CANADIAN WAGE AND PRICE CONTROLS: EVALUATING THE IMPACT OF THE ANTI-INFLATION BOARD UPON PRIVATE AND PUBLIC SECTOR WAGE SETTLEMENTS

by

ROBERT MARTIN ANDERTON
B.A., City of London Polytechnic, 1982

A THESIS SUBMITTED IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF ARTS

In the Department
of
Economics

We accept this thesis as conforming
to the required standard

[redacted]
Dr. J. Schaafsma

[redacted]
Dr. W.D. Walsh

[redacted]
Dr. J. McRae

[redacted]
Dr. R.J. Wilson

Supervisor: DR. J. Schaafsma

ABSTRACT

An econometric wage equation is developed and is used to calculate the effect of the AIB wage guidelines upon negotiated wage settlements in the public and private sectors. The general specification of the wage equation is based upon two main explanatory variables; the expected rate of inflation and the excess demand for labour.

This study experiments with five different methods of calculating the expected rate of inflation. The results indicate that the best method of estimating price expectations is by entering the past rates of change of the CPI directly into the wage equation, thus capturing the price expectations information that is contained in each observation of the wage data. Therefore, this price expectations proxy is used throughout the analysis. Two of the unsuccessful experimental methods of calculating price expectations are based upon past rates of change of the money supply. The results show that past growth rates of the money supply are not significant variables in the price expectations formation mechanism of wage negotiators. Therefore, it is concluded that the strategy of Monetary Gradualism was not responsible for reducing wage inflation , by decreasing price expectations, during the period of the AIB guidelines.

A distributed lag of the unemployment rate is used as one component of the excess demand for labour proxy variable. A proxy variable designed to represent movements in the natural rate of unemployment (U_n) is included in the wage equations in order to adjust the above unemployment rate so that the excess demand for labour variable approximates $U_t - U_n$. Three different possible proxy variables for U_n are evaluated. Of these three, the proxy variable designed to indicate changes in the generosity of the UIC system is the best variable to represent changes in U_n. Estimated regressions reveal that the linear version of the excess demand variable is the most appropriate specification for the wage equations as it provides more explanatory power concerning wage movements than the non linear version.

Three intercept shift dummy variables are included in the wage equations in order to reveal the impact of the AIB upon the rate of wage change. The first AIB dummy variable registers the effect of the AIB upon wage inflation during the actual guidelines period. Almost all of the empirical results for this dummy variable indicate that, during the period of the AIB guidelines, the rate of wage increase was substantially lower than that which would have occurred in tha absence of the AIB. Furthermore, the results consistently show that the AIB reduced wage inflation in the private sector to a greater extent than in the public sector.

The other two AIB dummy variables are designed to indicate whether the AIB affected wage inflation outside of the actual guidelines period by inducing an 'anticipation effect' and/or a wage 'explosion'. All of the wage equations display dummy variables which agree that a wage 'explosion' was not present in the immediate post-AIB period. Similarly, the empirical results reveal that an 'anticipation effect' did not occur in the immediate pre-AIB period in the private sector. However, the 'anticipation effect' dummy variable is both positive and statistically significant in the public sector. Unfortunately, it is unclear as to whether this dummy variable actually represents an 'anticipation effect' as it is possible that other reasons are responsible for the statistical significance of this variable.

Examiners:

[redacted]

Dr. J. Schaafsma

[redacted]

Dr. W.D. Walsh

[redacted]

Dr. J. McRae

[redacted]

Dr. R.J. Wilson

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ACKNOWLEDGEMENT

I would like to express my appreciation to Dr. J. Schaafsma for the useful advice and constructive criticism that I received from him during the writing of this thesis. I would also like to extend my thanks to the other members of the committee, Dr. W.D. Walsh (Department of Economics) and Dr. J. McRae (School of Public Administration).

Chapter I

INTRODUCTION

1.1 THE ANTI-INFLATION PROGRAM (AIP)

A three year program of wage and price controls was imposed upon the Canadian Economy in October 1975. These controls, which were administered by the Anti-Inflation Board, were part of a larger anti-inflation package which also included restrictive monetary and fiscal policies.[1] The government adopted a package of anti-inflation measures because it did not want to reduce inflation by using extremely severe monetary and fiscal restraint. The government wanted to avoid the inevitable increased unemployment, decreased output and recessionary effects of a policy of severe restraint. However, although the government desired a policy which would enable a transition to a lower inflation rate without causing the above recessionary effects, it also believed that monetary and fiscal restraint were necessary in order to maintain a permanent lowering of the inflation rate. Therefore, temporary wage and price controls were to be used in order to force wage and price inflation down to a lower rate

[1] See Macdonald (1975) for further information concerning the specific policies of the AIP.

and also to reduce price expectations. Simultaneously, monetary and fiscal restraint would also be applied so that in the post wage and price controls period the relevant economic variables would be at levels which were only sufficient to validate the new lower inflation rate. The following statement by the Department of Finance should provide a clearer understanding of the economic reasoning behind the introduction of the anti-inflation package;

> "The economic circumstances leading up to the AIP were bleak. Output growth had declined significantly; a deteriorating competitive position vis-a-vis the U.S was threatening to cause serious balance of payments problems; the unemployment rate had risen to above 6 percent; and the country was experiencing double-digit rates of inflation with rising inflation expectations. An attempt to obtain public consensus on wage and price restraint had failed.
>
> In these circumstances, sole reliance upon demand management policies in combatting inflation was rejected, because of the extent of the output losses and the higher unemployment rates which would likely have resulted. Instead, the AIP, which was designed to directly reduce the rate of growth of wages and prices, and through this to reduce inflationary expectations was also introduced. Consistent monetary and fiscal policies were regarded, however, as an essential part of the AIP.
>
> The purpose of incomes policy is to reduce inflation by shifting the short-term inflation-unemployment trade-off curve towards the origin, so that at any given unemployment rate the rate of inflation will be reduced. If incomes policies succeed in this aim and if they are in place for a sufficient length of time, then it is likely that expectations of inflation will also be reduced. If this happens, then the short term trade-off curve will not shift outwards once the incomes policies are removed. Temporary incomes policies

> will have succeeded in reducing price expectations and shifting the trade-off curve directly , so that less unemployment is required to achieve a given reduction in inflation."[2]

1.2 THESIS OUTLINE

This thesis is only concerned with the wage controls component of the AIP. Specifically, the main objective of this thesis is to ascertain whether the imposition of the wage guidelines resulted in the rate of wage increase being lower than that which would have prevailed in the absence of the Anti-Inflation Board (AIB).

Other studies have also attempted to calculate the impact of the AIB upon wage inflation.[3] However, this thesis will provide some additional information regarding the effect of the AIB upon the rate of wage change as this study contains elements which are substantially different from other studies. These differences include an attempt to discover if the AIB also affected wages outside of the actual controls period, by inducing an 'anticipation effect' and/or a wage 'bubble', and an analysis of how inflationary expectations are formed. Furthermore, a more extensive data set is used in this thesis which includes data that were not available when the other studies were completed.

++++++++++++++++++++

[2] Department of Finance (1978). P.51.

[3] Four of these studies will be reviewed in the next chapter.

The majority of wage equations used in previous studies are composed of two main variables; price expectations and the excess demand for labour. As neither of these variables are directly observable, proxy variables must be used in order to represent the true variables. Several different proxy variables are employed in this thesis. Some of the proxies used here are quite similar to those used in other studies but other proxies are very different.

Some doubts may be raised concerning the validity of the empirical results because of the fact that proxy variables have to be used instead of the true variables as the latter are unavailable. Therefore, this thesis uses several different proxy variables in order to discover how sensitive the results are to the exact specification of the proxies. Furthermore, the reliability of the results will be enhanced if all of the proxies yield similar results concerning the impact of the AIB upon wages. In addition, the use of certain proxies for price expectations will provide some useful information concerning the effect of the strategy of Monetary Gradualism upon wage inflation.

1.2.1 Contents of Individual Chapters

This thesis consists of five chapters. Chapter Two follows the introductory chapter and briefly describes the system of wage controls administered by the AIB and then reviews four

major studies concerned with the impact of the AIB upon wage inflation. Chapter Three begins with a detailed outline of the objectives of this thesis and also lists the ways in which this study differs from previous research. The specification of the wage equation is then explained and this is followed by a description of all the variables connected with the wage equation. The method used to measure the impact of the AIB upon wages is then described and, finally, the possible relative magnitudes of the AIB effect upon wage increases for the public and private sectors is explored. Chapter Four contains an analysis and interpretation of the empirical results. The final chapter briefly summarises the main findings of this thesis and compares the empirical results of this study with the results of other studies.

Chapter II

DESCRIPTION OF THE AIB GUIDELINES AND LITERATURE REVIEW

This chapter explains the functions of the AIB and briefly summarises the regulations of the wage controls program. The possible effects of these controls are examined and a number of studies which have attempted to measure the impact of the AIB upon the rate of wage increase are reviewed.

2.1 THE INTRODUCTION OF A PRICES AND INCOMES POLICY

A three year anti-inflation package was outlined in the government white paper, 'Attack on Inflation: A Program of National Action'.[4] Included among the four basic elements of this anti-inflation package was a prices and incomes policy. The Anti-Inflation Act of December 1975 provided details of the prices and incomes policy which included wage and price guidelines for the next three years (beginning on October 14, 1975). It was the duty of the Anti-Inflation Board to endeavour to ensure that wages and prices increased in line with these guidelines.

++++++++++++++++++++

[4] See Macdonald (1975) for the complete details on this government white paper.

All federal government employees and private companies with more than 500 employees had to comply with the wage guidelines. The guidelines for wage increases were outlined for a period of three years and were as follows; 10 percent for the first year, 8 percent for the second year and 6 percent for the last year. In addition, these general wage guidelines would be revised for individual bargaining groups according to an 'experience adjustment factor' which took into consideration the wage increases negotiated by groups in the period preceding the introduction of the controls program. The 'experience adjustment factor' could lead to the wage guideline for any specific group being increased/decreased, by up to a maximum of 2 percent per year during the guideline years, if the rate of wage increase received by these groups in the pre-AIB period was below/above a certain rate. Consequently, the average wage guidelines over the three year period amounted to 9.7 percent, 7.4 percent and 5.6 percent.[5]

Wage increases were expected to comply with the guidelines but some negotiated wage increases were higher than the guidelines. Therefore, the usual procedure was to implement a wage roll-back which would bring the wage increase closer to the guideline.

++++++++++++++++++++

[5] These average guidelines are taken from the Anti-Inflation Board (1979) Final Report P.8.

2.2 THE IMPACT OF THE GUIDELINES UPON WAGE INCREASES

There are several ways in which wages may have responded to the imposition of the guidelines. As the guidelines were designed to reduce wage inflation, it is likely that wage increases had to be decreased in order to satisfy the guidelines. However, other reactions to the guidelines are also possible. It may have been the case that the guidelines were too high, thus resulting in the guidelines acting as a wage floor instead of a wage ceiling. Or the guidelines may have had no effect on wages at all as the wage negotiators may have agreed upon wage settlements which were higher than they really desired so that the post roll-back settlement would equal the wage increase they would have agreed upon in the absence of the controls program.

It is the purpose of this thesis to determine the magnitude and direction of the impact upon wage inflation of the AIB controls program. A number of studies on this subject have already been completed. The methods and results of these studies are reviewed in the next section. This review will also serve as a background against which the differences in the approach adopted in this thesis are highlighted.

2.3 REVIEW OF EARLIER STUDIES

2.3.1 L.N.Christofides and D.A.Wilton (1979)

The objective of this study is to ascertain the 'indirect' effects of the Anti-Inflation Board upon wage settlements in the private and public sectors. The 'direct' effects of the AIB are defined as the actual roll-backs enforced by the AIB. The 'indirect' effects of the AIB are defined as the extent to which the size of wage agreements are altered by the mere existence of the AIB, and its guidelines, prior to any direct intervention in the form of roll-backs. In order to capture the 'indirect' effects, the authors employ micro data that only include individual negotiated wage settlements prior to any AIB roll-backs.

The econometric wage equation employed by C+W[6] is a very common specification for models that attempt to explain wage movements and it is similar to the specifications used in the other studies that will be mentioned below. The model is as follows;

$$1) \quad W_t = \beta_0 + \beta_1 X_t + \beta_2 PE_t + \beta_3[\{(PA_{t-1} - \beta_2 PE_{t-1})\, L_{t-1}\}/L_t]$$

where;

W_t = The annual percentage increase/decrease in the base wage rate of the current contract.

++++++++++++++++++++

[6] C+W is an abbreviation for 'Christofides and Wilton'.

X_t = A proxy variable representing the excess demand for labour.

PE_t = A proxy variable for price expectations (i.e. the expected annual percentage change in the CPI during the current contract).

PA_{t-1} = The actual annual percentage change in the CPI over the whole preceding contract.

L_t = Duration of the current contract in years.

The whole expression immediately following the coefficient β_3 is a 'Price Catch Up' variable.

The model is estimated using a combination of quarterly time-series and cross-section data (i.e micro data). Furthermore, the data base contains detailed information concerning wage contract dates, the number of employees in the bargaining group, industrial and geographic codes, etc.

2.3.1.1 W_t, the Dependent Variable

W_t is the total percentage change in the base wage rate negotiated for the life of the contract expressed as an annual compound rate. Contracts with a COLA clause are excluded from the wage data. As the wage data consists of micro-data

then each particular wage contract is treated as an individual observation. The wage data contains information relating to 5,133 private and public sector wage contracts that were negotiated during the period 1966:1 to 1978:2.

2.3.1.2 Proxy Variable For Price Expectations

Price expectations are included in the model as it seems rational that if employees anticipate that the inflation rate will increase during the effective period of the contract that is currently being negotiated , then these workers will attempt to offset this expected higher inflation rate by claiming a larger wage settlement. However, as actual price expectations are, of course, unobservable, a proxy variable must be constructed.

Christofides and Wilton devise a proxy variable for price expectations by assuming that the rates of price inflation that occurred in the past can explain current and future rates of price inflation. In addition, it is also assumed that economic decision makers are aware of the above relationship and that they use this information to predict future inflation rates. Therefore, the authors estimated the following second-degree Almon lag polynomial equation for the period 1964:1 to 1975:3 ;

$$2) \quad P_t = \underset{(0.81)}{0.0015} + \underset{(1.84)}{0.2174}P_{t-1} + \underset{(3.28)}{0.1917}P_{t-2} + \underset{(6.87)}{0.1656}P_{t-3}$$

$$+ 0.1391P_{t-4} + 0.1121P_{t-5} + 0.0847P_{t-6} + 0.0569P_{t-7}$$

(3.63) (2.0) (1.36) (1.03)

$+ 0.0287P_{t-8}$
(0.83)

$R^2 = 0.52$. 'T' statistics are in parentheses.

A forecast of the quarterly change in the CPI for each quarter of the life of the current contract is calculated by using the above estimated structural coefficients and the actual, past values of the CPI. These forecasts are then used to estimate an annual compound expected inflation rate for each PE observation.

2.3.1.3 Proxy Variable for the Excess Demand for Labour

Christofides and Wilton reject the use of the usual excess demand for labour proxy, namely the unemployment rate, because they believe that the relationship between the excess demand for labour and the unemployment rate has not been stable because of a non-constant natural rate of unemployment.[7] The authors prefer to use the vacancy rate , specifically the 'help wanted' index, as the measure for excess labour demand. The use of micro data enables C+W to obtain a more precise excess demand variable by making it possible to specify the most appropriate 'regionalised' help wanted in-

[7] C+W claim that the Unemployment Insurance Act of 1971, by altering the conditions concerning eligibility for UIC, may possibly have shifted the relationship between excess demand and unemployment by increasing the amount of unemployment associated with every level of the excess demand for labour.

dex for each individual wage contract.

2.3.1.4 Price Catch Up Variable

C+W also develop a theory which describes the reactions of wage negotiators to the gains or losses that occur due to incorrect forecasts of price inflation. The authors hypothesize that when new contracts are being negotiated any incorrect inflation forecasts that occurred during the previous contract will not be forgotten. C+W therefore argue that one element of the currently negotiated contract will be a sum that will compensate for unanticipated inflation that occurred during the previous contract period. Consequently, the authors include a price catch up variable in their wage equations. The PCU variable is calculated in two stages. The first step is to compute the difference between the actual annual inflation rate that occurred over the life of the last contract and the amount of expected annual inflation that was included in the wage increase for the previous contract. The second step is to multiply the above difference by the length of the previous contract (in years) and then divide by the number of years in the present contract in order to obtain the PCU component of each wage settlement (i.e PCU = $\{[PA_{t-1} - \beta_2 PE_{t-1}]L_{t-1}\}/L_t$).[8]

[8] An advantage associated with the use of the micro data is that the correct length of 'catch-up' period can be specified for each individual wage contract.

The inclusion of the PCU variable also has implications for the proxy variable for price expectations. Phelps (1967) and Friedman (1968) argued that the coefficient of the price expectations variable, which is purely ex ante compensation, should have a value of unity in order to be consistent with the absence of money illusion. However, when the PCU variable is included in the wage equation, it is implied that both negotiating parties realise that compensation for previous rates of inflation will always take place, thus negating the necessity for the total amount of expected future inflation to be taken into account by the currently negotiated contract. In other words, the coefficient for the price expectations variable need not be unity when ex post compensation is possible.

2.3.1.5 Estimated Wage Equations

Using OLS, Christofides and Wilton obtained the results displayed in Table 2.1 by estimating the above equation for the pre-AIB period (1966:1 - 1975:3).[9]

On the basis of a standard F-test, Christofides and Wilton discover that the wage equations for the private and public sectors are structurally different. Therefore, they

[9] Throughout this thesis, the R^2 statistic is actually the corrected R^2 (i.e all of the R^2 statistics have been corrected for the dependence of the goodness of fit on the number of degrees of freedom).

TABLE 2.1

ESTIMATED WAGE EQUATIONS FOR THE PRE-AIB PERIOD

SECTOR	CONSTANT	P.C.U	PE	X	R^2
Private	3.386	0.57	0.371	2.025	0.428
	(9.01)	(18.43)	(6.92)	(5.15)	
Public	1.286	0.647	0.302	3.418	0.409
	(1.73)	(12.73)	(2.91)	(4.84)	

'T' statistics are in parentheses.

continue to estimate separate wage equations for the two sectors instead of pooling the data.

2.3.1.6 Counterfactual Forecasts

One of the methods used by Christofides and Wilton to estimate the impact of the AIB is the 'counterfactual forecasting' technique. This method assumes that, in the absence of the AIB, the structural parameters of the estimated wage equation displayed in Table 2.1, would also have been applicable to the post-estimation period. In other words, it is implied that the structure of the wage equation in the period 1966:1 to 1975:2 is the same as the structure prevailing in the period 1975:4 to 1978:3. If this is indeed the case, then the wage settlements which would have occurred in the

absence of the AIB can be forecast by using the estimated structural parameters of the wage equation combined with the actual values of the independent variables that prevailed during the period of the AIB.

Using this technique, Christofides and Wilton find that the structural forecasts for wage settlements during the AIB period are consistently above the actual values that occurred during this period, which suggests that the AIB did influence the rate of wage change in a downward direction. The counterfactual forecasts reveal an average overprediction for the private sector of 3.76 percent per year and an average overprediction of 4.36 percent per year in the public sector.

2.3.1.7 Structural Shift Analysis

Christofides and Wilton also attempt to ascertain the effect of the AIB upon wage settlements by testing to see if a structural shift occurred when the AIB guidelines became effective. Therefore, the authors added an intercept dummy variable to the wage equation and estimated the equation using the complete data set (1966:1 to 1978:2). The sign , size and significance of this dummy variable, which has a value of 1 during the AIB period and zero otherwise, will reveal the impact of the AIB upon the rate of wage change. The econometric results are shown in table 2.2 below.

TABLE 2.2

STRUCTURAL SHIFT WAGE EQUATIONS

SECTOR	Constant	PE	P.C.U	X	D
Private	3.385	0.465	0.495	2.037	-3.229
	(11.70)	(12.98)	(22.23)	(7.75)	(16.99)
Public	2.652	0.443	0.525	2.657	-3.675
	(5.71)	(8.48)	(6.97)	(8.11)	(14.88)

'T' statistics are in parentheses.

The intercept dummy variable regressions indicate that a structural shift did occur (i.e the dummy variable is significant in both equations) and that the rate of increase for new wage settlements was apparently 3.2 percent and 3.6 percent lower during the AIB period for the private and public sectors, respectively. It should be noted that this type of analysis cannot reveal the cause of any structural shift that takes place, but if a shift does occur at the same time that there is a significant change in policy (e.g the introduction of the AIB guidelines) then the occurrence of the structural shift can be attributed to the policy change if other possible causes do not exist.

In summary, the wage equations employed by Christofides and Wilton consistently suggest that the AIB did reduce the

rate of wage change below that which would have prevailed in the absence of the AIB. In addition, their results indicate that during the period of the AIB guidelines the public sector experienced a larger decrease in its rate of wage change than the private sector.

2.3.2 F.Reid (1979)

The following model specification is employed by Reid for the purpose of estimating negotiated wage settlements in the manufacturing sector;

$$3) \quad W_t = \beta_0 + \beta_1 V_t + \beta_2 PE_t + \varepsilon_t$$

where;

W = The quarterly average of the percentage increase contained in new wage settlements.

V = An excess demand for labour proxy variable which, in this specification, is a seven quarter distributed lag of the job vacancy rate.

PE = A proxy variable for price expectations.

The observations for the dependent variable consist of data relating to new wage settlements that have been negotiated in the manufacturing industry for establishments with 500 or more workers. To be more specific, the wage settlements, which are calculated by Labour Canada, are derived by

computing the average per annum increase in wages over the duration of the agreement and then the total average wage is determined by calculating an employee weighted average of all the individual wage contracts.

Price expectations are formulated by using a technique similar to the one employed by Christofides and Wilton (1979), with the exception that Reid employs a second degree polynomial with a six-quarter distributed lag of previous rates of price inflation. Also, Reid only forecasts price inflation for the first quarter of the current wage contract whereas C+W estimate price expectations for the total duration of the current contract. A distributed lag of the job vacancy rate was used for the excess demand for labour variable as Reid had provided evidence in a previous study that this was a more consistent proxy for excess demand than the unemployment rate.[10]

Reid does not include a price catch up variable in the wage equation as he believes that the pressure for a wage change resulting from price catch up is actually manifested

[10] Reid and Meltz (1979) construct the 'unemployment-vacancy curve' by plotting the unemployment rate against the job vacancy rate. The authors attribute the major cause of the apparent upward shift in the curve, over the period 1953-1978, to changes in the generosity of the UIC system. As the upward shift reflects an increase in the natural rate of unemployment, Reid and Meltz argue that the vacancy rate is a more accurate indicator of excess demand in the labour market than the unemployment rate because the latter proxy variable is impaired by the changes in UIC generosity.

by the excess demand for labour variable. He argues that if the actual inflation rate exceeds the amount of inflation that was expected for the duration of the contract then the real wage will not correspond to its market value when the contract has expired. If this is indeed the case, then an excess demand for labour will be created within this particular firm which corresponds to the magnitude of catch up that is necessary. He then argues that if the excess demand for labour is properly specified then the catch up variable is superfluous as the excess demand variable will perform the PCU variable's function (e.g if the wage falls below its market value, via the process of underestimation of the future inflation rate, then firms would wish to employ more workers which leads to an increase in the job vacancy rate).[11] In addition, specifying the dependent variable in terms of aggregate wage data for the whole economy may render the PCU variable unnecessary as both overestimation and underestimation of future price inflation may occur within the same year for different contracts which will cancel out individual misforecasts of price inflation.

++++++++++++++++++++

[11] Reid states that it is reasonable to include a price catch up variable in the wage equation if the dependent variable is composed of individual wage settlements (e.g the micro data used by Christofides and Wilton) as the PCU variable will then perform the function of a firm specific excess demand variable.

Reid's results concerning the impact of the AIB upon wage inflation are not directly comparable to the results of Christofides and Wilton (1979). As Reid's data for the dependent variable includes the roll-backs of the AIB then his wage equation will estimate the 'direct' effects of the AIB (whereas C+W calculate the 'indirect' effects). Moreover, unlike C+W, who calculated equations for both the private and public sectors, Reid's equations are only concerned with the manufacturing industry.

2.3.2.1 Empirical Results

Reid's estimation of the above equation for the period 1967:1 to 1975:3 (the period when controls were not in force) yielded the following results ;

4) $$W_t = \underset{(1.8)}{1.69} + \underset{(2.6)}{2.46V_t} + \underset{(8.7)}{1.22PE_t}$$

$R^2 = 0.75$ D.W = 1.83

'T' statistics are in parentheses.

Analysis of the 'T' statistics indicates that both variables are statistically significant and further testing reveals that although the coefficient of PE_t is greater than unity it is not significantly different from its hypothesized value of 1.

2.3.2.2 Counterfactual Forecasting

Using the counterfactual forecasting technique, Reid calculates that the average wage settlement that would have been negotiated in the absence of the AIB (i.e in the period from 1975:4 to 1978:3) was 13.6 percent , whereas the actual average wage settlement during the guidelines was 9 percent. Consequently, this method indicates that the AIB controls reduced the rate of change of wage settlements by 4.6 percent.

2.3.2.3 Structural Shift Analysis

Structural shift analysis, employing an intercept shift dummy variable, resulted in the following regression equation ;

$$5) \quad W_t = \underset{(2.2)}{1.78} + \underset{(3.7)}{2.86}V_t + \underset{(9.2)}{1.16}PE_t - \underset{(-6.2)}{4.5}D_t$$

$R^2 = 0.74$ D.W = 1.66

'T' statistics are in parentheses.

These results lead to the conclusion that the AIB decreased the rate of wage change for new wage agreements by 4.5 percent during its period of operation.

2.3.3 W.Riddell and P.Smith (1982)

The Model of wage determination used by Riddell and Smith, over the sample period 1967:1 to 1981:4, is shown below ;

$$6) \quad W_t = \alpha_0 + \beta_1 AIB1_t + \beta_2 AIB2_t + \beta_3 AIB3_t + \alpha_1 PE_t + \alpha_2 PCU + \alpha_3 (U_t - U_n) + \varepsilon_t$$

where ;

W_t = Monthly average (weighted by the number of employees) of all wage changes concerning organisations employing at least 500 employees and some wage contracts involving 200-500 employees.

$AIBi_t$ = Three separate dummy variables representing each year of the existence of the AIB.

PE_t = Expected rate of price inflation for the current contract.

PCU = A Price Catch Up variable.

U_t = The unemployment rate.

U_n = The natural rate of unemployment.

The dependent variable, W_t , requires no further explanation as it is exactly the same variable as that used by Reid, with the exception that Riddell and Smith's model is based upon monthly data and is concerned with the commercial and non commercial sectors. Also, Reid's wage data only includes wage contracts for organisations employing 500 or more employees, whereas Riddell and Smith include in their data some wage contracts relating to organisations who employ less than 500 workers. Specification of the dummy variables in the above manner should make it possible to determine whether the effect of the AIB on wages was increasing in magnitude or declining as the AIB program progressed.

The variable $(U_t - U_n)$ represents a measure of the excess demand for labour. Riddell and Smith hypothesize that the larger is the divergence between the natural rate of unemployment (U_n) and the unemployment rate (U_t), then the greater is the amount of pressure being exerted for a change in wages. As it is alleged that the natural rate of unemployment has not been stable over time, then the unemployment rate , by itself, is not a sufficiently accurate indicator of excess demand ,therefore, $(U_t - U_n)$ is preferred. The size of U_n cannot be determined exactly, thus, variables which might affect U_n are added to the wage equation so that they modify the magnitude of the unemployment rate as an explanatory variable in accordance with changes in U_n. Rid-

dell and Smith include two variables to perform the above function ;

1. UIC, which is an indicator of the 'benevolence' of the Unemployment Insurance system, and
2. DEM, which is concerned with the effects on U_n of demographic changes, specifically the growing numbers of women and younger people who are becoming members of the workforce.

When constructing the price expectations variable , Riddell and Smith assume that ;

1. Collecting information regarding the functioning of variables in the economy is a costly process, and
2. Experience encourages a learning process with the result that individuals continually alter their perception and understanding of the inflationary mechanism.

The first assumption implies that , although an awareness of many variables may provide a more accurate forecast, individuals may consider the past values of only one variable when attempting to predict the future movements of another variable. An implication of the second assumption is that the exact structural parameters of the above forecasting method are not known. Therefore, the appropriate technique to be used for generating price expectations is to regard the actual coefficients as unknowns which can only be estimated by using exactly the information that was known at the

time the decision was made instead of using the whole data period. This requires that the parameters are re-estimated whenever new data becomes available.

Riddell and Smith incorporate the above measures into their price expectations calculation by using an ARIMA time series model based on the past movements of the CPI. The future price inflation rate for month t is forecast using only data up to, and inclusive of, month t-1. Therefore, a moving sample method (add the most recent observation and drop the earliest observation) is used. The moving sample is for a period of thirty two years; the first sample extends from 1921 to 1952 and the final sample is for the period 1949-1980. The forecasting model reveals that some parameters are reasonably stable whereas other coefficients substantially change in size over time.

Riddell and Smith's specification for the PCU variable is similar to that used by C+W (1979) {i.e PCU = P_{t-1} - PE_{t-1}}. However, whenever a PCU variable is used in conjunction with aggregate wage data, a problem arises because the length of the current, or previous, wage contract is unknown. Therefore, the forecast period for price expectations is not known and the 'Catch-Up' period for PE_{t-1} is also unknown. Consequently, Riddell and Smith use a two-year time horizon for PE_t and PCU as this is the 'typical' contract length for their data period.

2.3.3.1 Empirical Results

Generalised Least Squares is applied during estimation as the Durbin-Watson Statistic indicates that autocorrelation is present.

Riddell and Smith estimate ten different equations, trying variations of the main specification. Only the results of the major equation, explaining wage changes for all industries, is reproduced below ;

$$7) \quad W_t = \underset{(2.21)}{6.73} + \underset{(0.107)}{0.136PE_t} + \underset{(0.252)}{0.967PCU} - \underset{(0.4)}{0.933U_t}$$

$$+ \underset{(9.57)}{11.3UIC} - \underset{(1.03)}{2.04AIBDUM_t}$$

Figures in parentheses are estimated standard errors.
D.W = 1.43

Analysis of the results reveals that price expectations and 'price catch-up' are important determinants of wage changes. In addition, the total price inflation impact has a value that is not significantly different from unity.

A positive sign for the UIC variable was obtained which is theoretically correct, but it was only statistically significant in the commercial sector equation. Both the non commercial sector and the all industries equations registered a statistically insignificant coefficient for UIC. The demographic variable was discarded from the analysis as it exhibited a theoretically incorrect sign (i.e negative).

When three separate dummy variables (one for each year) are used to gauge the effect of the AIB, the results indicate that the guidelines had a diminishing impact upon wages in each year of the AIB's existence. However, only AIB1 is statistically significant. When the restriction that the three dummies in each year are of equal value is upheld, R+S discover that the AIB reduced the rate of wage change by an average of 2.04 percent per annum (see the coefficient for AIBDUM in above equation) for all industrial sectors. R+S[12] also estimate separate equations for the non commercial and commercial sectors and discover that the AIB reduced the rate of wage change of the CS more than the NCS,[13] which disagrees with C+W's results.

It will be noted that Riddell and Smith's estimate of the impact of the AIB is substantially below that of Christofides and Wilton (1979) and Reid (1979). R+S postulate that there are two major reasons for the divergence of results between their study and earlier work;

1. The inclusion of post-controls data, which was absent from the earlier studies, will provide more information regarding the determination of the rate of wage

++++++++++++++++++

[12] R+S is an abbreviation for 'Riddell and Smith'.

[13] CS and NCS are abbreviations for the 'commercial sector' and the 'non commercial' sector. It should be noted that the terms 'public sector' and 'private sector' are equivalent to the NCS and CS.

change and thus affect the estimates of what W would have been in the absence of the AIB.

2. W is more responsive to a change in the excess demand for labour according to their model in comparison to the results of earlier work. Thus, as the excess demand for labour was quite low during the controls period, the results of this study suggest that the decrease in the excess demand for labour (during the controls period) made a far more significant contribution to the decrease in W than was previously recognised. Therefore, earlier studies conclude that the AIB had a larger effect upon wage inflation because their excess demand variables do not account for as large a decrease in W as this study's excess demand variable does.

The authors also considered the possibility that their estimates of the AIB effect upon wage inflation was lower because they used GLS. However, after estimating the same equation using OLS they discovered that the AIB impact was even lower. Thus, it was concluded that the two reasons outlined above were responsible for the lower AIB effect.

It may be the case that the differences between the results obtained by Riddell and Smith and the results of the C+W study are attributable to the fact that the wage data used by R+S are composed of negotiated wages with varying

contract lengths. As explained earlier, R+S attempt to solve this problem concerning the various contract lengths by using a two year time period for both price expectations and the 'price catch-up' variable as two year wage agreements were the most common contracts during the estimation period. However, during the period of AIB controls, one year contracts became the most popular wage agreement. Thus, during the actual period of the AIB's existence, which is the most critical period of the analysis, R+S use independent variables which explain the movements in two year contracts instead of one year contracts. It may therefore be the case that Riddell and Smith are estimating the Phillip's curve incorrectly as they may have mis-specified the time-horizon of the price expectations proxy variable. Consequently, this may also be a reason for the differing results between this study and earlier work.

2.3.4 Wilton (1982)

In this study, Wilton extends the model that was formulated in the Christofides and Wilton (1979) article. He devises a four equation wage-price simulation model using two of the equations which were estimated in the earlier study (1979). This model is shown below.

$$8) \quad W_t = 3.385 + .465PE_t + .495(PA8_t - .465PE_{t-8}) + 2.037X_{t-1} - 3.229DAIB_t$$

$$9) \quad PE_t = .0015 + .2174CPI_{t-1} + .1917CPI_{t-2} + .1656CPI_{t-3} + .1391CPI_{t-4} + .1121CPI_{t-5} + .0847CPI_{t-6} + .0569CPI_{t-7} + .0287CPI_{t-8}$$

$$10) \quad CPI_t = .7229CPIXFE_t + .2771CPIFE_t$$

$$11) \quad CPIXFE_t = .075W_t + .073W_{t-1} + .070W_{t-2} + .067W_{t-3} + .064W_{t-4} + .062W_{t-5} + .059W_{t-6} + .056W_{t-7} - .429PROD_t + .155FP_t$$

W = Average annual percentage change in new wage settlements.

PE = Expected annual inflation rate.

PA8 = Actual inflation rate over the last eight quarters (at an annual rate).

X = Help-wanted/vacancy rate.

DAIB = Dummy variable for AIB period.

CPI = Consumer price index.

CPIXFE = Consumer price index excluding food and energy prices.

CPIFE = Food and energy component price index within CPI.

PROD = Average productivity growth over the last two years (at an annual rate).

FP = Increase in foreign (import) prices over the last two quarters (at an annual rate).

The wage equation (8) is exactly the same private sector wage equation, in terms of the general specification and the coefficients, that was calculated by Christofides and Wilton (1979). One major difference is that the micro data that was employed by C+W (1979) is replaced by time series, aggregate data. In fact, the dependent variable for the wage equation is the same as that used by Reid (1979) except that Reid's analysis only concerns the manufacturing industry whereas Wilton's explains wage movements for the entire private sector. Consequently, as the wage variable consists of data relating to contracts of various lengths, a general time horizon of two years is assumed for the price expectations and price catch-up variables.

The second equation (9) calculates price expectations for the current wage contract by referring to past rates of change of the CPI. This equation is also taken directly from the earlier study by C+W. However, the coefficients of this price expectations equation were estimated by C+W using data which only extended to 1975:3. Consequently, even

though Wilton's analysis extends substantially beyond 1975:3, he assumes that the weights attached by wage bargainers to the past rates of change of the CPI when formulating price expectations remain unchanged.

The third equation (10) of the model estimates the CPI. This equation consists of two explanatory variables; the CPI excluding food and energy prices (CPIXFE) and the CPI for food and energy prices (CPIFE). Finally, the last equation (11) explains the movements of CPIXFE. Wilton separates the CPI into CPIXFE and CPIFE because the AIB did not control food and energy prices (Wilton assumes that CPIFE is exogenously determined). After breaking the CPI down into these two components it then becomes possible to calculate what the CPI would have been in the absence of the AIB.

Wilton's objective is to investigate the effect of the wage-price-price expectations-wage 'nexus'. To explain further, Wilton hypothesizes that if the AIB decreases wage inflation then this will also reduce the CPI which, in turn, will lower price expectations and lead to a further reduction in W. As the intercept shift dummy variable in the wage equation already represents the impact of the AIB upon wage inflation, Wilton wishes to discover how much this figure is increased when the aforementioned 'nexus' is taken into account.

In order to calculate the effect of this wage-price 'nexus', Wilton uses the following method;

1. Initially, Wilton uses the wage equation (including the AIB negative dummy variable) and the actual values of the independent variables to calculate a 'control' simulation. Wilton verifies that the simulated path for W during the controls period is very similar to the actual path of W.
2. The AIB dummy variable in the wage equation is suppressed and the wage settlements that would have occurred in the absence of the AIB are calculated.
3. The CPI that would have occurred in the absence of the AIB is then calculated by substituting the values for W that were estimated above (i.e with the AIB dummy suppressed) into equation (11) and then substituting the estimated values for CPIXFE into the CPI equation.
4. The CPI values calculated in step 3 above are then substituted into the price expectations equation. The price expectations that would have been formulated in the absence of the AIB are then calculated and substituted into the wage equation.
5. The wage settlements that would have prevailed without the guidelines are then estimated using the price expectations calculated in the previous step. Final-

ly, a comparison of the estimates for W in step 1 and step 5 will reveal the effect of the AIB upon wage inflation including the effect of the wage-price 'nexus'.

Wilton provides a good summary of the effect upon the results when the wage-price 'nexus' is included in the analysis;

> "As AIB restrained wage settlements slowly feed into lower rates of inflation and inflation expectations, the AIB wage impact effect increases from 3.2 percent per annum to 3.5 percent per annum in 1976:3 and to 4.3 percent in 1978:1. In rough terms , the wage-price nexus adds an additional one percentage point to the AIB effect on new wage settlements."[14]

It is also interesting to note that Wilton's wage-price simulation model substantially overpredicts the actual post-AIB wage settlements. Therefore, it seems that the downward shift in wage inflation that occurred during the controls period was also present in the immediate post-AIB period.

++++++++++++++++++++

[14] Wilton (1982) p.25.

Chapter III

DESCRIPTION OF OBJECTIVES AND WAGE EQUATION SPECIFICATION

3.1 OUTLINE OF OBJECTIVES

This study is similar to the earlier studies reviewed in the preceding chapter in the sense that it also attempts to measure the effect of the AIB upon negotiated wage settlements in the commercial and non commercial sectors.[15] However, there are also some important differences between the analysis employed here and the approach adopted by the studies reviewed in chapter two.

First, although the proxy variable for price expectations used in this analysis is also based upon the past rates of change of the CPI, it enters the analysis in such a way as to capture the price expectations information that is contained in each observation on the wage variable (W). Other studies do not take advantage of this price expectations

[15] The non commercial industries consist of highway and bridge maintenance, water systems and utilities, hospitals, welfare organisations, private households, education and related services, public administration and defence. Commercial industries consist of all others. See Labour Canada's 'Annual Review of Wage Developments' for further details concerning the definitions of commercial and non commercial industries.

data that is stored in the observations on the wage variable as these earlier studies calculate price expectations outside of the wage equation. But this thesis enters the past rates of change of the CPI directly into the wage equation, thus allowing the coefficients of the price expectations proxy to be formed by the price expectations information in the W observations.

Second, alternative specifications of the price expectations proxy variable are employed in an attempt to discover if other variables , apart from the CPI, such as the rate of a change of the money supply, are significant in the price expectation formation mechanism of wage negotiators. If changes in the growth rate of the money supply (M) do play a significant part in the formation of price expectations, then any decrease in price expectations during the guidelines period, which consequently results in a reduction of wage inflation, may be partly explained by the movements in M rather than being attributable solely to the AIB.

Third, it may have been the case that employees anticipated the introduction of the guidelines and attempted to offset the lowering of the rate of wage increase that was expected during the existence of the AIB by negotiating higher wage increases than they would otherwise have claimed in the pre-AIB period. If this is true, the pre-AIB model structure would tend to predict upward biased wage settle-

ments for the AIB period and hence indicate a larger restrictive AIB effect than that which actually occurred. Thus, the other studies reviewed earlier may have overestimated the AIB effect. Therefore, this study includes a dummy variable in the wage equation in order to ascertain whether or not an 'anticipation effect' occurred in the period immediately preceding the imposition of controls. The inclusion of this dummy variable will also prevent the overestimation of the AIB effect (during controls) if an 'anticipation effect' did actually occur.

Fourth, separate wage equations will be estimated using the following two different dependent variables;

1. The rate of wage change for contracts of one year duration, and
2. The rate of wage change for contracts of all durations (i.e the length of the wage contract may be one year, two years or three, or more, years).

Comparison of the regression results for the different dependent variables should provide evidence as to whether or not the AIB affected contracts of differing lengths equally.

Fifth, dummy variables of various durations will be used in order to test for the occurrence of a wage 'explosion' in the immediate post-controls period. Other studies do not test for the presence of a wage 'explosion' as, unlike this study, they do not have a sufficient amount of post-controls data.

Sixth, the proxy variable for the excess demand for labour is specified in such a way that the rate of labour hoarding will be included in the calculation of the excess demand for labour.

Seventh, as the data period for this study contains more post-controls data, and approximately the same amount of pre-controls data, than the other studies, it is likely that the results concerning the impact of the AIB, along with the estimates for the wage equation parameters, will be more reliable because more information will be used regarding wage behaviour.[16]

3.2 SPECIFICATION OF THE WAGE EQUATION

The specification of the wage equation employed in this analysis is as follows;

$$W_t = (XDL, PE, PREAIB, DURAIB, POSTAIB)$$

where;

++++++++++++++++++++

[16] Recall that the data periods examined by the other studies on the effects of the AIB are as follows;

Christofides and Wilton (1979) ----- 1966:1 to 1978:2.

Reid (1979) ----- 1967:1 to 1978:3.

Riddell and Smith (1982) ----- 1967:1 to 1981:4.

Wilton (1982) ----- 1967:1 to 1979:4.

W_t = Average percentage increase in base wage rates for new wage settlements without a COLA clause.

XDL = Proxy variable representing the excess demand for labour.

PE = Proxy variable representing price expectations.

PREAIB = A dummy variable designed to indicate the presence or non-presence of an 'anticipation effect' during the period immediately before controls were introduced.

DURAIB = A dummy variable representing the impact of the AIB upon negotiated wage settlements during the actual period of controls.

POSTAIB = A dummy variable designed to register the presence, or absence, of a wage 'explosion' following the lifting of the AIB controls.

The estimation period for the above wage equation extends from 1967:1 to 1983:4. Quarterly Canadian data are used throughout the analysis. Labour Canada is the source of the wage data and the data for the independent variables originate from Statistics Canada and/or the Bank of Canada Review.[17]

++++++++++++++++++++

[17] Appendix A gives details of the data sources used in this thesis.

The above basic model postulates that wage settlements are determined by two major variables; the excess demand for labour and the expected rate of inflation. Referring to the previous studies mentioned in the first chapter, it can be seen that these two variables form the main 'body' of all the wage equations that were reviewed in the previous chapter. Consequently, these two variables are included in this study's wage equation for the same reasons that they appear in the analyses reported in Chapter Two.

It will be noted that this study departs from the practise of including a PCU variable in the wage equation specification. In addition to the reasons given by Reid (1979), another reason for excluding the PCU variable is that, when using aggregate data, the duration of the previous wage contract is unknown which means that the length of the 'catch up' period cannot be ascertained. Thus, inclusion of the PCU variable may impair the accuracy of the results if an unsuitable 'catch up' length is prescribed for the PCU variable.

The inclusion of the three AIB dummy variables (PREAIB, DURAIB and POSTAIB) will register all of the effects of the AIB upon wages. Some studies only employ a dummy variable to indicate the effect of the AIB upon wages during the guideline years. Consequently, as noted earlier, the possibility arises that the coefficients of the independent vari-

ables which comprise these structural wage equations (of the previous studies) are not accurate as the AIB may have had an impact upon the rate of change of wages outside of the guideline years.

Separate wage equations are estimated for the private and public sectors. One reason for estimating separate wage equations for these two sectors is that the results will reveal whether the AIB affected the rate of wage change of one sector to a greater extent than the other sector. A second reason for this separation of the private and public sectors is that as the latter sector is governed by the political process and not the profit motive, then wage changes in the public sector may not respond to changes in economic variables in exactly the same way as the private sector. Therefore, the structural coefficients of the wage equations for the two sectors may differ. It may even be the case that the structural coefficients of the wage equations differ between individual industries and occupations. However, the lack of detailed aggregate data prevents this analysis from testing the possibility that the structure of wage determination may vary according to occupation or industry. Therefore, it is assumed that both the CS and the NCS are sufficiently homogeneous to be defined as distinct groups.

3.3 DESCRIPTION OF VARIABLES

3.3.1 W_t , the Dependent Variable

The model specified above is an aggregate wage equation which measures the 'direct' and 'indirect' effects of the AIB upon the rate of wage change. Suitable wage data for an aggregate wage equation are available from Labour Canada in their 'Annual Review of Wage Developments'. Separate wage data for the commercial and non commercial sectors are also available from this source. The dependent variable is defined as:

> "Average percentage increase in base rates for new wage settlements, without a COLA clause, covering all Collective Bargaining Units of 500 or more employees, construction industry excluded. Annual compound rates by quarter are given. Quarterly figures are obtained by taking all negotiations settled in any given quarter, and then calculating the average annual percentage increase over the life of the agreement. These figures are then weighted by the total number of employees covered by the agreement, summed, and a weighted mean for the quarter was obtained."[18]

This specific wage variable, which is similar to the wage data used by Reid (1979) and Riddell and Smith (1982), is chosen because it only consists of data concerning new wage contracts. Thus, wage agreements negotiated, and already in effect, before the formation of the AIB will only influence

++++++++++++++++++++

[18] Labour Canada, 'Annual Review, Wage Developments (1981) Resulting from Major Collective Bargaining Settlements (Construction Industry Excluded)'. Since the data for 1983 includes the Construction Industry, the wage data for this group is extracted from the main body of data.

the dependent variable in the quarter which corresponds with the implementation of the new wage agreement. For example, if a long-term wage contract becomes effective before the imposition of the AIB guidelines and specifies that wage increases will take place in several stages, which results in wage increases occurring both before and during controls, then the dependent variable will only register the average annual percentage wage increase (over the life of the contract) in the period when the agreement first came into force. It therefore follows that DURAIB will only register the impact of the AIB upon wage contracts that could actually be affected by the AIB. Contrast this with another possible dependent variable, say 'percentage increase in average hourly earnings', and it becomes apparent that such a variable would, during the period of AIB controls, include data relating to wage contracts negotiated before the introduction of controls, thus making it impossible for the AIB to have any impact upon these particular contracts.

3.3.2 Proxy Variable for the Expected Rate of Price Inflation (PE)

This study experiments with five different methods of calculating price expectations. Three of these proxy variables for price expectations are based upon past rates of change of the CPI and the remaining two proxies use past growth

rates of the money supply to forecast the future inflation rate.

The first specification for the price expectations proxy is based upon the CPI and is similar to the proxy variables used by Christofides and Wilton (1979) and Reid (1979);

1. $P_t = \beta_0 + \sum \beta_j P_{t-j}$

   Where P_t = The rate of change of the CPI in period t.

   This proxy variable assumes that a distributed lag of past inflation rates ($\sum \beta_j P_{t-j}$) can explain the current inflation rate (P_t). It also assumes that wage negotiators are aware of this relationship and use this information to forecast the future inflation rate. Therefore, if the parameters of the above distributed lag are calculated by regressing P_t upon its previous values, then price expectations can be calculated by using these coefficients in conjunction with the actual past values of P. The entire data period is used to calculate the parameters of this price expectations proxy.

   It should be noted that this proxy variable, like most of the price expectations proxies used in this analysis, assumes that economic agents only refer to one variable to form their price expectations.[19]

[19] This assumption is reasonable if economic agents are re-

The second specification is a modification of the CPI variable explained above;

2. $P_t = \beta_0 + \sum \beta_i P_{t-i}$

This specification also calculates price expectations by using the coefficients of the distributed lag of past rates of change of the CPI. As explained above, the previous specification regresses P_t upon its past values by using data for the complete CPI sample period (i.e 1965:1 to 1983:4). However, this second proxy variable calculates new coefficients for the distributed lag each time new information becomes available. Therefore, similar to Riddell and Smith's (1982) proxy, the coefficients that are used to forecast price expectations are calculated by using only the information that was available at the time the expectations regarding future inflation rates were formed. The selection of the data period for this method of calculating price expectations will be explained later.

++++++++++++++++++

luctant to allocate the extra time for the gathering of information that is necessary if additional variables are used in the price expectations formation process as it may be highly expensive in opportunity cost terms.

The third specification, also based upon the CPI but quite different from the previous proxy variables, is:

3. $PE_t = \sum \phi_j P_{t-j}$

Previous studies calculate price expectations separately, outside of the main wage equation, and then enter the estimated values for price expectations into the structural wage equation. However, this does not take advantage of the price expectations information that is contained in each W_t observation (i.e one component of each W_t observation represents an amount that is specifically included in the wage contract for the purpose of offsetting future expected price inflation). Therefore, this third specification attempts to utilize this information by entering a distributed lag of previous rates of change of the CPI directly into the main wage equation. Thus, price expectations will be calculated by the method of allowing the wage equation to form the coefficients of the CPI terms in the distributed lag which will make use of the price expectations information contained in the W_t data.[20]

++++++++++++++++++++

[20] Although a PCU variable is not explicitly included in this analysis, elements of the 'catch up' mechanism are incorporated into the wage equation when this method of calculating price expectations is used. This follows from the fact that if the brackets are removed from the

A priori theory would predict that the signs on the coefficients should all be positive. If the sum of the distributed lag coefficients sum to one, this would imply that in the long-run price inflation is fully reflected in wage settlements.

The fourth proxy for the expected rate of inflation is based upon the money supply and is:

4. $PE_t = \sum \theta_k M_{t-k}$

Where M_t = Rate of growth of the money supply (M1).

This specification postulates that expectations concerning future inflation rates are based upon the monetarist theory that the inflation rate is inextricably linked to the rate of growth of the money supply. Thus, it is assumed that economic agents view inflation as a monetary phenomenon and, consequently, change their expectations regarding inflation in accordance with changes in the rate of growth of the money supply. Once again, the past rates of change of the proxy variable for price expectations are directly entered into the wage equation. The distrib-

---

expression for the PCU variable, then it becomes apparent that all of the variables concerned with price inflation can be represented by a distributed lag of past inflation rates.

uted lag of past rates of change of the money supply should exhibit positive coefficients.

At a later stage in this thesis, information concerning the role of changes in the growth rate of the money supply in the price expectations formation process will be used to evaluate the effect of the strategy of Monetary Gradualism upon price expectations. Since M1 was the monetary aggregate controlled by the policy of Monetary Gradualism, M1 is also chosen to represent the money supply aggregate in the M and M-Q (see below) price expectation proxy variable specifications.

The fifth specification is a modification of the money supply variable used above and is:

5. $PE_t = \sum\theta_k(M-Q)_{t-k}$

Where Q = Rate of growth of real GNP.

This is a more sophisticated model of price expectation formation and is based upon the more rigorous Monetarist hypothesis that inflation occurs when the rate of growth of the money supply exceeds the growth rate of real output. Some may view this as a far too elaborate price expectation formation mechanism but it seems more reasonable when it is remembered that economically sophisticated wage bargainers (both

trade unions and management) are the economic decision makers here and they will almost certainly refer to some type of economic model in order to understand and predict the inflationary process. As before, positive coefficients should be displayed for the variables comprising the distributed lag of (M-Q).

All of the previous studies reviewed in the preceding chapter employ past rates of change of the CPI in order to calculate price expectations. Therefore, using past rates of change of the money supply as a proxy variable for price expectations will make it possible to determine whether or not other variables, apart from the CPI, are significant contributors to the formation of price expectations in the wage negotiating process. Also, as mentioned earlier, an additional reason for including money supply growth in the price expectation calculation is that the two policies of wage and price controls and Monetary Gradualism were both introduced at the same time. Therefore, if price expectations are reduced after the implementation of Monetary Gradualism and the rate of wage increase is subsequently lowered, earlier studies will have overestimated the restraining influence upon wages of the AIB. However, if the results of this thesis reveal that the rate of growth of the money supply is not significant in formulating price expectations , then it can be presumed that any decrease in

wage settlements during the AIB period (that is indicated by the intercept shift dummy variable method) was not partly attributable to Monetary Gradualism but was caused by the AIB guidelines.[21]

3.3.3 The Excess Demand for Labour (XDL)

The current unemployment rate is sometimes used as a proxy variable for the excess demand for labour. However, the rate of labour hoarding is also a component of the excess demand for labour and it will be excluded if only the current rate of unemployment is used as the proxy variable for excess demand.

Labour hoarding occurs whenever an underutilization of employed labour exists. It is caused by the fact that labour is a semi-fixed factor of production. Thus, if a corporation has an excess supply of labour it will not immediately reduce the size of its labour force. Specific reasons for the occurrence of this labour hoarding may be that the corporation has contractual obligations with its employees or perhaps the corporation is reluctant to release skilled and experienced workers if it is thought that the underuti-

[21] Any decrease in wages that is suggested by the intercept shift dummy variable method can only be attributable to the AIB if there are no other competing hypotheses that could explain this phenomena. Non significance of money supply growth in regard to price expectation formation only eliminates one competing hypothesis (i.e Monetary Gradualism).

lization of its labour force is a temporary phenomenon. Regardless of the specific reason for the labour hoarding, the hoarded labour is a component of the excess demand for labour. Consequently, fluctuations in the rate of labour hoarding will affect the rate of wage increase as the rate of hoarding will influence the relative bargaining power of trade unions and management.

If changes in the rate of labour hoarding exactly corresponded with changes in the unemployment rate, then the latter variable alone would be a sufficient indicator of excess demand. However, it seems that the U rate is a lagged indicator of the excess demand for labour as employed labour will experience the initial effects of a change in excess demand (i.e labour hoarding will occur). Thus, the unemployment rate alone is an inadequate proxy for excess demand and it will be much improved by combining it with the rate of labour hoarding.

It is postulated in this thesis that the current rate of labour hoarding is a function of past unemployment rates. Therefore, entering a distributed lag of past rates of unemployment into the wage equation provides a more accurate measure of the amount of excess demand existing in the labour market for the current period (this improved measure of the excess demand for labour is denoted by U^*_t). The proxy variable U^*_t thus consists of both the unemployment rate and

the rate of labour hoarding. A priori theory predicts that negative signs will be displayed for each coefficient of the distributed lag of past unemployment rates.

The Prime Age Male unemployment rate (i.e males aged 25-54 years old) is used in this analysis in preference to the aggregate U rate. It is thought that the changing demographic composition of the labour force has rendered the latter variable unreliable by increasing the natural rate of unemployment for this category. In contrast, the natural rate of unemployment for 'Prime Age Males' is largely unaffected by these demographic changes.

Additionally, a distributed lag of the non-linear version of the excess demand for labour variable (i.e 1/U) is introduced into the regression equation (replacing U) in order to establish whether a non-linear relationship between U and W is more appropriate. Also, a comparison of the results for the linear and non-linear versions of the proxy variable representing the excess demand for labour will reveal the extent to which the calculated impact of the AIB upon wages is affected by the exact specification of the excess demand variable. Positive signs are expected for each lag coefficient of this non linear version of the proxy for the excess demand for labour.

As the true measure of the excess demand for labour is actually the difference between the unemployment rate (U^*_t)

and the natural rate of unemployment (U_n), the unemployment rate (U^*_t) alone is an imprecise indicator of excess demand if U_n has not remained constant. Recent empirical research has concluded that U_n has not been stable during the period 1967:1 to 1983:4 and indicates that U_n has been increasing.[22] Consequently, it is necessary to adjust the unemployment rate (U^*_t) so that the excess demand variable approximates the unemployment rate minus the natural rate of unemployment (i.e $U^*_t - U_n$).[23] Therefore, the variable UADJ, which is designed to register changes in the natural rate of unemployment for Prime Age Males, is included in the wage equation specification so that XDL consists of the unemployment rate (U^*_t), plus a variable (UADJ) which adjusts U^*_t whenever U_n increases or decreases. The specification of UADJ is explained in the next section.

3.3.3.1 Specification of UADJ

Three different specifications of UADJ are employed separately in the wage equation in an attempt to include fluctuations of the natural rate of unemployment.

++++++++++++++++++++

[22] Fortin (1980) calculated that the natural rate of unemployment in Canada increased from 4.5 percent in 1956 to 6.5 percent in 1978.

[23] It can be seen that this is similar to the excess demand proxy used by Riddell and Smith (1982).

1. **UADJ1**

The first version of UADJ consists of a simple time trend which is intended to register the effects of a non-constant U_n. UADJ1 implicitly assumes U_n was either increasing or decreasing by a given amount each year during the time period analysed in this study. The expected sign for the coefficient of UADJ1 cannot be determined as this variable may not only register the effect of an unstable U_n, but could also be influenced by any instabilty associated with the relationship between wages and prices.

2. **UADJ2**

This second set of proxies for fluctuations in U_n consists of a time trend plus several dummy variables which have a value of 1 when changes in the UIC Act lead to a change in the generosity of the UIC system and zero otherwise. Therefore, UADJ2 specifically identifies changes in the UIC Act as a major cause of fluctuations in U_n.[24] It is expected that as the UIC

[24] Five dummy variables are chosen to represent changes in the 'generosity' of the UIC system;

a) The first dummy variable represents the increase in maximum benefit in the third quarter of 1968.

b) the second dummy variable represents the fact that benefits became taxable in the third quarter of 1971.

c) The third dummy variable represents the increase

Act increases the generosity of the UIC system the natural rate of unemployment will increase (and vice-versa). UADJ2 should have positive signs for the dummy variables associated with increases in the generosity of UIC and negative signs for the dummy variables associated with decreases in the generosity of UIC. The sign for the trend component will again be indeterminate as explained above.

3. **UADJ3**

The third version of UADJ also assumes that changes in the generosity of UIC are a major cause of a non-constant U_n and, therefore, UADJ3 is also designed to indicate changes in the generosity of UIC but is different from UADJ2 in the sense that it is a continous variable instead of a dummy variable. As a positive relationship should exist between the natural rate of unemployment and the rate of wage change , UADJ3 should exhibit a positive coefficient. UADJ3 is

++++++++++++++++++++

in the number of employees covered by UIC that occurred in early 1972.

d) The fourth dummy variable represents the more stringent entrance requirements that were introduced in late 1977.

e) The fifth dummy variable represents the decrease in benefit that occurred in early 1979.

Further details concerning the above changes in the UIC system can be found in Dingledene (1981).

based upon Riddell and Smith's (1982) 'UIC' variable. The formulation of UADJ3 is as follows;

UADJ3 = (COV)(UIC/WAGE)(TAX)

where;

COV = Number of persons covered by UIC expressed as a fraction of the labour force.

UIC/WAGE = A ratio of average weekly UI benefits to average weekly wages.[25]

TAX = A constant , with a value of 1 up to, and including, 1971:2 and a value of 0.8 for the remainder of the data period. This variable allows for the fact that UI benefits became taxable in 1971 resulting in after tax benefits that were 80 percent of the value of the pre tax benefits.[26]

3.3.3.2 Does UADJ3 Reflect Changes in U_n?

++++++++++++++++++++

[25] See Appendix A for details of the data sources for COV and UIC/WAGE.

[26] Cloutier (1978) calculated that benefits after tax were approximately only 80 percent of before tax benefits.

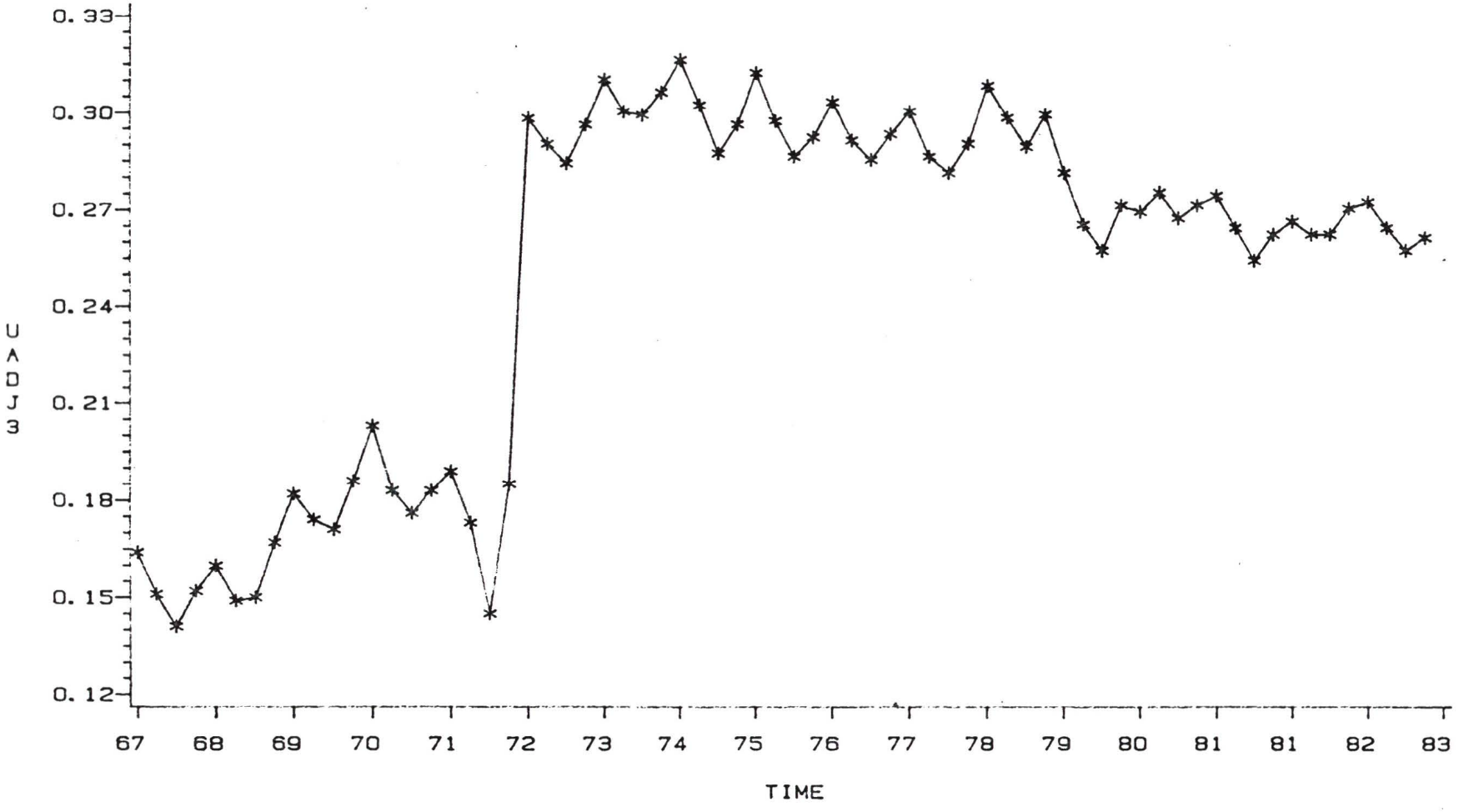
UADJ3 is designed to vary positively with changes in the generosity of the UIC system. However, UADJ3 may be criticised on the grounds that it could change in size merely because of factors that are endogenous to the variable itself rather than only changing in value when exogenous changes in the generosity of UIC actually occur (e.g such as an ammendment to the UIC Act itself). Thus, it is possible that during a period of stability for U_n, UADJ3 may incorrectly indicate that U_n has changed. An example of an endogenous change in UADJ3 that does not actually represent a change in U_n is as follows; suppose a deep recession causes many more highly paid individuals in 'professional' occupations to be unemployed than there would be at lower unemployment rates, this could result in an increase in the average weekly benefit and consequently increase the size of UADJ3 even though the UIC Act has not changed during this time period.[27]

In order to check that UADJ3 is actually responding to changes in the generosity of the UIC system and is not dominated by endogenous changes, the variable UADJ3 is plotted against time in Figure 3.1.

++++++++++++++++++++

[27] It should be remembered that UADJ3 is not only responding to changes in the UIC Act but it is also registering changes in the relative generosity of the UIC system. Thus, if wages increase relative to UIC payments then this will result in a valid movement in UADJ3.

Figure 3.1
UADJ3 PLOTTED AGAINST TIME



3.3.3.3 Movements In UADJ3

Referring to Figure 3.1, it does seem that the major movements in UADJ3 are in accordance with ammendments to the UIC Act. The increases in the 'generosity' of the UIC system caused by the increase in the rate of benefit on June 30, 1968 and the increase in the number of employees covered by UIC that occurred in January, 1972 are both indicated by upward swings in UADJ3. The decreases in the 'generosity' of UIC due to the taxing of benefits in 1971 and the decrease in the rate of benefit in early 1979 are both represented by downward movements in UADJ3.[28] However, it should be noted that there are also appreciable movements in UADJ3 that fluctuate around this broader pattern.

3.3.3.4 Comparison of Two Excess Demand Variables: XDL and the Vacancy Rate

Reid (1979) and Christofides and Wilton (1979) were of the opinion that the vacancy rate was a more accurate indicator of excess demand in the labour market than the unemployment rate. The reason for this opinion was that the relationship between the excess demand for labour and the unemployment rate had not been stable over time because of the effects of an increasing natural rate of unemployment. Furthermore, it

++++++++++++++++++++

[28] For information concerning all of the above mentioned ammendments to the UIC Act, see Dingledene (1981) and the 'Annual Report of the Unemployment Insurance Commission'.

was hypothesized that one major cause of the increase in U_n was the increasing generosity of the UIC system. However, the vacancy rate will not register the effects upon the excess demand for labour of changes in the generosity of the UIC system. The vacancy rate will only act as an indicator of the number of jobs available, it will not reveal that individuals may be less willing to accept these jobs, which will affect the rate of wage change, because the generosity of the UIC system has increased. Therefore, it is suggested that the combination of U^*_t and UADJ used in this analysis may be a more accurate proxy for the true excess demand for labour (i.e $U^*_t - U_n$) than the vacancy rate.

3.3.4 Measuring the Impact of the AIB.

This study will employ structural shift analysis (using intercept shift dummy variables) to compare the relative influence of the AIB upon negotiated wage settlements in the public and private sectors.[29] However, unlike the previous studies mentioned earlier, in addition to attempting to assess the effect of the AIB upon wage agreements during its actual years of operation (by using DURAIB), this project also endeavours to discover whether wage settlements outside of the period 1975:4 to 1978:3 were also influenced by the

++++++++++++++++++

[29] The basic econometric technique used throughout this thesis is Multiple Regression Analysis.

AIB.

Tests are conducted to ascertain whether an 'anticipation effect' occurred; that is, employees may have anticipated the imposition of wage guidelines and, in order to offset the expected restricted wage settlements that would prevail under wage controls, may have demanded higher wage settlements than they would otherwise have claimed. PREAIB, the dummy variable designed to indicate the presence or absence of an 'anticipation effect', will only have a value of 1 for the four quarters immediately before the imposition of controls (and zero otherwise) as it is highly unlikely that the introduction of wage guidelines was suspected by the workforce before the period covered by PREAIB.[30]

After the completion of the controls program , it is possible that a wage 'explosion' occurred once wage settlements no longer had to comply with statutory limits. A wage 'explosion' will have occurred if the AIB artificially suppressed wage levels below their market levels and immediately after the lifting of controls employees used their market power to accelerate wage rate increases in order to restore

[30] The Liberal Party had only been in power for little more than a year when the AIB was introduced. Therefore, as it is asssumed that an 'anticipation effect' would only occur if the Government gave some indication of its intention to introduce wage guidelines , an 'anticipation effect' would not occur before the Election was completed. Furthermore, during their Election campaign the Liberals stated that they would not introduce wage and price controls.

their wages back to levels that correspond with market forces. The dummy variable POSTAIB will indicate whether a wage 'explosion' did, or did not, occur. However, as the duration of wage contracts can extend up to a period of three years or more, it is possible that some three year wage contracts became effective just before the lifting of controls. The wage 'explosion' period could therefore last for at least three years beyond 1978:3. To allow for this possibility, three versions of POSTAIB were incorporated into the wage equation by assigning it lengths of 6 quarters , 10 quarters, and 12 quarters.[31]

++++++++++++++++++++

[31] It was decided that the best method for checking for the existence of a wage 'bubble' was to have three different lengths for POSTAIB, one for each length of contract (1 year, 2 years or 3 years). Thus, whatever the duration of the last contract that was negotiated before the lifting of controls , a POSTAIB dummy variable will exist which picks up only the first contract entered into by any group of employees after the lifting of controls. Consequently, each wage equation is estimated three times so that the effects upon the results of using the three different versions of POSTAIB can be recorded.

It is important to note that Labour Canada defines contract lengths as follows;

1. One year agreements are those with a term of less than 18 months.

2. Two year agreements are those with a term of 18 to 29 months.

3. Three year agreements are those extending for a

The dummy variable DURAIB will indicate whether there was a decrease in the rate of wage change during the actual period when the guidelines were enforced. Therefore, DURAIB has a value of 1 for the period 1975:4 to 1978:3 and zero otherwise.

3.4 POSSIBLE DIFFERENCES BETWEEN THE PRIVATE AND PUBLIC SECTOR RESULTS

Wage data are divided into the public and private sectors as there are several competing hypotheses which maintain that the AIB affected the wages of one sector to a greater extent than the other sector . These hypotheses are listed below with the first two supporting the view that the AIB would decrease wage inflation in the public sector by a greater extent than in the private sector, and the third hypothesis leading to the opposite conclusion.

1. The Government has more control over public sector wages than the private sector. Consequently, if the Government controlled industries/sectors exceeded the guidelines then the AIB would not be taken seriously. It therefore follows that the Government may make an example of the public sector. If this is indeed the case, then the AIB would exert a greater restraining influence upon public sector wages in comparison to

++++++++++++++++++++

period of 30 months and over.

private sector wages.

2. The private sector is more exposed to the market pressures that lead to changes in wages . Consequently, if there was a great deal of market pressure to increase wages in a certain occupation then the AIB may be sympathetic to this claim in an attempt to avoid creating distortions in the economy. Therefore, there would be less of a restraining influence exerted by the AIB upon private sector wages compared to public sector wages.
3. Because of the technical regulations of the AIB wage controls program, the guidelines for the unionized public sector were, on average, higher than the unionized private sector in each year of the program.[32] Consequently, the rate of wage increase in the private sector would have to be reduced by a greater extent than the public sector to satisfy the guidelines.

++++++++++++++++++

[32] Reid (1982) states that the AIB guidelines for the three years of the program were 9.8 percent, 7.3 percent and 5.5 percent for the unionised public sector. The guidelines for the three consecutive years of the AIB program in the unionised private sector were 9.3 percent , 7.1 percent and 5.3 percent.

3.5 CONTRACTS OF DIFFERENT LENGTHS

Separate wage equations will be estimated for one year contracts and 'all contracts'.[33] Disaggregating the wage data in this manner will provide information as to whether the AIB affected wage contracts of differing lengths equally.

++++++++++++++++++++

[33] The expression 'all contracts' refers to contracts of all durations (i.e contract lengths of one year, two years or three years or more).

Chapter IV

ANALYSIS OF EMPIRICAL RESULTS

4.1 INTRODUCTION

This chapter consists of the following sections;

1. Results concerning the choice of the best specification of UADJ.
2. Results concerning the significance of changes in the rate of growth of the money supply in the formation of price expectations.
3. Results concerning the price expectations proxies based upon the past rates of change of the CPI.
4. Tables of regression results for the structural wage equations and analysis of these empirical results.
5. An overview of the results.

4.2 CHOICE OF SPECIFICATION FOR UADJ

4.2.1 UADJ1

The simple time trend specification of UADJ does not achieve a statistically significant coefficient in either sector regardless of whether the linear or non linear version of the unemployment rate is used. This variable was therefore eliminated from the analysis.

4.2.2 UADJ2

Employing a time trend plus dummy variables is not successful either. Both the time trend and the dummy variables register statistically insignificant coefficients in all cases with the exception of the dummy variable which represents changes in the generosity of the UIC system that became effective in early 1972. This dummy variable is significant in the CS equations and also possesses the correct positive sign. A number of the coefficients of the other UIC dummy variables also display signs which are contrary to a priori expectations.

A second specification of UADJ2 is employed which excludes the time trend and only consists of the UIC dummy variables. The results are similar to those above; only the dummy variable for 1972:1 is statistically significant (only in the CS) , the remaining dummy variable coefficients are not significantly different from zero and many exhibit theoretically incorrect signs.

4.2.3 UADJ3

All of the CS equations register a coefficient for UADJ3 that is both statistically significant and positively signed (which corresponds with a priori theory). However, the coefficients for UADJ3 in the NCS equations are not statistically significant.

In comparison to the other versions of UADJ, UADJ3 delivers superior results in terms of correspondence with a priori theory, statistical significance and the R^2 statistic for the wage equation. Therefore, UADJ3 is chosen as the best variable to represent changes in the UIC Act and , consequently, adjust the excess demand for labour variable according to fluctuations in the natural rate of unemployment.

4.3 PRICE EXPECTATIONS AND THE MONEY SUPPLY

This section summarises the attempts to determine if the growth rate of the money supply is a significant variable in the formation of price expectations.

1. $\sum \theta_k M_{t-k}$

Consider first the results if a distributed lag of past rates of change of the money supply is used as a proxy variable for price expectations in the structural wage equations.[34] In the public sector , all of the lag coefficients for M are statistically insignificant and all the lagged coefficients display an unexpected negative sign in the 'all contracts' equation. The private sector exhibits statistically insignificant coefficients for most lags of M except

[34] Tests concerning the significance of changes in the rate of growth of the money supply are only conducted upon the wage equations which employ the linear excess demand for labour proxy variable.

for the initial lag (i.e M_{t-1}). Therefore, wage equations using only M_{t-1} as the proxy for price expectations are estimated for the private sector and the results reveal a statistically insignificant coefficient for M_{t-1}. Thus, the regression results strongly indicate that changes in the growth rate of the money supply do not play an important role in the formation of the price expectations used in the wage bargaining process.

2. $\sum\theta_k(M-Q)_{t-k}$

When a distributed lag of (M-Q) is used as a proxy variable for price expectations in the structural wage equations, the private sector lag coefficients display either unexpected negative signs or are statistically insignificant. Only the first lag coefficient, $(M-Q)_{t-1}$, is statistically significant for the public sector equations and many of the insignificant coefficients display incorrect negative signs. Thus, further regressions are estimated for the public sector using only $(M-Q)_{t-1}$ as the proxy variable for price expectations . The regression results reveal a statistically significant coefficient for $(M-Q)_{t-1}$, but the R^2 statistics for the wage equations are very low.

As will be noted later , previous rates of change of the CPI are far more effective as a proxy variable for price expectations than either M or (M-Q). It therefore seems probable that any reduction in the price expectations of wage negotiators that occurred over the estimation period was not caused directly by Monetary Gradualism.

4.4 PRICE EXPECTATIONS AND PAST RATES OF CHANGE OF THE CPI

Three methods of calculating price expectations by using a distributed lag of past rates of change of the CPI were proposed in this study. However, two of these methods were abandoned as they gave poor results and only the third method was retained and incorporated into the wage equations. The statistical performances of these three proxies for price expectations are explained below;

1. The attempt to calculate price expectations by using the the method employed by Christofides and Wilton (1979) and Reid (1979) was not successful. Regressing P_t upon its previous values results in several parameters of the distributed lag registering negative signs, which conflicts with a priori theory. Many lag lengths were employed but none of the resulting lag structures seemed reasonable. The typical lag structure is dominated by a large positive coefficient for P_{t-1} (sometimes greater than unity)

followed by coefficients which fluctuate in size and exhibit a mixture of positive and negative signs. All of the price expectations equations calculated by this method are corrected for the presence of serial correlation.

The coefficients for the distributed lags of the above price expectations equations do not resemble the coefficients obtained by Christofides and Wilton (1979). This may have important implications for the study undertaken by Wilton (1982), as he uses the same coefficients for the price expectations equation that were calculated in Christofides and Wilton (1979). Therefore, the results of this thesis indicate that if Wilton (1982) had re-estimated the coefficients of the price expectations equation his results may have been quite different because of the addition of more recent CPI data.

2. The proxy variable for price expectations that uses only the information concerning the CPI that was available at the time the price expectations were formed also gave poor results. The coefficients of the distributed lag are often statistically insignificant and negative signs frequently occur. In addition, serial correlation was present in most of the price expectations equations.

Decisions concerning the sub-sample data period and the general length of the lag may have contributed to the poor quality of the results. It was somewhat 'arbitrarily' decided to use ten years of data to calculate each price expectations observation using an overall data period extending from 1957:1 to 1983:4. It was also extremely difficult to determine a general length of lag which is suitable for the whole estimation period, but it was eventually decided that a six quarter length distributed lag was the most appropriate.

3. The most reasonable results for a price expectations proxy are obtained by entering the past rates of change of the CPI directly into the wage equation. Therefore, this proxy variable is incorporated into the main wage equations and its performance is evaluated when the results for the wage equations are analysed.

4.5 EMPIRICAL RESULTS

Three separate dummy variables, one for each year of the AIB guidelines period, were also used to register the impact of the AIB controls upon wage inflation during the time period covered by DURAIB. However, this method of representing DURAIB with three dummy variables instead of a single vari-

able was not successful. The results were weak and inconsistent; the vast majority of the results indicated that only one of the dummy variables was statistically significant, but different dummy variables were significant for different equations. Therefore, in a similar fashion to some of the studies reviewed earlier, the three separate dummy variables were combined to form a single dummy variable to represent DURAIB.

All of the following results are obtained by using the ten quarter length version of POSTAIB. Therefore, during this ten quarter post-AIB period, all of the employees who entered into one year or two year wage agreements during the AIB controls will have entered into a new wage contract in the period after the lifting of controls.[35]

All of the equations are corrected for the presence of first order serial correlation using the Hildreth-Lu technique.

Each distributed lag variable is formed by a second order polynomial with the endpoint constrained to equal zero. The lengths of the distributed lags are decided by comparing regression results for several lag lengths and then choosing

++++++++++++++++++

[35] Only the results for the ten quarter length POSTAIB are displayed as the vast majority of wage contracts during the period of controls were one year or two year wage contracts. A mere five percent of all employees entered into three year wage agreements in the final three quarters of the controls period.

the 'best' lag length by referring to the following criteria;

1. The R^2 statistic for the wage equation.
2. The 'T' statistics for the lag coefficients.
3. The theoretical validity of the signs of the coefficients and the length of the lag.

The degree of the polynomial and the decision to impose an endpoint constraint are also decided according to the above criteria. For example, a second degree polynomial is preferred to a third degree polynomial because the former polynomial always registers a higher R^2 statistic , more coefficients are statistically significant and more theoretically correct signs are exhibited by the lag coefficients.

4.6 ONE YEAR WAGE CONTRACTS

4.6.1 Using the Linear U Rate

4.6.1.1 Price Expectations

Referring to Table 4.1, it can be seen that in both sectors, the proxy variable for price expectations provides good statistical results, with each coefficient of the distributed lag exhibiting the expected positive sign and only P_{t-1} is statistically insignificant. For both sectors the lag structures are very similar in size and display lag weights that first increase and then decrease in size, resulting in a lag structure resembling an inverted U shape. The length

of these lags seems reasonable and is consistent with other studies.[36] The sum of the lag coefficients for P_{t-i} is not significantly different from unity in either sector (at the 99 percent level of significance).[37] Therefore, this provides evidence which suggests that, in the long-run, price inflation is fully reflected in wage settlements.

4.6.1.2 The Excess Demand for Labour

Each coefficient of the distributed lags of past unemployment rates exhibits the theoretically correct negative sign with the exception of the last lag coefficient in the CS. Statistically insignificant coefficients are registered for the last and penultimate lag coefficients in both sectors, but their inclusion is necessary in order to maintain statistical significance and correct signs in the earlier lag coefficients. Both sectors reveal a declining lag structure, which is reasonable as the more recent unemployment rates should possess more up to date information concerning the changes in the excess demand for labour that lead to changes in U^*_t

++++++++++++++++++++

[36] Christofides and Wilton (1979) use an eight quarter distributed lag of past rates of change of the CPI and Reid (1979) employs a six quarter distributed lag.

[37] All statements relating to whether the sum of the lag coefficients for P_{t-i} are significantly different from unity are made at the 99 percent level of significance.

TABLE 4.1

ONE YEAR CONTRACTS (LINEAR U RATE VERSION)

		NCS	CS
Intercept		13.096	7.128
Distributed Lag Weights For Price Expectations	P_{t-1}	0.115	0.025
		(0.663)	(0.085)
	P_{t-2}	0.178	0.200
		(2.824)	(2.624)
	P_{t-3}	0.208	0.285
		(4.904)	(2.703)
	P_{t-4}	0.205	0.280
		(2.591)	(1.811)
	P_{t-5}	0.169	0.185
		(1.940)	(1.532)
	P_{t-6}	0.101	
		(1.651)	
Distributed Lag Weights For the Excess Demand For Labour	U_t	-0.525	-1.184
		(-1.738)	(-2.200)
	U_{t-1}	-0.387	-0.520
		(-4.265)	(-4.449)
	U_{t-2}	-0.266	-0.102
		(-2.252)	(-0.351)
	U_{t-3}	-0.161	0.071
		(-0.979)	(0.258)
	U_{t-4}	-0.072	
		(-0.569)	
UADJ3		-4.918	26.868
		(-0.586)	(2.292)
PREAIB		7.141	1.309
		(5.314)	(0.685)
DURAIB		-2.133	-4.655
		(-2.108)	(-3.382)
POSTAIB		-2.531	-3.172
		(-2.684)	(-2.372)
Sum Of Lag Coeffic. (P_{t-i})		0.971	0.975
		(6.122)	(4.345)
Sum of Lag Coeffic. (U_{t-i})		-1.411	-1.735
		(-4.723)	(-4.450)
R^2		0.6339	0.5973
Durbin-Watson Statistic		1.916	1.937
Rho		0.160	0.180

'T' statistics are in parentheses.

Statistical significance is obtained for UADJ3 in the CS but UADJ3 is insignificant in the NCS. The significant coefficient is accompanied by the expected positive sign which indicates that UADJ3, by registering changes in the generosity of the UIC system, is actually representing fluctuations in the natural rate of unemployment. An insignificant coefficient for UADJ3 in the NCS might be explained by the hypothesis that the rate of wage change is not so responsive to fluctuations in the excess demand for labour in the NCS compared to the CS, because the NCS is partly 'sheltered' from market forces. Evidence to support this claim is provided by the fact that the sum of the coefficients for the distributed lag of the unemployment rates is larger for the CS in comparison to the NCS. It should be noted that Riddell and Smith (1982) also discover that UADJ3 is only statistically significant in their private sector wage equation.

4.6.1.3 Intercept Shift Dummy Variables

The PREAIB coefficient indicates that there was a 7.1 percent 'anticipatory' wage increase in the NCS in the four quarters prior to the imposition of controls. However , interpretation of the PREAIB dummy variable is difficult as it is unclear as to whether the coefficient represents an actual 'anticipation affect' or whether it is just registering

the very high wage increases which were actually the catalyst for the inception of controls. That is to say, the extremely high wage increases (relative to labour market conditions and inflationary expectations) may have caused the implementation of controls instead of the anticipated controls causing the high wage increases.

The DURAIB dummy variable is both negative and significant in each sector indicating that during its years of operation the AIB did reduce wages below the rate of wage increase that would otherwise have occurred. The magnitude of the DURAIB coefficients points to the conclusion that the rate of wage increase was reduced by 4.7 percent and 2.1 percent by the AIB in the private and public sectors respectively. This suggests that the hypothesis that the higher guidelines in the public sector would result in a lower AIB effect upon wages in the public sector compared to the private sector outweighs the arguments that support the opposite prediction.

The POSTAIB dummy variable is both statistically significant and negatively signed for each sector which indicates that a wage 'explosion' did not occur after controls were lifted.[38] However, a statistically significant negative coefficient for POSTAIB implies that there was a downward

[38] Throughout this analysis, the results for POSTAIB are extremely similar regardless of the length for POSTAIB.

shift in the structural wage equations in the immediate post-AIB period. It seems that this downward shift resulted in the rate of wage increase being lowered by 3.2 percent in the private sector and 2.5 percent in the public sector. A detailed analysis of the reason for this downward shift is beyond the scope of this thesis. However, one possible explanation for the downward shift concerns the mechanism by which the AIB decreased wage inflation during the controls period. If the AIB reduced the rate of wage increase during controls by decreasing price expectations, then it is possible that price expectations continued to be lower (for a limited period) than they would have been in the absence of the AIB in the post-controls period. Conseqently, the negative sign for POSTAIB may be due to the fact that wage inflation was temporarily lower than it would otherwise have been because price expectations were still responding to the downward influence of the AIB.

4.6.2 Using the Non Linear U rate

The performance of the price expectations proxy is not improved when $\sum U_{t-i}$ is replaced by $\sum (1/U)_{t-i}$ (see Table 4.2). Using the non linear U rate results in statistical insignificance for a number of the lag coefficients of the price expectations proxy; two out of five in the public sector and three out of five in the private sector are statistically

insignificant. However, employing this version of the excess demand variable does not change the result that the sum of the price expectations coefficients is not significantly different from unity (the coefficients sum to 0.796 for the NCS and 0.816 for the CS). It is worth noting that P_{t-1} is both significant and also the largest coefficient for the NCS (which is in total contrast to the linear U rate specification results for this coefficient), but it is statistically insignificant for the private sector.

Statistical insignificance is also more prevalent among the lag coefficients of the non linear excess demand for labour proxy variable in comparison to the linear version, but all of the signs for the lag coefficients correspond with a priori expectations (i.e positive signs). The results for UADJ3 are very similar to those obtained using the linear U rate version; UADJ3 is only statistically significant for the CS and its coefficient has a positive sign that is consistent with the assertion that UADJ3 is representing fluctuations in the natural rate of unemployment.

The intercept shift dummy variables are all affected, to varying degrees, by the substitution of $\sum(1/U)_{t-i}$ for $\sum U_{t-i}$. PREAIB remains largely the same , in the sense that only the NCS registers a statistically significant 'anticipation effect'. However, the magnitude of the PREAIB coefficient is larger for the non linear U rate equation and suggests that

TABLE 4.2

ONE YEAR CONTRACTS (NON LINEAR U RATE)

		NCS	CS
Intercept		0.851	-14.833
Distributed Lag Weights For Price Expectations	P_{t-1}	0.434	0.298
		(1.963)	(0.944)
	P_{t-2}	0.246	0.223
		(4.087)	(2.573)
	P_{t-3}	0.109	0.155
		(1.343)	(1.320)
	P_{t-4}	0.022	0.096
		(0.188)	(0.564)
	P_{t-5}	-0.014	0.044
		(-0.155)	(0.333)
Distributed Lag Weights For The Excess Demand For Labour	$(1/U)_t$	1.539	15.886
		(0.138)	(1.129)
	$(1/U)_{t-1}$	6.689	10.450
		(2.569)	(2.448)
	$(1/U)_{t-2}$	8.148	6.144
		(1.385)	(1.435)
	$(1/U)_{t-3}$	5.919	2.967
		(1.054)	(0.422)
	$(1/U)_{t-4}$		0.919
			(0.167)
	UADJ3	-8.400	24.809
		(-0.833)	(1.662)
	PREAIB	7.878	1.700
		(4.871)	(0.732)
	DURAIB	-0.286	-2.765
		(-0.265)	(-1.768)
	POSTAIB	-1.019	-1.462
		(-1.023)	(-0.933)
Sum Of Lag Coeffic. (P_{t-i})		0.796	0.816
		(4.388)	(3.086)
Sum Of Lag Coeffic. $(1/U)_{t-i}$		22.295	36.366
		(2.569)	(2.867)
R^2		0.6227	0.4805
Durbin-Watson Statistic		1.812	1.978
RHO		0.29	0.33

'T' statistics are in parentheses.

a 7.9 percent 'anticipatory' wage increase occurred in the immediate pre-AIB period.

The most surprising result obtained by using a non linear U rate is that DURAIB is statistically insignificant for the NCS, thus indicating that the AIB did not influence this sector's rate of wage change at all during the imposition of the wage guidelines. Furthermore, when using $\sum(1/U)_{t-i}$ the calculated impact of the AIB upon the private sector's wage inflation is lower than that estimated when using the linear U rate version (i.e 2.8 percent compared to 4.7 percent).

The POSTAIB dummy variables are statistically insignificant in both sectors, thus disagreeing with the conclusion of the linear U rate version that there was a downward shift in the wage equation during the POSTAIB period. However, the two specifications (linear and non linear) both agree that a wage 'explosion' did not occur after the AIB wage guidelines were lifted.

By referring to the R^2 statistics, it can be seen that the linear U rate version of the wage equation has more explanatory power than the non linear version (especially for the CS). Therefore, after taking into consideration the statistical results of the proxy variables and the R^2 statistics for the linear and non linear U rate specifications, it seems that replacing $\sum U_{t-i}$ with $\sum(1/U)_{t-i}$ has a detrimental effect upon the overall statistical performance of the

structural wage equation. Hence, the results of the linear U rate equations are to be preferred.

4.7 ALL WAGE CONTRACTS

4.7.1 Using the Linear U Rate

4.7.1.1 Price Expectations

The results for this category are shown in Table 4.3. The proxy variable for price expectations always exhibits the expected positive sign for each coefficient of the distributed lag for both sectors and all the coefficients are significantly different from zero except for P_{t-1}. An inverted U shape describes the lag weight coefficients, as the weights attached to subsequent time periods at first increase and then decrease, with the largest lag weight attached to P_{t-3} and P_{t-4} in the private and public sectors respectively. The length of the lag is similar for both sectors; 7 lags for the public sector and 6 lags for the private sector. This lag is of a similar length to other price expectation proxies based on past rates of change of the CPI {i.e Christofides and Wilton (1979) and Reid (1979)}. The sum of the lag coefficients amount to 1.097 and 1.014 for the public and private sectors respectively, both of which are not significantly different from unity. Therefore, the evidence indicates that all price inflation is reflected in wage settlements in the long-run.

TABLE 4.3

ALL CONTRACTS (LINEAR U RATE)

		NCS	CS
Intercept		10.949	15.94
Distributed Lag Weights For Price Expectations	P_{t-1}	0.125	0.117
		(1.193)	(0.752)
	P_{t-2}	0.171	0.184
		(3.668)	(3.167)
	P_{t-3}	0.196	0.216
		(9.660)	(5.135)
	P_{t-4}	0.199	0.214
		(5.164)	(2.906)
	P_{t-5}	0.181	0.177
		(3.547)	(2.208)
	P_{t-6}	0.142	0.106
		(2.882)	(1.891)
	P_{t-7}	0.082	
		(2.525)	
Distributed Lag Weights For The Excess Demand For Labour	U_t	-0.734	-0.575
		(-2.851)	(-1.773)
	U_{t-1}	-0.460	-0.488
		(-7.238)	(-5.697)
	U_{t-2}	-0.246	-0.364
		(-1.703)	(-2.050)
	U_{t-3}	-0.093	-0.201
		(-0.684)	(-1.207)
UADJ3		0.021	14.404
		(0.004)	(1.859)
PREAIB		6.196	-0.724
		(6.722)	(-0.646)
DURAIB		-2.791	-3.290
		(-3.794)	(-3.380)
POSTAIB		-2.551	-2.518
		(-3.899)	(-2.746)
Sum Of Lag Coeffic. (P_{t-i})		1.097	1.014
		(9.660)	(6.155)
Sum Of Lag Coeffic. (U_{t-i})		-1.534	-1.627
		(7.238)	(5.697)
R^2		0.8422	0.7680
Durbin Watson Statistic		2.090	2.067
Rho		0.15	0.53

'T' statistics are in parentheses.

4.7.1.2 The Excess Demand for Labour

The distributed lag of past unemployment rates yields the correct negative sign for all lag coefficients in each sector and statistical significance is registered for each coefficient of the lag with the exception of the final lag coefficient in both sectors.[39] It is evident from the lag structure that the importance of past rates of change of unemployment in the determination of U^*_t diminishes as the lag extends farther into the past.

Similar to the results for one year wage contracts, only the private sector registers a statistically significant coefficient for the unemployment rate adjuster variable (UADJ3) and the sign for the coefficient is a positive one, which is also in accord with earlier results.

4.7.1.3 Intercept Shift Dummy Variables

The dummy variable PREAIB, designed to register any 'anticipation effect', shows that, in the four quarters preceding the introduction of the AIB, wage increases in the public sector were 6.2 percent higher than that predicted by the structural wage equation. Conversely, the private sector yielded an insignificant coefficient for PREAIB. However, as mentioned in the previous section, it is not absolutely

++++++++++++++++++

[39] Although insignificant, this final lag is included because it helps maintain a reasonable lag structure.

certain that PREAIB is actually representing an 'anticipation effect' as this variable could actually be capturing extraordinarily high wage increases that were merely the catalyst for the imposition of the AIB guidelines.

DURAIB is both statistically significant and negatively signed in each sector, indicating that the AIB reduced wages below the rate of wage change that would have occurred in the absence of the AIB. The dummy variable implies that the AIB had a depressing effect upon the rate of wage change to the extent of 3.3 percent and 2.8 percent in the commercial and non commercial sectors respectively.

According to POSTAIB, a wage 'explosion' did not occur in the ten quarters after controls were lifted. However, as POSTAIB has a statistically significant negative coefficient, it seems that a negative impact was exerted upon the rate of wage change in the post-AIB period. The coefficients for POSTAIB indicate that the rate of wage increase was approximately 2.5 percent lower in both sectors than that predicted by the structural wage equation.

4.7.2 Using the Non Linear U Rate

Replacing $\sum U_{t-i}$ with $\sum (1/U)_{t-i}$ (see Table 4.4) affects the structural wage equation in a manner that is very similar to that experienced by the one year contracts equations when

the same substitution is made. Therefore, only the general effects of the substitution will be outlined here.

Although the lengths of the distributed lags of the price expectations proxy are shorter when $\sum(1/U)_{t-i}$ is used, the overall performance of this proxy variable is largely unaffected by this substitution. However, the excess demand for labour proxy variable registers more statistical insignificance when using the non linear version of this proxy and one of the lag coefficients also exhibits an incorrect sign. The results for UADJ3 are not affected by the replacement of $\sum U_{t-i}$ with $\sum(1/U)_{t-i}$ (i.e UADJ3 still possesses a positive sign and is only statistically significant for the CS).

Using $\sum(1/U)_{t-i}$ also results in a statistically significant coefficient for PREAIB in the NCS (but PREAIB is insignificant for the CS) and, once again the magnitude of the PREAIB coefficient is larger when the non linear U rate is used (i.e a 7.4 percent 'anticipation effect' is registered).

Similar to the results for one year contracts, using $\sum(1/U)_{t-i}$ yields a statistically insignificant coefficient for DURAIB in the NCS. But the results for the CS indicate that wage inflation was 2.2 percent lower than it would have been in the absence of the AIB during the controls period (note that this estimate is lower than that obtained when $\sum U_{t-i}$ is used).

TABLE 4.4

ALL CONTRACTS (NON LINEAR U RATE)

		NCS	CS
Intercept		-3.149	-36.6
Distributed Lag Weights For Price Expectations	P_{t-1}	0.408	0.116
		(1.864)	(0.59)
	P_{t-2}	0.278	0.199
		(6.218)	(3.155)
	P_{t-3}	0.166	0.229
		(1.396)	(2.771)
	P_{t-4}	0.074	0.206
		(0.647)	(1.859)
	P_{t-5}		0.129
			(1.529)
Distributed Lag Weights For The Excess Demand For Labour	$(1/U)_t$	17.368	2.570
		(2.033)	(0.330)
	$(1/U)_{t-1}$	7.928	9.009
		(3.781)	(2.879)
	$(1/U)_{t-2}$	1.886	11.972
		(0.422)	(3.612)
	$(1/U)_{t-3}$	-0.756	11.458
		(-0.178)	(2.779)
	$(1/U)_{t-4}$		7.468
			(2.397)
	UADJ3	-7.233	14.267
		(-0.904)	(1.536)
	PREAIB	7.422	-1.924
		(5.939)	(-1.257)
	DURAIB	-0.528	-2.155
		(-0.597)	(-1.811)
	POSTAIB	-0.979	-1.602
		(-1.099)	(-1.451)
Sum Of Lag Coeffic. (P_{t-i})		0.926	0.879
		(6.218)	(3.964)
Sum Of Lag Coeffic. $(1/U)_{t-i}$		26.426	42.478
		(3.781)	(3.832)
R^2		0.7911	0.4665
Durbin-Watson Statistic		2.190	2.134
RHO		0.42	0.74

'T' statistics are in parentheses.

The results for POSTAIB using $\sum(1/U)_{t-i}$ also indicate that a wage 'explosion' did not occur in the immediate post-AIB period. However, the decrease in the rate of wage change suggested by POSTAIB when $\sum U_{t-i}$ is used is not present here.

Referring to the R^2 statistics, it can be seen that the linear version of the excess demand variable provides the wage equation with more explanatory power concerning the variations in the movement of W than the $\sum(1/U)_{t-i}$ version. This is especially true for the CS where 76.8 percent and 46.7 percent of the variation in the movements of the dependent variable is explained by the wage equations using $\sum U_{t-i}$ and $\sum(1/U)_{t-i}$ respectively. After consideration of the R^2 statistics and the overall performance of the structural wage equations, it seems that the equations which use the linear U rate are to be preferred.

4.8 COMPARING THE RESULTS FOR CONTRACTS OF DIFFERENT LENGTHS

The empirical results reveal that the calculated impact of the AIB upon wage settlements during the controls period is quite sensitive to the length of the wage contracts selected for the analysis. The NCS results suggest that the 'all wage contracts' category was affected by the AIB to a greater extent than the one year contracts. However, the CS re-

sults point to the opposite conclusion; it appears that wage inflation for one year contracts in the CS experienced a larger downward AIB effect than the 'all contracts' category.

4.9 OVERVIEW OF RESULTS

4.9.1 Price Expectations

Of the eight empirical equations presented, only two equations reveal a coefficient for P_{t-1} that is significantly different from zero.[40] In addition, with the exception of one other equation, it is only these same two equations which allocate the largest lag weight for the distributed lag of the price expectations proxy to the coefficient for P_{t-1}. Therefore, the majority of the results imply that wage negotiators do not attach a great deal of importance to P_{t-1}, the rate of change of the CPI for the previous time period, when forecasting future price inflation for the duration of the wage contract which begins in the current period. This is a very surprising result as it would be assumed that wage negotiators would allocate the most weight to the most recent CPI information available as this weight-

[40] Statistical significance for P_{t-1} only occurs in the NCS equations which employ the non-linear version of the excess demand variable. However, as discussed earlier, the equations estimated using the non linear U rate seem to be statistically inferior (i.e smaller R^2 statistic etc.) than the equations which employ the linear U rate specification.

ing should provide the most accurate forecasts.

One possible explanation for the apparent unimportance of P_{t-1} in the formation of price expectations concerns the pragmatics of the negotiating process. It may be the case that the wage bargaining procedure begins with an initial proposal (i.e the employees propose a certain percentage wage increase) and then negotiations centre around this original wage claim. If the negotiating process continues for a number of months then the initial proposal would have been made before the data for P_{t-1} became available . Also, once the two parties have committed themselves to their initial proposals it may be difficult to deviate from them. Thus, it may be impossible to incorporate the information relating to P_{t-1} into the price expectations component of the proposed wage increase.

There is an important implication for some of the studies reviewed in Chapter Two if it is indeed correct to deduce from the results of this thesis that P_{t-1} does not significantly contribute to the formation of price expectations in the wage bargaining process. Christofides and Wilton (1979) allocate the most weight to P_{t-1} in the formation of their price expectations proxy variable equation {note that Wilton (1982) uses the same price expectations equation as C+W}. Therefore, if P_{t-1} is not a significant variable in the formation of price expectations then substantial inaccuracies could be introduced into the studies mentioned above.

4.9.2 The Excess Demand for Labour

The results suggest that the CS and NCS differ somewhat in terms of their reactions to changes in the excess demand for labour. For example, the NCS consistently registers a statistically insignificant coefficient for UADJ3. This may indicate that small changes in the excess demand for labour caused by an unstable U_n may not significantly affect the rate of wage change in the NCS. In addition, the sum of the coefficients for the distributed lags of past unemployment rates (linear or non linear) is always greater for the private sector in comparison to the public sector. Thus, these empirical results imply that the rate of wage change in the CS is more responsive to fluctuations in the excess demand for labour than the NCS.

4.9.3 Intercept Shift Dummy Variables

The public sector reveals a statistically significant coefficient for PREAIB in all versions of the wage equation. However, as explained earlier , this does not necessarily mean that an 'anticipation effect' actually took place in this sector. Evidence that an 'anticipation effect' did not occur is found in Reid (1982, p.482), who states that

> "A comprehensive three year program of wage and price controls on the Canadian economy was announced as a complete surprise in a national television address by Prime Minister Trudeau on October 13, 1975."

However, it should be noted that the AIB program of wage controls was designed and implemented by public sector employees. Therefore, it is possible that the introduction of the AIB guidelines was indeed a surprise to the private sector but the public sector may have been expecting the imposition of the AIB controls.

It may seem surprising that although the private sector also experienced 'large' wage increases in the immediate pre-AIB period, the coefficient for PREAIB in the private sector is consistently statistically insignificant. Therefore, the wage equation is stating that the high natural rate of unemployment and the level of price expectations at this time justified the wage increases in the private sector.

The coefficient for DURAIB is consistently statistically significant and negative, with the exception of the public sector in the non linear U rate version of the wage equation where DURAIB is statistically insignificant. Therefore, the majority of the wage equations suggest that the AIB did result in the rate of wage change being lower than it would have been in the absence of the AIB.[41]

++++++++++++++++++

[41] The structural wage equations are also estimated with the statistically insignificant dummy variables for POSTAIB and PREAIB excluded. However, the magnitude of the coefficients for DURAIB remain stable.

DURAIB always registers a larger negative coefficient for the private sector in comparison to the public sector. The differing guidelines (due to the 'experience adjustment factor') may have been responsible for the AIB having a greater impact upon the wage inflation of the CS.

The results for DURAIB suggest that the calculated impact of the AIB is quite sensitive to the specification of the excess demand for labour proxy. A substantially smaller coefficient for DURAIB is calculated each time the non linear U rate is used.

The coefficient for POSTAIB is consistently negative which indicates that a post controls wage 'bubble' did not occur in either sector. The statistical significance of a negative coefficient for POSTAIB suggests that there was a downward shift in the structural wage equations in the immediate post-AIB period.[42] This post-AIB downward shift is also apparent in Wilton (1982) and Riddell and Smith (1982). Wilton (1982) calculates a wage equation , using some post-AIB data, which consistently overpredicts wage settlements in the period immediately following the lifting of controls. Riddell and Smith (1982) argue that their results concerning the impact of the AIB upon wage settlements are substantially different to other studies because their study (R+S) is

[42] Statistical significance for POSTAIB only occurred in the linear U rate version of the wage equation for both sectors (according to a two tailed 'T' test).

the only one which includes post controls data. Thus, Riddell and Smith (1982) imply that the structure of the wage equation is different in the post-AIB period in comparison to the pre-AIB structure.

A possible explanation for the post-AIB downward shift in the wage equation may be that the AIB decreased price expectations during the controls period, thus decreasing the rate of wage change, and this downward impact upon price expectations continued temporarily into the post-AIB period. Unfortunately, a detailed analysis of this hypothesis is beyond the limitations of this thesis.

As the empirical results indicate that changes in the rate of growth of the money supply did not have a substantial effect upon the formation of price expectations, then it may be assumed that the downward effect upon the rate of wage change indicated by POSTAIB is not caused by the continued operation of the policy of Monetary Gradualism.

Chapter V

SUMMARY OF RESULTS

This chapter contains a summary of some of the issues, results and findings of this thesis. The chapter begins with a brief review of the results concerning the proxy variables for price expectations and the excess demand for labour. The next section compares this project's estimates of the impact of the AIB upon wages during the controls period (i.e DURAIB) with the empirical results of previous studies. Finally, the coefficients for POSTAIB and PREAIB are summarised.

5.1 PRICE EXPECTATIONS

The evidence provided by this thesis suggests that changes in the growth rate of the money supply (M1) do not play an important role in the price expectations formation process of wage negotiators. Thus, it does not seem likely that Monetary Gradualism was the cause of any reduction in wage inflation that occurred during the period of the AIB wage guidelines.

However, it does seem that the price expectations of wage negotiators are largely based upon past rates of change of

the CPI. Furthermore, the results of this thesis indicate that entering the past rates of change of the CPI directly into the wage equation is the most 'successful' method of calculating price expectations. The superior statistical and theoretical results of this method may have been due to the fact that this proxy variable , in contrast to the other price expectations proxies, uses the information concerning price expectations that is present in each W_t observation.

5.2 THE EXCESS DEMAND FOR LABOUR

Estimating the wage equations using both linear and non linear versions of the excess demand proxy variable reveals that the results concerning the impact of the AIB upon wages are very sensitive to the exact specification of this proxy variable. However, superior econometric results are obtained when the linear U rate is used as the excess demand proxy. Therefore, the empirical results of the linear U rate specification are to be preferred when analysing the results concerning the impact of the AIB upon wage inflation.

Each wage equation reveals that the sum of the lag coefficients for the excess demand proxy variable is smaller for the NCS in comparison to the CS. In addition, UADJ3 is always statistically insignificant for the NCS , thus implying that this sectors wage increases are not responsive to fluc-

tuations in U_n resulting from changes in the generosity of the UIC system. Therefore, the empirical results suggest that labour market conditions have a stronger influence upon wage changes in the CS than the NCS.

5.3 COMPARISON OF RESULTS WITH EARLIER STUDIES

As mentioned previously, several other studies have also calculated the impact of the AIB upon the rate of wage increase during the controls period. It will be informative to compare the magnitudes of the coefficients of the various AIB intercept dummy variables calculated by these earlier studies with the results of this thesis. Table 5.1 below shows the results for the AIB dummy variables for the aggregate equations, the CS equations and the NCS equations.

It can be seen that the majority of results obtained in this study are very similar to the estimates of the earlier studies. However, it seems that some of the wage equations employed in this thesis provide results which do not fall within the range of estimates recorded by other studies;

1. The non linear excess demand for labour specifications used in this study indicate that the AIB did not reduce the rate of wage change in the NCS. This disagrees with the Christodfides and Wilton (1979) study which concluded that the AIB substantially reduced wage inflation in this sector. As Christofides

TABLE 5.1

SUMMARY OF AIB INTERCEPT DUMMY VARIABLES

Author(s)	Aggregate	CS	NCS
C+W (1979)		-3.2	-3.6
Reid (1979)*		-4.5	
R+S (1982)	-2.04		
Anderton (A)		-4.7	-2.1
Anderton (B)		-2.8	0
Anderton (C)		-3.2	-2.8
Anderton (D)		-2.2	0

* Manufacturing sector only
(A) One year contracts using a linear U rate.
(B) One year contracts using a non-linear U rate.
(C) 'All contracts' using a linear U rate.
(D) 'All contracts' using a non-linear U rate.

and Wilton used a linear excess demand for labour proxy variable, the differing results may be further evidence that the empirical results are quite sensitive to the exact specification of the excess demand variable (i.e linear or non linear).

2. The coefficient of the AIB intercept dummy variable for one year contracts (CS) is larger than any of the

other estimates. Perhaps this adds further support to the conclusion, outlined in the previous chapter, that the magnitude of the impact of the AIB upon the rate of wage change varies between wage contracts of differing lengths.

Another obvious difference betweeen the results concerns the relative influence of the AIB upon the CS and NCS. Christofides and Wilton (1979) estimate that the rate of wage increase of the NCS was reduced by a greater extent than the CS by the AIB. However, the results of this study consistently find the converse - that the CS experienced the largest reduction in W during the guideline years. However, it must be remembered that Christofides and Wilton (1979) were calculating the 'indirect' effects of the AIB whereas this study is concerned with both the 'direct' and 'indirect' effects, thus the results may not be comparable. Consequently, it seems that there is no general agreement concerning the relative impact of the AIB upon the CS and NCS.

Although many different proxy variables are used by the above studies to calculate the impact of the AIB upon wage inflation, it is clear that the results are in general agreement regarding the impact of the AIB. The empirical evidence consistently indicates that there was a significant reduction in the rate of wage change during the imposition

of the AIB.[43] Unfortunately, it is virtually impossible to determine the exact magnitude of the impact of the AIB upon wages as many different methods can be used to calculate this impact.

5.4 SUMMARY OF OTHER VARIABLES CONNECTED WITH THE AIB

5.4.1 The Anticipation Effect

PREAIB is not statistically significant in any of the CS equations which points to the conclusion that an 'anticipation effect' did not occur in this sector. Conversely, the public sector registers a statistically significant coefficient for PREAIB in all of the wage equations with the coefficients varying in size from 7.9 percent to 6.2 percent. Unfortunately, it is not possible to definitely ascertain whether a statistically significant coefficient for PREAIB represents an 'anticipation effect', or the influence of some other variable or variables.

++++++++++++++++++++

[43] Several other studies also conclude that the AIB decreased the rate of wage increase during the controls period. These studies include Cousineau and Lacroix (1978) and Fortin and Newton (1980).

5.4.2 The Wage Bubble Effect

All of the wage equations used in this study consistently display a coefficient for POSTAIB that is either statistically insignificant or negative. Therefore, it seems that the imposition of the wage guidelines did not cause a wage 'explosion' in the post-AIB period. An explanation for this apparent non-existence of a wage 'bubble' may be that real wages were not decreased over the controls period.[44] Thus, if the purchasing power of wages did not deteriorate during the guideline years then there is less of an incentive for 'catch-up' increases in the immediate post-AIB period.

As a statistically significant negative coefficient for POSTAIB pervades most of the results it is concluded that a downward shift in the wage equation occurred in the post-AIB period. It is possible that the AIB was responsible for this downward shift , via the mechanism of reduced price expectations, but no definite conclusions can be reached concerning this shift.

++++++++++++++++++++

[44] Wilton (p.21, 1982) states that 'From 1975 to 1978, labour compensation per person employed increased 26.8 percent compared to a 26.4 percent increase in the CPI.'

BIBLIOGRAPHY

Aliber, R.Z. and G.P.Schultz (1966) Guidelines, Informal Controls, and the Market Place. Chicago: The University of Chicago Press.

Anderson, J. and M. Gunderson, Editors (1982) Union Management Relations in Canada. Ontario: Addison-Wesley.

Anti-Inflation Board (1977) Second Year Report. Ottawa: Minister of Supply and Services.

Anti-Inflation Board (1978) Third Year Report. Ottawa: Minister of Supply and Services.

Anti-Inflation Board (1979) Chronicles of the Anti-Inflation Board. Ottawa: Minister of Supply and Services.

Anti-Inflation Board (1979) Final Report. Ottawa: Minister of Supply and Services.

Auld, D.A.L., L.N.Christofides, R.Swidinsky, and D.A.Wilton (1979) The Determinants of Negotiated Wage Settlements in Canada (1966-1975). An Anti-Inflation Board Study. Ottawa: Minister of Supply and Services.

Barber, C.L., and J.C.P. McCallum (1980) Unemployment and Inflation : The Canadian Experience. Canadian Institute for Economic Policy.

Brittain, S. and P. Lilley (1977) The Delusion of Incomes Policy. London ; Temple Smith Ltd.

Brunner, K. and A. Meltzer (1976) The Economics of Price and Wage Controls. Amsterdam : North Holland Publishing Company.

Burrows, P. and T. Hitiris (1973) "Estimating the Impact of Incomes Policy." In M. Parkin and M.T. Sumner, Editors. Incomes Policy and Inflation. Manchester: Manchester University Press.

Christofides, L.N. and D.A.Wilton (1979) Wage Controls in Canada (1975:3 - 1978:2) : A Study of Their Impact on Negotiated Base Wage Rates. An Anti-Inflation Board Study. Ottawa: Minister of Supply and Services.

Cloutier, J.E. (1978) The Distribution of Benefits and Costs of Social Security in Canada 1971-1975. Economic Council of Canada, Discussion Paper No.108.

Courchene, T.J. (1976) Money, Inflation and the Bank of Canada : An Analysis of Canadian Monetary Policy from 1970 to Early 1975. Montreal: C.D.Howe Research Institute.

Courchene, T.J. (1976) Monetarism and Controls : The Inflation Fighters. Montreal ; C.D.Howe Research Institute.

Cousineaux, J. and R. Lacroix (1978) "L'impact de la Politique Canadienne de Controle des Prix et des Revenus sur les Ententes Salariales." Canadian Public Policy. Pp. 88-100. Vol.4.

Department of Finance (1978) Canada's Recent Inflation Experience. Ottawa.

Dicks-Mireaux, L.A. and J.C.R.Dow (1959) "The Determinants of Wage Inflation in the United Kingdom 1946-56." Journal of The Royal Statistical Society. Vol 122, No 59, Pt.2 (p.145-174).

Dingledene, G. (1981) A Chronology of Response: The Evolution of U.I.C from 1940 to 1980. Employment and Immigration Canada. Ottawa: Supply and Services Canada.

Elliott, R.F. and J.L. Fallick (1981) Incomes Policies, Inflation and Relative Pay. London: George Allen and Unwin Ltd.

Employment and Immigration Canada (1981) Unemployment Insurance in the 1980's. Ottawa.

Flanagan, R.J. and L. Ulman, Editors (1971) Wage Restraint: A Study of Incomes Policies in Western Europe. California: University of California Press.

Foot, D.K. and D.J. Poirier (1979) The Compensation Decisions of The Anti-Inflation Board: An Empirical Analysis. Institute for Policy Analysis, University of Toronto. Ottawa, Supply and Services Canada.

Fortin, P. (1980) Unemployment, Inflation and Economic Stabilization in Quebec. Montreal: C.D. Howe Research Institute.

Fortin, P. and K. Newton (1980) "Labour Market Tightness and Wage Inflation in Canada". Mimeo.

Fortin, P. and L. Phaneuf (1981) "Why is the Unemployment Rate so High in Canada ?." Universite Laval Cahier 8115.

Grubel, H.G., D. Maki and S. Sax (1975) "Real and Insurance-Induced Unemployment in Canada." The Canadian Journal of Economics. Pp. 179-191. Vol.8, No.2.

Jackson, D., H.A. Turner and F. Wilkinson (1972) Do Trade Unions Cause Inflation ?. Cambridge: Cambridge University Press.

Johnson, H.G. and A.R. Nobay, Editors (1971) The Current Inflation. London: The Macmillan Press Ltd.

Kaliski, S.F. (1964) "The Relation Between Unemployment and the Rate of Wage Change of Money Wages in Canada." International Economic Review. Pp. 1-33. Vol.5.

Klein, L.R. (1974) A Textbook of Econometrics. Second edition. Englewood Cliffs, N.J.: Prentice Hall Inc.

Kmenta, J. (1971) Elements of Econometrics. New York : Macmillan Publishing Co., Inc.

Koutsoyiannis, A. (1973) Theory of Econometrics: An Introductory Exposition of Econometric Methods. London: The Macmillan Press Ltd.

Kumar, P. and W. Wood, Editors (1976) Canadian Perspectives On Wage-Price Guidelines: A Book Of Readings. Industrial Relations Centre , Queens University.

Letourneau, R.S. (1979) The Impact of The Anti-Inflation Program: A Framework for Analysis. The Conference Board in Canada.

Lipsey, R.G. (1960) "The Relation Between Unemployment and the Rate of Change of Money Wage Rates in the United Kingdom." Economica. Pp. 1-31. Vol.27, No.105.

Lipsey, R.G. (1977) "Wage-Price Controls: How to do a Lot of Harm by Trying to Do a Little Good." Canadian Public Policy. Pp. 1-13. Vol.3, No.1.

Lipsey, R.G. and J.M. Parkin (1970) "Incomes Policy: A Re-appraisal." Economica. Pp. 115-138. Vol.37.

Macdonald, D.S. (1975) Attack on inflation: A Program of National Action. Policy Statement, House of Commons, October 14, 1975. Ottawa: Minister of Supply and Services.

Maslove, A. and G.Swimmer (1980) Wage Controls in Canada 1975-78: A Study of Public Decision Making. The Institute for Research on Public Policy.

Mason, G. (1978) Wage and Price Control. The Institute for Social and Economic Research.

Mcguire, T.W. (1976) "On Estimating The Effects of Controls." In K. Brunner and A.H. Meltzer, Editors. The Economics of Price and Wage Controls. Amsterdam: North Holland Publishing Company.

Meyer, L.H. (1980) Macroeconomics: A Model Building Approach. South Western Publishing Co.

Oi, W.Y. (1976) "On Measuring the Impact of Wage-Price Controls: A Critical Appraisal." In K. Brunner and A.H. Meltzer, Editors. The Economics of Price and Wage Controls. Amsterdam: North Holland Publishing Company.

Panitch, L. (1976) Workers, Wages and Controls. New Hogtown Press.

Parkin, M. and M.T. Sumner, Editors (1972) Incomes Policy and Inflation. Manchester: Manchester University Press.

Parkin, J.M., Sumner, M.T., and R.A.Jones (1972) "A Survey of the Econometric Evidence on the Effects of Incomes Policy and the Rate of Inflation." In M. Parkin and M.T. Sumner, Editors. Incomes Policy and Inflation. Manchester: Manchester University Press.

Parkin, J.M., Sumner, M.T., and R.A. Jones (1976) "The Effects of Excess Demand, Generalised Expectations and Wage-Price Controls on Wage Inflation in the U.K, 1956-71." In K. Brunner and A.H. Meltzer, Editors. The Economics of Price and Wage Controls. Amsterdam: North Holland Publishing Company.

Patterson, J.H. and R.C. Pfaffenberger (1981) Statistical Methods for Business and Economics. Richard D. Irwin Inc.

Pesando, J.E. (1976) "Rational Expectations and Distributed Lag Expectations Proxies." Journal of the American Statistical Association. Pp. 36-42. Vol.71.

Phillips, A.W. (1958) "The Relation Between Unemployment and the Rate of Change of Money Wages in the United Kingdom, 1861-1957." Economica. Pp.283-299. Vol.25.

Pindyck, R.S. and D.L. Rubinfeld (1981) Econometric Models and Economic Forecasts. Second edition. New York: Mcgraw-Hill Inc.

Prices and Incomes Commission (1972) Inflation, Unemployment and Incomes Policy: Summary Report. Ottawa: Information Canada.

Reid, F.J. (1976) "Canadian Wage and Price Controls." Canadian Public Policy. Pp. 103-113. Vol.2, No.1.

Reid, F. and N.M. Meltz (1979) "Causes of Shifts in the Unemployment-Vacancy Relationship: An Empirical Analysis for Canada." Review of Economics and Statistics. Pp. 470-475. Vol.61.

Reid, F.J. (1979) "The Effect of Controls on the Rate of Wage Change in Canada." The Canadian Journal of Economics. Pp. 214-227. Vol.12.

Reid. F.J. (1979) An Analysis of U.S Wage Controls and Implications for Canada. An Anti-inflation Board Study. Ottawa : Supply and Services Canada.

Reid, F. (1982) "Wage and Price Controls in Canada." In Anderson, J. and M. Gunderson (Editors). Union-Management Relations in Canada. Ontario: Addison-Wesley.

Riddell, W. and P.M. Smith (1982) "Expected Inflation and Wage Changes in Canada, 1967-1981." The Canadian Journal of Economics. Pp. 377-393. Vol.15.

Rowley, J.C.R. and D.A. Wilton (1974) "Empirical Foundations for the Canadian Phillips' Curve." The Canadian Journal of Economics. Pp. 240-259. Vol.7, No.2.

Smith, D.C. (1972) "Incomes Policy" In M. Parkin and M. Sumner, Editors. Incomes Policy and Inflation. Manchester: Manchester University Press.

Statistics Canada (Quarterly, Various) Employment Earnings and Hours. Ottawa: Information Canada, Catalogue No. 72-002.

Statistics Canada (Quarterly , Various) Historical Labour Force Statistics. Ottawa: Information Canada, Catalogue No. 71-201.

Statistics Canada (Quarterly, Various) National Income and Expenditure Accounts. Ottawa: Information Canada, Catalogue No. 13-001.

Statistics Canada (Quarterly, Various) Statistical Report on the Operation of the UIC Act. Ottawa: Information Canada, Catalogue No. 73-001.

Taylor, J. (1972) "Incomes Policy, the Structure of Unemployment and The Phillips' Curve: The United Kingdom Experience 1953-70." In M. Parkin and M. Sumner, Editors. Incomes Policy and Inflation. Manchester: Manchester University Press.

Taylor, J. (1974) Unemployment and Wage Inflation: With Special Reference to Britain and the USA. Harlow: Longman Group Ltd.

Unemployment Insurance Commission (Annual, Various) Annual Report. Ottawa: Minister of Supply and Services.

Walker, M., Editor (1976) The Illusion of Wage and Price Control. The Fraser Institute.

Walker, M., Editor (1982) Tax Based Incomes Policies: A Cure for Inflation?. The Fraser Institute.

Wilson, T.A. and G.V. Jump (1979) The Influence of the Anti-Inflation Program on Aggregate Wages and Prices. Anti-Inflation Board, Ottawa.

Wilton, D.A. (1982) An Evaluation of Wage and Price Controls in Canada. Waterloo Economic Series. No.130.

Appendix A

DATA SOURCES

VARIABLE	SOURCE
The annual percentage increase or decrease in the base wage rate.	Annual Review, Wage Developments Resulting from Major Collective Bargaining Settlements (Construction Industry Excluded). Labour Canada.
Rate of change of the CPI.	Bank of Canada Review.
Growth rate of the M1 definition of the money supply.	Bank of Canada Review.
Percentage change in Gross National Product in 1971 dollars.	National Income and Expenditure Accounts. Statistics Canada. Catalogue No. 13-001.
The unemployment rate for 'Prime Age Males'.	Historical Labour Force Statistics. Statistics Canada. Catalogue No. 71-201.
Dummy variables for changes in the generosity of the UIC Act.	The Annual Report of the Unemployment Insurance Commission and Dingledene (1981).

VARIABLE	SOURCE
Number of persons covered by UIC.	Statistical Report on the Operation of the UIC Act, Statistics Canada, Catalogue No. 73-001.
Average weekly wages and salaries.	Employment Earnings and Hours Statistics Canada, Catalogue No. 72-002.
Average weekly Unemployment Insurance payments.	Statistical Report on the Operation of the UIC Act, Statistics Canada, Catalogue No. 73-001.

VITA

Surname: ANDERTON Given Names: ROBERT MARTIN

Place of Birth: NORTHAMPTON, ENG. Date of Birth: Feb. 9, 1959

Educational Institutions Attended, with Dates of Entering and Leaving:

CITY OF LONDON POLYTECHNIC, ENGLAND	1979	to 1982
UNIVERSITY OF VICTORIA, B.C.	1982	to 1984

Degrees, Diplomas, Etc., Awarded, with Dates and Names of Institutions:

B.A.	1982	CITY OF LONDON POLYTECHNIC

Honors and Awards:

Phillips, Hager and North Ltd. Graduate Bursary, 1982/83

Publications:

PARTIAL COPYRIGHT LICENSE

I hereby grant the right to lend my thesis (the title of which is shown below) to users of the University of Victoria Library, and to make single copies only for such users or in response to a request from the library of any other university, or similar institution, on its behalf or for one of its users. I further agree that permission for extensive copying of this thesis for scholarly purposes may be granted by me or a member of the University designated by me. It is understood that copying or publication of this thesis for financial gain shall not be allowed without my written permission.

Title of Thesis

CANADIAN WAGE AND PRICE CONTROLS: EVALUATING THE IMPACT OF THE ANTI INFLATION BOARD UPON PRIVATE AND PUBLIC SECTOR WAGE SETTLEMENTS

Author [redacted]

Signature

Robert M. Anderton

10th December 1984

Date