL	PREDICTED	DIFFERENCE	%DIFFERENCE
44570	40476.27	4093.731	9.184946
43410	45056.32	-1646.32	-3.792491
27260	42643.34	-15383.34	-56.4319
60290	50549.66	9740.34	16.15581
53750	45971.82	7778.184	14.47104
38100	49397.15	-11297.15	-29.6513
33600	32709.53	890.4688	2.650205
20370	18209.28	2160.725	10.60739
23950	21326.1	2623.906	10.95577
35460	27430.87	8029.135	22.64279
21830	25221.58	-3391.578	-15.53632
27750	36079.24	-8329.235	-30.01526
71090	66358.93	4731.071	6.655043

DURBIN-WATSON = 2.399275

R-SQ UNADJUSTED = .7540352344512 94

R-SQ ADJUSTED = .7048422694206232

FINAL SOLUTION

CANADA: 1968 Quarter 2 to 1979 Quarter 3

REGRESSION NUMBER 4

APPROVLS = -86020.28
+ 1978.359 CPSHELTR
+ -4.667221E-02 CHQCSHNQ
+ 890.0288 SALTOLIS

COEFFICIENT OF DETERMINATION = .9244448

STD DEVIATION OF ESTIMATE = 4677.759

ACTUAL	PREDICTED	DIFFERENCE	%DIFFERENCE
18810	21374.17	-2564.172	-13.63196
19080	22641.9	-3561.899	-18.66823
33500	29764.59	3735.416	11.1505
22980	21128.7	1851.305	8.056156
25640	26869.37	-1229.369	-4.794732
21010	23084.55	-2074.549	-9.874101
21870	23796.39	-1926.393	-8.808379
18010	17477.11	532.8868	2.956838
18130	19954.25	-1824.254	-10.06207
23370	25335.18	-1965.18	-8.408984
25210	27656.61	-2446.613	-9.704931
16480	24908.12	-8428.118	-51.14149
34750	31451.6	3298.402	9.491805
36190	34834.33	1355.672	3.745985
39690	37871.47	1818.535	4.581847
42260	34545.49	7714.516	18.25489
40320	41313.22	-993.2149	-2.463331
40940	43364.97	-2424.973	-5.923236
46900	49686.61	-2786.606	-5.94159
51650	47166.85	4483.156	8.679876
52930	53156.1	-226.1016	-.4271709
50850	49070.44	1779.559	3.499624
51800	56456.67	-4656.672	-8.989714
62450	60588.03	1861.973	2.981542
47500	38106.97	9453.031	19.87601
33930	34598.26	-668.2539	-1.969508
31210	41355.6	-10145.6	-32.50754
44930	40693.05	4236.953	9.430121
56680	47104.99	9575.016	16.89311
54990	52421.01	2568.996	4.671752
48090	55792.76	-7702.754	-16.01737
51560	47266.36	4293.641	8.327464
45680	49719.77	-4039.766	-8.84362
49230	50106.92	-876.9141	-1.78126
56450	56129.5	320.5039	.567700
64690	53810.44	10879.57	16.818
63030	57765.41	5264.594	8.352521
63400	60342.9	3057.098	4.821921
65720	66107.54	-387.5391	-.5896821
61710	62835.95	-1125.945	-1.824575
59200	66115.63	-6915.633	-11.68181
64700	66728.06	-2028.063	-3.134564
69330	69805.01	-475.0078	-.6851404
60540	64216.51	-3676.512	-6.072864
65020	69565.04	-4545.039	-6.990217
67490	65875.91	1614.086	2.391593

DURBIN-WATSON = 1.613436

R-SQ UNADJUSTED = .924444913806.41356

R-SQ ADJUSTED = .919048130512237e

ONTARIO: 1968 Quarter 1 to 1982 Quarter 4

FINAL SOLUTION

REGRESSION NUMBER 6

APPROVLS = -764.9324
+ -2269.866 CONVSYR
+ 2618.744 UNEMPRT
+ .6109674 ARESSLPR
+ 282.2294 SALTOLIS
+ -1.576967E-02 CHQCSHNO

COEFFICIENT OF DETERMINATION = .8755395

STD DEVIATION OF ESTIMATE = 2692.797

ACTUAL	PREDICTED	DIFFERENCE	%DIFFERENCE
11494	14193.54	-2699.54	-23.48652
8921	13399.79	-4478.792	-50.20505
10350	13786.92	-3436.919	-33.20695
16699	16196.18	502.8194	3.011075
11710	11916.49	-206.4912	-1.763375
12356	13594.42	-1238.417	-10.0228
10853	9920.75	932.25	8.589791
10564	10009	554.999	5.253683
9991	7463.119	2527.881	25.30158
10313	9095.554	1217.446	11.80497
13691	12153.52	1537.483	11.22988
14893	13602.31	1290.69	8.666424
14670	16125.67	-1255.669	-8.44431
18100	18764.32	-664.3145	-3.670246
18263	17483.65	779.3476	4.267358
18729	19807.13	-1078.125	-5.756448
21815	19027.74	2787.258	12.7768
20288	19631.91	656.0899	3.233861
19899	20417.42	-518.42	-2.605256
22603	23141	-537.9941	-2.380189
24772	21866.03	2905.973	11.73088
26550	22878.88	3671.119	13.82719
24413	22584.52	1828.484	7.489798
26318	26520.36	-202.3613	-.7689085
31157	31050.08	106.918	.3431588
21363	20094.98	1268.022	5.935597
17224	17702.16	-478.1641	-2.77615
14404	19819.27	-5415.27	-37.5956
21727	25338.19	-3611.188	-16.62074
27965	28459.74	-494.7344	-1.76912
28539	28028.07	510.9297	1.790286
28977	28314.48	662.5195	2.286363
25529	24060.8	1468.201	5.751111
22122	24924.42	-2802.422	-12.66803
25200	24046.81	1153.193	4.576164
30358	28111.92	2246.086	7.398603
36211	29930.84	6280.16	17.34324
34021	32070.5	1950.504	5.733235
33298	31055.16	2242.838	6.735654
32077	31900.13	176.8672	.5513832
30821	30651.51	169.4922	.5499244
29450	32750.95	-3300.949	-11.20866
30371	31004.73	-633.7266	-2.086618
31554	30003.27	1550.734	4.914541
27419	28104.05	-685.0508	-2.498453
30593	30057.62	535.3789	1.750005
27811	25301.42	2509.58	9.023696
17940	21678.99	-3738.99	-20.84164
16255	20001.73	-3746.729	-23.0497
11295	19551.99	-8256.986	-73.10302
21792	22726.6	-934.6035	-4.288746
19875	19466.9	408.0957	2.053312
15185	19123.7	-3938.703	-25.93612
16795	16043.58	751.4238	4.474093
9389	1640.15	7748.85	82.53115
10843	13106.69	-2263.693	-20.877
14906	11451.62	3454.379	23.17442
12410	12246.12	163.8828	1.320571
12005	16380.36	-4375.358	-36.44613
32365	27921.24	4443.764	13.73015

DURBIN-WATSON = 1.514254

R-SQ UNADJUSTED = .875539422035217[illegible]

R-SQ ADJUSTED = .86401[illegible]

ONTARIO: 1968 Quarter 1 to 1975 Quarter 1

FINAL SOLUTION

REGRESSION NUMBER 7
APPROVLS = -64507.43
+ -4308.925 CONV5YR
+ 1744.29 UNEMPRT
+ 815.8916 EMPLINDX
+ 145.845 SALTOLIS
COEFFICIENT OF DETERMINATION = .9406621
STD DEVIATION OF ESTIMATE = 1572.047

ACTUAL	PREDICTED	DIFFERENCE	%DIFFERENCE
11494	11883.12	-389.1192	-3.385411
8921	10067.15	-1146.153	-12.84781
10350	13126.23	-2776.231	-26.82348
16699	15251.24	1447.757	8.669721
11710	12827.12	-1117.121	-9.539889
12356	14321.93	-1965.933	-15.91075
10853	9896.747	956.2529	8.810955
10564	10691.71	-127.7119	-1.208935
9991	8433.131	1557.869	15.59273
10313	8926.33	1386.67	13.44585
13691	11087.05	2603.953	19.01945
14893	13265.41	1627.595	10.92859
14870	15465.07	-595.0703	-4.001818
18100	19302.03	-1202.031	-6.641057
18263	18101.96	161.0371	.881767
18729	19064.85	-335.8477	-1.793196
21815	20065.61	1749.393	8.019219
20288	20546.5	-258.4961	-1.274133
19899	20838.03	-939.0332	-4.718997
22603	22962.49	-359.4863	-1.590436
24772	24772.01	-5.859375E-03	-2.365322E-05
26550	25587.66	962.3379	3.624625
24413	24154.88	258.1211	1.05731
26318	26960.2	-642.2031	-2.440167
31157	29169.24	1987.76	6.379818
21363	20171.57	1191.43	5.577071
17224	17639.92	-415.9199	-2.41477
14404	18292.86	-3888.858	-26.99846
21727	21457.9	269.1035	1.238567

DURBIN-WATSON = 1.716849

R-SQ UNADJUSTED = .940662026405334 5

R-SQ ADJUSTED = .930772364137556 9

ONTARIO: 1975 Quarter 2 to 1979 Quarter 3

FINAL SOLUTION

REGRESSION NUMBER 2
APPROVLS = 72841.2
+ -3902.714 CONVSYR
COEFFICIENT OF DETERMINATION = .5705594
STD DEVIATION OF ESTIMATE = 2285.007

ACTUAL	PREDICTED	DIFFERENCE	%DIFFERENCE
27965	30067.46	-2102.457	-7.518173
28539	27569.72	969.2793	3.396332
28977	26008.64	2968.365	10.24387
25529	26594.04	-1065.041	-4.171887
22122	26086.69	-3964.69	-17.92193
25200	26711.12	-1511.123	-5.99652
30358	28038.05	2319.955	7.641989
36211	32174.92	4036.078	11.146
34021	32526.17	1494.834	4.393857
33298	32448.11	849.8887	2.552372
32077	32487.14	-410.1387	-1.278607
30821	32565.19	-1744.193	-5.659107
29450	32292.01	-2842.004	-9.650268
30371	32135.9	-1764.895	-5.811116
31554	28974.7	2579.303	8.17425
27419	29091.78	-1672.779	-6.100804
30593	29560.1	1032.897	3.376251
27811	26984.31	826.6875	2.97232

DURBIN-WATSON = 1.420546

R-SQ UNADJUSTED = .57056097694397

R-SQ ADJUSTED = .54372012615203B6

ONTARIO: 1979 Quarter 4 to 1982 Quarter 4

FINAL SOLUTION

REGRESSION NUMBER 3
APPROVLS = 35092.04
+ -2753.064 CONVSYR
+ 2.659193E-02 CHOCSHNG
COEFFICIENT OF DETERMINATION = .7144738
STD DEVIATION OF ESTIMATE = 3557.581

ACTUAL	PREDICTED	DIFFERENCE	%DIFFERENCE
17940	15112.67	2827.331	15.75993
16255	17237.74	-982.7344	-6.045736
11295	17175.24	-5880.242	-52.06058
21792	19739.51	2052.492	9.416556
19875	18286.49	1588.514	7.992522
15185	19912.36	-4727.363	-31.1318
16795	13966.85	2828.151	16.83924
9389	9864.344	-475.3438	-5.062773
10843	9335.309	1507.691	13.90474
14906	12366.48	2539.521	17.0369
12410	12257.85	152.1484	1.226015
12005	16959.79	-4954.793	-41.27274
32365	28840.35	3524.651	10.89032

DURBIN-WATSON = 2.514252

R-SQ UNADJUSTED = .7144736051559448

R-SQ ADJUSTED = .6573683023452759

FINAL SOLUTION

ONTARIO: 1968 Quarter 1 to 1979 Quarter 3

REGRESSION NUMBER 6
APPROVLS = 3295.464
+ -2667.101 CONVSYR
+ 2493.766 UNEMPRT
+ .62533231 ARESSLPR
+ 270.949 SALTOLIS
+ -1.235186E-02 CHQCSHNG
COEFFICIENT OF DETERMINATION = .9253835
STD DEVIATION OF ESTIMATE = 2274.41

ACTUAL	PREDICTED	DIFFERENCE	%DIFFERENCE
11494	14354.13	-2860.134	-24.88371
8921	13443.04	-4522.037	-50.6898
10350	13905.35	-3555.352	-34.35122
16699	16221.03	477.9697	2.862266
11710	12027.36	-317.3613	-2.710174
12356	13601.67	-1245.67	-10.0815
10853	9854.054	998.9463	9.204333
10564	9794.521	769.4795	7.283979
9991	7244.109	2746.892	27.49366
10313	8790.324	1522.676	14.76463
13691	11827.26	1863.738	13.61287
14893	13295.25	1597.753	10.72621
14870	16067.95	-1197.948	-8.056142
18100	18775.17	-675.1738	-3.730242
18263	17446.15	816.8457	4.472681
18729	19844.18	-1115.184	-5.954315
21815	19303.82	2511.184	11.51127
20288	19779.16	508.836	2.508064
19899	20478.2	-579.2031	-2.910715
22603	23200.37	-597.3731	-2.642893
24772	22266.97	2505.031	10.11235
26550	23217.85	3332.149	12.55047
24413	22836.64	1576.365	6.457073
26318	26606.15	-288.1524	-1.094887
31157	31173.91	-16.90625	-5.426149E-02
21363	20287.61	1075.393	5.033903
17224	17606.27	-382.2695	-2.219401
14404	19568.73	-5164.729	-35.85621
21727	25401.86	-3674.863	-16.91381
27965	28541.38	-576.3809	-2.06108
28539	27827.18	711.8223	2.494209
28977	28002.9	974.0976	3.361624
25529	24103.31	1425.688	5.584581
22122	24890.36	-2768.363	-12.51407
25200	24139.17	1060.836	4.209666
30358	28270.74	2087.264	6.875475
36211	30578.75	5632.254	15.55399
34021	32745.24	1275.764	3.74997
33298	31762.95	1535.047	4.610028
32077	32616.12	-539.1153	-1.680671
30821	31460.27	-639.2735	-2.074149
29450	33631.17	-4181.164	-14.1975
30371	31977.46	-1606.457	-5.289444
31554	30846.37	707.6309	2.242603
27419	29172.96	-1753.959	-6.396875
30593	31273.46	-680.457	-2.224235
27811	26587.25	1223.748	4.400231

DURBIN-WATSON = 1.065675

R-SQ UNADJUSTED = .9253835082054138

FINAL SOLUTION **B.C.: 1968 Quarter 1 to 1982 Quarter 4**

REGRESSION NUMBER 7
APPROVLS = -10502.44
+ -920.5171 CONV5YR
+ 810.1124 UNEMPRT
+ 80.80325 EMPLINDX
+ .1512723 ARESSLPR
+ 128.8429 SALTOLIS
+ -5.504224E-02 CHGCSHNG
COEFFICIENT OF DETERMINATION = .8635963
STD DEVIATION OF ESTIMATE = 1240.166

ACTUAL	PREDICTED	DIFFERENCE	%DIFFERENCE
3717	3135.676	581.3245	15.63961
2318	3559.546	-1241.546	-53.56108
2782	3902.334	-1120.334	-40.27082
4563	4129.182	433.8184	9.507306
3304	3294.867	9.133301	.2764316
3678	3586.715	91.28467	2.481911
3574	2605.864	968.136	27.08831
3093	3154.852	-61.85156	-1.999727
3091	2025.414	1065.587	34.47385
3203	3574.647	-371.647	-11.60309
4143	5041.576	-898.5757	-21.68901
5523	4839.184	683.816	12.38124
4972	4594.824	377.1756	7.585997
5587	6529.746	-942.7461	-16.87392
6694	6434.125	259.8755	3.882215
6414	7048.019	-634.0191	-9.884924
7102	7195.257	-93.25684	-1.313107
6951	7744.663	-793.6631	-11.41797
6975	8853.552	-1878.552	-26.93264
8754	9872.363	-1118.363	-12.77546
10078	9179.506	898.4941	8.915401
9895	10601.4	-706.3965	-7.138924
10393	8852.404	1540.596	14.8234
10759	8364.855	2394.146	22.25249
12037	11181.29	855.7129	7.109021
8293	6773.984	1519.016	18.31685
7075	6492.374	582.626	8.234996
6160	6631.843	-471.8428	-7.659785
9947	9111.575	835.4248	8.398762
11106	9605.364	1500.636	13.51194
8977	9033.948	-56.94727	-.6343655
8858	9937.532	-1079.532	-12.18709
9001	9035.426	-34.42578	-.3824662
9004	9547.632	-543.632	-6.039891
9066	8798.167	267.833	2.954256
10494	9441.597	1052.403	10.02862
12060	10068.79	1991.208	16.51085
9720	10133.73	-413.7305	-4.256487
9796	10329.84	-533.8438	-5.44961
9735	10547.78	-812.7842	-8.349093
8448	9908.655	-1460.655	-17.28995
8783	9959.521	-1176.522	-13.39544
8619	10959.31	-2340.313	-27.15295
9578	10427.34	-849.3359	-8.867571
9601	9708.136	-107.1357	-1.115881
12970	11220.38	1749.617	13.48972
11827	12118.28	-291.2813	-2.46285
8265	9329.686	-1064.686	-12.88186
9864	9564.131	299.8692	3.040036
8694	8804.75	-110.75	-1.273867
14199	13834.38	364.6192	2.567921
13657	13876.93	-219.9258	-1.610352
9112	10381.16	-1269.158	-13.92843
7456	6614.256	841.7441	11.28949
2437	2728.362	-291.3621	-11.95577
4154	5708.709	-1554.709	-37.42679
7038	5143.224	1894.776	26.92209
5311	5774.85	-463.8496	-8.733753
4031	6160.59	-2129.59	-52.83031
15193	11114.69	4078.306	26.84332

DURBIN-WATSON = 1.660809

R-SQ UNADJUSTED = .8635963797569275

R-SQ ADJUSTED = .8481544256210327

B.C.: 1968 Quarter 1 to 1975 Quarter 1

FINAL SOLUTION

REGRESSION NUMBER 6

APPROVLS = -8287.865
+ -1114.856 CONVSYR
+ 371.4768 UNEMPRT
+ 113.2192 EMPLINDX
+ 84.57079 SALTOLIS
+ .1409909 CHGCSHNG

COEFFICIENT OF DETERMINATION = .93793999

STD DEVIATION OF ESTIMATE = 772.5058

ACTUAL	PREDICTED	DIFFERENCE	%DIFFERENCE
3717	3005.257	711.743	19.14832
2318	3152.718	-834.718	-36.01027
2782	3665.88	-883.8796	-31.77137
4563	4017.705	545.2952	11.95037
3304	3540.795	-236.7947	-7.166909
3678	4064.248	-386.2476	-10.50157
3574	3325.034	248.9666	6.966048
3093	3536.348	-443.3479	-14.33391
3091	2509.529	581.4707	18.81173
3203	2959.78	243.2205	7.593521
4143	3999.845	143.1548	3.455341
5523	4132.93	1390.07	25.16876
4972	4512.116	459.8843	9.249483
5587	6314.314	-727.3135	-13.01796
6694	6409.495	284.5049	4.250148
6414	6755.591	-341.5913	-5.325714
7102	7326.443	-224.4424	-3.16027
6951	6959.17	-8.169922	-.1175359
6975	8352.648	-1377.648	-19.75122
8754	9316.339	-562.3389	-6.423794
10078	9158.369	919.6309	9.125132
9895	10551.27	-656.2656	-6.632295
10393	9610.712	782.2881	7.527067
10759	10139.46	619.5391	5.758333
12037	11160.8	876.2041	7.279257
8293	8145.322	147.6782	1.780758
7075	7432.479	-357.479	-5.052707
6160	7570.764	-1410.764	-22.90201
9947	9449.676	497.3242	4.999741

DURBIN-WATSON = 1.992742

R-SQ UNADJUSTED = .937940001487731 9

R-SQ ADJUSTED = .924448728361401 4

B.C.: 1979 Quarter 4 to 1982 Quarter 4

FINAL SOLUTION

REGRESSION NUMBER 3
APPROVLS = 30793.13
+ -2052.708 CONV5YR
+ .1027277 CHQCSHNG
COEFFICIENT OF DETERMINATION = .7519973
STD DEVIATION OF ESTIMATE = 2199.795

ACTUAL	PREDICTED	DIFFERENCE	%DIFFERENCE
8265	10593.26	-2328.258	-28.17009
9864	11043.05	-1179.047	-11.95303
8694	9387.936	-693.9365	-7.981787
14199	11587.55	2611.446	18.39176
13657	12617.15	1039.849	7.614034
9112	11407.87	-2295.873	-25.19615
7456	8813.146	-1357.147	-18.20207
2437	3290.077	-853.0771	-35.00522
4154	4062.473	91.52686	2.203343
7038	4602.797	2435.203	34.60079
5311	3741.26	1569.741	29.5564
4031	6422.944	-2391.944	-59.33872
15193	11841.46	3351.543	22.05979

DURBIN-WATSON = 1.715628

R-SQ UNADJUSTED = .751997590065O024

R-SQ ADJUSTED = .7023971080780029

FINAL SOLUTION

B.C.: 1968 Quarter 1 to 1979 Quarter 3

REGRESSION NUMBER 4

APPROVLS = -24287.12
+ 569.5056 UNEMPRT
+ 146.9686 EMPLINDX
+ 121.8644 SALTOLIS

COEFFICIENT OF DETERMINATION = .8835194

STD DEVIATION OF ESTIMATE = 1036

ACTUAL	PREDICTED	DIFFERENCE	%DIFFERENCE
3717	2234.777	1482.223	39.87686
2318	2857.746	-539.7456	-23.28497
2782	3210.172	-428.1716	-15.39078
4563	3510.359	1052.641	23.06906
3304	3195.22	108.7805	3.292369
3678	3961.492	-283.492	-7.707775
3574	3508.749	65.25073	1.825706
3093	4240.224	-1147.224	-37.09097
3091	3305.909	-214.9085	-6.952716
3203	4071.381	-868.3809	-27.11149
4143	5253.266	-1110.266	-26.7986
5523	5104.823	418.1768	7.571551
4972	4511.981	460.0191	9.252194
5587	6298.165	-711.1651	-12.72893
6694	6650.716	43.28467	.6466189
6414	6768.851	-354.8511	-5.532446
7102	6712.367	389.6328	5.486241
6951	6609.889	341.1109	4.907364
6975	8625.262	-1650.262	-23.65967
8754	9427.664	-673.6641	-7.6955
10078	8584.594	1493.406	14.81848
9895	10642.14	-747.1358	-7.550639
10393	9487.921	905.0791	8.708545
10759	10344.2	414.8018	3.855393
12037	11271.65	765.3526	6.358333
8293	7830.862	462.1377	5.572624
7075	8141.19	-1066.19	-15.06982
6160	8008.855	-1848.855	-30.01387
9947	8757.733	1189.267	11.95603
11106	9560.34	1545.66	13.9172e
8977	8044.96	932.0401	10.38253
8858	10013.48	-1155.481	-13.04449
9001	9063.79	-62.79004	-.6973896
9004	9628.158	-624.1582	-6.93201
9066	9140.331	-74.33106	-.8198581
10494	9365.809	1128.191	10.75082
12060	8994.882	3065.118	25.41557
9720	9259.473	460.5069	4.737725
9796	9669.539	126.4609	1.290945
9735	9212.776	522.2246	5.364403
8448	9057.092	-609.0918	-7.209893
8783	9585.769	-802.7686	-9.140027
8619	10360.3	-1741.303	-20.20307
9578	10430.96	-852.9639	-8.905449
9601	9587.594	13.40625	.1396339
12970	11640.42	1329.582	10.25121
11827	12954.16	-1127.161	-9.530406

DURBIN-WATSON = 1.6395557

R-SQ UNADJUSTED = .883519232273101B

R-SQ ADJUSTED = .875392675399780З

FINAL SOLUTION **TORONTO: 1968 Quarter 1 to 1982 Quarter 4**

REGRESSION NUMBER 6
APPRVLS2 = -3812.822
+ -1445.106 CONV5YR
+ 8.264503E-02 ARRESLPR
+ 166.0852 EMPLINDX
COEFFICIENT OF DETERMINATION = .6820698
STD DEVIATION OF ESTIMATE = 1860.341

ACTUAL	PREDICTED	DIFFERENCE	%DIFFERENCE
5475	6397.943	-922.9429	-16.85741
4249	6533.414	-2284.414	-53.76357
4930	7010.096	-2080.096	-42.19262
7955	6953.799	1001.202	12.58582
5628	6768.77	-1140.77	-20.26954
5938	7487.901	-1549.901	-26.1014
5216	7018.14	-1802.14	-34.55023
5077	6128.2	-1051.2	-20.70514
4455	5564.052	-1109.052	-24.89454
4599	6161.959	-1562.959	-33.98475
6105	6287.053	-182.0527	-2.982027
6641	6211.338	429.6626	6.469848
6634	7022.397	-388.397	-5.854643
8075	8632.326	-557.3262	-6.901872
8148	7889.052	258.9478	3.178053
8356	7810.529	545.4707	6.527893
9809	8522.789	1286.211	13.11256
9122	9348.696	-226.6963	-2.48516
8947	8829.314	117.6856	1.315363
10163	8855.408	1307.593	12.86621
11657	10439.28	1217.717	10.44623
12494	11375.63	1118.372	8.951273
11488	10442.13	1045.869	9.104014
12385	10360.39	2024.61	16.34728
15057	11588.47	3468.527	23.03598
10324	11043.04	-719.0351	-6.964696
8324	9736.822	-1412.822	-16.97288
6961	9138.061	-2177.062	-31.27513
9918	9919.174	-1.173828	-1.183533E-02
12766	10959.89	1806.107	14.14779
13028	9785.899	3242.102	24.88564
13228	9041.771	4186.23	31.64673
11113	9589.038	1523.962	13.71333
9630	10165.16	-535.1641	-5.557259
10970	10197.08	772.9209	7.045769
13215	10522.33	2692.67	20.37586
15037	11721.65	3315.346	22.04792
14128	12864.83	1263.166	8.940469
13827	12703.06	1123.937	8.128564
13320	12418.56	901.4365	6.767056
12606	13093.21	-487.209	-3.864898
12045	13855.69	-1810.693	-15.03274
12422	13781.28	-1359.28	-10.94252
12906	12577.53	328.4717	2.545108
11660	13050.87	-1390.874	-11.92857
13010	14453.32	-1443.317	-11.09391
11827	13366.68	-1539.68	-13.01835
7629	10066.22	-2437.221	-31.94679
7333	10622.05	-3289.052	-44.85275
5095	10130.31	-5035.307	-98.82839
9831	11538.53	-1707.532	-17.36886
8966	9366.558	-400.5576	-4.467518
7236	8285.068	-1049.067	-14.49789
8003	6121.111	1881.89	23.5148
4474	1756.241	2717.759	60.74561
5167	3340.442	1826.558	35.35046
6573	6862.655	-289.6553	-4.406744
5472	6678.252	-1206.252	-22.04407
5293	6797.28	-1504.28	-28.42018
14272	11023.22	3248.779	22.76331

DURBIN-WATSON = .7306185

R-SQ UNADJUSTED = .6820702552795 41

R-SQ ADJUSTED = .6650382876396179

FINAL SOLUTION

TORONTO: 1968 Quarter 1 to 1979 Quarter 3

REGRESSION NUMBER 3

APPRVLS2 = 17117.34

+ -1783.384 CONVSYR

+ .2310375 ARRESLPR

COEFFICIENT OF DETERMINATION = .7519755

STD DEVIATION OF ESTIMATE = 1629.116

ACTUAL	PREDICTED	DIFFERENCE	%DIFFERENCE
5475	7662.149	-2187.149	-39.94793
4249	7091.466	-2842.466	-66.89729
4930	7269.804	-2339.804	-47.46054
7955	7323.306	631.6939	7.94084
5628	7175.345	-1547.345	-27.4937
5938	6997.007	-1059.007	-17.8344
5216	6212.318	-996.3179	-19.10119
5077	5605.967	-528.9673	-10.4189
4455	5244.307	-789.3066	-17.71732
4599	5244.307	-645.3066	-14.03146
6105	5583.15	521.8506	8.547921
6641	5797.156	843.8442	12.70658
6634	7291.646	-657.646	-9.913265
8075	7987.166	87.83399	1.087727
8148	7541.32	606.6802	7.445756
8356	7915.831	440.1695	5.267705
9809	9045.624	763.376	7.782404
9122	8671.113	450.8867	4.942849
8947	8296.603	650.3975	7.269448
10163	8492.776	1670.225	16.43437
11657	11287.26	369.7393	3.171822
12494	10823.58	1670.419	13.36977
11488	9753.551	1734.449	15.09792
12385	9468.209	2916.791	23.551
15057	12255.25	2801.753	18.60764
10324	10311.36	12.6416	.1224487
8324	9027.322	-703.3223	-8.44933
6961	8759.814	-1796.815	-25.84132
9918	10812.35	-894.3476	-9.01742
12766	11133.36	1632.644	12.789
13028	9991.99	3036.01	23.30373
13228	9278.637	3949.363	29.85609
11113	10516.5	596.4981	5.36757
9630	10284.66	-654.6621	-6.796153
10970	10570	399.9971	3.646282
13215	11176.36	2038.645	15.42675
15037	13251.57	1785.429	11.87337
14128	13412.08	715.9236	5.067411
13827	13376.41	450.5918	3.258782
13320	13394.24	-74.24219	-.5573738
12606	14585.1	-1979.098	-15.69965
12045	14460.26	-2415.261	-20.05198
12422	14388.93	-1966.925	-15.8342
12906	12944.38	-38.38379	-.2974104
11660	14060.66	-2400.658	-20.58864
13010	14274.66	-1264.664	-9.720708
11827	13097.63	-1270.631	-10.74348
7629	9352.524	-1723.524	-22.59174

DURBIN-WATSON = .6525571

R-SQ UNADJUSTED = .7519756343696594

R-SQ ADJUSTED = .7409525513648987

FINAL SOLUTION

LONDON: 1968 Quarter 1 to 1982 Quarter 4

REGRESSION NUMBER 4

APPRVLS2 = 3285.589
+ -150.3595 CONVSYR
+ 3.636441E-02 ARRESLFR
+ -13.42054 EMPLINDX

COEFFICIENT OF DETERMINATION = .709368

STD DEVIATION OF ESTIMATE = 218.4476

ACTUAL	PREDICTED	DIFFERENCE	%DIFFERENCE
642	999.2382	-357.2383	-55.64459
498	918.914	-420.914	-84.52088
578	861.479	-283.479	-49.04481
933	902.2251	30.77484	3.298483
610	912.9649	-302.965	-49.66639
644	832.1684	-188.1684	-29.2187
565	748.5635	-183.5635	-32.48912
550	752.4654	-202.4654	-36.81189
649	720.9051	-71.90509	-11.07937
670	648.4342	21.5658	3.218776
890	725.3165	164.6835	18.50376
968	756.78	211.22	21.82025
922	1016.402	-94.40155	-10.23878
1123	942.1786	180.8214	16.10164
1133	873.7212	259.2788	22.88427
1162	954.9529	207.0471	17.81816
1166	1064.09	101.9099	8.740129
1084	990.911	93.08899	8.587546
1064	949.941	114.059	10.71963
1208	1008.084	199.9158	16.54932
1134	1152.87	-18.86963	-1.663989
1216	1082.909	133.0912	10.945
1118	941.6952	176.3048	15.76966
1205	916.2956	288.7044	23.95887
1492	1273.411	218.589	14.65074
1023	1019.602	3.398438	.3322031
825	927.4472	-102.4472	-12.41764
690	996.1529	-306.1529	-44.36999
1057	1337.51	-280.5103	-26.53834
1361	1301.498	59.50159	4.371902
1389	1232.109	156.8908	11.29523
1410	1197.465	212.5355	15.07344
1318	1345.238	-27.23804	-2.066619
1142	1267.983	-125.9832	-11.0318
1301	1285.331	15.66956	1.204424
1567	1406.239	160.7606	10.25713
1938	1666.434	271.5663	14.01271
1821	1586.022	234.9779	12.90378
1782	1587.041	194.9587	10.94045
1717	1583.177	133.8234	7.794013
1563	1666.483	-103.4825	-6.620764
1494	1559.33	-65.32947	-4.372789
1540	1538.553	1.44751	9.399414E-02
1600	1446.287	153.7135	9.607094
1397	1535.61	-138.6101	-9.921984
1559	1501.313	57.68677	3.700242
1417	1387.313	29.68665	2.095035
914	1103.768	-189.7676	-20.76232
777	1228.867	-451.867	-58.15534
540	1069.66	-529.6598	-98.08514
1041	1198.919	-157.9192	-15.16995
950	1017.991	-67.9906	-7.156905
660	1109.905	-449.905	-68.16743
729	699.7713	29.22876	4.009432
408	251.0041	156.9959	38.47939
471	531.729	-60.72894	-12.89362
689	423.0639	265.9361	38.5974
574	372.5881	201.412	35.08919
555	517.7781	37.22186	6.706642
1497	1093.904	403.0963	26.92694

DURBIN-WATSON = .7962528

R-SQ UNADJUSTED = .709367930889296

R-SQ ADJUSTED = .693798303604126

FINAL SOLUTION LONDON: 1969 Quarter 1 to 1979 Quarter 3

REGRESSION NUMBER 3
APPRVLS2 = 2192.583
+ -208.3934 CONV5YR
+ 3.429541E-02 ARRESLPR
COEFFICIENT OF DETERMINATION = .7595029
STD DEVIATION OF ESTIMATE = 187.9558

ACTUAL	PREDICTED	DIFFERENCE	%DIFFERENCE
642	930.9364	-288.9364	-45.00567
498	864.2506	-366.2506	-73.54429
578	885.0899	-307.0899	-53.12974
933	891.3417	41.65833	4.464987
610	874.235	-264.235	-43.31721
644	853.3956	-209.3956	-32.51485
565	761.7026	-196.7026	-34.81461
550	690.8488	-140.8488	-25.60688
649	620.4548	28.54517	4.398331
670	620.4548	49.54517	7.394801
890	660.0496	229.9505	25.83713
968	685.0568	282.9432	29.22967
922	879.3958	42.60425	4.620851
1123	960.6692	162.3308	14.4551
1133	908.5708	224.4292	19.8084
1162	952.3334	209.6666	18.04359
1166	1104.415	61.58508	5.28174
1084	1060.652	23.34766	2.153643
1064	1016.89	47.11029	4.427659
1208	1039.813	168.187	13.92277
1134	1211.927	-77.92713	-6.871881
1216	1157.745	58.25513	4.790718
1118	1032.709	85.29114	7.628904
1205	999.3659	205.6341	17.06507
1492	1345.221	146.7791	9.837738
1023	1118.072	-95.07214	-9.293464
825	968.0289	-143.0289	-17.33684
690	936.7699	-246.7699	-35.76375
1057	1272.872	-215.8716	-20.42304
1361	1310.383	50.61756	3.719144
1389	1177.011	211.9894	15.26202
1410	1093.653	316.3467	22.43594
1318	1249.336	68.66394	5.209707
1142	1222.245	-80.24488	-7.026696
1301	1255.588	45.41211	3.490554
1567	1326.442	240.5584	15.35152
1938	1619.633	318.3667	16.42759
1821	1638.389	182.6113	10.02808
1782	1634.221	147.7792	8.292883
1717	1636.305	80.69519	4.699778
1563	1745.314	-182.3137	-11.66439
1494	1730.726	-236.7262	-15.84513
1540	1722.391	-182.3905	-11.84354
1600	1553.592	46.40821	2.900513
1397	1617.048	-220.0484	-15.75149
1559	1642.056	-83.05555	-5.327489
1417	1504.516	-87.51599	-6.176146
914	1066.89	-152.8899	-16.72756

DURBIN-WATSON = .6778331

R-SQ UNADJUSTED = .7595029473304749

R-SQ ADJUSTED = [illegible]

FINAL SOLUTION

REGRESSION NUMBER 2
APPRVLS2 = 1567.367
+ 29.29187 SALTOLIS
COEFFICIENT OF DETERMINATION = .1089489
STD DEVIATION OF ESTIMATE = 908.0907

ACTUAL	PREDICTED	DIFFERENCE	%DIFFERENCE
1956	2782.475	-826.4749	-42.25332
1219	2782.475	-1563.475	-128.2588
1464	2782.475	-1318.475	-90.05976
2401	2782.475	-381.4749	-15.88817
1664	2814.696	-1150.696	-69.15241
1853	2814.696	-961.6961	-51.89941
1800	2814.696	-1014.696	-56.372
1558	2814.696	-1256.696	-80.66085
1588	2571.574	-983.5735	-61.93788
1646	2571.574	-925.5735	-56.23168
2129	2571.574	-442.5735	-20.78786
2838	2571.574	266.4265	9.387826
2458	2832.271	-374.271	-15.22665
2762	2832.271	-70.271	-2.544207
3310	2832.271	477.729	14.4329
3171	2832.271	338.729	10.68209
3309	3069.535	239.4649	7.236774
3239	3069.535	169.4649	5.232012
3250	3069.535	180.4649	5.552765
4079	3069.535	1009.465	24.74785
3629	3210.136	418.8638	11.54213
3563	3210.136	352.8638	9.903558
3742	3210.136	531.8638	14.21336
3874	3210.136	663.8638	17.13639
3625	2633.087	991.9136	27.36313
2497	2633.087	-136.0864	-5.449997
2131	2633.087	-502.0864	-23.56107
1855	2633.087	-778.0865	-41.94536
3458	2759.042	698.9585	20.2128
3861	2759.042	1101.959	28.54076
3121	2759.042	361.9585	11.59752
3080	2759.042	320.9585	10.42073
3078	2571.574	506.4265	16.4531
3079	2571.574	507.4265	16.48024
3101	2571.574	529.4265	17.07277
3589	2571.574	1017.427	28.34847
3695	2501.273	1193.727	32.30655
2978	2501.273	476.7271	16.0083
3001	2501.273	499.7271	16.65202
2983	2501.273	481.7271	16.14908
2614	2589.149	24.85156	.9507101
2718	2589.149	128.8516	4.740676
2667	2589.149	77.85156	2.919069
2964	2589.149	374.8516	12.64681
2913	3002.164	-89.16382	-3.060893
3936	3002.164	933.8362	23.72551
3589	3002.164	586.8362	16.35097
2508	3002.164	-494.1638	-19.7035
2558	3535.276	-977.2759	-38.20469
2255	3535.276	-1280.276	-56.77498
3683	3535.276	147.7241	4.010973
3542	3535.276	6.724121	.1898397
2172	2231.788	-59.78784	-2.752663
1777	2231.788	-454.7879	-25.59302
581	2231.788	-1650.788	-284.1287
990	2231.788	-1241.788	-125.4331
3027	2565.715	461.2849	15.23901
2284	2565.715	-281.7151	-12.33429
1733	2565.715	-832.7151	-48.0505
6534	2565.715	3968.285	60.73286

DURBIN-WATSON = .9204354

R-SQ UNADJUSTED = .10894930362701 42

R-SQ ADJUSTED = 9.358638525009155D-02

VANCOUVER: 1968 Quarter 1 to 1979 Quarter 3

REGRESSION NUMBER 4
APPRVLS2 = -2444.53
+ -350.0261 CONV5YR
+ 31.80608 SALTOLIS
+ 48.46789 EMPLINDX
COEFFICIENT OF DETERMINATION = .6015693
STD DEVIATION OF ESTIMATE = 494.0251

ACTUAL	PREDICTED	DIFFERENCE	%DIFFERENCE
1956	1817.953	138.0474	7.057636
1219	1962.824	-743.8241	-61.01921
1464	2123.843	-659.843	-45.07125
2401	2124.651	276.3496	11.50977
1664	2173.378	-509.3775	-30.61163
1853	2317.706	-464.7063	-25.07859
1800	2347.873	-547.8726	-30.43737
1558	2224.017	-666.0169	-42.74819
1588	1738.964	-150.964	-9.506549
1646	1632.335	13.66541	.830219
2129	1916.945	212.0551	9.960312
2838	1886.246	951.7539	33.53608
2458	2271.36	186.6401	7.593171
2762	2800.46	-38.45996	-1.392468
3310	2853.51	456.49	13.79124
3171	2762.225	408.7749	12.89104
3309	3364.509	-55.50855	-1.677502
3239	2849.945	389.0552	12.01158
3250	3338.667	-88.66699	-2.728215
4079	3163.912	915.0886	22.43414
3629	3547.337	81.66333	2.250299
3563	3766.525	-203.5249	-5.712178
3742	3663.139	78.86108	2.107458
3874	3684.683	189.3169	4.886859
3625	3335.985	289.0156	7.972845
2497	2901.141	-404.1414	-16.18508
2131	2925.39	-794.3896	-37.27779
1855	2679.014	-824.0141	-44.42125
3458	3003.172	454.8277	13.15291
3861	3264.896	596.1043	15.43912
3121	2522.273	598.7273	19.18383
3080	2687.61	392.3904	12.73995
3078	2570.483	507.5171	16.48854
3079	2670.383	408.6167	13.27109
3101	2653.685	447.3147	14.42485
3589	2830.856	758.1445	21.12412
3695	3212.791	482.2095	13.05033
2978	3263.68	-285.6802	-9.593021
3001	3203.365	-202.365	-6.743252
2983	2833.662	149.3377	5.006291
2614	3241.429	-627.429	-24.00264
2718	3270.242	-552.2417	-20.31794
2667	3348.33	-681.3296	-25.54667
2964	2846.703	117.2969	3.957384
2913	3494.695	-581.6948	-19.96893
3936	3779.037	156.9629	3.987878
3589	3722.505	-133.5044	-3.719622
2508	2948.676	-440.6756	-17.5708

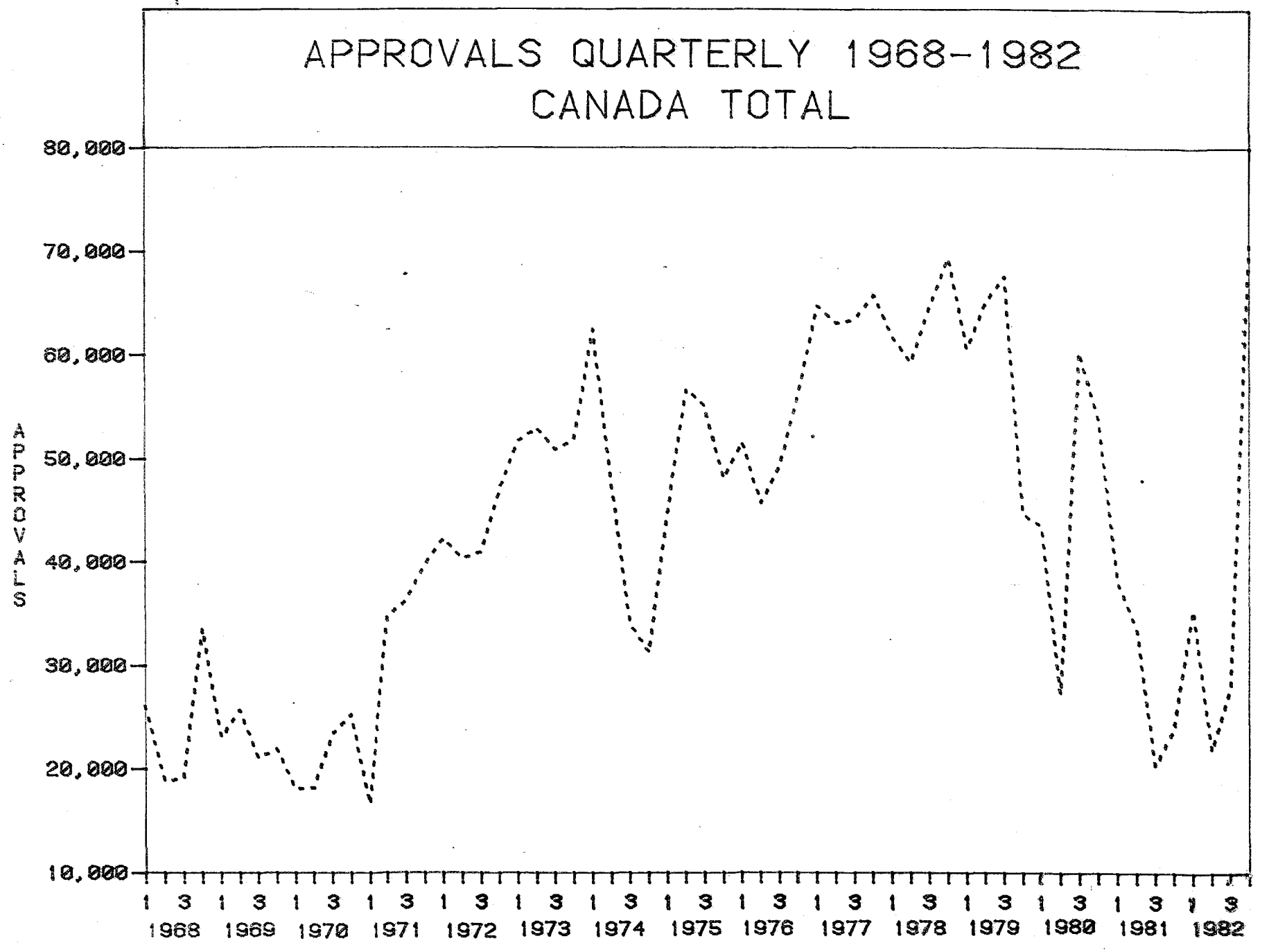
DURBIN-WATSON = 1.146884

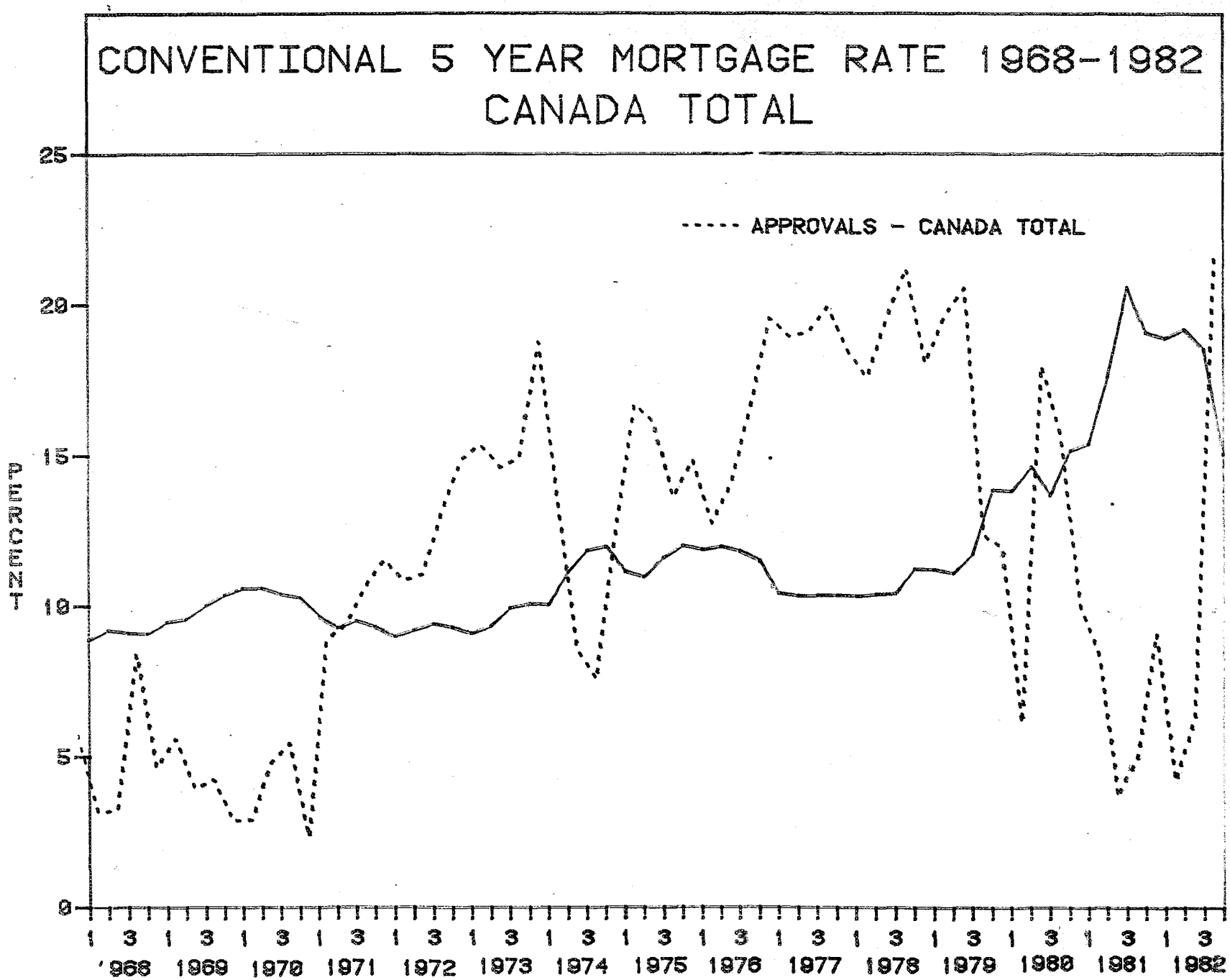
R-SQ UNADJUSTED = .6015698097597522

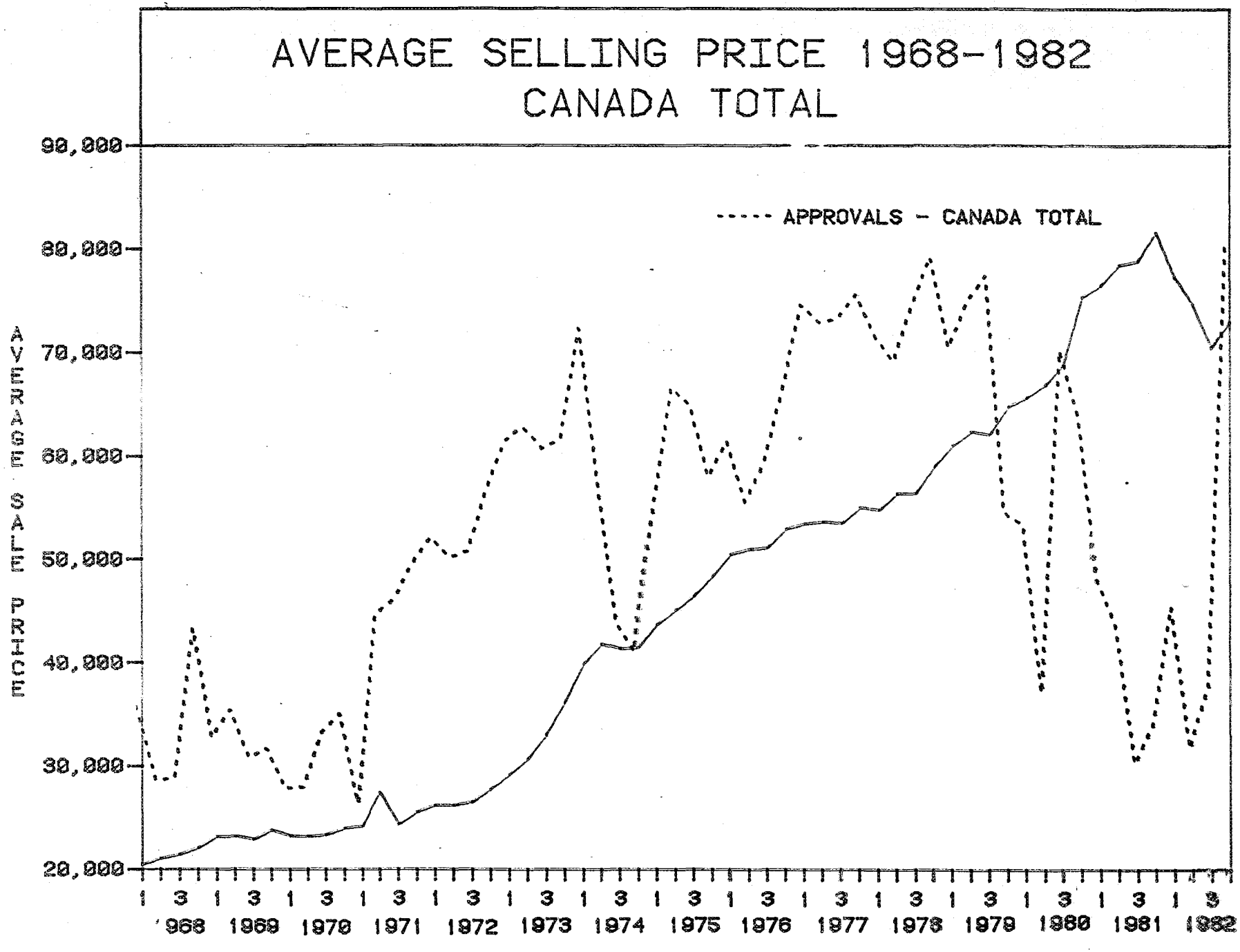
R-SQ ADJUSTED = .5744042396454541

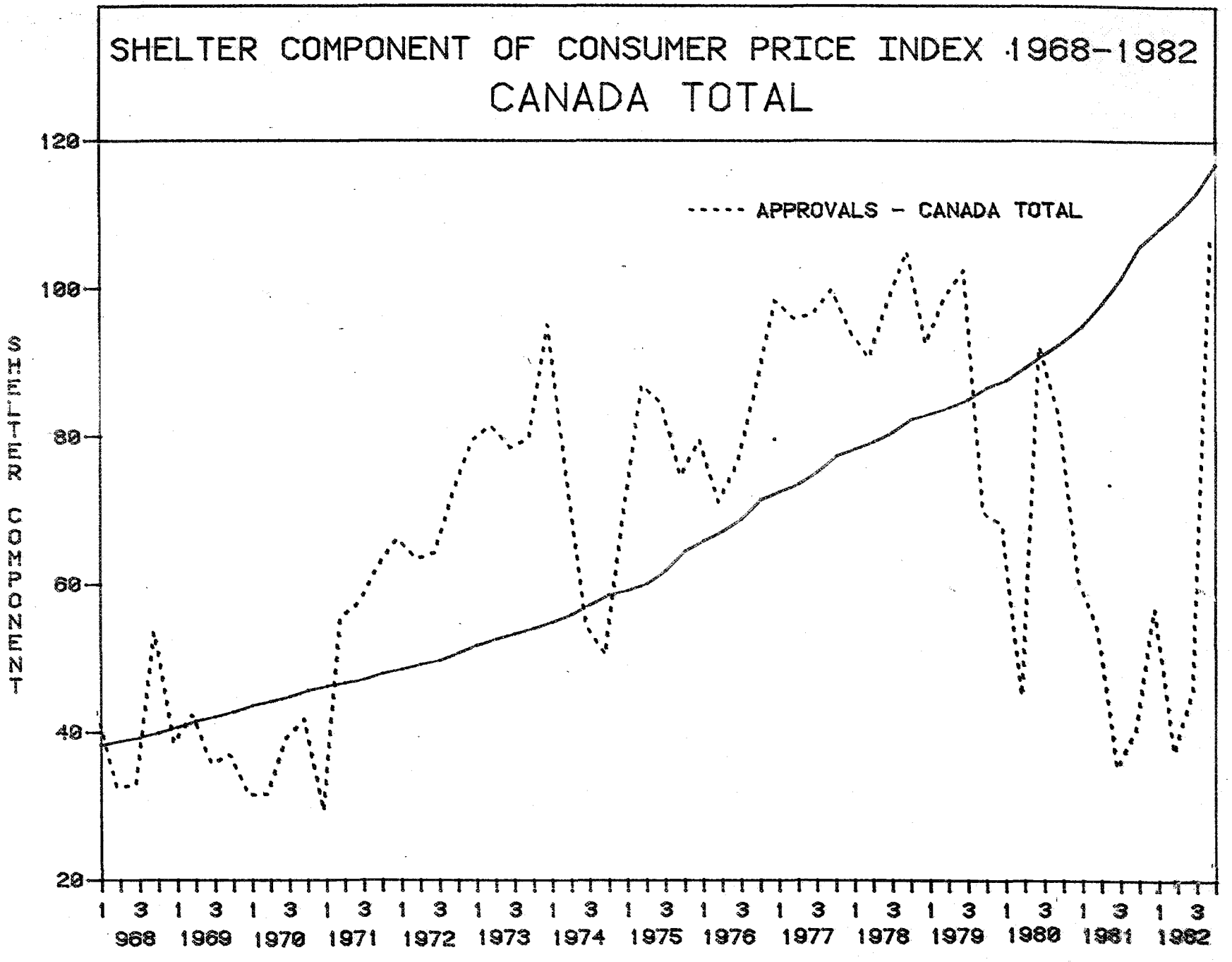
APPENDIX D

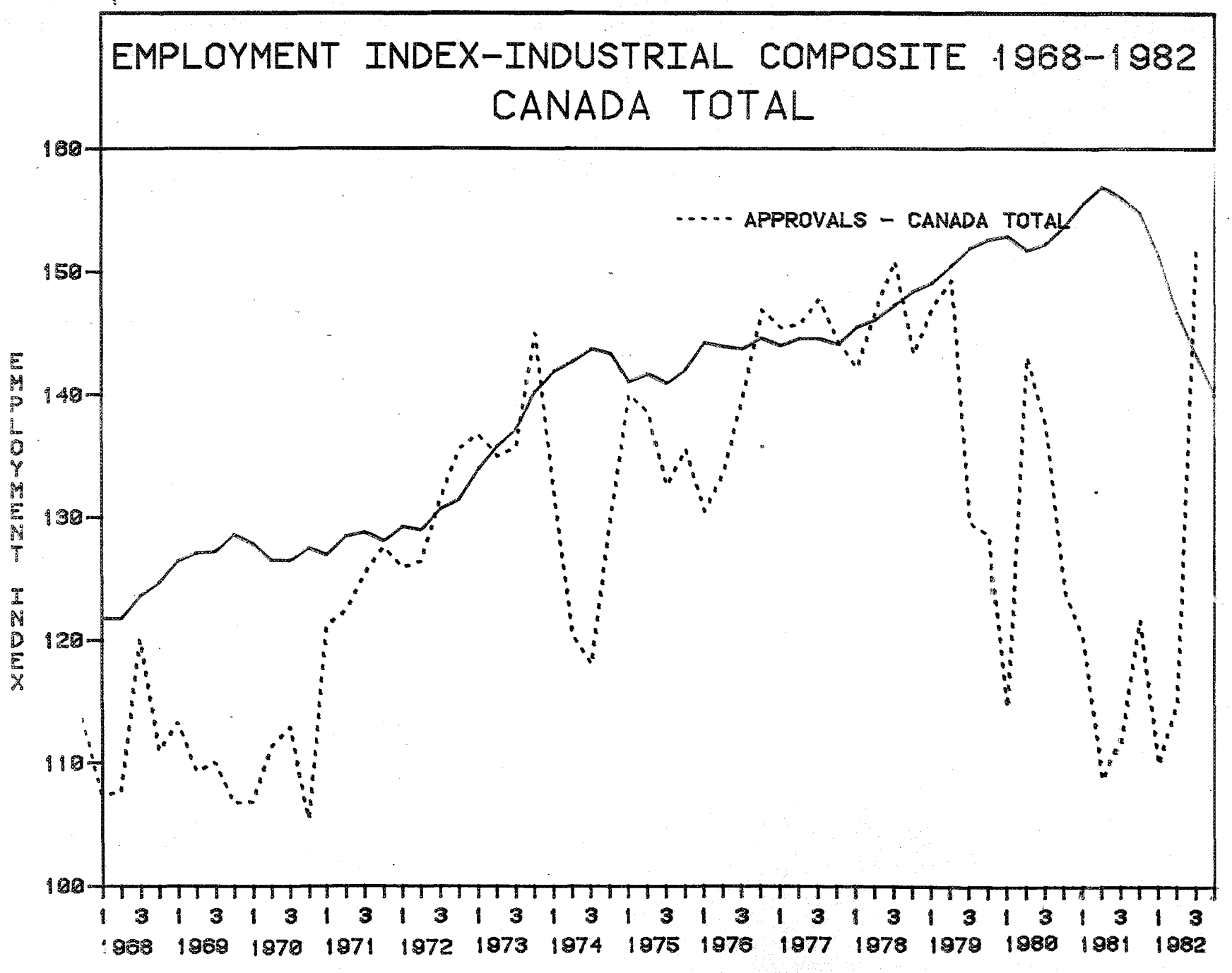
Charts of Selected National, Provincial and Local Indicators Related to Mortgage Loan Approvals.

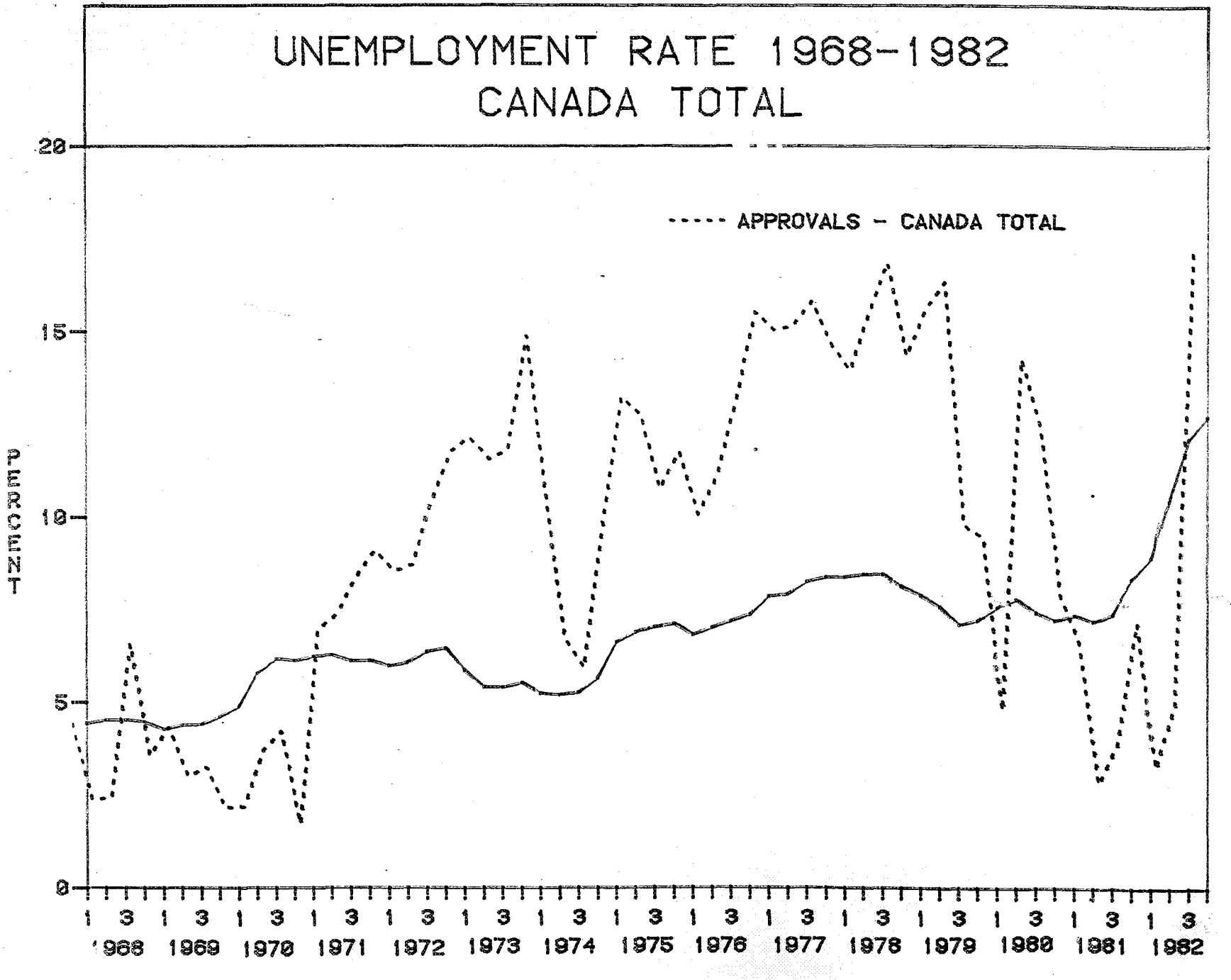

APPROVALS QUARTERLY 1968-1982
CANADA TOTAL
APPROVALS
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3
1968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982

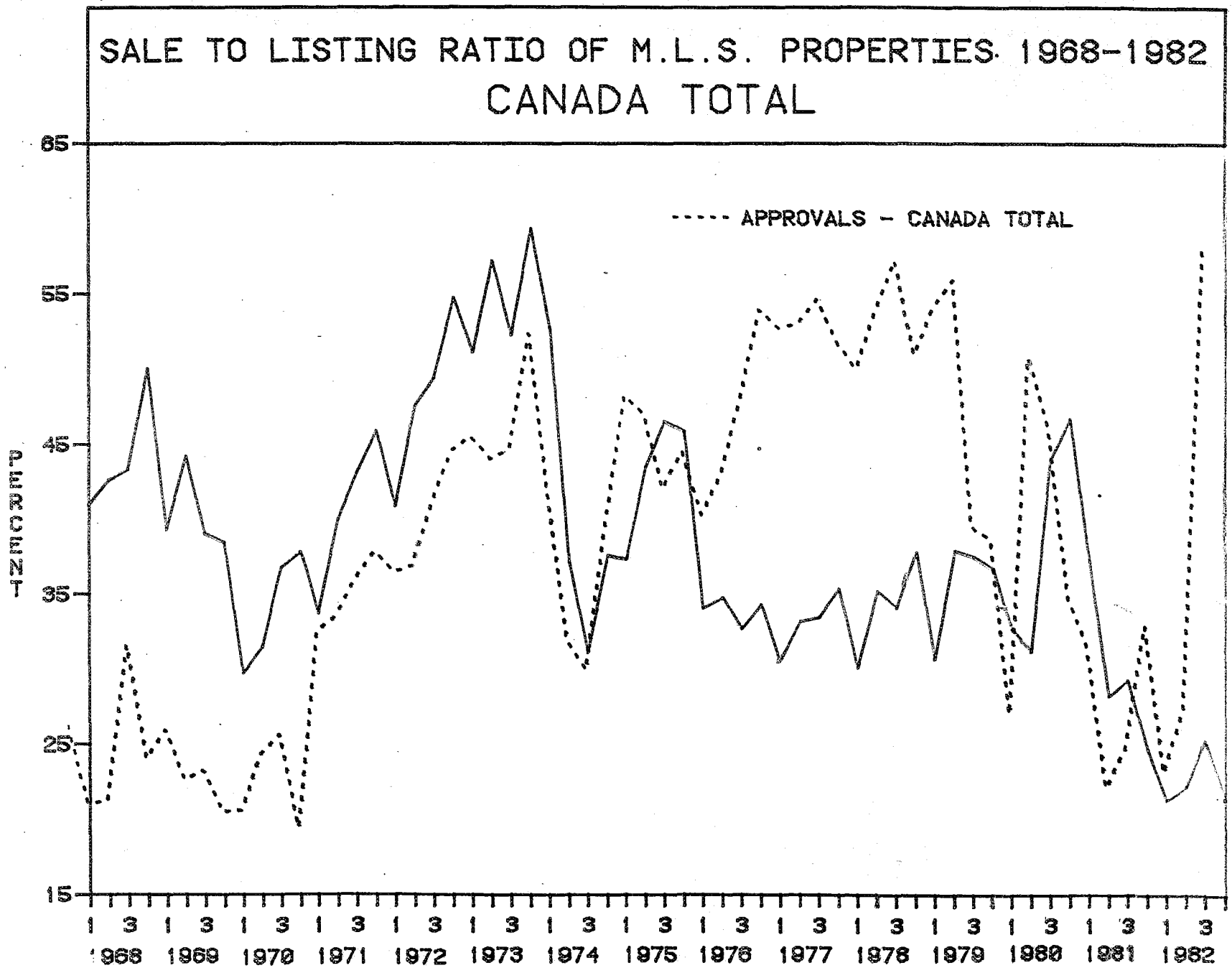

CONVENTIONAL 5 YEAR MORTGAGE RATE 1968-1982
CANADA TOTAL
----- APPROVALS - CANADA TOTAL
PERCENT
25
20
15
10
5
0
1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3
1968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982

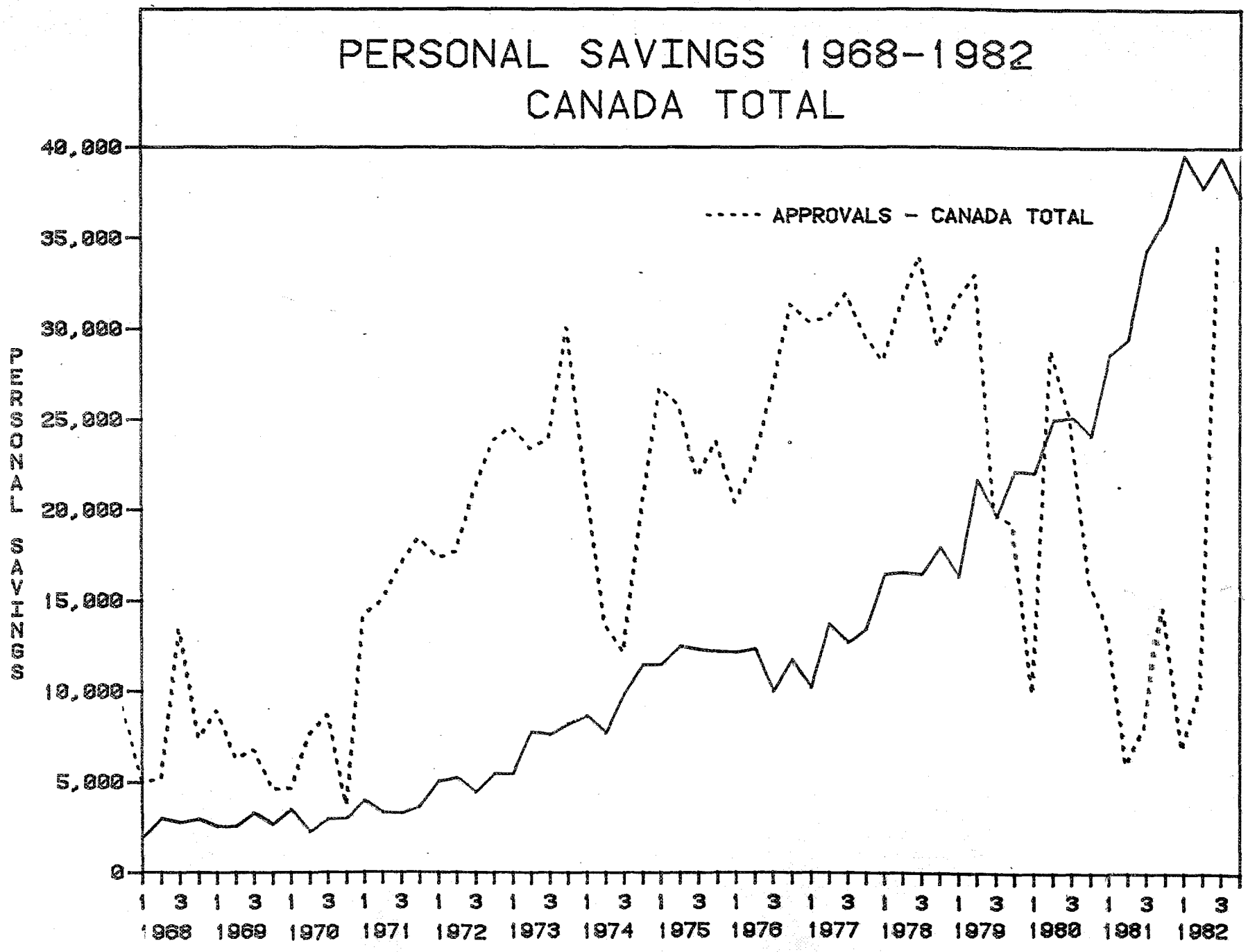

AVERAGE SELLING PRICE 1968-1982
CANADA TOTAL
----- APPROVALS - CANADA TOTAL
AVERAGE SALE PRICE
90,000
80,000
70,000
60,000
50,000
40,000
30,000
20,000
1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3
1968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982

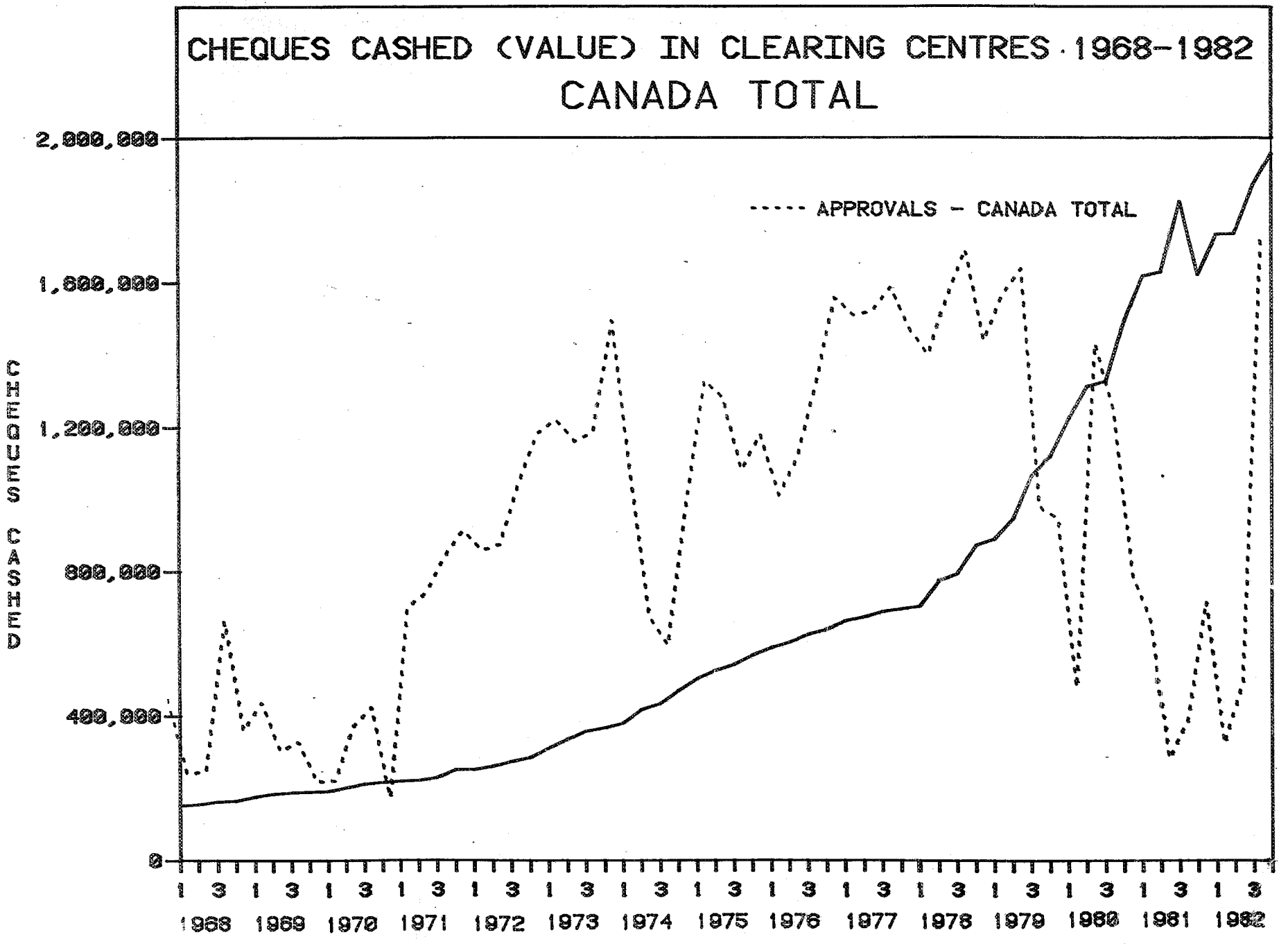

SHELTER COMPONENT OF CONSUMER PRICE INDEX 1968-1982
CANADA TOTAL
APPROVALS - CANADA TOTAL
SHELTER COMPONENT
120
100
80
60
40
20
1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3
968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982

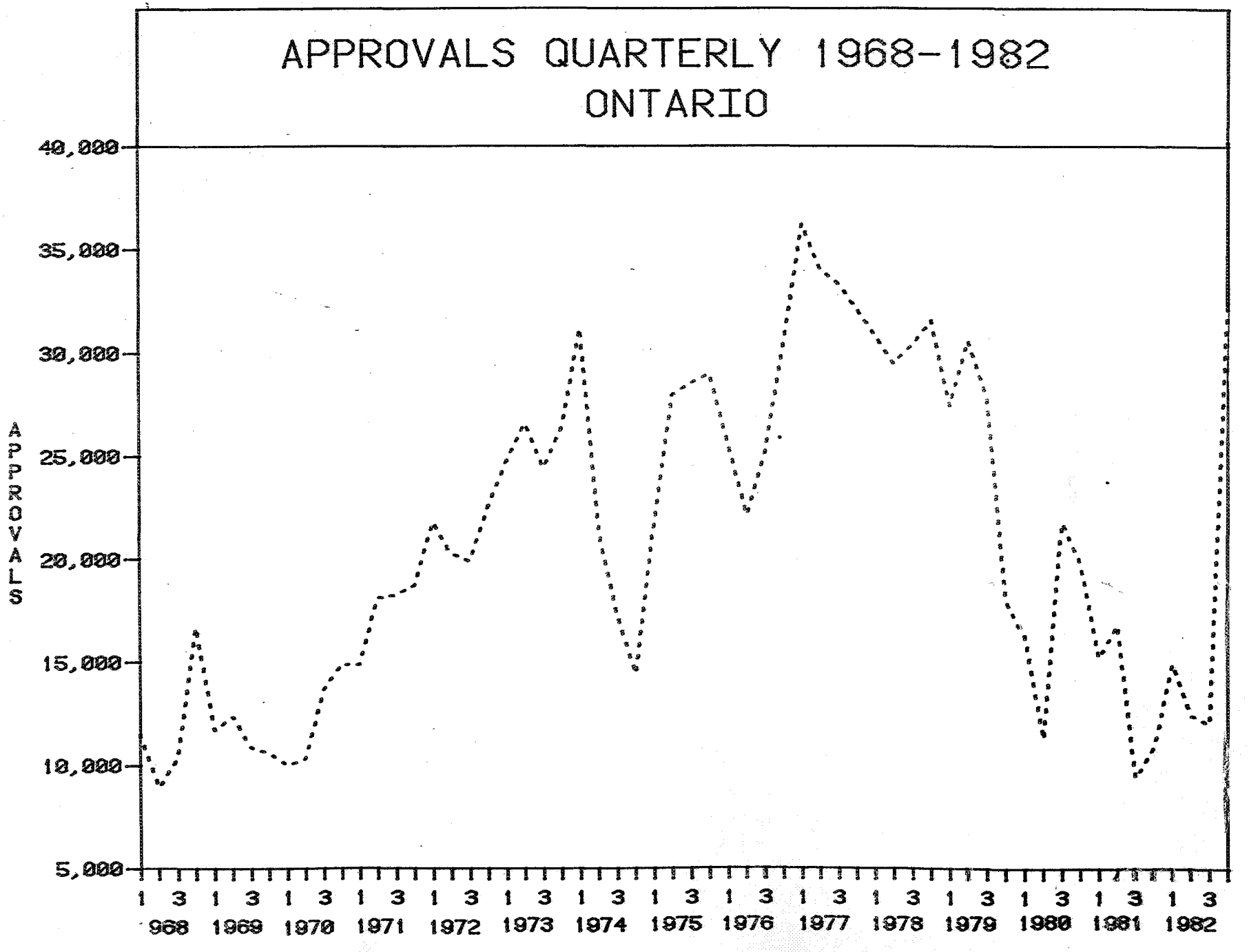

EMPLOYMENT INDEX-INDUSTRIAL COMPOSITE 1968-1982
CANADA TOTAL
APPROVALS - CANADA TOTAL
EMPLOYMENT INDEX
180
150
140
130
120
110
100
1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3
1968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982

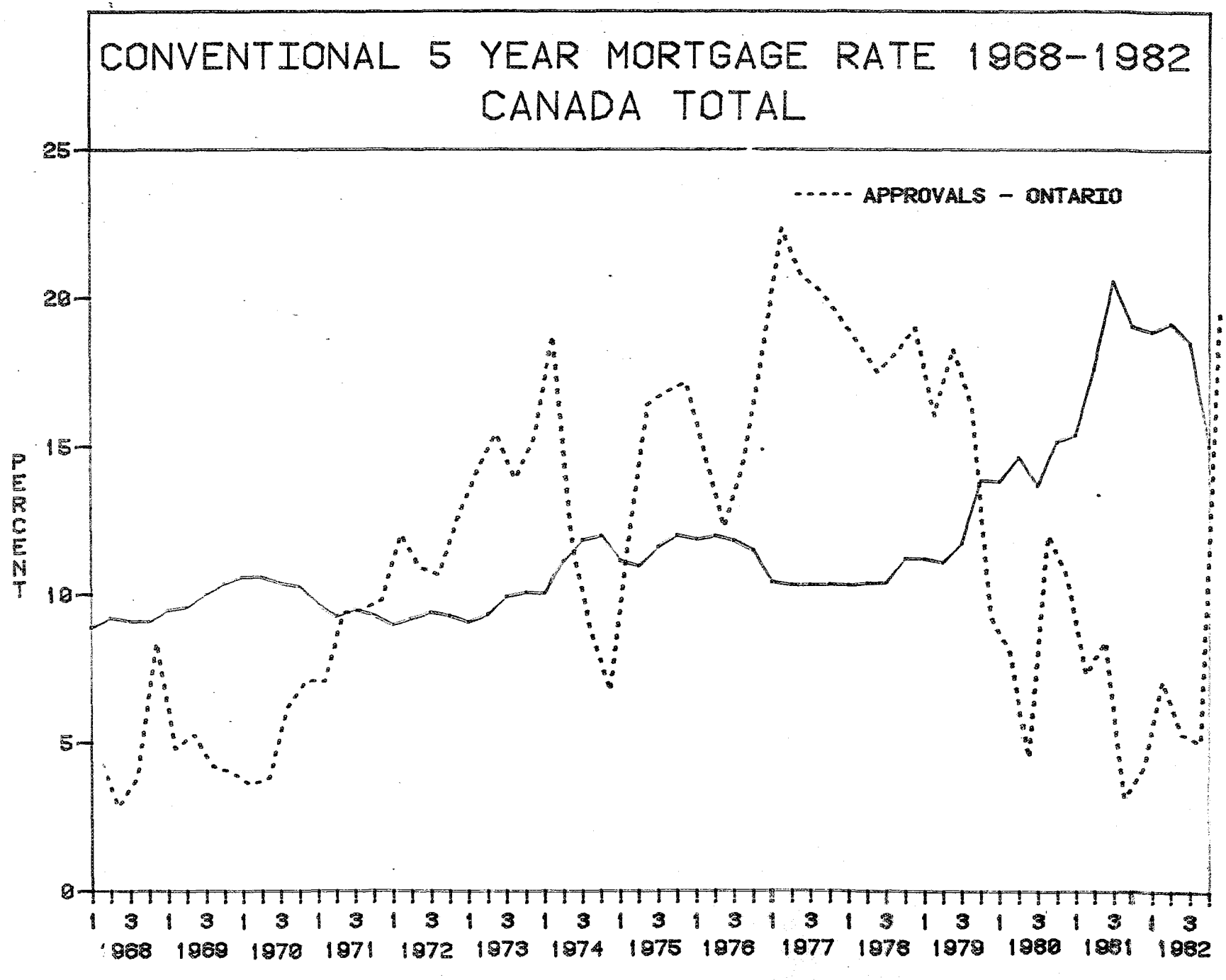

UNEMPLOYMENT RATE 1968-1982
CANADA TOTAL
----- APPROVALS - CANADA TOTAL
PERCENT
20
15
10
5
0
1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3
1968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982

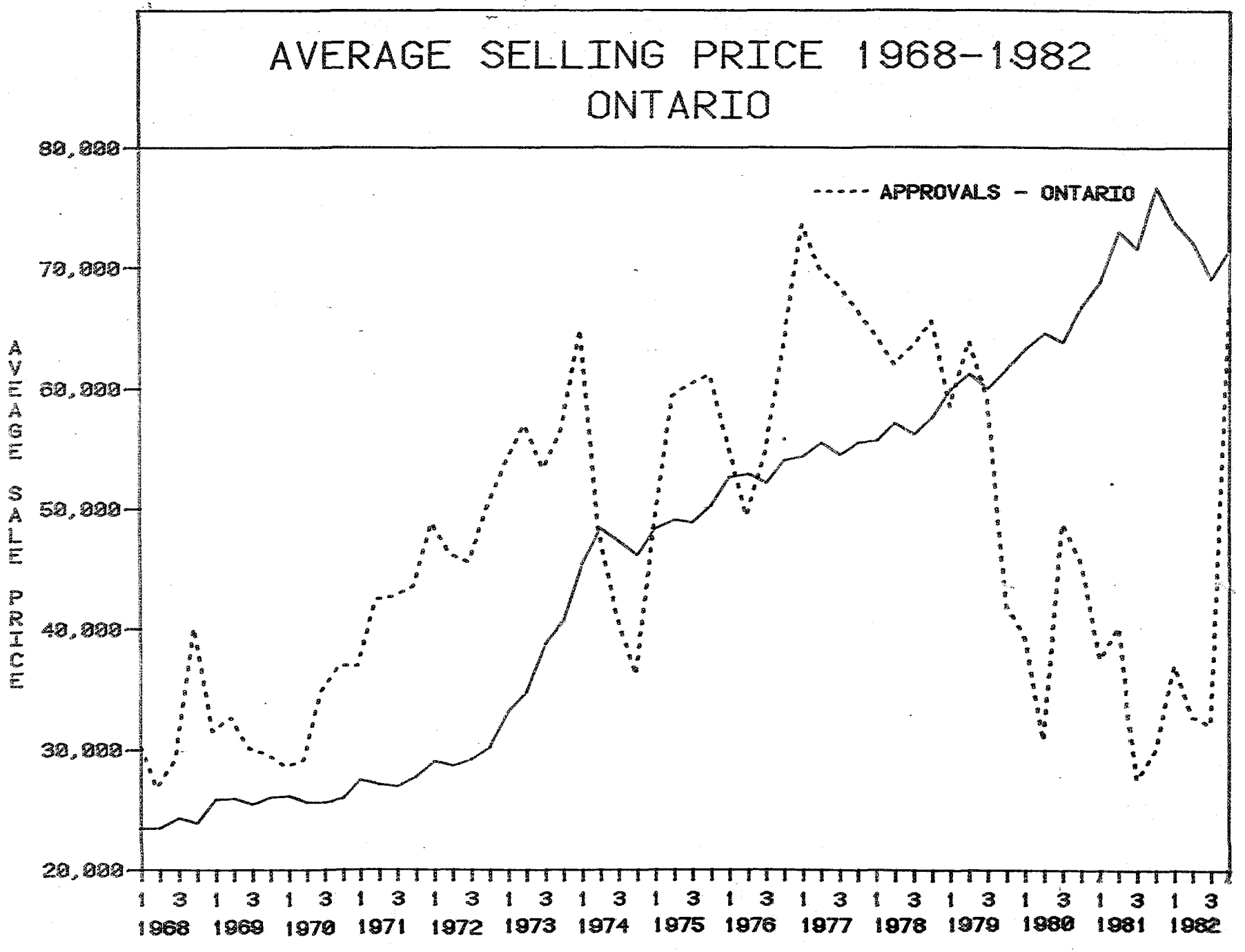

SALE TO LISTING RATIO OF M.L.S. PROPERTIES 1968-1982
CANADA TOTAL
----- APPROVALS - CANADA TOTAL
PERCENT
65
55
45
35
25
15
1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3
1968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982

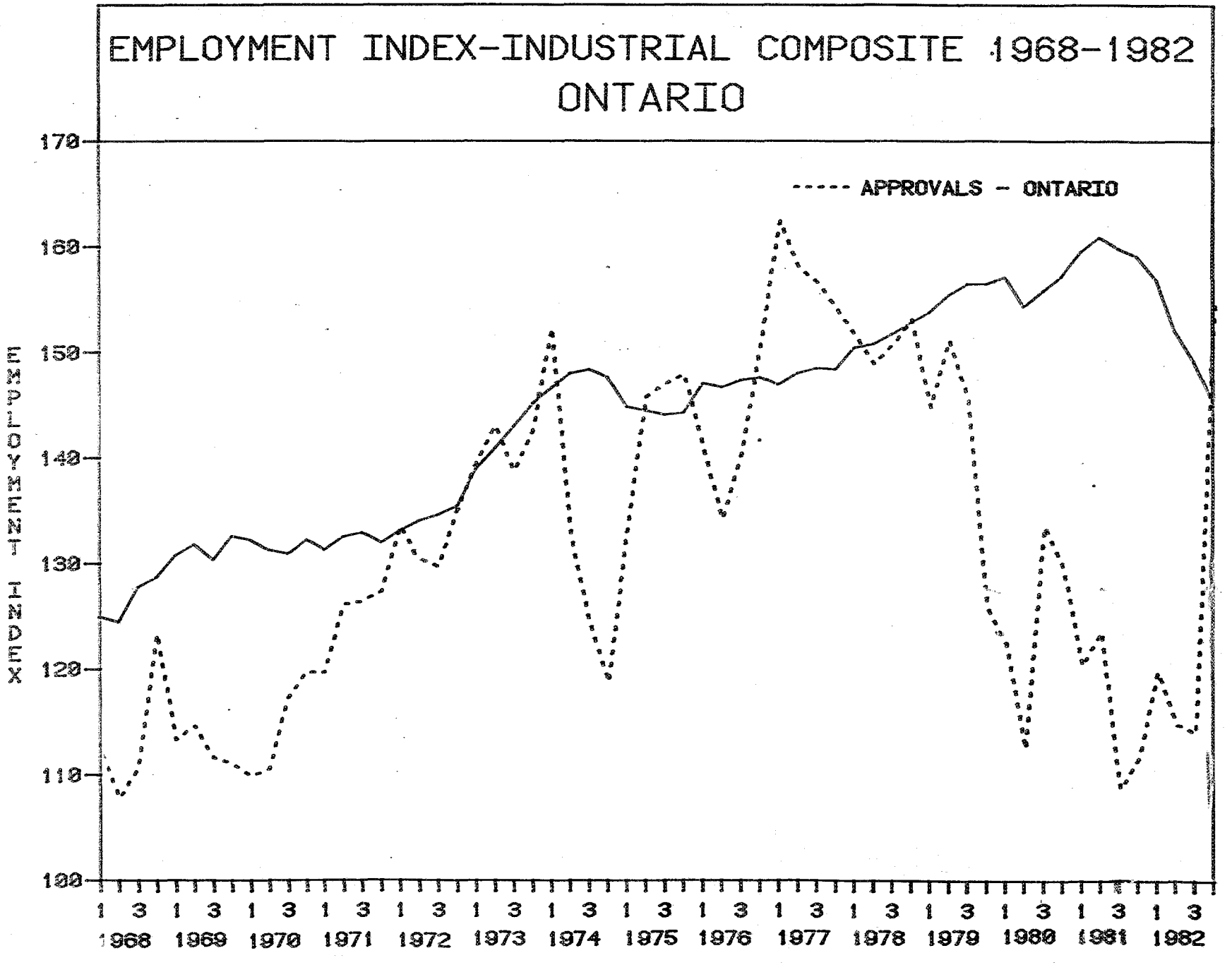

PERSONAL SAVINGS 1968-1982
CANADA TOTAL
APPROVALS - CANADA TOTAL
PERSONAL SAVINGS
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3
1968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982

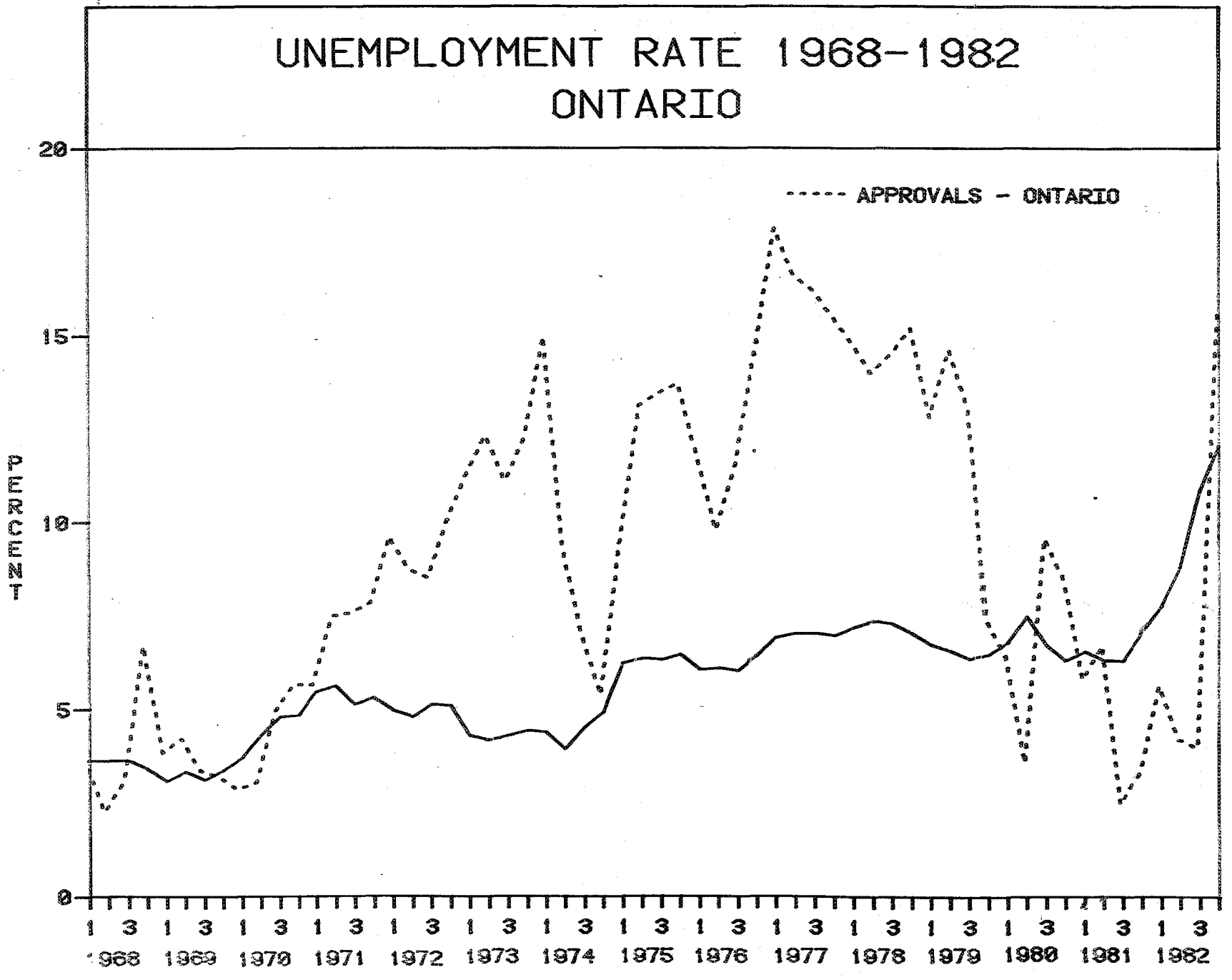

CHEQUES CASHED (VALUE) IN CLEARING CENTRES 1968-1982
CANADA TOTAL
APPROVALS - CANADA TOTAL
CHEQUES CASHED
2,000,000
1,600,000
1,200,000
800,000
400,000
0
1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3
1968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982

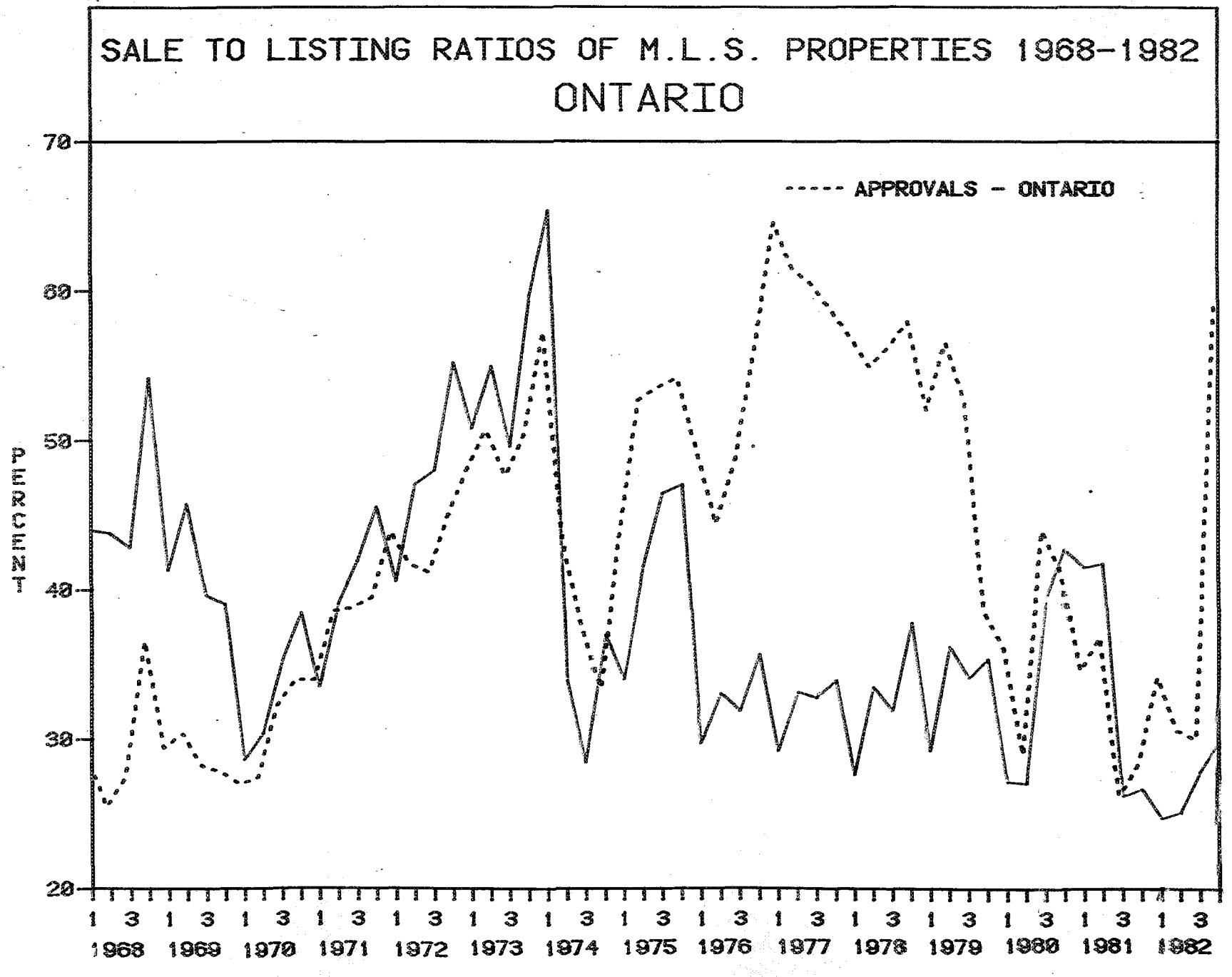

APPROVALS QUARTERLY 1968-1982
ONTARIO
APPROVALS
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3
968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982

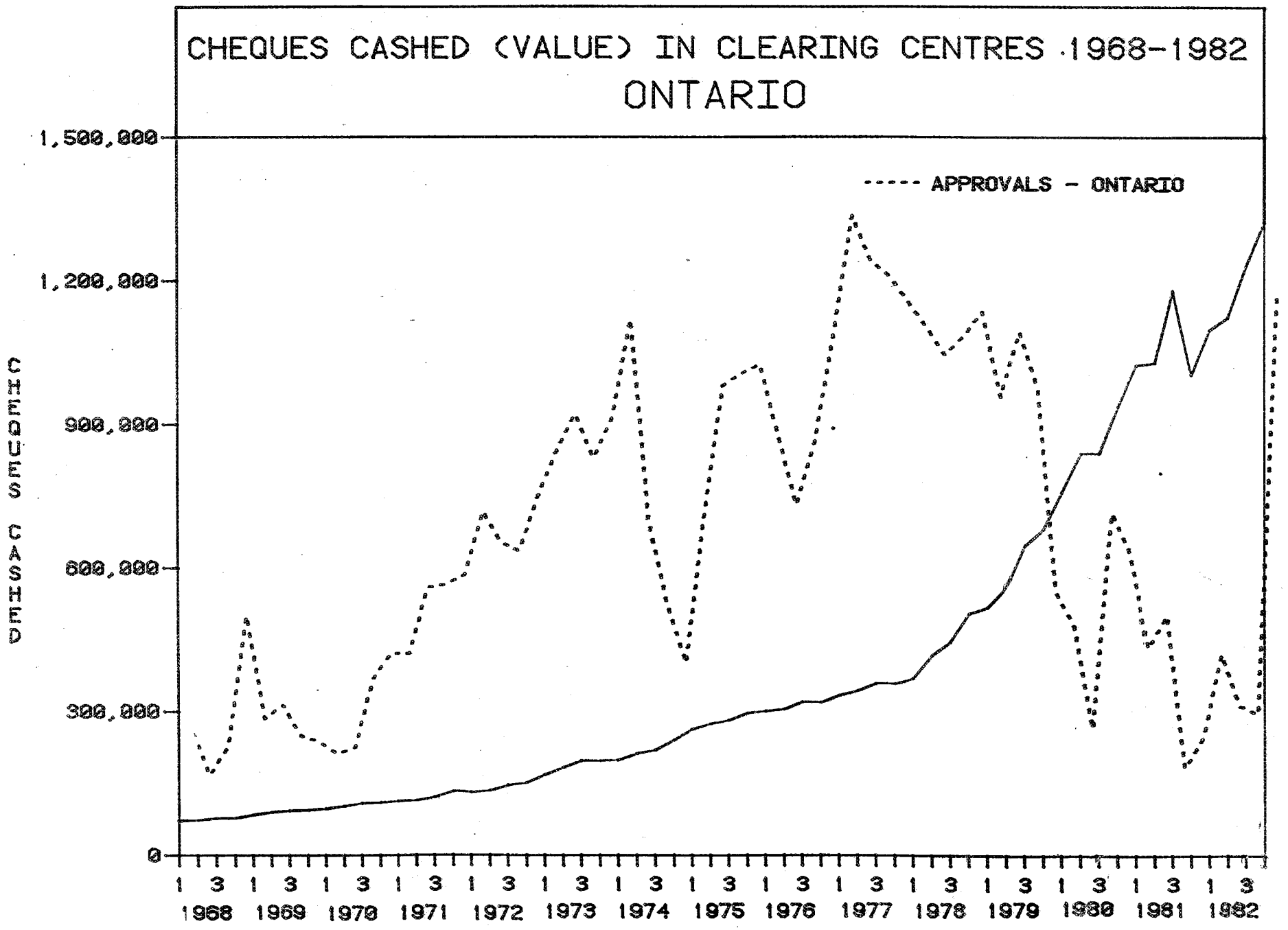

CONVENTIONAL 5 YEAR MORTGAGE RATE 1968-1982
CANADA TOTAL
----- APPROVALS - ONTARIO
PERCENT
25
20
15
10
5
0
1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3
1968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982

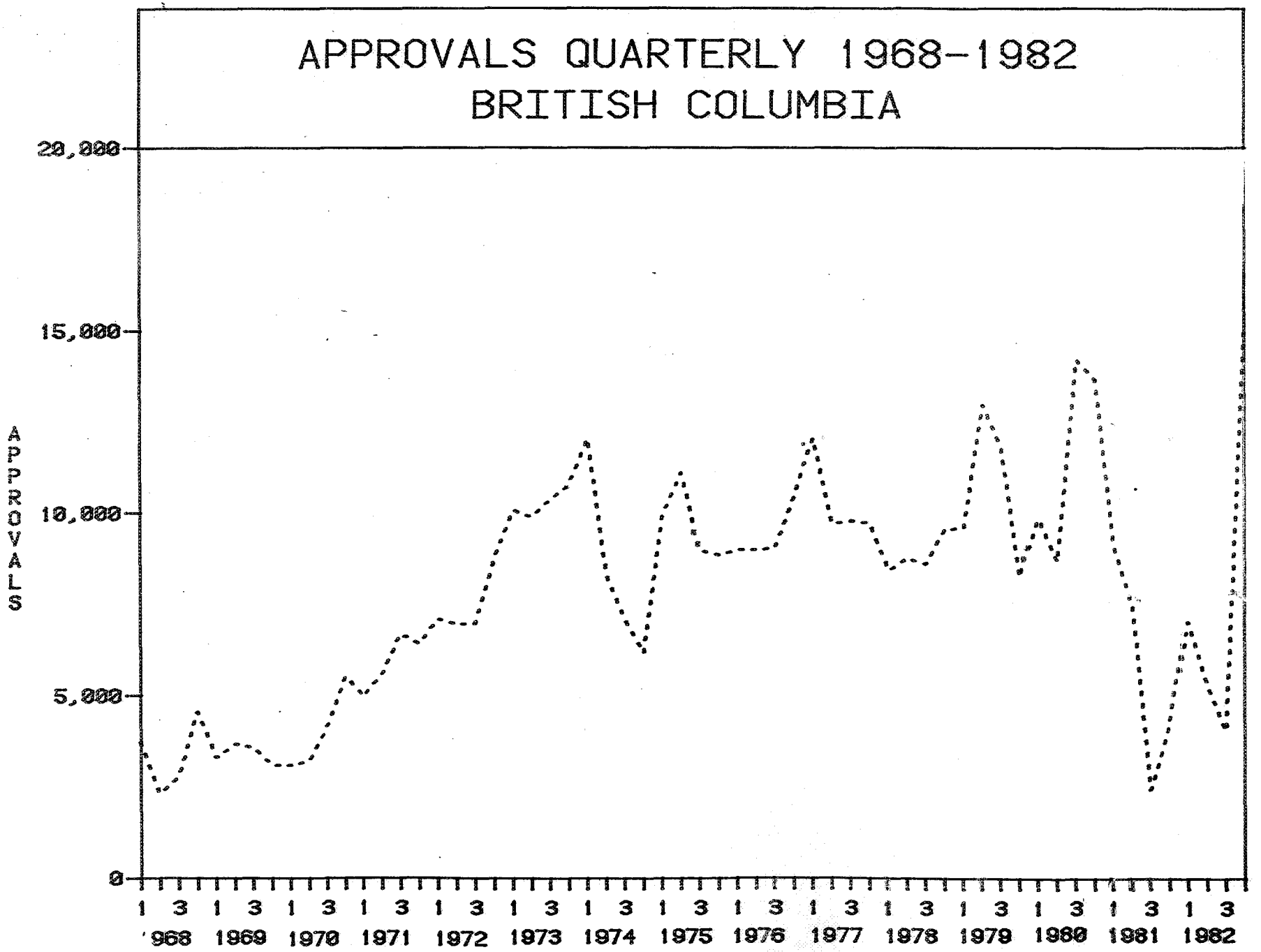

AVERAGE SELLING PRICE 1968-1982
ONTARIO
APPROVALS - ONTARIO
AVERAGE SELLING PRICE
80,000
70,000
60,000
50,000
40,000
30,000
20,000
1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3
1968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982

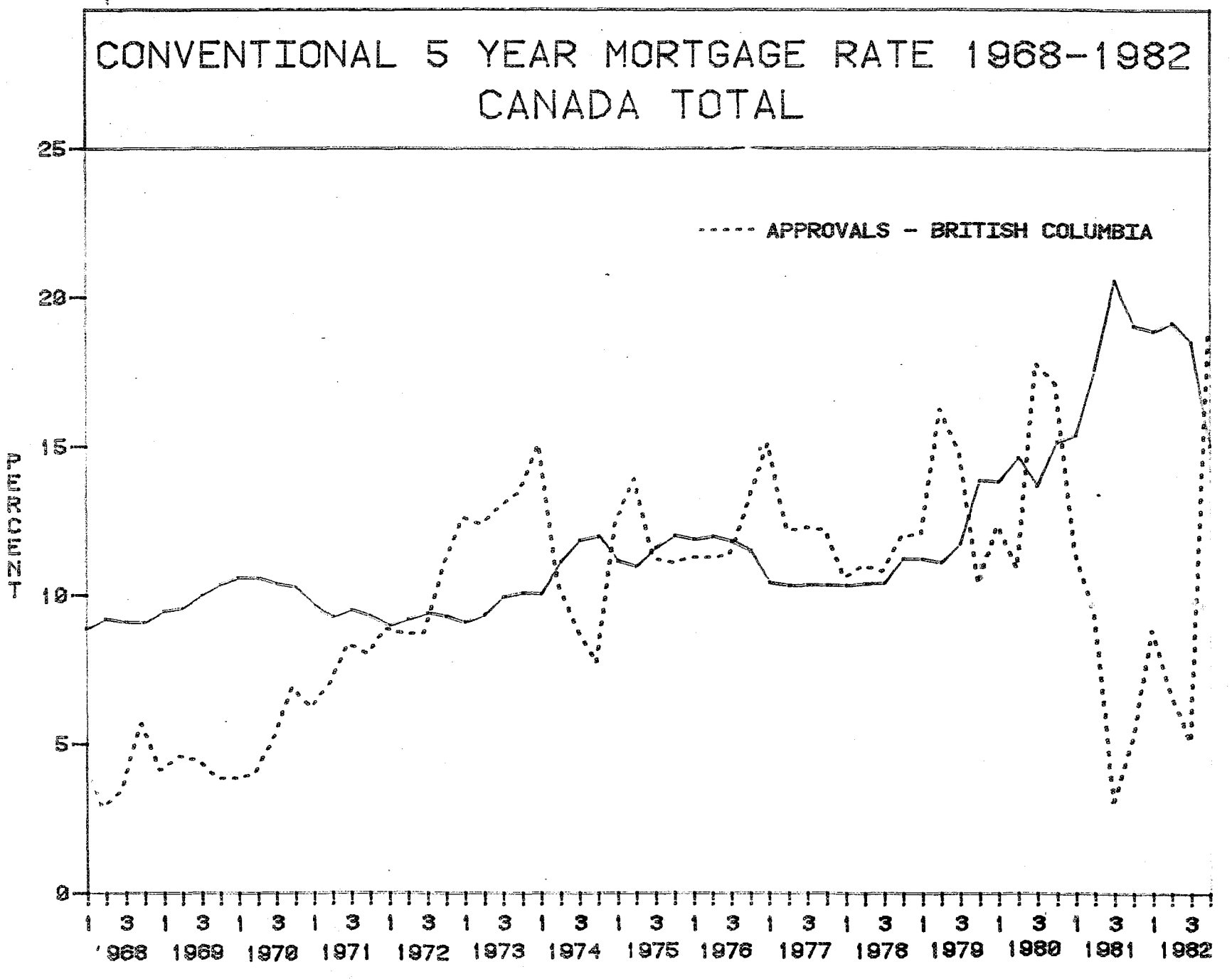

EMPLOYMENT INDEX-INDUSTRIAL COMPOSITE 1968-1982
ONTARIO
----- APPROVALS - ONTARIO
INDEX NUMBER
170
160
150
140
130
120
110
100
1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3
1968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982

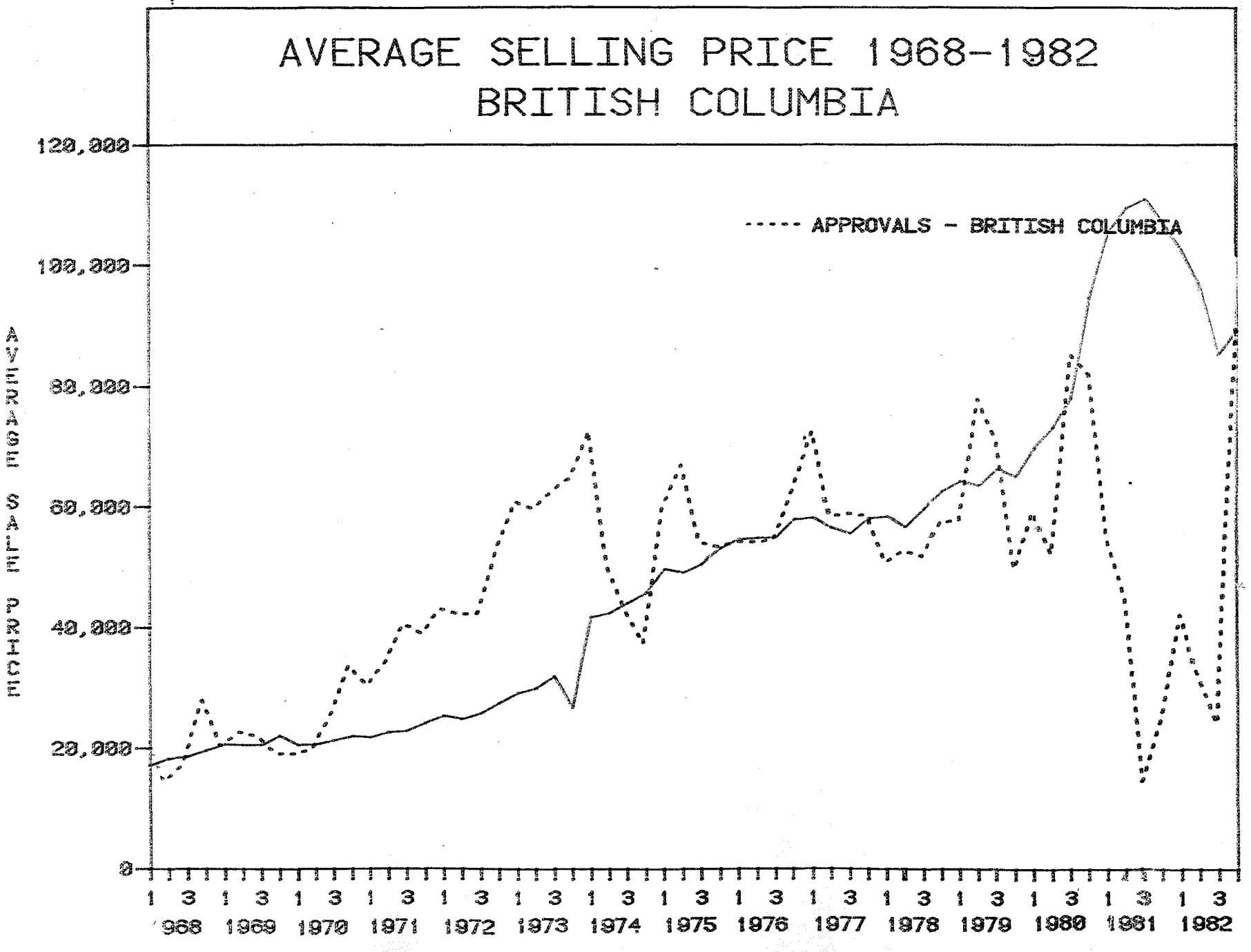

UNEMPLOYMENT RATE 1968-1982
ONTARIO
----- APPROVALS - ONTARIO
PERCENT
20
15
10
5
0
1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3
1968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982

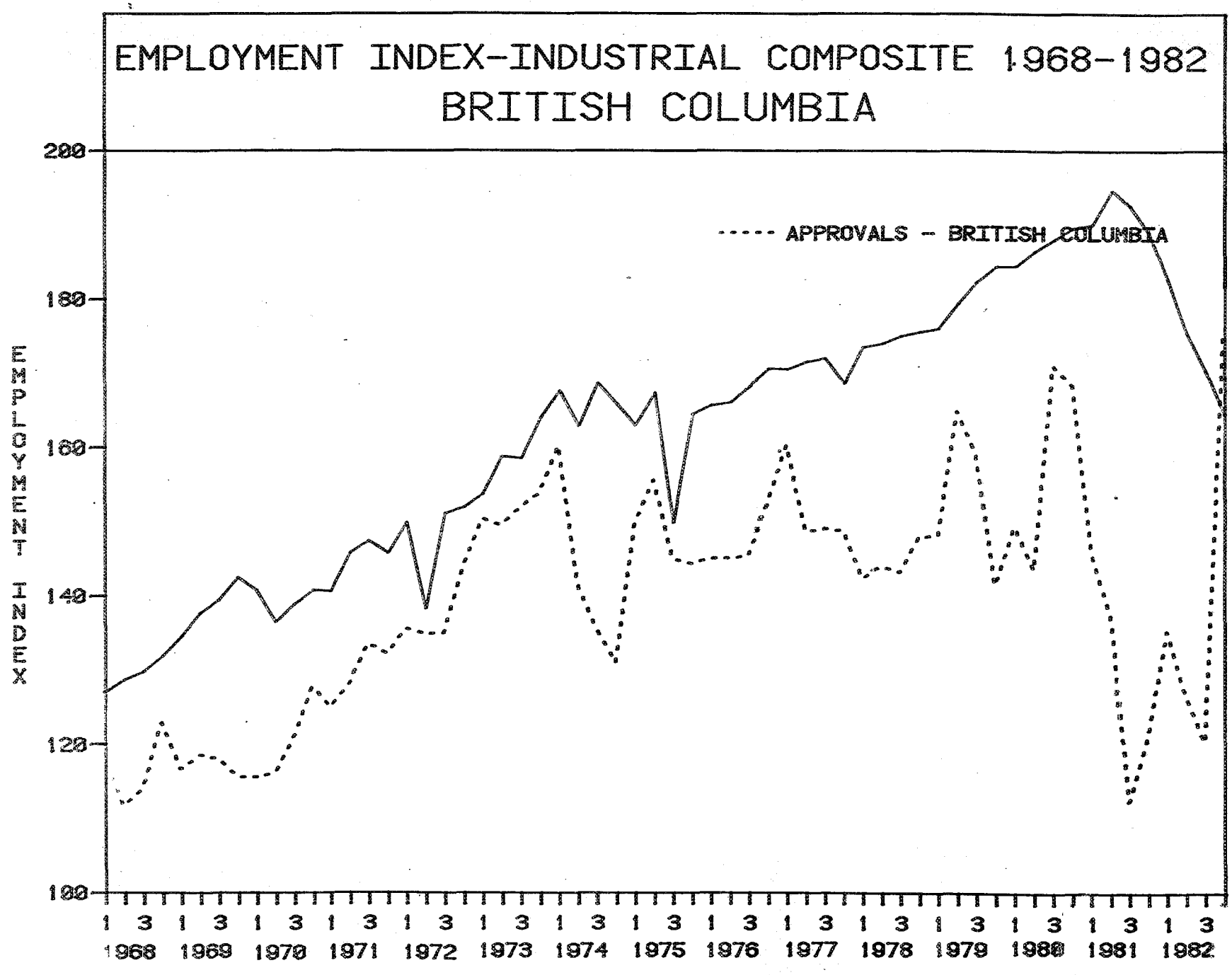

SALE TO LISTING RATIOS OF M.L.S. PROPERTIES 1968-1982
ONTARIO
----- APPROVALS - ONTARIO
PERCENT
70
60
50
40
30
20
1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3
1968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982

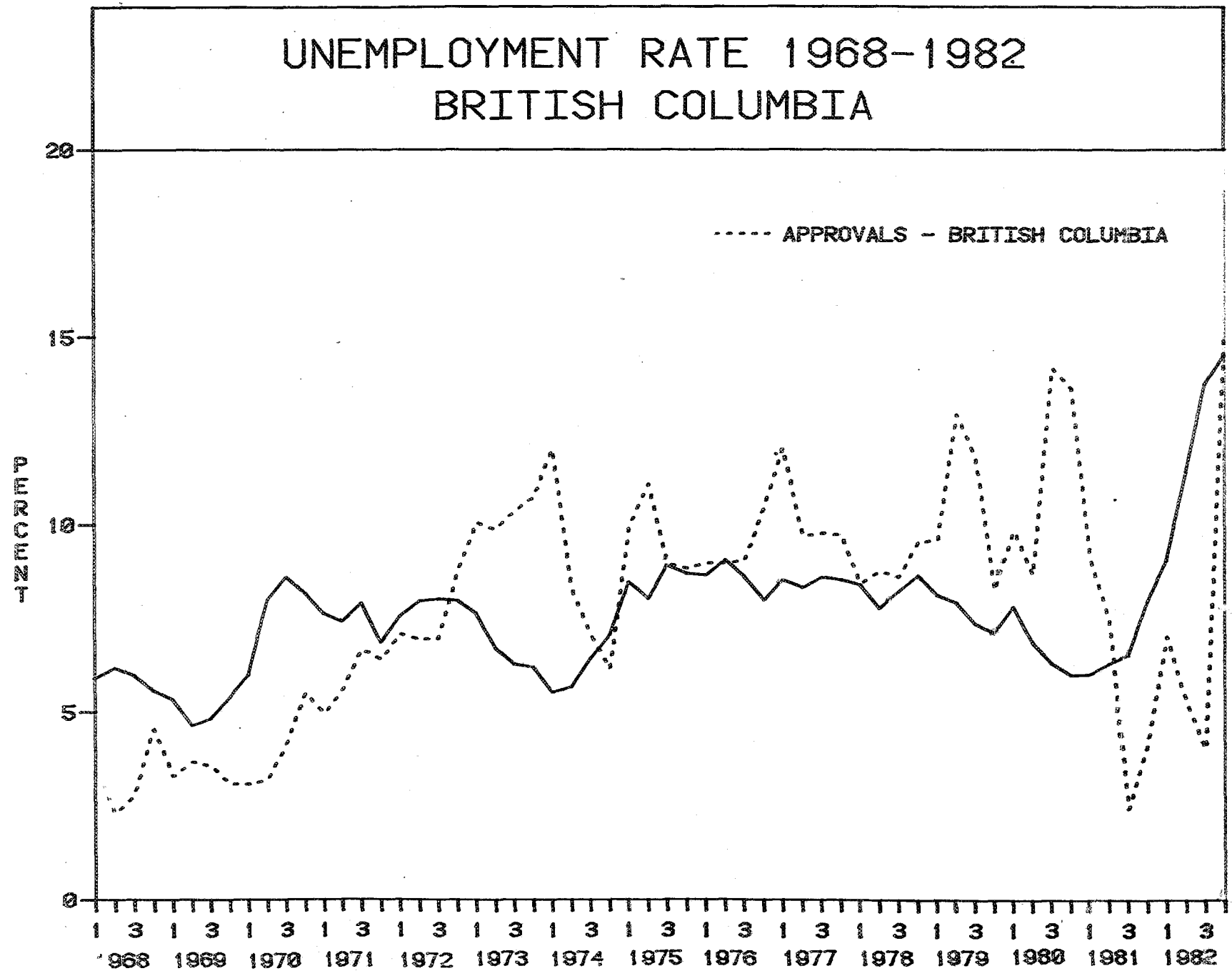

CHEQUES CASHED (VALUE) IN CLEARING CENTRES 1968-1982
ONTARIO
----- APPROVALS - ONTARIO
CHEQUES CASHED
1,500,000
1,200,000
900,000
600,000
300,000
0
1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3
1968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982

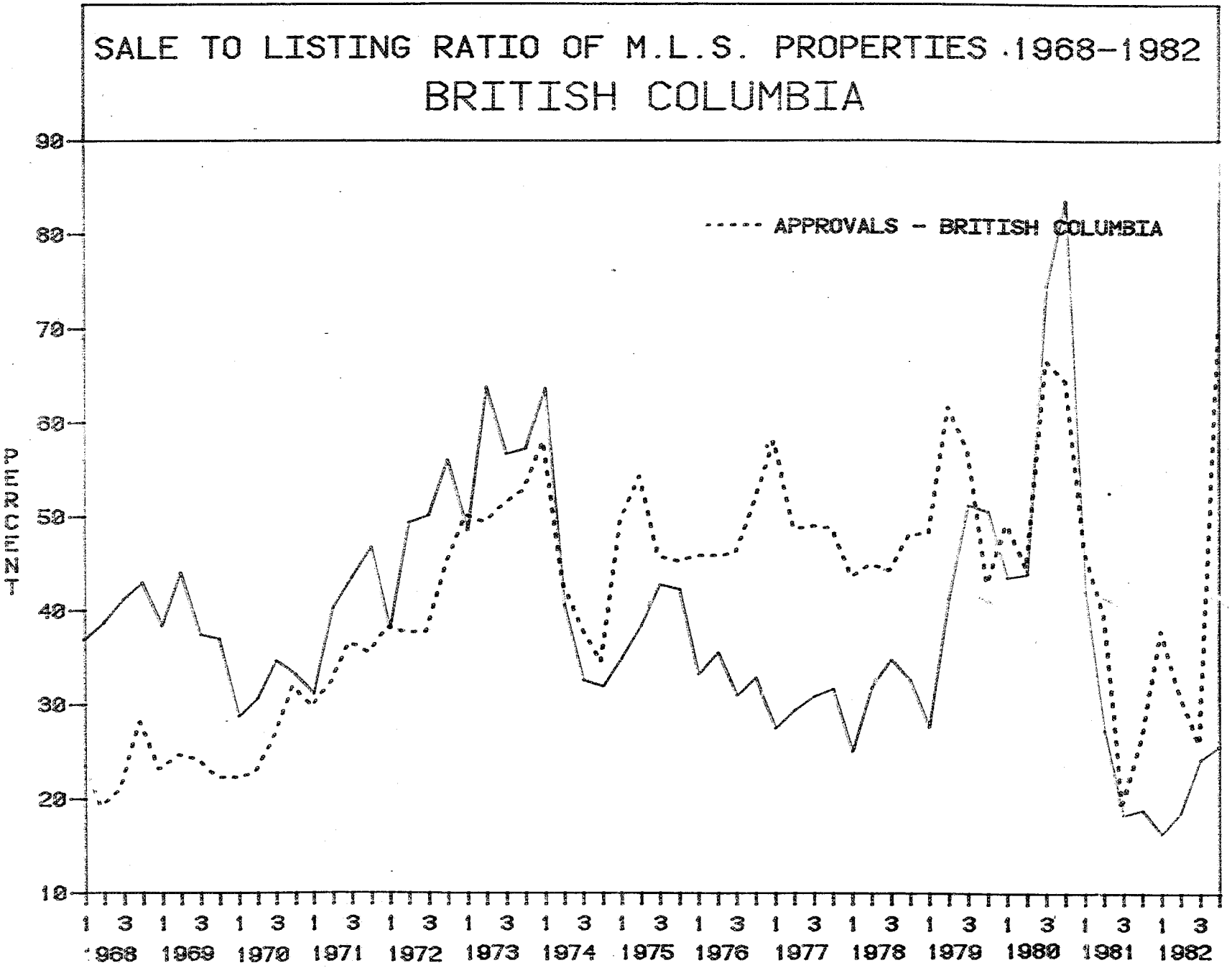

APPROVALS QUARTERLY 1968-1982
BRITISH COLUMBIA
APPROVALS
20,000
15,000
10,000
5,000
0
1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3
1968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982

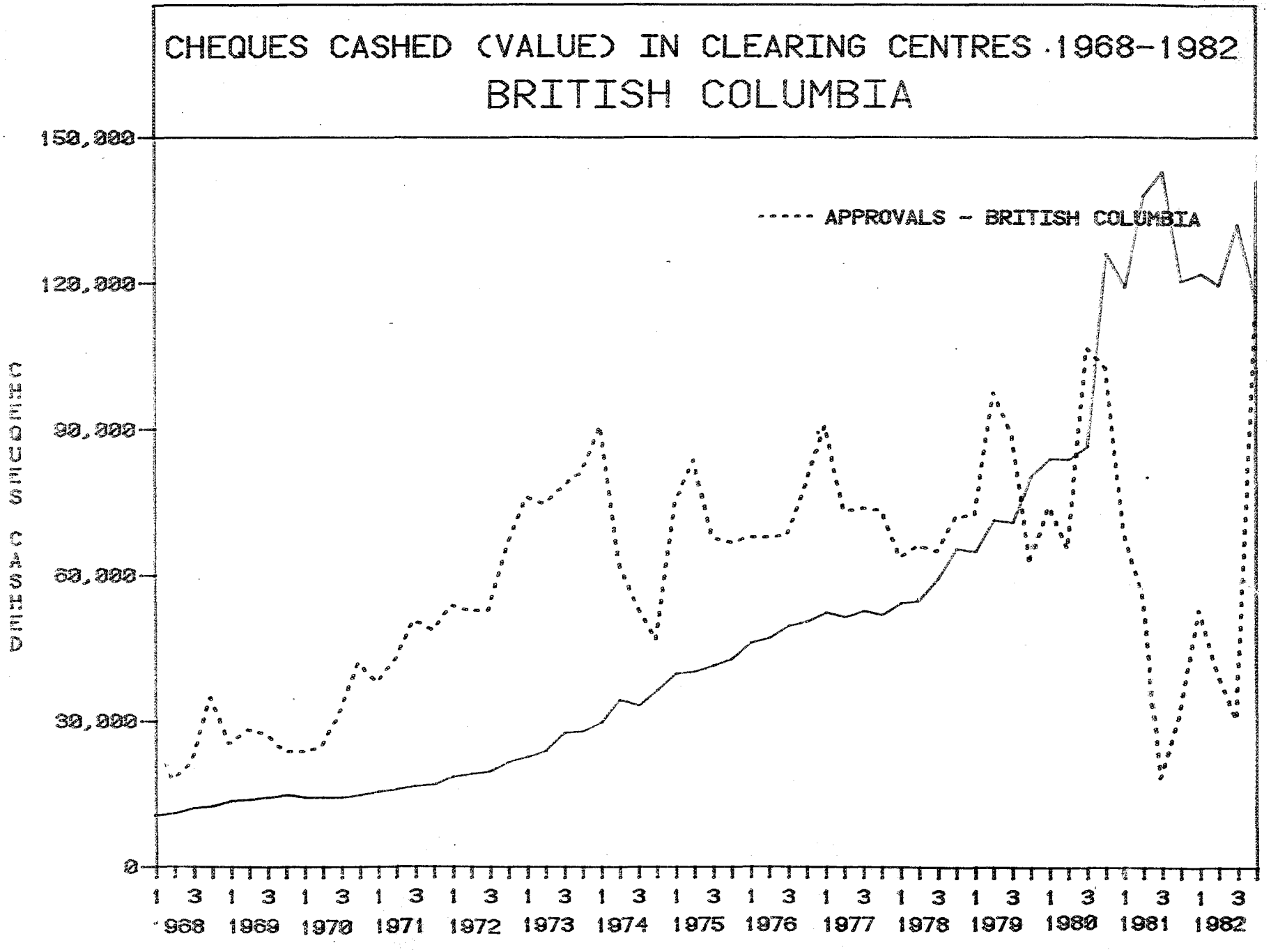

CONVENTIONAL 5 YEAR MORTGAGE RATE 1968-1982
CANADA TOTAL
APPROVALS - BRITISH COLUMBIA
PERCENT
25
20
15
10
5
0
1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3
1968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982

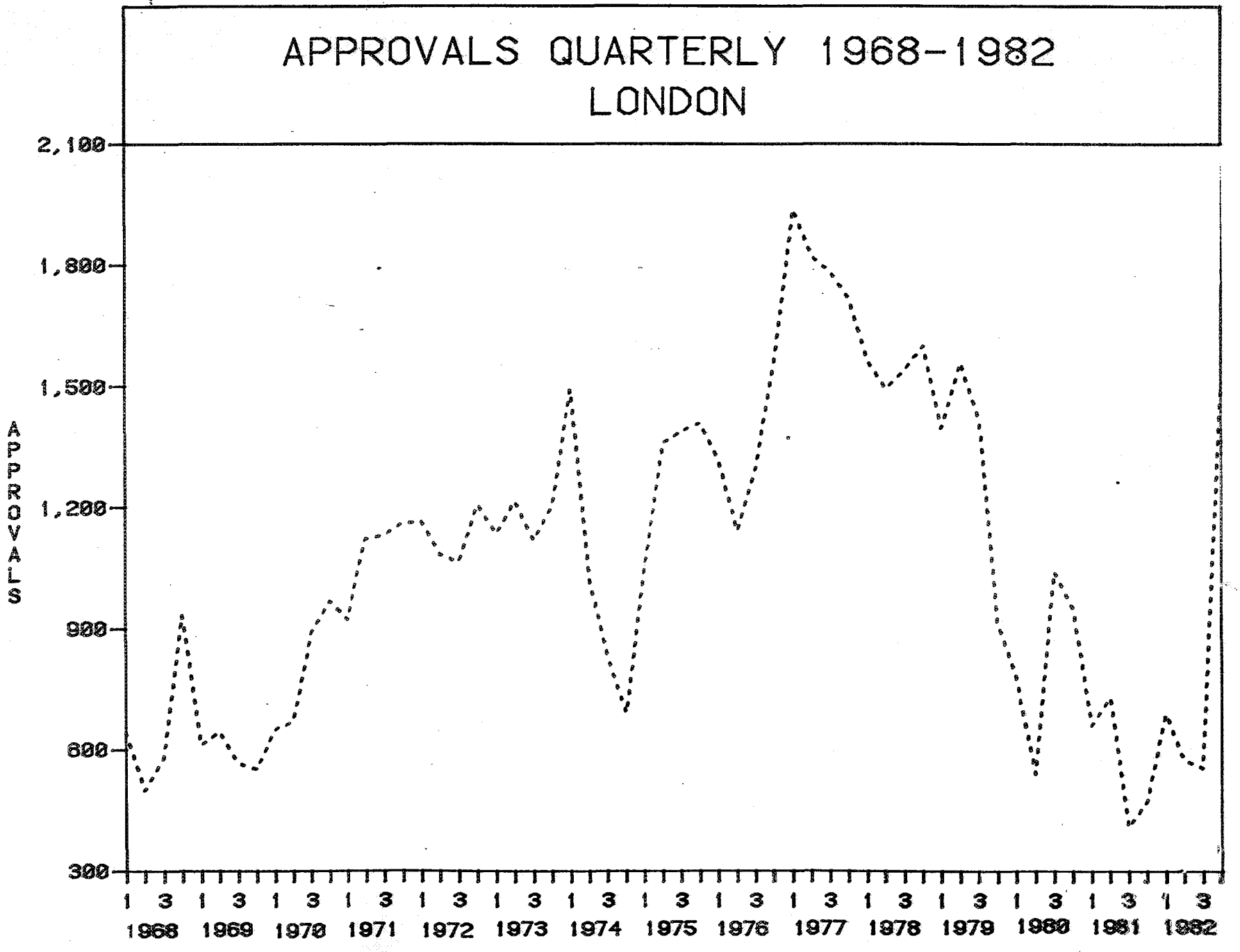

AVERAGE SELLING PRICE 1968-1982
BRITISH COLUMBIA
----- APPROVALS - BRITISH COLUMBIA
AVERAGE PRICE PER DWELLING UNIT
120,000
100,000
80,000
60,000
40,000
20,000
0
1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3
1968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982

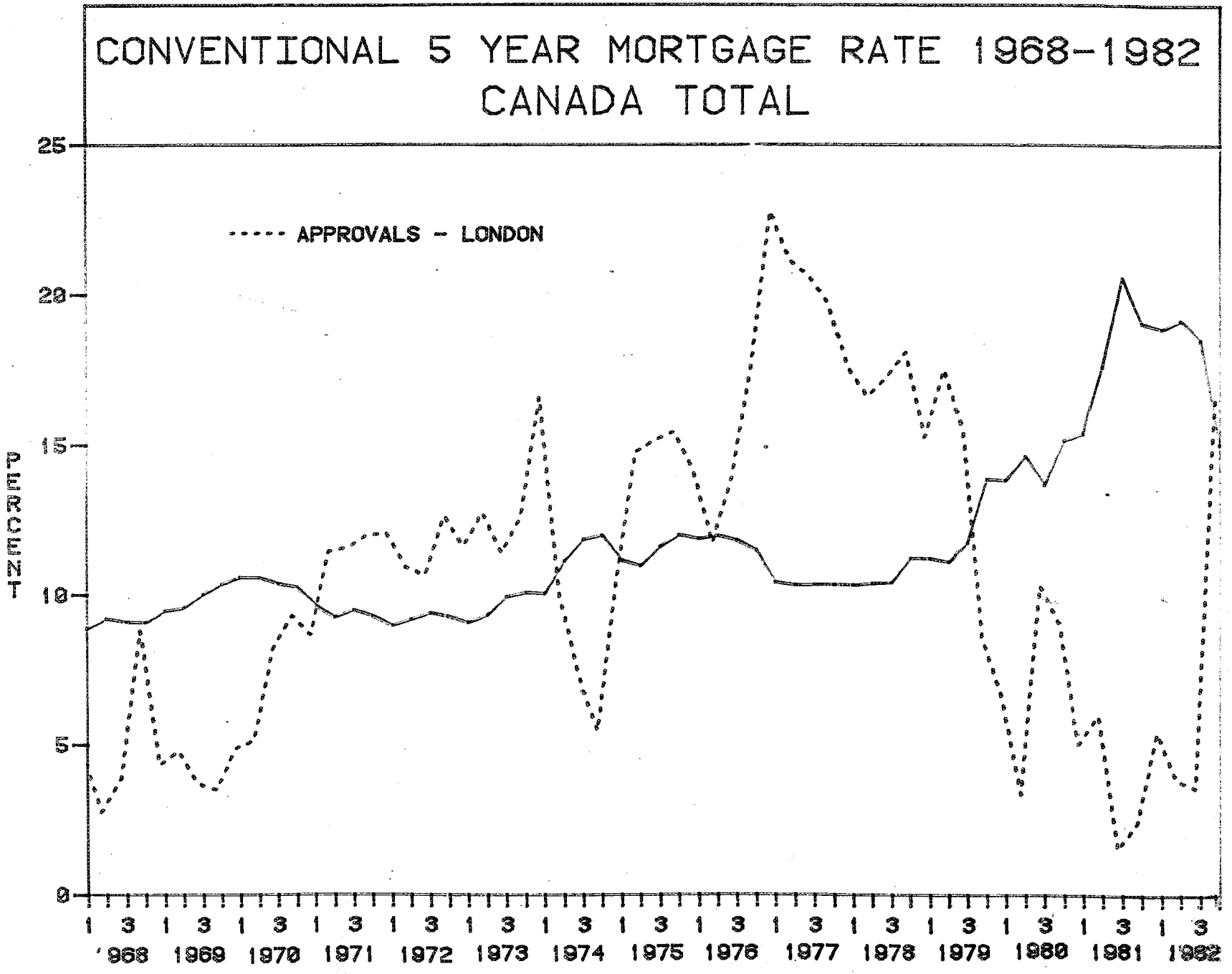

EMPLOYMENT INDEX-INDUSTRIAL COMPOSITE 1968-1982
BRITISH COLUMBIA
APPROVALS - BRITISH COLUMBIA
EMPLOYMENT INDEX
200
180
160
140
120
100
1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3
1968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982

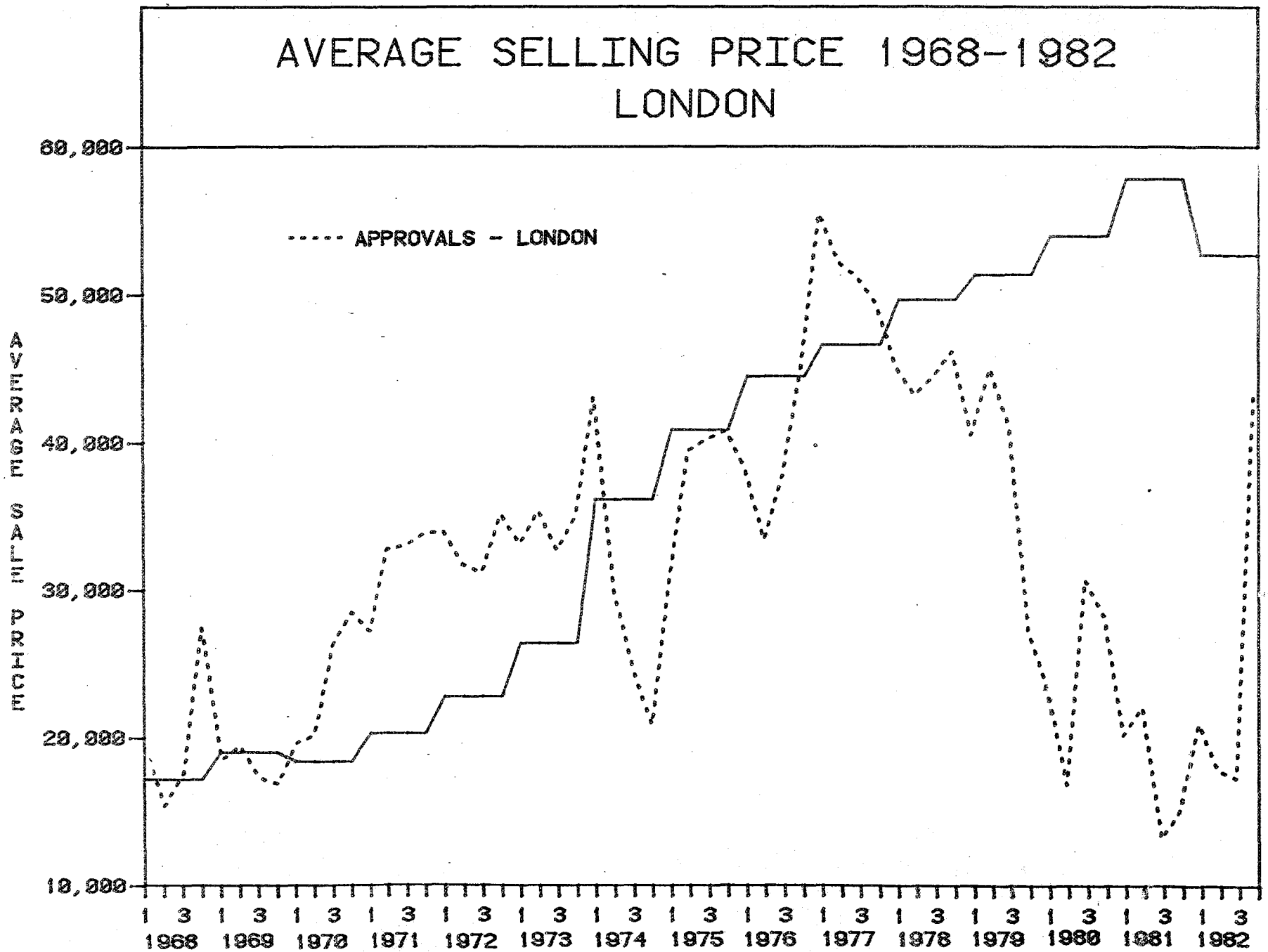

UNEMPLOYMENT RATE 1968-1982
BRITISH COLUMBIA
----- APPROVALS - BRITISH COLUMBIA
PERCENT
20
15
10
5
0
1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3
1968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982

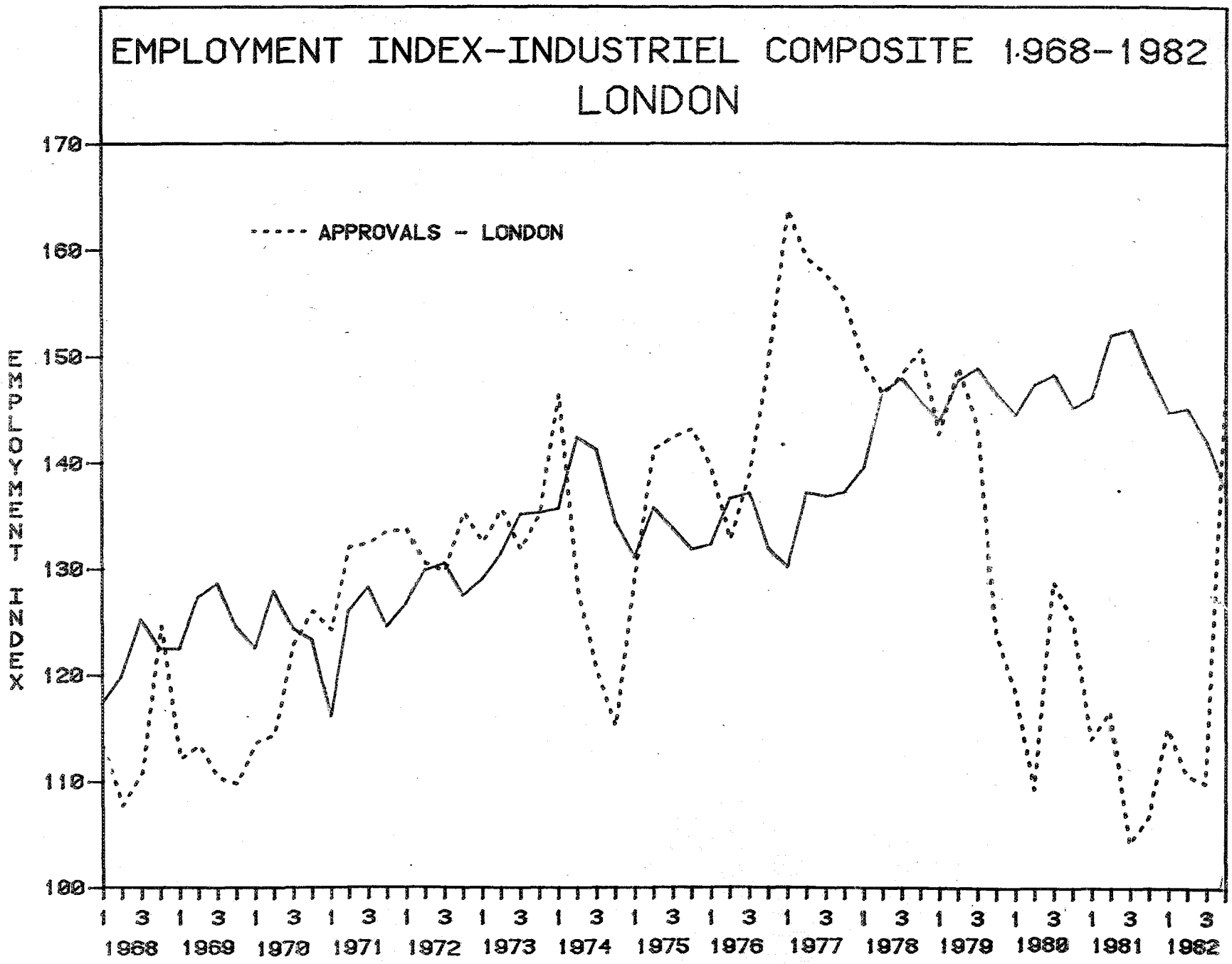

SALE TO LISTING RATIO OF M.L.S. PROPERTIES 1968-1982
BRITISH COLUMBIA
----- APPROVALS - BRITISH COLUMBIA
PERCENT
90
80
70
60
50
40
30
20
10
1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3
1968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982

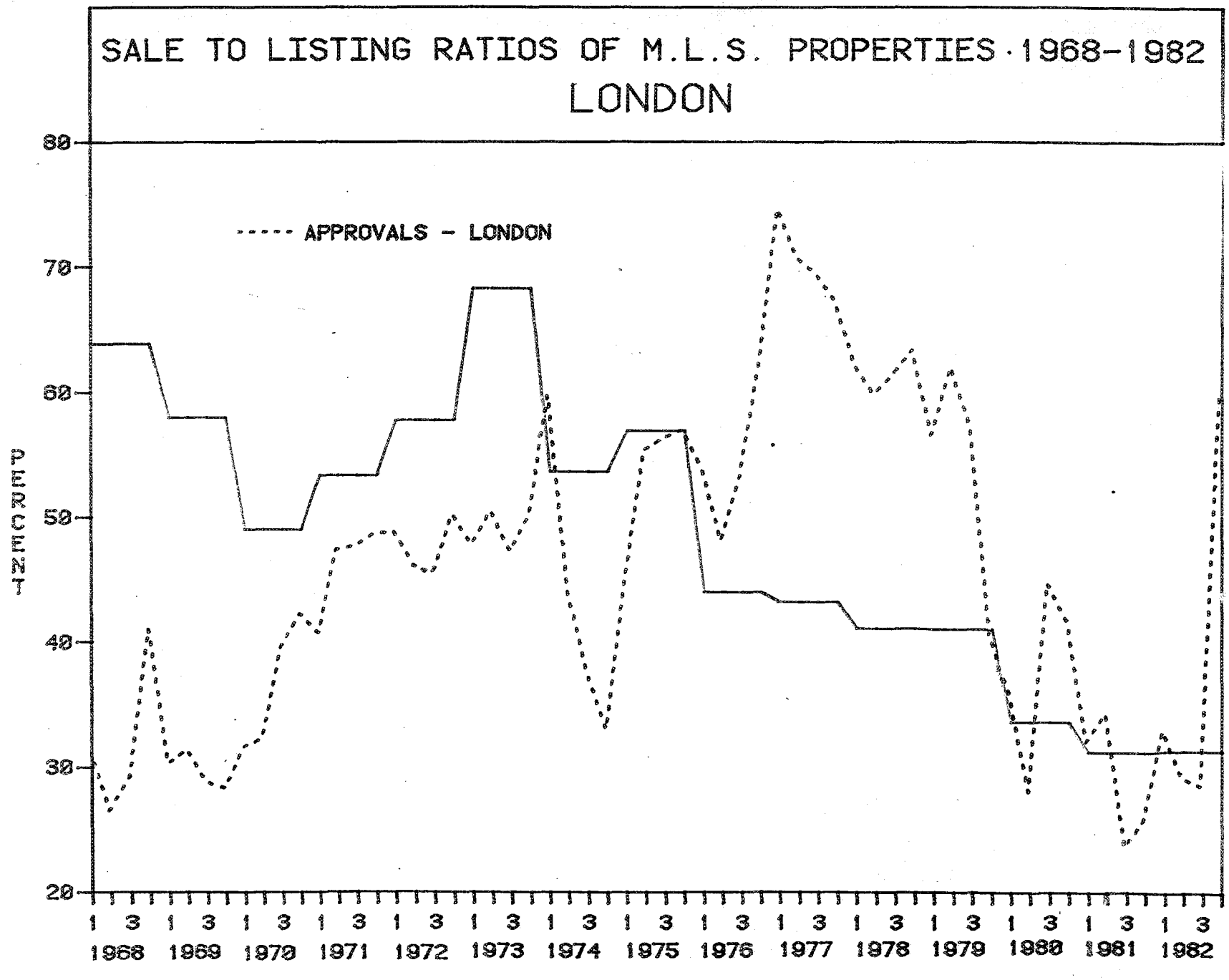

CHEQUES CASHED (VALUE) IN CLEARING CENTRES 1968-1982
BRITISH COLUMBIA
----- APPROVALS - BRITISH COLUMBIA
150,000
120,000
90,000
60,000
30,000
0
1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3
1968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982

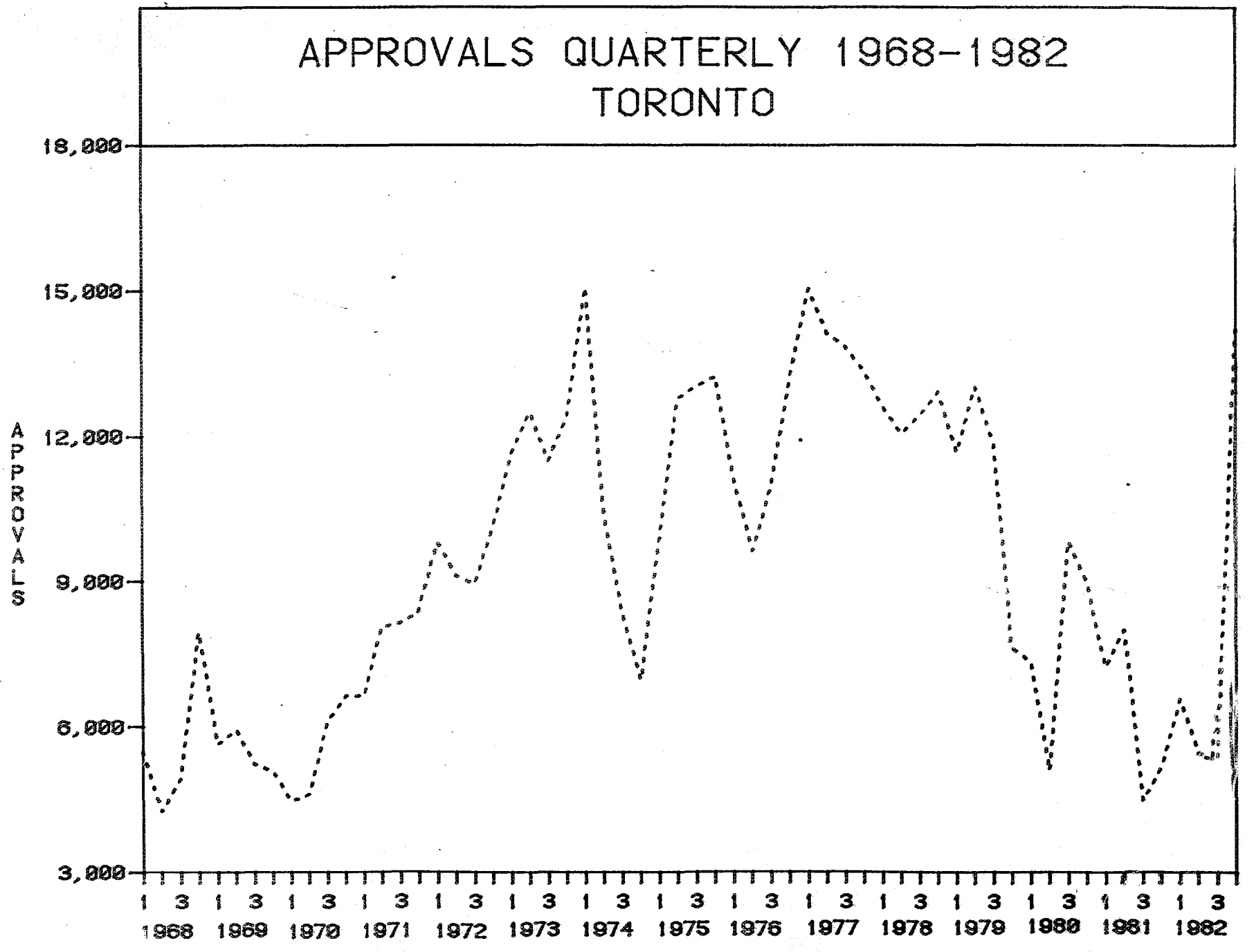

APPROVALS QUARTERLY 1968-1982
LONDON
APPROVALS
2,100
1,800
1,500
1,200
900
600
300
1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3
1968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982

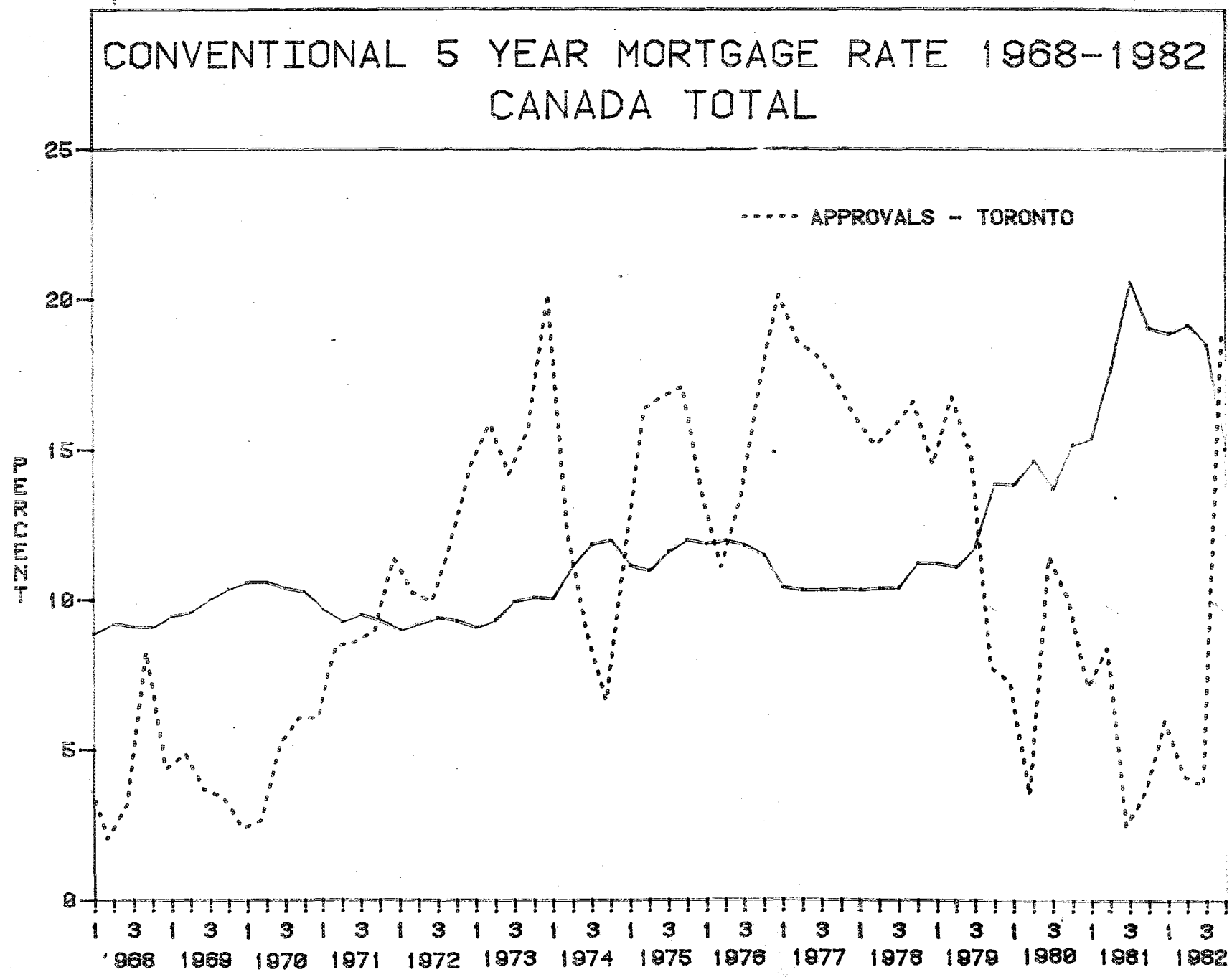

CONVENTIONAL 5 YEAR MORTGAGE RATE 1968-1982
CANADA TOTAL
----- APPROVALS - LONDON
PERCENT
25
20
15
10
5
0
1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3
1968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982

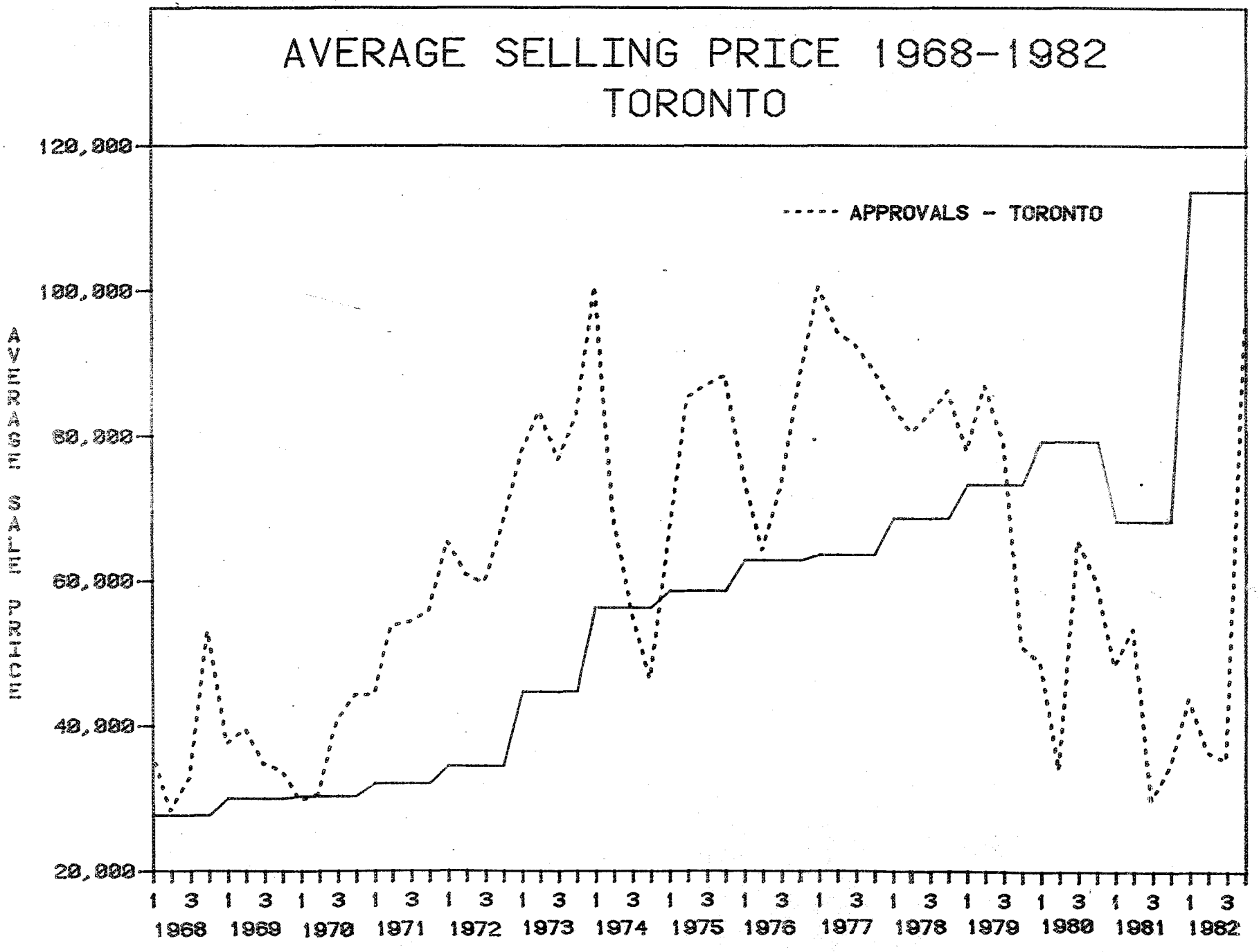

AVERAGE SELLING PRICE 1968-1982
LONDON
----- APPROVALS - LONDON
AVERAGE MEAN PRICE
60,000
50,000
40,000
30,000
20,000
10,000
1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3
1968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982

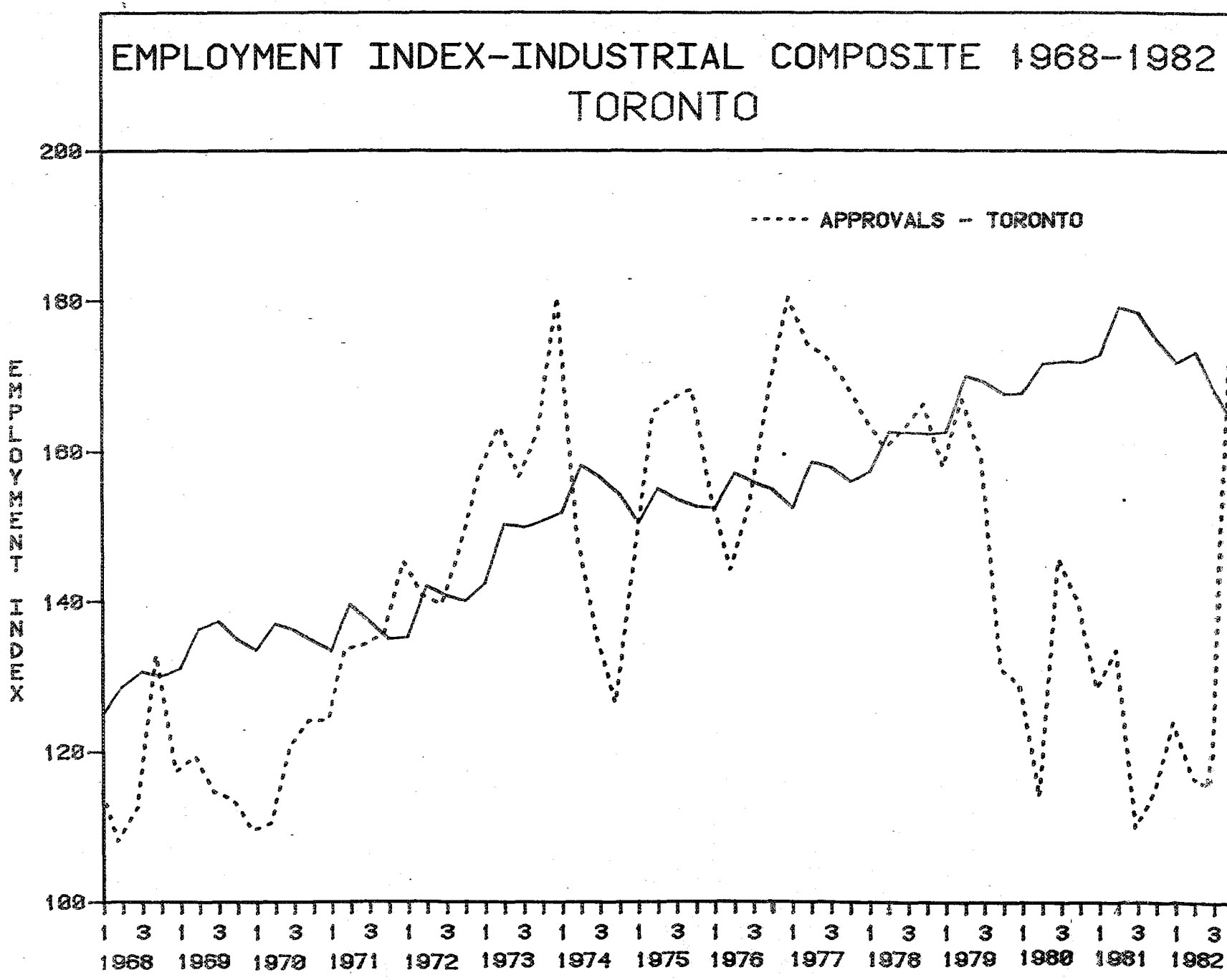

EMPLOYMENT INDEX-INDUSTRIEL COMPOSITE 1968-1982
LONDON
APPROVALS - LONDON
INDEX 1967=100
170
160
150
140
130
120
110
100
1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3
1968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982

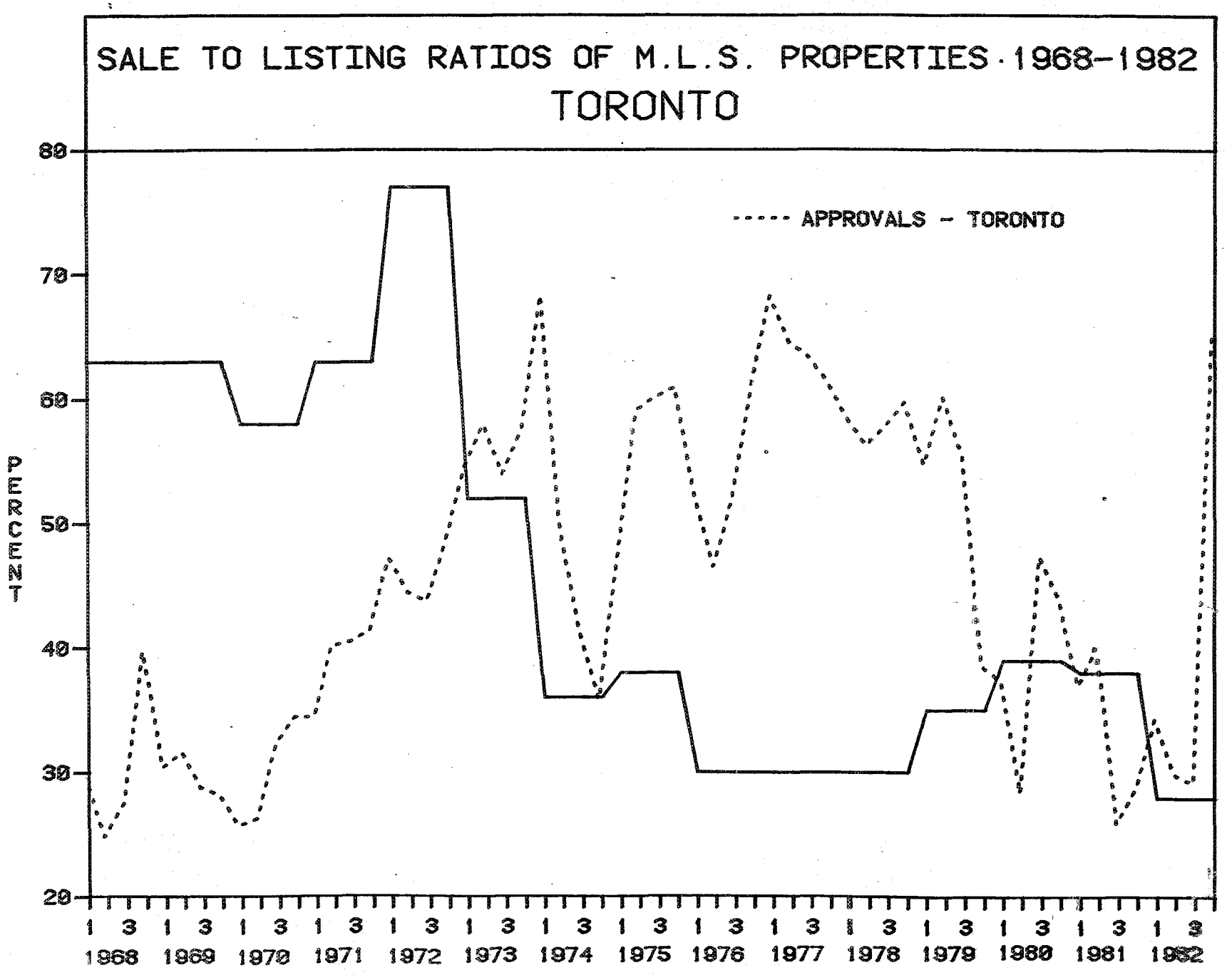

SALE TO LISTING RATIOS OF M.L.S. PROPERTIES · 1968-1982
LONDON
----- APPROVALS - LONDON
PERCENT
80
70
60
50
40
30
20
1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3
1968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982

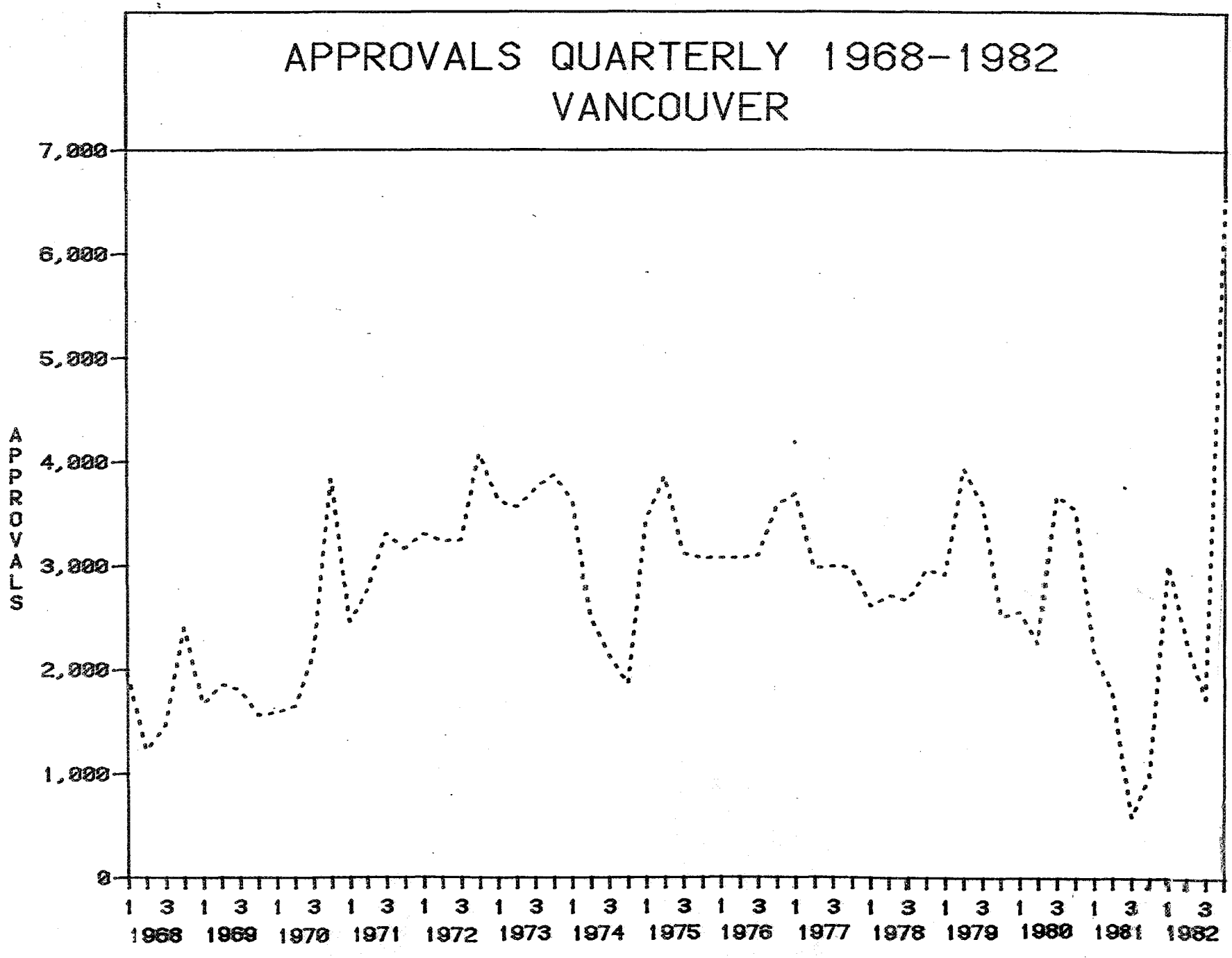

APPROVALS QUARTERLY 1968-1982
TORONTO
APPROVALS
18,000
15,000
12,000
9,000
6,000
3,000
1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3
1968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982

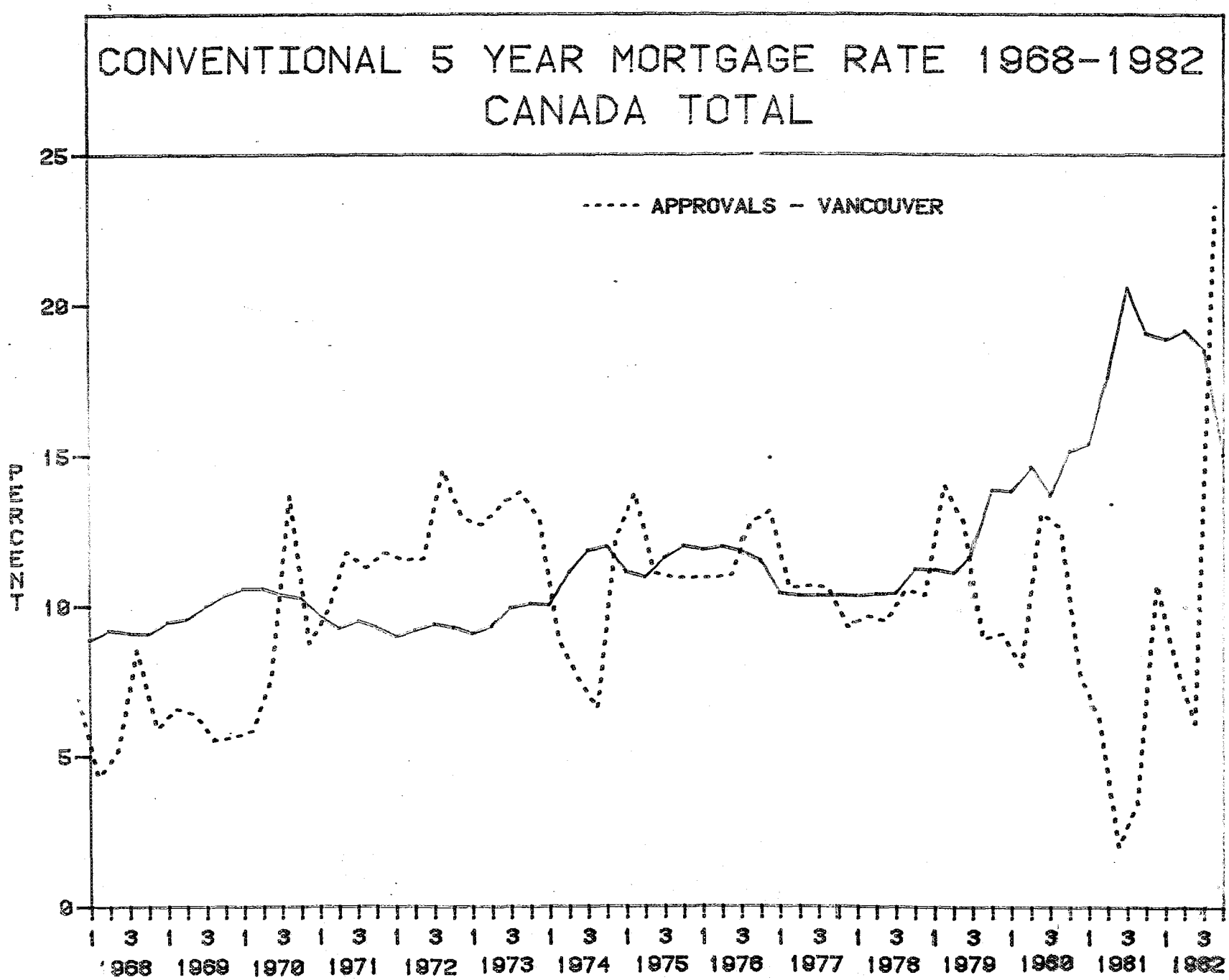

CONVENTIONAL 5 YEAR MORTGAGE RATE 1968-1982
CANADA TOTAL
APPROVALS - TORONTO
25
20
15
10
5
0
1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3
1968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982

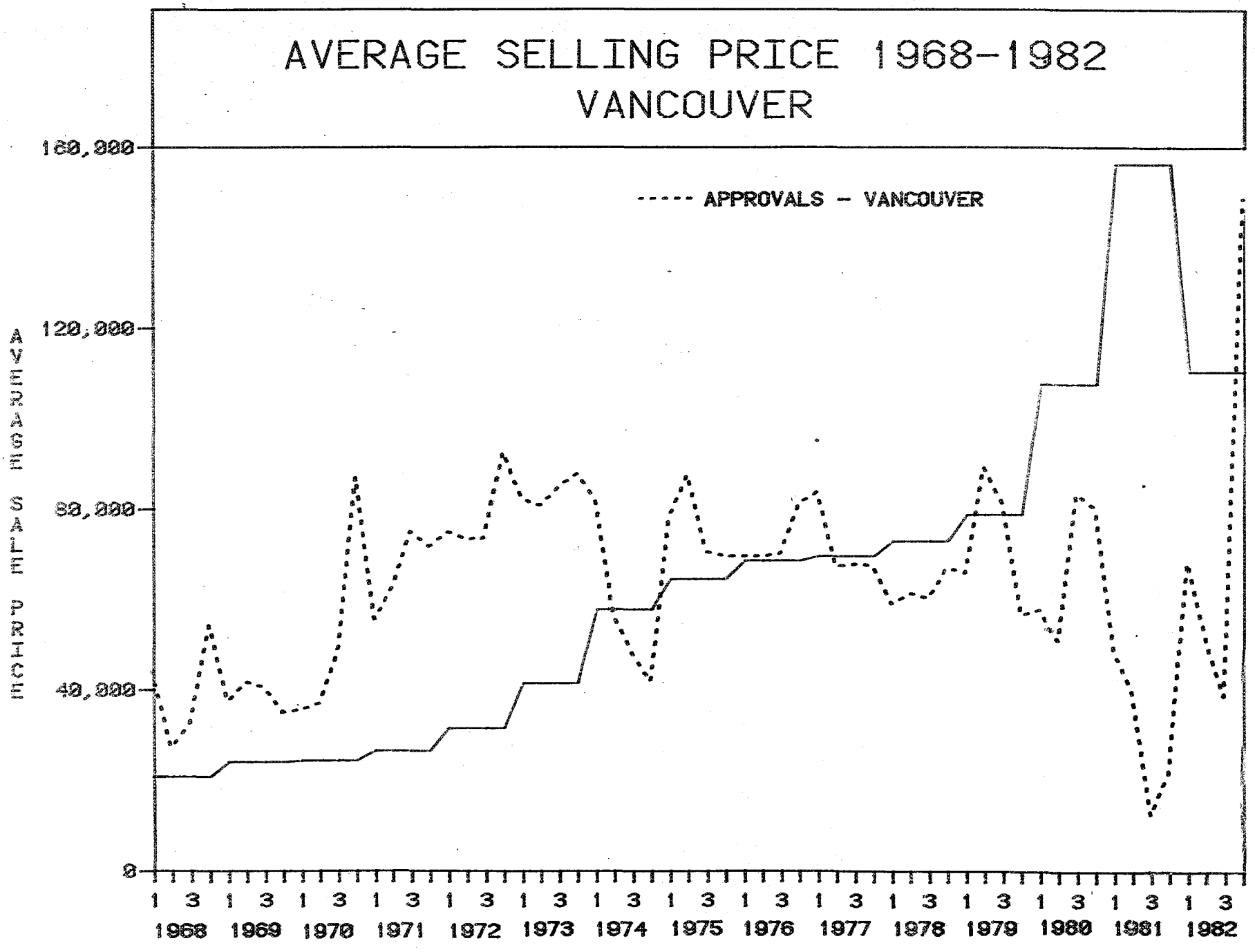

AVERAGE SELLING PRICE 1968-1982
TORONTO
120,000
100,000
80,000
60,000
40,000
20,000
----- APPROVALS - TORONTO
1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3
1968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982

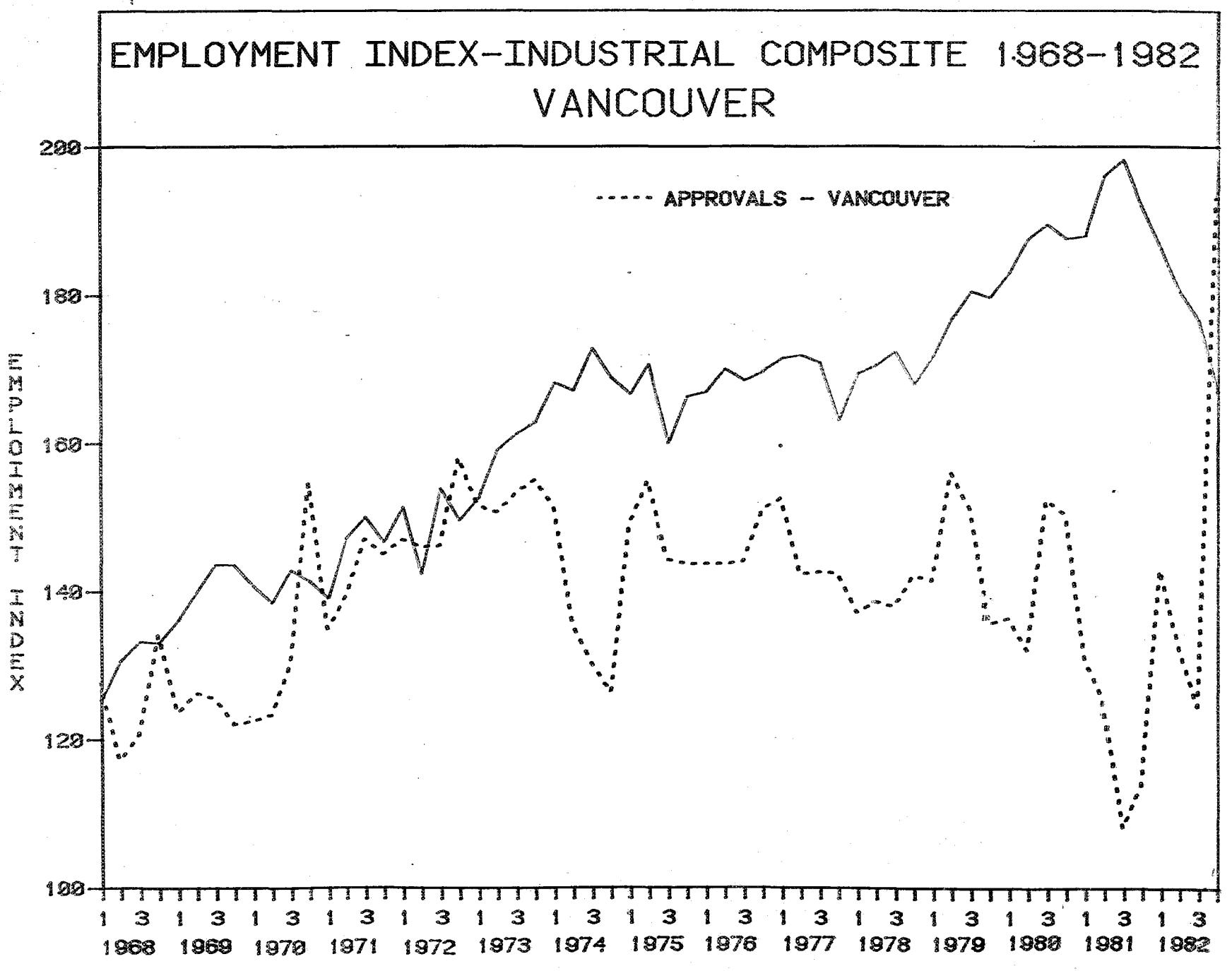

EMPLOYMENT INDEX-INDUSTRIAL COMPOSITE 1968-1982
TORONTO
----- APPROVALS - TORONTO
EMPLOYMENT INDEX
200
180
160
140
120
100
1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3
1968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982

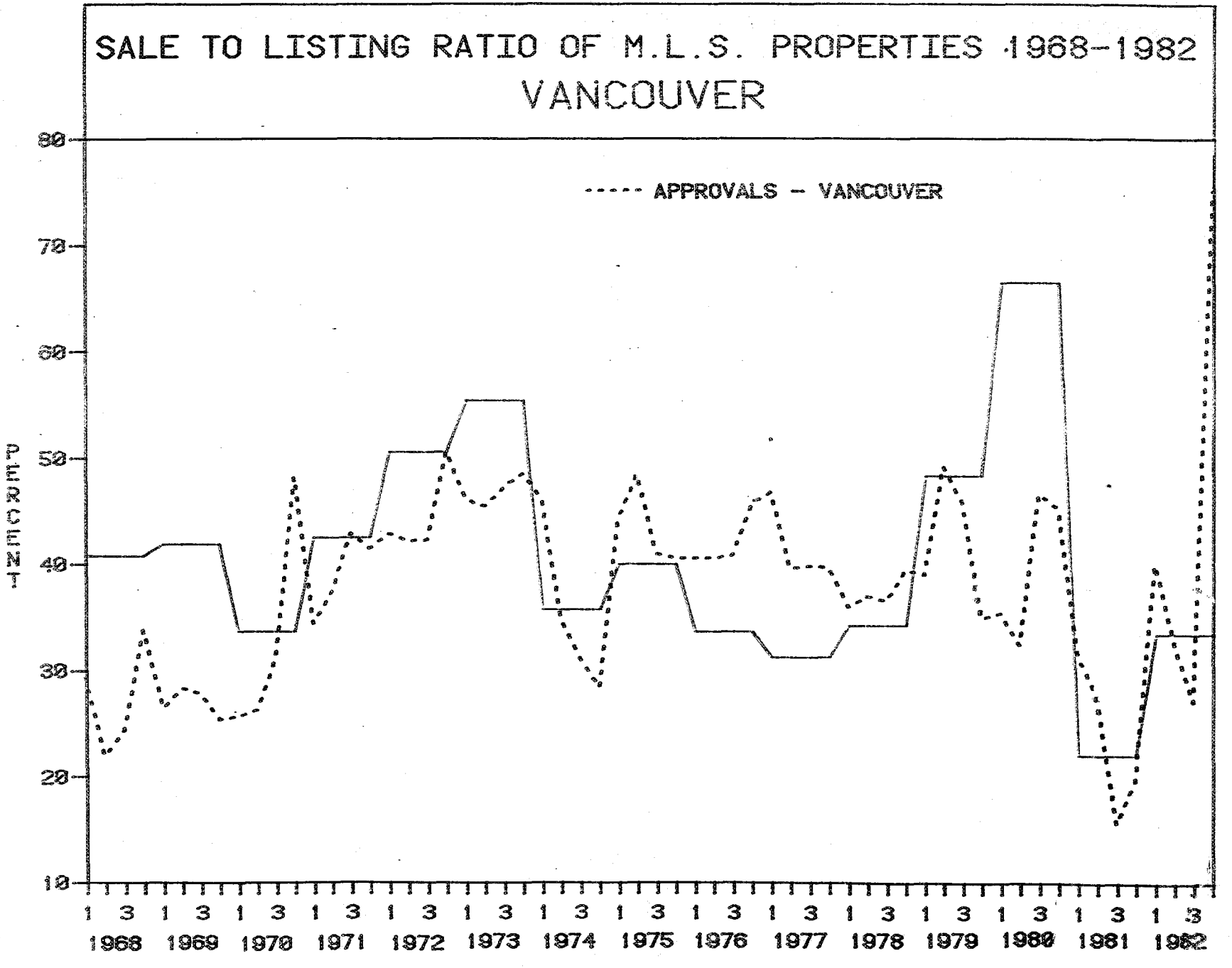

SALE TO LISTING RATIOS OF M.L.S. PROPERTIES · 1968–1982
TORONTO
----- APPROVALS – TORONTO
PERCENT
80
70
60
50
40
30
20
1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3
1968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982


APPROVALS QUARTERLY 1968-1982
VANCOUVER
APPROVALS
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3
1968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982


CONVENTIONAL 5 YEAR MORTGAGE RATE 1968-1982
CANADA TOTAL
APPROVALS - VANCOUVER
PERCENT
25
20
15
10
5
0
1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3
1968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982


AVERAGE SELLING PRICE 1968-1982
VANCOUVER
----- APPROVALS - VANCOUVER
160,000
120,000
80,000
40,000
0
AVERAGE MEAN SELLING PRICE
1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3
1968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982


EMPLOYMENT INDEX-INDUSTRIAL COMPOSITE 1968-1982
VANCOUVER
----- APPROVALS - VANCOUVER
INDEX - 1981=100
200
180
160
140
120
100
1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3
1968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982


SALE TO LISTING RATIO OF M.L.S. PROPERTIES 1968-1982
VANCOUVER
----- APPROVALS - VANCOUVER
80
70
60
50
40
30
20
10
1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3
1968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982