CONSEQUENCES OF MILD INFLATION - CANADA 1947-70

THE CONSEQUENCES OF MILD INFLATION - THE CANADIAN CASE 1947 - 1970

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ABSTRACT

This thesis reviews the social costs and consequences of mild inflation. The consequences studied are: the effect of inflation on the distribution of income and wealth, on resource allocation, on current and future output, on the level of economic activity and lastly, the instability of mild inflation. I first develop the theory underlying the impact of inflation on each variable, and then review the literature and previous empirical research. Then I apply similar tests to Canadian data for the period 1947 to 1970. Finally I attempt to evaluate the overall impact of inflation in Canada during this period. My conclusion is that the consequences were minor but measurable, the most harmful being the effect on the distribution of income and wealth.

RESUME

Cette thèse passe en revue les coûts sociaux et les conséquences de l'inflation rampante. Les conséquences considérées sont: l'effet de l'inflation sur la distribution du revenu et de la richesse, sur l'allocation des ressources, sur le produit actuel et futur, sur le niveau de l'activité économique, et enfin, l'instabilité de l'inflation rampante. Je developpe, d'abord, l'aspect théorique de l'impact de l'inflation sur chacune des variables et puis, passe en revue la littérature et les travaux empiriques. Ensuite, j'applique des tests similaires aux douuées canadiennes durant la periode 1947 - 1970. Finallement, je peute d'évaluer l'effet global de l'inflation sur le Canada durant cette période. Ma conclusion est que les conséquences ont été mineures mais mesurables; l'éffet le plus important étant l'impact de l'inflation sur la distribution du revenu et de la richesse.

PREFACE

Each chapter of my thesis contains a section entitled "New Canadian Evidence". In this section I have attempted to apply previous empirical tests of the consequences of mild inflation to Canadian data for the period 1947 - 1970. I consider these sections to be contributions to original knowledge. In my opinion the findings on the redistribution of income and wealth in Canadian inflation, and on the effect of inflation on the level of economic activity in Canada are of special importance.

Previous empirical work on the effects of mild inflation can be divided into two categories: those covering all the consequences, and those studying one or two specific effects. The most important overall studies are those by Conard, Scitovsky, Bronfenbrenner and Holzman, and Bach. On the redistribution of income and wealth in inflation the Bailey, Alchian and Kessel, and Bach and Ando studies are important. Mueller deals specifically with the instability of inflation. On the misallocation of resources relevant articles are those by Wolozin, Shaalan, and Bailey. Odeh studies the effects of short run inflation on consumption and investment. The important work on the effect of inflation on output is by Bhatia.

I wish to thank especially my husband Ron for his assistance in collecting the material, preparing the computer program and editing the written drafts. Mention must also be made of the students enrolled in my Canadian Economics Problems and Policies class. Their comments and questions were invaluable.

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INTRODUCTION

This thesis reviews the social costs and consequences of mild inflation on the economy. "Mild inflation" is taken to mean open inflation of less than ten percent per year. Hyperinflation and suppressed inflation are not considered.

All economists agree that the effects of hyperinflation are severe and disruptive to the economy. However the problem of gradually rising prices is harder to analyze and appraise. Mild inflation does cause problems; some of which may be serious. The question is whether these problems are more severe than the consequences of attempts to maintain price stability.

Certain undesirable consequences are widely believed to result from mild inflation. Inflation is believed to arbitrarily and regressively redistribute income and wealth among factor groups and individuals within these groups. Inflation may encourage speculative activity causing inflation to become self-perpetuating. Inflation may cause misallocation of resources by distorting the price system and affecting the profitability of various investments. Current rates of output may decline if inflation causes falling rates of real consumption and investment, social strife, economic inefficiencies or worsens our terms of trade. Economic growth may be hindered if inflation weakens the desire to save or reduce the productivity of fixed investment. This thesis attempts to evaluate the validity of each of these statements.

Each chapter is organized into four main sections. The first develops the theory behind each consequence of mild inflation. The second reviews the literature and empirical work on each topic. The third introduces new evidence for the period 1947 - 1970 on the effect of each consequence on the Canadian economy. The fourth summarizes the previous three and concludes with a judgement on the general impact of each consequence on Canada in the post war period.

Chapter I

INFLATION AND THE REDISTRIBUTION OF INCOME

Theory

Income distribution is determined by the quality and quantity of the factors of production held by different economic units. The income of the factor owner is determined by the quantities of the various factors he owns multiplied by the price each factor commands. Inflation through its effects on relative factor prices affects income distribution in the economy. It can alter the relative prices of broad factor groups or alter relative prices within a particular factor group.

Income redistribution occurs when the money income of one economic group rises more slowly (or falls) relative to the rise in the per capita National Income of the economy while that of another group rises more quickly. The real income of the slower group falls while that of the faster group rises and so a redistribution of real purchasing power occurs from the slower to the faster economic group.

One group's relative share of real National Income decreases because the prices paid to its factors lag behind those of the rest of society while the relative share of the other rises because its factor prices lead others. The problem then is one of leads and lags. In unanticipated inflation people do not foresee price rises and therefore

make no adjustments in their economic behaviour to protect themselves. Redistribution occurs according to the flexibility of factor prices. Fixed income groups lose to more flexible income groups. If inflation is anticipated income redistribution occurs depending on one's ability to foresee inflation and secondly, one's ability to adjust his economic behaviour. If inflation is expected but the expectations are inaccurate (higher or lower) redistribution will still occur. If the expectations are accurate but groups differ in their ability to adjust their behaviour redistribution will still occur. Only if all expectations are correct and all individuals fully compensate for the expected inflation will no income redistribution occur.

So in studying the effect of inflation on income distribution the important considerations are: expectations and flexibility of factor prices.

Empirical Work

In analyzing the data on income distribution two problems arise. One problem is that relative factor price changes may be the result of changes in factor demand or supply rather than due to inflation. In analysing the data the problem of separating the effects may prove impossible. The second problem is that changes in income distribution occur not only because factor prices change, but also because relative factor quantities change. If the economist is attempting to determine the effects of inflation on income distribution quantity changes can obscure the relationship.

Most economists have divided their studies of the effects of inflation on income distribution into two classes:

1. income distribution by relative factor shares of National Income.

2. income distribution by income-size class.

Relative Factor Shares of National Income

The best known hypothesis about the effect of inflation on relative factor shares is that of the wage lag hypothesis. Wages are supposed to lag profits in inflationary periods, thus redistributing income from laborers to entrepreneurs. Other theories are that interest and rents lag in inflation.

Several economists have studied the effect of inflation on income distribution by analyzing various historical inflations. These economists believed that wages did lag profits in inflation and offered various explanations for this. Hamilton studied inflation in Western Europe during the colonialization of the New World.[1] Mitchell analyzed inflation in the North during the Civil War in the United States.[2] Both believed wages were more sluggish than other factor prices due to labor's weak bargaining power and the importance of custom in determining wages during this period. Later Bresciani-Turroni studied the German inflation of 1923 and also found

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[1] E.J. Hamilton, "Profit Inflation and the Industrial Revolution, 1751-1800", Quarterly Journal of Economics, Vol. 56 (February 1942) pp. 256-73.

[2] W.C. Mitchell, Gold Prices and Wages under the Greenback Standard (Berkley 1908).

a wage lag.[3] His explanation was that employees are creditors of employers because of the lag between the earning and the payment of income. The longer this payment period the greater the [illegible]ion in real purchasing power of the earned income by inflation. Irving Fisher hypothesized that employer-employee contracts were the basis of the wage lag.[4] At the time a contract was signed the real wage equaled the marginal product of labor. However during the life of a contract inflation would reduce the real wage below the marginal product.

The wage lag hypothesis has been discredited since Alchian and Kessel challenged the conclusions derived from the historical studies.[5] They found that either faulty methodology or demand-supply changes was capable of explaining the observed wage lags. Hamilton's study of 18th century Spanish inflation errs because the large increase in labor supply, not the inflation rate, was responsible for the fall in real wages. Similarly a different choice of end years eliminates the wage lag in Spain in 1520 - 1600. Alchian and Kessel suggest a new test of the wage lag hypothesis: firms with large annual wage bills should gain relative to those with small annual wage bills. If inflation causes wages to lag behind other factor prices, firms that are labor-intensive should experience a relatively lower increase in total costs than firms that are not labor-intensive.

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[3] C. Bresciani-Turroni, The Economics of Inflation (London 1937).

[4] I. Fisher, The Purchasing Power of Money - Rev. Ed. (New York 1926).

[5] A. Alchian and R.A. Kessel, "The Meaning and Validity of the Inflation-Induced Lag of Wages Behind Prices", American Economic Review, Vol. 4 (March 1960), pp. 43-66.

Therefore the profits of labor-intensive firms should increase relative to those of nonlabor-intensive firms. The relative size of the gain is a function of the wage bill of the firm to the equity of the firm - W/E. Alchian and Kessel attempt to correlate W/E to stock prices of firms to test the hypothesis that the larger W/E the higher the rise in stock prices of a firm during inflation. They found no correlation and therefore rejected the wage lag hypothesis.

Bach and Ando attempt to test the wage lag theory by plotting shares of Personal Income over the period 1939 - 1952 in the United States.[6] (See Table 1.L) They divide the total period into smaller ones based on bursts of inflation and then compute the change in the share of Personal Income for different economic groups (for example Labor's share rose from 64% to 70% or 6% of total Income between 1939 and 1952.) They find no evidence of a wage lag. Several criticisms of their method can be made. The first is again the problem of changes in real forces; increases in the labor force may have caused total labor income to rise even though factor prices may have fallen. This could overshadow the wage lag.

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[6] G.L. Bach and A. Ando, "The Redistributional Effects of Inflation", Review of Economics and Statistics, Vol. 39 (February 1957) pp. 1-13.

Table 1.1

CHANGE IN SHARE OF UNITED STATES PERSONAL INCOME

FOR MAJOR ECONOMIC GROUPS 1939-1954

(Percent of Total)

	1939-54	1939-46	1946-49	1949-52	1952-54
Total Labor Income	6	0	3	3	- 1
Unincorporate Businesses:	- 1	4	- 4	- 1	- 2
1. nonfarm	0	2	- 2	0	- 1
2. farm	- 1	2	- 2	- 1	- 1
Rental Income	0	0	0	0	0
Interest Income	- 4	- 4	1	- 1	1
Dividends	- 2	- 2	0	0	0
Transfer Payments	1	2	0	- 1	0
	0	0	0	0	0
Corporation Profits after taxes	- 1	1	- 1	- 1	0
Corporation Profits before taxes	3	4	- 1	0	- 1

Source: Bach and Ando, p. 3.

The second is that Bach and Ando compute only the absolute change in relative shares not the relative change. Where one group (labor income) is far larger than the rest a change in its share may be large but the

percentage change small. Thirdly, periods differ in numbers of years and so cannot be compared. Annual changes should have been computed. Bach and Ando stress the point that although there were no large changes in total shares, changes within groups have been large depending on the flexibility of factor prices and expectations. Fixed income groups such as pensioners and teachers have been hurt by inflation. Bach and Ando also point out that corporate profits are overstated in inflation. Corporate profits are computed exclusive of depreciation changes. In inflation depreciation is understated (and profits overstated) because goods are valued at original not replacement (or higher) costs. This could affect the wage lag hypothesis.

Bhatia tests the wage lag hypothesis to determine whether periods of inflation coincide with periods of rising profits.[7] He assumes profits rise if the annual percentage change in the price level exceeds the annual percentage change in money wages minus the annual percentage change in productivity. This hypothesis is tested for five countries, one of which is Canada and the results are summarized in Table 1.2.

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[7] R.J. Bhatia, "Inflation, Deflation and Economic Development", International Monetary Fund Staff Papers, Vol. 8 (November 1960) pp. 101-114.

Table 1.2

RELATIONS BETWEEN PERCENT CHANGES IN PROFITS AND PERCENT CHANGES IN PRICES FOR THE UNITED STATES, GERMANY, SWEDEN, AND CANADA 1839-1936

Prices \ Profits	Rising	Falling	Total
Rising	7	3	10
Falling	4	9	13
Total	11	12	23

$X^2 = 2.94$ $10\% > p > 5\%$

Source: Ibid, p. 106.

He finds rising prices were associated more often with rising profits than falling profits. This could be evidence of a wage lag. In Table 1.3 he finds that the 1910-1920 inflationary period in Canada coincided with rising profits while the 1920-1930 inflation was accompanied by falling profits.

Table 1.3

ANNUAL PERCENTAGE CHANGES IN PRICES, MONEY WAGES AND PRODUCTIVITY, CANADA 1890-1939

	Prices	Money Wages	Productivity
1890-1900	-0.8	1.0	1.2
1900-1910	-0.9	0.9	-0.2
1910-1920	7.9	0.8	0.3
1920-1930	-3.4	-1.0	4.5
1933-1939	1.4	4.7	2.2

Source: Ibid, p. 107.

Conard distinguishes between demand-pull and cost-push inflation when studying the wage lag hypothesis.[8] In demand-pull inflation he hypothesises that profits rise sharply at first but labor income may rise later. In cost-push inflation wages rise over the whole period. Therefore evidence of a wage lag may be due to demand forces.

Budd and Seiders test the hypothesis that real wages fall in inflation because wages lag behind prices.[9] They carry out regressions

[8] J.W. Conard, "The Causes and Consequences of Inflation", Inflation, Growth and Employment, Commission on Money and Credit (New Jersey 1964) pp. 1-144.

[9] E.C. Budd and D.F. Seiders, "The Impact of Inflation on the Distribution of Income and Wealth", American Economic Review Papers and Proceedings Vol. 61 Part 1 (May 1971) pp. 128-138.

on the rate of price change and real wage rates holding real National Income or productivity constant. The tests do not support the hypothesis.

Rosalind Blauer develops a framework to estimate the effect of inflation on income redistribution holding the quantity and quality of factor supplies constant.[10] She reconstructs household income statements and balance sheets and adjusts them using certain "multipliers". These multipliers measure the real changes that occur in the rates of return to different factors over specific time periods. She separates the time period 1950-1967 into eight short periods based on the rate of inflation in each. Blauer uses a short-run multiplier to measure the course of prices during each period, and a long-run multiplier to measure the entire response of prices to the initial disturbance that caused the inflation. Using these multipliers she estimates the average percentage change in the major components of National Income for each period that would have occurred had the quantity and quality of factor supplies remained constant. Her results, summarized in Table 1.4, do not support the wage lag hypothesis. In all periods except the mild inflation of 1956-58 wage and salary income rose faster than investment income. The table also shows that the share of income going to pensioners and other transfer recipients declines sharply in inflationary periods.

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[10] Rosalind Blauer, "Inflation and the Redistribution of Income and Net Worth of Canadian Households: 1950-1967" (unpublished Ph.D. dissertation, McGill University, 1971).

Table 1.4

AVERAGE PERCENTAGE CHANGE IN REAL INCOME, ALL HOUSEHOLDS,

BY MAJOR SOURCE OF INCOME, CANADA, 1950-1967

Period	Quarterly % Price Change	Major Source of Income: Wages & Salaries	Self-Employment	Government Transfers	Investments	Retirement Pension & Others
1950/2-51/4	2.45%	- 2.4%	- 4.2%	- 13.0%	- 3.6%	-12.6%
long-run adjustment to price change in period 1950/2-51/4						
	-	6.4	3.0	- 12.1	- 0.9	-11.6
1954/1-56/2	0.07	10.3	17.6	0.9	5.7	1.2
1956/3-58/4	0.79	3.8	2.9	8.9	3.9	- 0.8
long-run adjustment to price change in 1956/3-58/4						
	-	5.9	5.6	9.2	6.5	- 0.3
1959/1-61/2	0.22	5.6	-3.4	- 0.9	3.8	- 0.6
1961/3-65/1	0.58	12.8	14.2	4.5	3.8	- 4.8
1965/1-67/1	0.82	7.2	2.2	- 5.1	2.3	- 4.8

Source: Blauer, pp. 144, 157.

Charles explains the behaviour of wages and profits in terms of the business cycle, not of inflation.[11] In the upswing rates of profits per

[11] K.J. Charles, The Myth of Inflation 2nd Edition, (Toronto 1968).

unit of output rise and business' share of National Income increases. On the downswing labor regains lost ground as wages and salaries per unit of output increases and labor wins back its share of Income.

In conclusion the wage lag hypothesis has been consistently refuted by modern economists. Redistribution has been mild among the major factor groups. But all economists who have studied the impact of inflation on income distribution within economic groups stress the harmful effects of inflation on particular income groups.

Income Distribution by Income-Size Class

Redistribution of income occurs when the rate of increase of one income lags behind the rate of increase of another income. For income distribution by tenths this means reduced or increased equality of income distribution. The popular view is that inflation increases income inequality. Economists however have not found this to be so.

The Scitovskys state that in none of the countries they have studied is there any indication that inflation has increased the inequality of income distribution.[12]

In Table 1.5 Blauer studies the estimated effect of inflation on the distribution of income by income-size class had the quantity and quality of factor supplies remained constant.[13] She concludes that the

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[12] T. Scitovsky and A. Scitovsky, "Inflation versus Unemployment: An Examination of their Effects", Inflation, Growth and Employment, Commission on Money and Credit (New Jersey 1964).

[13] Blauer, p.157.

most important shift is the relative worsening of the position of households with incomes below $3,000. In stable periods their gains are below average, while during inflationary periods, these households often lose real income. Blauer provides two explanations for this shift. First, 31.6% of households with incomes below $3,000 have transfer payments as their major source of income compared to only 0.9 percent of the rest of the income distribution. Transfer payment recipients sustain larger losses in inflation than other groups. Second, among recipients of investment income and pension plans the income distribution becomes more unequal throughout the income scale in inflationary periods.[14]

However because the average income of these households is so low, Blauer says that these shifts do not show up in Lorenz curves drawn for these periods. She finds the Gini concentration ratios to be almost identical for each period, varying between .372 and .378.

Budd and Seiders test the effect of two percent and five percent simulated inflations ($p = .02$ and $p = .05$) on income distribution by fractiles in Table 1.6.[15] They find their simulated inflations have a relatively small effect on income distribution. The lower and upper tails lose relative to the middle so

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14 Ibid, p. 162.

15 Budd and Seiders, p. 135.

Table 1.5

AVERAGE PERCENTAGE CHANGE IN REAL INCOME, ALL HOUSEHOLDS, BY SIZE OF INCOME

CANADA, 1950-1967

Period	Income-Size Class							
	$1,000-1,499	$1,500-2,999	$3,000-4,999	$5,000-6,999	$7,000-9,999	$10,000-14,999	$15,000-24,999	$25,000 & over
1950/2-51/4	- 9.4%	- 4.8%	- 2.4%	- 2.3%	- 2.7%	- 3.3%	- 3.8%	- 3.1%
long-run adjustment	- 5.4	1.6	5.0	5.1	4.4	3.5	3.4	4.5
1954/1-56/2	4.5	8.0	10.0	10.6	11.2	11.8	12.6	11.6
1956/3-58/4	9.6	4.1	3.8	3.7	3.6	3.5	3.3	3.1
long-run adjustment	10.3	5.7	6.0	6.0	5.9	5.6	5.3	5.6
1959/1-61/2	1.6	3.6	4.7	4.8	4.6	4.2	3.0	2.7
1961/3-65/1	9.3	10.0	12.1	12.3	12.4	12.5	13.5	13.9
1965/1-67/1	- 1.0	3.6	5.8	6.3	6.6	6.6	6.8	7.2

Source: Ibid, p. 159.

Table I.6

THE EFFECT OF SIMULATED INFLATION ON THE VALUE OF AND SHARES IN REAL MONEY INCOME FOR QUANTILE GROUPS, UNITED STATES 1962

Size of Quantile	Percent Change in Shares		Percent Change in Real Value	
	p = 0.05	p = 0.02	p = 0.05	p = 0.02
1 - 10	- 1.604	- 0.824	- 2.017	- 1.017
11 - 20	- 1.114	- .603	- 1.541	- 0.795
21 - 30	- 0.679	- .342	- 1.088	- .552
31 - 40	- .169	- .107	- 0.580	- .298
41 - 50	.145	.066	- .267	- .124
51 - 60	.239	.098	- .173	- .095
61 - 70	.282	.132	- .130	- .059
71 - 80	.232	.106	- .180	- .084
81 - 90	.230	.109	- .182	- .081
91 - 95	.221	.105	- .165	- .077
96 -100	- 0.425	- 0.206	- .789	- .352
all units	-------	-------	- 0.413	- 0.192

Source: Ibid, p. 135.

inequality is increased at the lower end and decreased at the upper end. Budd and Seiders explain this effect by reference to the factors different income groups own. The lowest groups receive most of their income from transfer payments. Their income is therefore fixed and susceptible to erosion by inflation. The middle income groups get most of their income from wages and salaries. If there is no wage lag (and the tests seem to support this) then these groups do not lose in inflation. The upper groups receive most of their income from property rents which have lagged behind prices according to Budd and Seiders.[16]

One can conclude that redistribution in mild inflation is small but measurable.

New Canadian Evidence

Relative Factor Shares of National Income

A test of the wage lag hypothesis similar to that conducted by Bach and Ando was done.[17] Shares of Gross National Product for the period 1947-1970 were plotted; as was the Consumer Price Index in Chart 1.1. Periods of stable and inflationary prices were marked. Then the average annual percentage change in relative shares of GNP were computed in Table 1.7.[18] Data was unavailable for changes in factor proportions in each economic group so no adjustment could be made for this.

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[16] Note however Table 1.1 where Bach and Ando show no change for 1939-1952 in rental income.

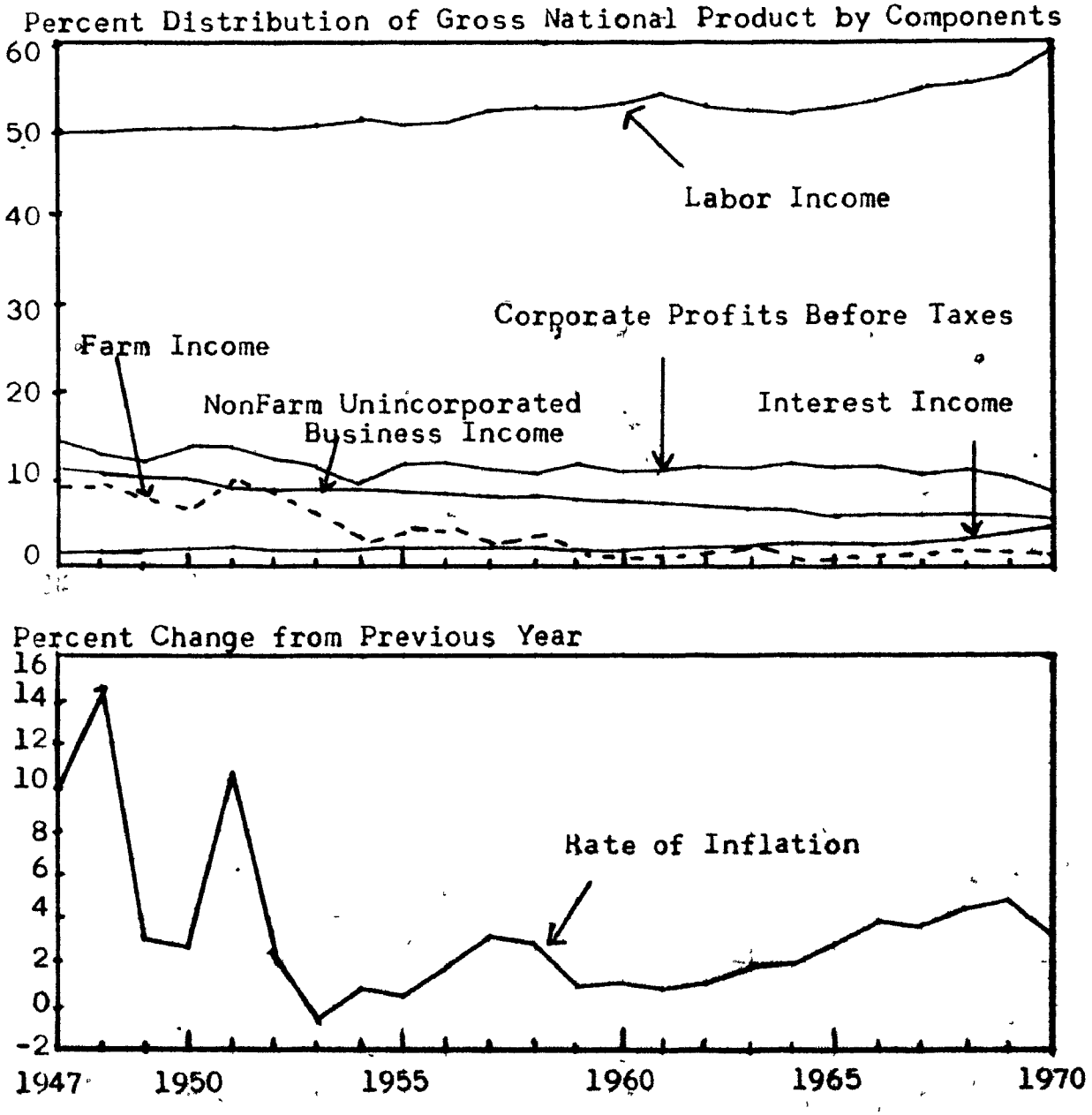
[17] Bach and Ando, pp. 3-6.

[18] See criticisms of Bach and Ando's work page 7.

Chart 1.1

Inflation Rates and Structural Changes in Income

Canada 1947 - 1970



Source : Canada, Department of Finance, Budget Papers (Ottawa, Queen's Printer, 1971) pp. 70, 111

Table 1.7

AVERAGE ANNUAL PERCENTAGE CHANGE IN

RELATIVE SHARES OF GROSS NATIONAL PRODUCT, CANADA 1947-1970

	Labor Income	Corporate Profits Before Taxes	Interest Income	Unincorporated Businesses		Average Inflation Rate
				Farm	Nonfarm	
1947-70	9.45 %	7.55 %	13.80 %	4.03 %	5.34 %	3.32 %
1947-52	12.27	12.07	19.63	11.78	3.57	7.15
1953-55	6.33	6.37	14.87	-12.47	8.63	-0.03
1956-58	8.2	3.2	10.7	2.77	3.03	2.43
1959-64	6.58	9.82	9.2	5.32	2.97	1.32
1965-70	11.68	3.53	13.57	4.05	5.98	3.62

Source: Budget Papers, pp., 70, 111.

Over the total period the labor share rose an average 9.45% while corporate profits on average rose 7.55%. The largest gainer was the interest component. The 13.80% average increase in the interest share illustrates how relative factor quantity changes can obscure the relationship between inflation and income distribution. Much of this increase is probably due to the large increase in bonds held by Canadians during this period. Income from unincorporated businesses rose by 4.03% for farm recipients and by 5.34% for nonfarm and rents.

Three periods of inflation occurred between 1947-70 in Canada. In all three periods profits rose less than wages (1947-52, 1956-58, 1965-70). In both stable periods (1953-55, 1959-64) profits rose more than wages. This evidence does not support the wage lag hypothesis. It suggests that in Canada wages lag profits in stable periods and lead them during inflation.

A different approach to the wage-profits relationship was attempted based on the Charles data.[19] Chart 1.2 plots percentage changes in output, wages and salaries per unit output, and corporate profits per unit output for the period 1952-1970. Cycles were determined on the basis of troughs and peaks in the output chart. Five downturns and four upswings were noted. Then increases or decreases in the rates of change of wages and profits were noted. The hypothesis was that on the upswing when productivity is high a rising output rate will be accompanied by a rising rate of increase in profits. On the downturn when labor is catching up a falling rate of output will be accompanied by a rising rate of increase of wages. If the business cycle explains percentage changes in profits and wages better than the wage lag hypothesis then this is a better theory and the other can be rejected. The results are summarized in Table 1.8. In 100% of cases on the upswing rising rates of output occurred together with rising rates of profits. In three out of four cases the rates of change of wages fell at the same time. On the downturn falling rates of profit were accompanied by falling rates of output in all cases while in four out of five the rate of change of wages rose. Thus wages lagged profits on the upswing and led

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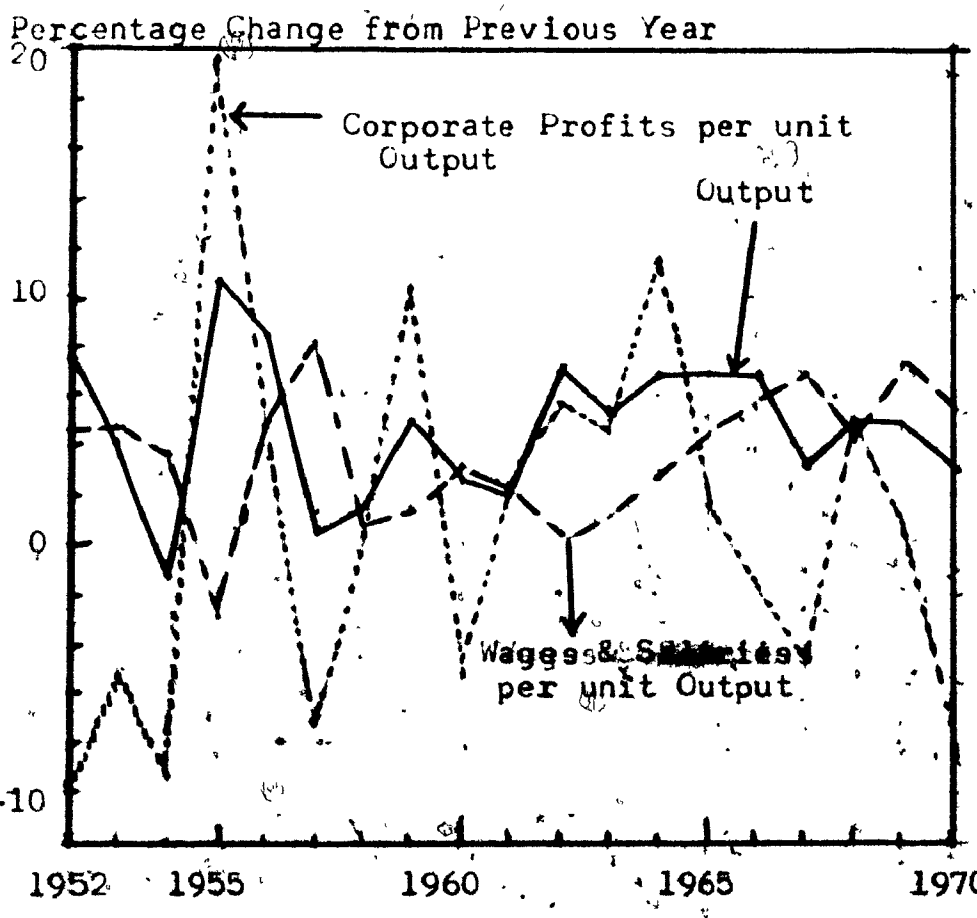
[19] Charles, p. 48.

Chart 1.2

Wages and Corporate Profits over the Business Cycle, Canada 1952 - 1970



Source : Budget Papers, p. 103

profits on the downturn as theory predicted. The business cycle (for this limited period) is therefore a good explanation of wage-profit movements.

In conclusion the new Canadian data does not support the wage lag hypothesis and finds the business cycle to be a better explanation of relative changes in wages and profits.

Table 1.8

WAGES AND CORPORATE PROFITS OVER THE BUSINESS CYCLE

CANADA 1952-1970

Stage of Business Cycle					
Upswing[a]			Downturn[b]		
Profit Rate \ Wage Rate	Rising	Falling	Profit Rate \ Wage Rate	Rising	Falling
Rising	1	3	Rising	0	0
Falling	0	0	Falling	4	1

[a]Upswing stages of the business cycle were 1954-55, 1957-59, 1961-65 and 1967-68.

[b]Downturn stages of the business cycle were 1952-54, 1955-51, 1956-61, 1965-67 and 1968-70.

Source: Chart 1.2.

Income Distribution by Income-size Class

Data on the shares of Personal Income by quintiles for the years 1951, 1954, 1957, 1959, 1961 and 1965 were available. This however was for non-farm families and individuals only. Farm families represent only a small proportion of Canadian households however, and so the data, with minor modifications, probably represents the Canadian population as a whole. Percentage changes in the quintiles were computed for the periods in Table 1.9.

Table 1.9

PERCENTAGE CHANGES IN SHARES OF PERSONAL INCOME BY QUINTILES, CANADA 1951-1965

Period	Lowest	Second	Middle	Fourth	Highest	Average Inflation Rate
1951-54	0	+ 7.1	- 2.7	+ 3.0	- 2.3	3.2
1954-57	- 4.5	- 0.8	+ 1.1	+ 2.1	- 1.0	1.4
1957-59	+ 4.8	0	0	- 1.6	+ 0.5	2.3
1959-61	- 4.5	0	+ 1.7	+ 1.7	- 1.2	1.0
1961-65	+ 9.5	0	- 1.6	- 0.4	0	1.6
1951-65	+ 4.5	+ 6.3	- 1.6	+ 4.7	- 4.0	2.0

Source: Budget Papers, p. 111. Incomes of Non-farm Families and Individuals in Canada, Selected Years 1951-64, Dominion Bureau of Statistics (Ottawa 1969) p. 78, hereinafter referred to as No. 13-529.

The most inflationary period is 1951-54 where the Consumer Price Index rises an average 3.2 percent per year. In this period the middle quintiles gain at the expense of the highest and lowest quintiles. (This result is supported in chart 1.3). 1957-59 was a mildly inflationary period. In these years the lowest quintile gains 4.8 percent at the expense of the higher income groups. In two of the stable periods, 1954-57 and 1959-61, the lowest quintile loses ground while in the third, 1961-65 it gains an astonishing 9.5 percent. Over the whole period the lowest group gains at the expense of the highest.

Conclusions

In mild inflation redistribution of income does occur but it is minor. Wages do not lag profits in inflation. The lower income groups which lose in stable periods also lose in inflationary periods.

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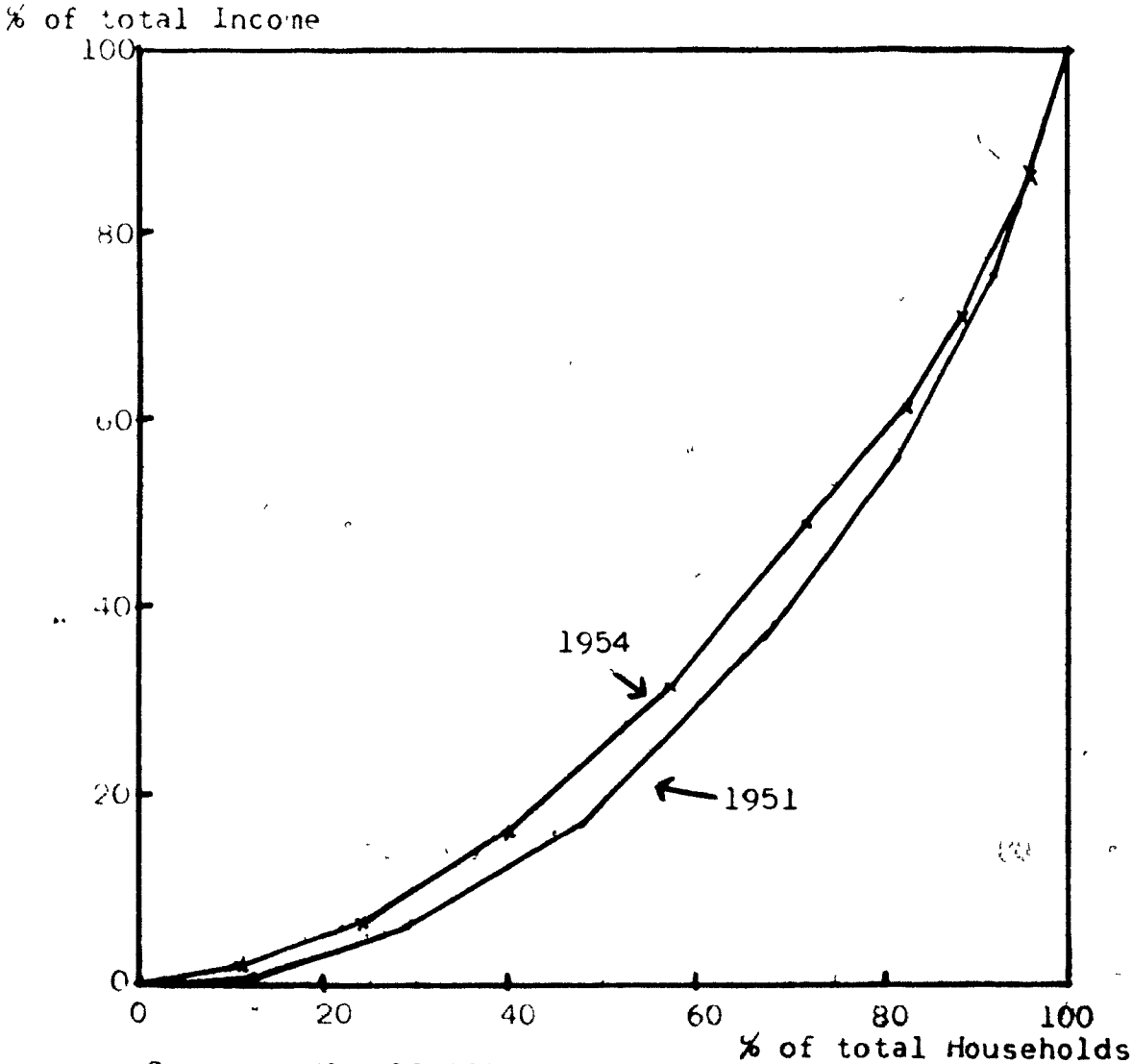
Chart 1.3

Lorenz Curves, Canada 1951 and 1954



Source : No. 13-529, pp. 54-56

Chapter 2

INFLATION AND THE REDISTRIBUTION OF WEALTH

Theory

An individual's wealth or net worth is his total assets minus his total debts. Assets and debts can be classified into two types--monetary and variable price. Monetary assets and debts are short term liquid assets and debts fixed in dollar value such as money, government securities, pensions and life insurance reserves. Variable price or real assets such as common stocks, houses and inventories, on the other hand, find their prices rise with increases in the general price level.

Inflation affects the community's demands for monetary and real assets. When the rate of increase in the price of one asset is less than the rate of the general price level its real value declines. When the rate of increase in the price of another asset exceeds that of the general price level its real value increases. Holders of net assets with more slowly rising prices experience declines in their real wealth while holders of net assets with more quickly rising prices experience gains in real wealth. A redistribution of real wealth occurs from one group of asset holders to another group. Similarly holders of monetary debt see the real value of their debts eroded by inflation and experience gains equal to the losses sustained by their creditors.

Where inflation is unanticipated, wealth redistribution occurs from creditors to debtors and from holders of net assets rising more slowly in price to holders of net assets rising more quickly in price. Where inflation is anticipated people make adjustments to their portfolios to protect themselves from inflation. Inflation therefore affects the demands for different assets based on their relative prices. Two main types of adjustment may be distinguished: between money and other assets and between different types of real assets.

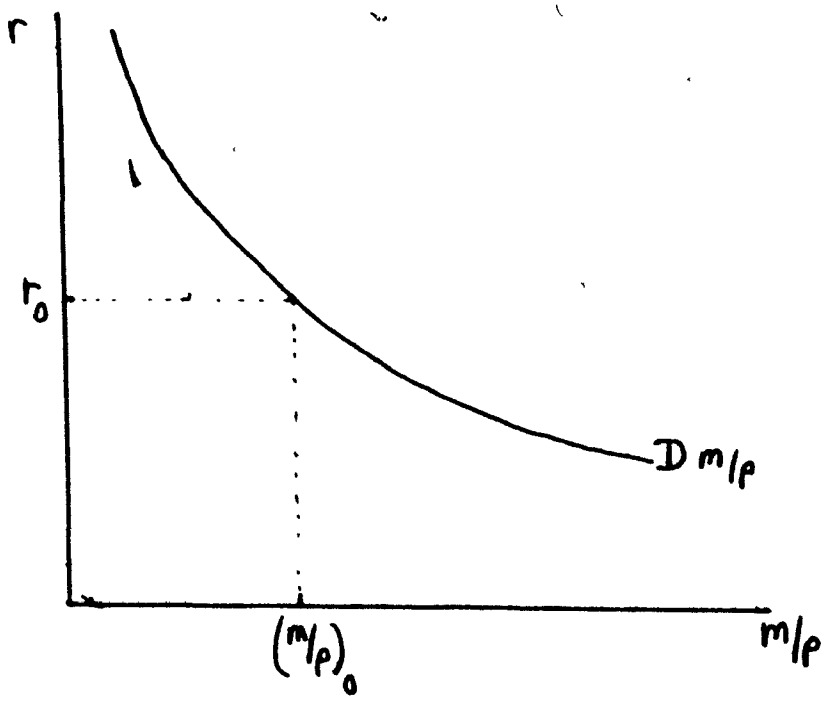
Inflation and the Demand for Money

The demand for money is a real demand. Money is in demand as an asset because it yields certain benefits to its holders. Money serves as a hedge against capital losses due to interest rate or relative price changes. Its transactions costs are zero, making it the most liquid of all assets. Against these advantages must be weighed the costs involved in holding money--its erosion during inflation, and the opportunity costs involved in holding money instead of interest-bearing assets. The community weighs the costs and benefits of holding money and will establish a long-run equilibrium ratio between money and other assets where the marginal costs equal the marginal benefits .

Figure 2.1 shows the liquidity preference or demand for money curve. It can be interpreted to be the subjective marginal rate of substitution of real assets for money of the people holding cash balances. Or the curve can represent the marginal productivity of money balances.

Figure 2.1

The Liquidity Preference Curve



In unanticipated inflation people expect the present price level to continue. They make no adjustments to their portfolios and so no changes take place in the capital market. The nominal interest rate therefore fails to rise enough to reflect rising prices and creditors lose on both interest received and on principal while debtors gain. Debtors can pay back interest and principal in depreciated currency and therefore a redistribution of wealth occurs from creditors to debtors.

Inflation reduces the purchasing power of money in the same way as a tax on money balances would do. In unanticipated inflation no adjustments occur and redistribution occurs from creditors (holders of currency)

to debtors (the government who issues the currency). Holders of government debt find its real value eroded by inflation. This reduction in the real value of government debt means the cost of servicing the debt is smaller in real terms. The beneficiaries of this are those taxpayers whose federal taxes are less than they would have been if the inflation had not occurred. If these taxpayers are different individuals from the holders of government debt a net redistribution occurs ,within the community.

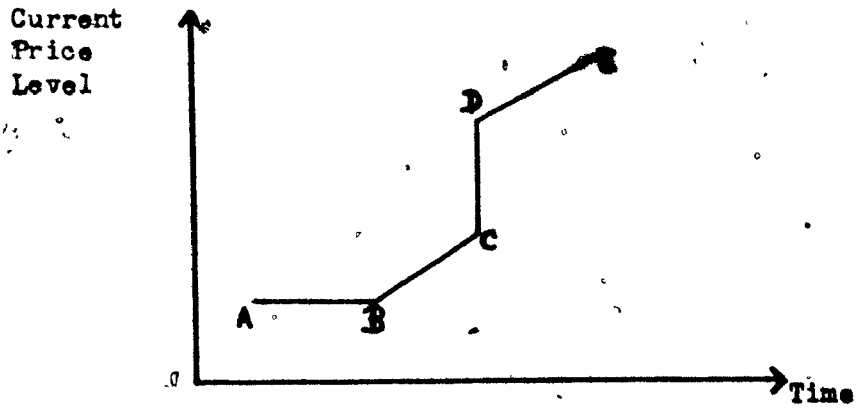
Banks also gain as debtors in inflation. They create debts or demand deposits. Inflation reduces the real value of these debts. Only if interest rates rise enough to compensate creditors for the decline in the real value of their demand deposits will a redistribution from creditors to commercial banks not occur. Banks however may lose in inflation if they are net creditors, that is, if their money assets are greater than their money debts.

In the transition period between unanticipated and fully anticipated inflation people begin to adjust their portfolios according to their price expectations and their ability to adjust their behavior. When people expect price rises they realize the real value of their money holdings is declining and so the cost of holding money has increased. The costs now outweigh the benefits of holding the same nominal money stock in the expected inflation. People shift from money assets to variable price assets. This drives up the price of real assets and the interest rate on money assets until the stock of real money balances adjusts to a new long run equilibrium. Holders of monetary assets incur capital losses as their

real values decline. Holders of money balances incur losses as the real value of money declines further due to the impact of price expectations on the current price level. Redistribution of wealth occurs from money creditors to money debtors. Figure 2.2 illustrates the impact of price expectations on the current price level. AB represents stable prices; BC, a period of unanticipated inflation--current prices are rising but price expectations are inelastic. CD represents the transition period when people expect further price rises and adjust their economic behavior thus forcing up the current price level until the demand for real money balances equals the supply. If the expected rate of inflation equals the actual rate the transition is complete and no further adjustments are necessary. At this point, the resulting inflation is a "warranted" rate of price change because all economic groups are in equilibrium in that they desire to make no changes. Inflation will not accelerate unless a change in exogenous forces occurs. If the transition is not complete the velocity of money again rises until the anticipated rate of inflation equals the actual rate.

Figure 2.2

The Impact of Price Expectations on the Current Price Level

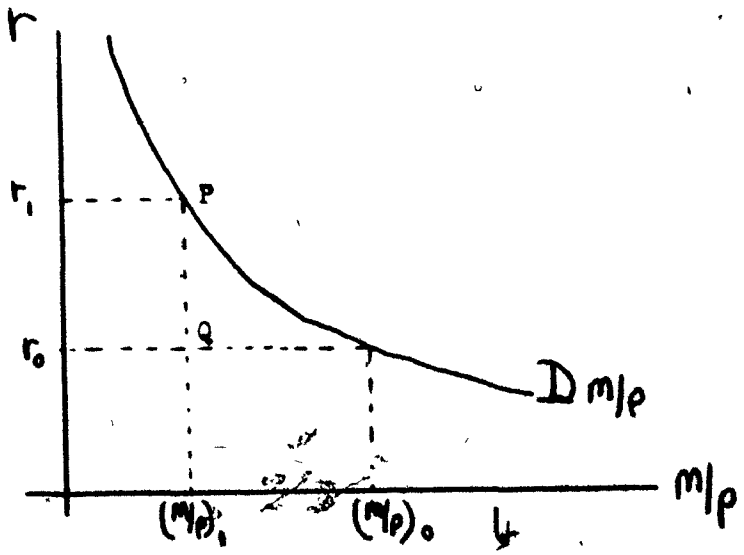


Source: R.A. Kessel and A. Alchian, "Effects of Inflation", Journal of Political Economy, Vol. 70 (December 1962), p. 530.

During this fully anticipated stage real cash balances will remain constant. In Figure 2.3 original real money balances are (M/P)o. In the transition stage prices rise until the anticipated inflation rate equals the actual inflation rate. At this price level the marginal costs and benefits from holding money balances are equalized. Real money balances are now (M/P)1. The shaded area under the liquidity preference curve represents the total productivity loss that occurs during the transition period. The rate of inflation will not accelerate during anticipated inflation (in the absence of exogenous forces) and so this productivity loss will be maintained as long as the inflation continues. The new tax proceeds (decline in value of government fiat) reaped by the government will equal the amount of real money balances times the increase in the inflation rate. If the money rate of interest rises to compensate fully for the increased rate of inflation then the tax proceeds may be represented by the rectangle $r_0 r_1 PQ$ in Figure 3.

Figure 2.3

The Welfare Cost of Inflationary Finance



Source: M.J. Bailey, "The Welfare Cost of Inflationary Finance", Journal of Political Economy, Vol. 64 (April 1956) p. 96.

Inflation and Variable Price Assets

If assets prices rise more slowly than the general price level their real value declines. If however asset prices rise more quickly their real value increases. As a result holders of slower moving assets lose relative to holders of faster moving assets. If inflation is unanticipated then a redistribution among variable price asset holders will occur. In the transition period, people realize that inflation is reducing the real value of some assets and adjust their portfolios to this until relative prices reflect the community's marginal rate of substitution between assets. No further adjustment takes place.

Empirical Work

Inflation and the Demand for Money

Bach and Ando estimate the value of monetary debt created in the United States between 1939 and 1952.[1] By dividing the yearly increase by the Consumer Price Index they estimate the value of debts eroded by inflation to be five hundred million dollars. This five hundred million is the amount of wealth redistribution from creditors to debtors over the period. Bach and Ando then determine which sections of the economy are net monetary creditors and which debtors. The largest monetary creditor (see Table 2.1) is the household sector; the largest debtor, the government sector. (All other sectors have very small balances.) Inflation therefore transfers purchasing power from households to the government. The ultimate beneficiaries from this reduced burden of

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[1] Bach and Ando, p. 5.

Table 2.1

NET DEBTOR AND CREDITOR STATUS OF MAJOR ECONOMIC SECTORS

UNITED STATES 1949 ($ billion)

Households	249.2
Unincorporated Businesses	15.7
Nonfinancial Corporations	-17.4
Financial Corporations	16.9
Government	-262.6

Source: Ibid, p. 6.

government debt are those taxpayers whose taxes are less than they would have to be to pay off the debt. By examining federal tax rates by income group one can get an idea who benefits most. Bach and Ando find people with incomes over $10,000 paid 38.7% of total federal taxes in 1954. This group can then be expected to gain the most from the reduced burden of government debt when the debt is paid off. If however the debt is refunded two possibilities arise. If the old holders of the debt buy the new debt they do not realize their loss. If the new debt is funded with different groups; old holders realize their loss. Their command over goods and services has decreased. The new holders do not get a corresponding gain because their debt has not changed its real value. The share of National Output lost by previous

holders therefore accrues to the economy as a whole in proportion to their spending. So if the debt is refunded no noticeable wealth redistribution occurs.

Bach and Ando then do an in depth study of households in 1950 as creditors (see Table 2.2) by income group, age of head of household, occupation and by net worth (total assets - total debts). They found that all income groups were net creditors. By net worth the lowest groups were net debtors while the rest were creditors. By occupation, retired individuals were the largest net creditors. By age of head, those fifty-five and over were large net creditors. A household whose head was retired and over fifty-five was therefore very susceptible to inflation. This is an example of the redistribution of income and wealth within groups that economists have stressed.

Within the business sector Bach and Ando test to determine whether a redistribution of wealth occurs from creditor firms to debtor firms. The hypothesis is that debtor firms should gain through inflation relative to creditor firms and that the relative prices of common stocks of debtor and creditor companies should reflect this. Bach and Ando run regressions on this and decide that the debtor-creditor status of a firm was not a major factor in determining relative stock prices. Real variables such as sales volume were more important. This conclusion conflicts with that drawn by Alchian and Kessel in their study of debtor-creditor firms.[2]

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[2] A. Alchian and R.A. Kessel, "Redistribution of Wealth through Inflation", Science Vol. 130 (September 4, 1959) p. 535-9.

Table 2.2

ASSETS AND DEBTS OF HOUSEHOLDS, UNITED STATES EARLY 1950

	Percent of all Households	Total Assets ($ billion)	Percent of Total Assets		
			Monetary Assets	Variable Assets	Debts
All Households	100	613	24	76	11
By 1949 money income before taxes:					
under $1000	14	39	19	81	12
1,000-3,000	40	119	26	74	13
3,000-5,000	29	150	27	73	16
5,000-7,500	11	107	25	75	12
7,500 and over	5	188	19	81	5
By occupation:					
professional and semi-professional	7	61	32	68	10
managerial	4	40	27	73	12
self-employed	8	155	16	84	6
clerical and skilled	41	136	29	71	18
unskilled	12	23	31	69	14
farm operator	9	97	13	87	12
retired	5	55	31	69	2
all other	14	46	28	72	8
By net worth in 1950:					
negative net worth	5	2	30	70	490
$0 - 1999	33	17	46	54	33
2000 - 9,999	34	117	29	71	20
10,000 - 24,999	18	162	24	76	9
25,000 - 59,999	7	135	22	78	6
60,000 - and over	3	180	17	83	[illegible]
By age of head of household:					
18 - 24	10	9	23	77	20
25 - 34	23	69	22	78	27
35 - 54	40	285	24	76	12
55 and over	26	244	23	77	4

Source: Ibid, p. 8.

They found that stock prices of debtor companies rose relative to those of creditor firms and therefore concluded debtor-creditor status was important. Bach and Ando suggest the different results are due to differences in procedures and that both studies are in general agreement.

Blauer's data in Table 2.3 supports the hypothesis that inflation redistributes wealth from net monetary creditors to net monetary debtors.[3] She finds that as the size of net monetary credit grows percentage gains in net worth decrease and losses increase in inflation. Large net creditors do well in stable periods such as 1954-56 but poorly in inflationary periods such as 1956-58, while large net debtors do well in both stable and inflationary periods.

Unanticipated inflation not only redistributes wealth from creditors to debtors, it also acts as a tax levied on holders of money balances. The alternative to inflation as a tax for the public is income or sales taxation. Pesek therefore compares the distributional effects of a 1% inflation tax with equivalent income and sales taxes for households in 1950.[4] First, he computes net monetary assets for each income group. A one percent inflation reduces the real value of these assets by one percent. The total capital loss due to inflation is therefore one percent of the total net monetary assets or seven hundred fifty-nine million dollars. Second, given the personal income taxes paid by each income group, Pesek calculates the percentage of total taxes paid by each group. An

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[3] Blauer, p. 184.

[4] B.P. Pesek, "A Comparison of the Distributional Effects of Inflation and Taxation", American Economic Review, Vol. 50 (March 1960) pp. 147-53.

Table 2.3

AVERAGE PERCENTAGE CHANGE IN REAL NET WORTH, ALL HOUSEHOLDS,

BY SIZE OF NET MONETARY CREDIT, CANADA, 1950-1967

Period	Size of Net Monetary Credit							
	Under -$4500	-500 to -4500	- $1 to - 500	Zero	$1 to 500	$500 - 1499	$1500 - 4499	Over $4499
1950/2 - 51/4	27.7%	14.8%	9.9%	6.2%	5.2%	4.3%	2.3%	0.8%
long-run adjustment	29.1	15.3	11.9	6.3	5.8	4.6	3.2	4.3
1954/1 - 56/2	16.4	9.4	13.1	5.6	6.6	6.7	7.3	15.8
1956/3 - 58/4	3.7	1.0	-1.6	-1.0	-1.6	-2.1	-2.9	-5.4
long-run adjustment	10.5	5.5	2.7	2.0	1.4	0.8	-0.1	-2.0
1959/1-61/2	12.2	7.2	7.6	4.3	4.4	4.2	4.2	6.9
1961/3 - 65/1	33.6	19.9	12.8	11.0	9.4	7.9	5.8	1.0
1965/1 - 67/1	11.7	6.5	2.4	2.9	2.0	1.2	0.1	-3.7

Source: Ibid, p. 186.

additional income tax is imposed such that

1. it does not disturb these percentages,

2. the total additional tax equals seven hundred fifty-nine million dollars .

He repeats this process for sales taxes. Thirdly, Pesek divides his equivalent inflation, income and sales taxes for each group by the number of households in each group to determine the average cost of each type of tax. (See Table 2.4). Comparisons can now be drawn between the alternatives available to the public. For families with incomes less than five thousand

Table 2.4

THE BURDEN OF INFLATION, EQUIVALENT INCOME AND SALES TAXATION ON VARIOUS INCOME GROUPS, BASED ON AMERICAN INCOME, ASSETS AND TAX STRUCTURE FOR 1950

Family Income before Taxes ($)	Number of Family Units (millions)	One Percent Inflation (in dollars)	Resources Collected per Family by: (in dollars)		
			Equivalent Income Tax	Equivalent Sales Tax	
				Food Taxable	Food not Taxable
under 1000	3.861	7.25	0.00	3.34	4.09
1000 - 2000	7.464	8.84	1.37	6.75	6.42
2000 - 3000	8.091	11.50	3.92	10.70	9.05
3000 - 4000	8.586	9.77	6.47	14.38	12.65
4000 - 5000	7.054	12.04	9.89	18.02	16.32
5000 - 7500	8.530	18.29	18.56	22.14	22.45
7½ and over	5.304	49.77	81.71	31.86	38.97

Source: Ibid, p. 151.

dollars the cheapest method is additional income taxes. Families between five thousand and seven thousand five hundred dollars will prefer inflation taxation while families with incomes above seven thousand five hundred dollars pay less with sales taxation. So thirty-five out of forty-nine million families in the United States should prefer income taxation to inflation. Finally Pesek compares the regressiveness of sales and inflation taxation and finds inflation taxation to be more regressive at the lower tail and more progressive at the upper tail.

Inflation and Variable Price Assets

Conard calculates a price index for different variable price assets.[5] This index equals:

$$\frac{\text{Price of asset in year two}}{\text{Price of asset in year one}} \cdot \frac{\text{GNP deflator year two}}{\text{GNP deflator year one}}$$

Table 2.5

THE RATIO OF ASSET PRICES TO THE GROSS NATIONAL PRODUCT DEFLATOR BY TYPE OF ASSET CHANGES UNITED STATES 1949-1958

	Price Index One Family Owner Occupied Houses	Producer Durables	Consumer Durables	Common Stock Price
1949-1953	1.115	1.007	0.937	1.285
1953-1958	1.081	1.080	0.953	1.866

Source: Ibid, p. 140.

[5] Conard, p. 140.

Table 2.5 gives the price index for various assets between 1949-1953 and 1953-1958. When the index exceeds one the price rise of an asset exceeds the rise in the GNP deflator and the real value of this asset increases. When the index is less than one the holder of this asset has been hurt by inflation. Of the four variable price assets in Table 4 only consumer durables has failed to keep pace with inflation.

Budd and Seiders compute "pure adjustment coefficients" for different components of net worth.[6] These estimate the elasticity of asset prices with respect to the general price level. They find the coefficient for common stocks to be 1.118; for equity in nonfarm unincorporated business to be 1.144; for equity in farm business to be 1.122. The prices of these assets are all elastic with respect to general prices. Budd and Seiders then rank consumer units by initial net worth and simulate a two percent and a five percent inflation to study the effect of inflation on real net worth by quantiles (see Table 2.6). The five percent inflation increases aggregate real net worth by a miniscule amount- .06 percent. By quantiles, a consistent shift to more equality of shares and of real value is observed. The largest gainers are the lowest thirty percent of the distribution. The upper twenty percent suffers an absolute decline in its share and in the real value of its assets.

Thus wealth is redistributed from the upper to the lower net worth groups.

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[6]Budd and Seiders, p. 128.

Table 2.6

THE EFFECT OF SIMULATED INFLATION ON THE VALUE OF AND SHARES IN REAL NET WORTH FOR QUANTILE GROUPS, UNITED STATES 1962

Size of Quantile	Percentage Change in Shares		Percentage Change in Real Value	
	p = .05	p = .02	p = .05	p = .02
1 - 10	10.546	4.386	10.458	4.340
11 - 30	11.048	4.614	11.099	4.593
31 - 40	5.026	2.087	5.084	2.104
41 - 50	3.688	1.528	3.742	1.548
51 - 60	1.523	0.631	1.578	0.653
61 - 70	0.754	0.312	0.809	0.335
71 - 80	0.189	0.079	0.245	0.101
81 - 90	-0.406	-0.168	-0.349	-0.145
91 - 95	-0.413	-0.170	-0.356	-0.148
96 - 100	-0.361	-0.150	-0.303	-0.128
all units	---	---	0.058	0.022

Source: Ibid, p. 34.

Blauer estimates the changes in the net worth of Canadian households that would have occurred in inflation had the quantity and quality of asset holdings remained unchanged.[7] Using short-run and long-run

[7] Blauer, p. 172-179.

multipliers to measure the real changes that occur in asset and liability prices over specified time periods she measures the average change in net worth of households by major source of income in Table 2.7. Blauer finds that all households experience larger increases in net worth during periods of price stability (1954-56, 1959-61) than in inflationary periods. However strong inflationary periods such as 1950-51 do not dampen the increase in net worth. By major source of income, in stable periods recipients of investment income gain more than other groups.

Table 2.7

AVERAGE PERCENTAGE CHANGE IN REAL NET WORTH, ALL HOUSEHOLDS, BY MAJOR SOURCE OF INCOME, CANADA 1950-1967

Period	All Households	Major Source of Income				
		Wages & Salaries	Self-Employment	Government Transfers	Investments	Retirement Pensions, etc.
1950/2-51/4	8.4%	10.3%	9.2%	1.5%	6.3%	2.7%
long-run adjustment	10.4	11.7	10.8	2.1	10.7	4.6
1954/1-56/2	12.8	11.2	11.6	5.8	20.8	10.7
1956/3-58/4	-2.0	-1.0	-1.4	-2.8	-4.7	-3.5
long-run adjustment	2.0	3.1	2.6	-0.2	-0.2	-0.5
1959/1-61/2	7.2	7.0	7.0	3.4	9.7	5.4
1961/3-65/1	11.1	13.9	12.5	5.4	5.6	5.0
1965/1-67/1	1.7	3.3	2.6	0.1	-2.4	-0.9

Source: Ibid, p. 150, 173.

However in inflation this group gains less than average. Holders of retirement pensions lose net worth in periods of inflation and price stability.

In studying the effect of inflation on the distribution of real net worth by income-size class Blauer finds that periods of inflation interfere with the tendency toward increased inequality that exists in stable periods. Households with incomes below $3000 do much worse than average in both inflationary and stable periods. By age of head Blauer finds that households with heads under thirty years of age gain net worth relative to other households. During inflation the tendency is for wealth to be redistributed from older to younger households. These older households often gain in periods of price stability.

In concluding, the empirical work on the effect of inflation on wealth distribution shows a redistribution from creditors to debtors, both between and inside sectors of the economy. Households as a group are the main creditors and the government sector the main debtor. Within the household sector it is the old and retired who are the most susceptible to inflation. Redistribution also occurs between firms and between holders of variable price assets.

New Canadian Evidence

Inflation and the Demand for Money

The effect of Canadian inflation on debtors and creditors in the economy was first studied. The various sectors of the Canadian economy

in 1963 were classified as net monetary debtors or creditors.[8,9] (See Table 2.8). The household sector is the largest net creditor while the government sector is the largest net debtor - a result similar to that of Bach and Ando in Table 2.1. However nonfinancial corporations are large net debtors whereas in the United States they are small net debtors. Commercial banks are small net debtors - eight hundred ninety-three million, and therefore gain from inflation. The transfer of purchasing power from households to the government involves a redistribution of wealth if the government debt is not refunded. In this case taxpayers gain in proportion to the amount of taxes they pay. Table 2.9 gives the percentage of total taxes paid by Canadian income group in 1957. Households with income over seven thousand dollars paid forty-two percent of total taxes. They would therefore be the largest gainers from this redistribution.

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[8]The sectors as classified by Dominion Bureau of Statistics, Financial Flows Accounts 1962-67 DBS (Ottawa 1969) (Hereinafter referred to as No. 13-530) are:

1. Persons
2. Unincorporated Business
3. Nonfinancial Corporations - federal and provincial government enterprises, private corporations
4. Financial Institutions - chartered banks, monetary authorities, other lending institutions, other private Financial Institutions, federal and provincial public Financial Institutions, insurance companies and pensions.
5. Government - Federal and Provincial governments.

[9]Monetary assets and debts include the following: currency plus bank deposits, consumer credit, bank loans, other loans, gold and foreign exchange, Treasury Bills, bonds, short term commercial paper, deposits in other institutions. (Source: No. 13-530.)

Table 2.8

NET DEBTOR AND CREDITOR STATUS OF SECTORS,[a] CANADA - 1965 ($ million)

Persons[b]	$ 8,388
Nonfinancial Private Corporations	-14,166
Financial Institutions	2,842
Government	-23,233
	-26,169

[a]Data for Unincorporated Businesses and for insurance companies and pensions was unavailable.

[b]The net status of the Personal sector was determined by multiplying the total number of Canadian households by the difference between their average liquid assets and their average liquid debts.

Sources: No. 13-530 pp. 58-67 with the following additions:

Persons: Distribution of Non-farm Incomes in Canada by Size, 1957, Dominion Bureau of Statistics (Ottawa, 1959) p. 21 (Hereinafter referred to as No. 13-512.)
Income Distribution by Size in Canada, 1965, Dominion Bureau of Statistics (Ottawa, 1968) p. 24.
Incomes, Assets and Indebtedness of Non-farm Families in Canada 1963, Dominion Bureau of Statistics (Ottawa, 1966) pp. 41,55 (Hereinafter referred to as No. 13-525).

Monetary Authorities: Statistical Summary, Bank of Canada, (Ottawa, 1967) pp. 1-2, 7-8.

Provincial Government: Provincial Government Finance, Debt 1963-67, Dominion Bureau of Statistics (Ottawa, 1965) p. 12-13.

Table 2.9

CANADIAN FEDERAL TAXES BY INCOME CLASS - 1957

Income Class	% of total Federal Taxes Paid	Effective Rates - Taxes as a % of Personal Income
Under $1000	1.1	11.6
1000 - 2000	3.7	13.0
2000 - 3000	7.0	13.8
3000 - 4000	11.0	14.1
4000 - 5000	12.9	16.0
5000 - 7000	21.5	17.5
7000 & over	42.7	24.3
Total	100.0	18.3

Source: I. Goffman, The Burden of Canadian Taxation Canadian Tax Foundation, (Ottawa, 1962) Tables I and IV.

Looking within the household sector to see the effects of inflation of wealth, Table 2.10 shows monetary assets, variable price assets and debts as percentages of total assets for non-farm households in 1963. The ratio of monetary assets to total assets declines as income rises, while that of debts to assets increases.

Table 2.10

ASSETS AND DEBTS OF NONFARM FAMILIES AND UNATTACHED INDIVIDUALS, CANADA 1963

	% of all Households	Average Assets	% of Total Assets: Monetary Assets	Variable Price Assets	Total Debts
All Households	100	$ 8988	18.2	81.8	22.3
By Income					
Under $1000	8	3081	23.4	76.6	5.6
1000 - 2000	9.9	4465	26.9	73.1	7.1
2000 - 3000	10.7	4657	20.9	79.1	14.1
3000 - 4000	12.4	5145	20.2	79.8	20.5
4000 - 5000	14.0	7171	18.4	81.6	22.5
5000 - 7000	24.1	19169	14.6	85.4	28.0
7000 & over	20.9	38283	18.1	81.9	23.4

Source: No. 13-525, pp. 40,47,66,67.

Table 2.11 provides a more in depth study of the household as net debtor or creditor in 1963.[10] For all households net creditors outweigh

[10] The DBS data on Liquid Assets to Consumer Debts (No. 13-525, p. 63) classifies households as:
1. those whose liquid assets are zero and whose consumer debts are positive
2. those whose liquid assets to consumer debt ratio exceeds 100%
3. those whose consumer debts equal zero and whose liquid assets are positive
4. those whose liquid assets to consumer debts ratio is less than 100%
5. those whose liquid assets and consumer debt both equal zero.

A "net monetary creditor" is therefore class two plus three; a "net monetary debtor", class one plus four. Class five is unaffected by inflation and is therefore omitted.

Table 2.11

NET DEBTORS AND CREDITORS - NONFARM FAMILIES AND UNATTACHED INDIVIDUALS, CANADA 1963

Households	(% of group) Net Debtors	(% of group) Net Creditors
All households	34.2	53.4
By Income Groups		
under $1000	12.4	39.9
1000 - 2000	21.8	59.4
2000 - 3000	40.0	43.9
3000 - 4000	39.5	47.7
4000 - 5000	43.8	48.9
5000 - 7000	40.9	54.8
7000 & over	28.7	69.3
By Age of Head		
Under 34 years	54.0	40.4
35 - 44	45.3	48.2
45 - 54	37.0	55.4
55 - 64	28.6	65.0
65 and over	10.2	74.7
By Employment Status		
in the labor force	42.9	51.4
not in the labor force	20.2	61.9

Source: No. 13-525, p. 62-63.

net debtors. By income groups creditors outweight debtors in all classes. The percent of households that are net creditors increases as income increases. By age of head debtors outweigh creditors for heads under thirty-four years. For all other groups creditors exceed debtors. This is especially pronounced for those over fifty-five. By employment status in both groups creditors outnumber debtors. This is however more pronounced for those not in the labor force such as retired people. The same combination of old and retired again is the combination most hurt by inflation.

The second effect of unanticipated inflation (inflation as a tax) was analyzed using the same method as Pesek.[11] First, the capital loss due to a one percent inflation was calculated in Table 2.12. Income, Liquid Assets and Indebtedness of Nonfarm Families and Individuals gives average liquid assets and consumer debts by income group for 1955 and 1958. The average was taken to represent average liquid assets and consumer debt for 1957. No. 13-512 gives the number of households for each income class. The totals were multiplied by the averages to give total liquid assets and debts by income groups for all households.[12] Net monetary assets were calculated and then the one percent erosion due to inflation was determined. The total capital loss in 1957 was estimated as 100.4 million dollars. Secondly, the additional anti-inflationary sales and excise and income taxes that would have had to have been imposed to raise this amount of

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[11] Pesek, pp. 147-53.

[12] An implicit assumption is that the assets and debts of nonfarm households are representative of all households.

Table 2.12

MONETARY ASSETS AND LIABILITIES OF CANADIAN INCOME GROUPS, 1957

Income Group	Total Liquid Assets mill.$	Total Liquid Debts mill.$	Net Liquid Assets mill.$ (A-D)	Capital Loss Caused by a 1% Inflation mill.$	As a % of Income
Under $1000	465.4	24.9	440.5	4.4	1.1
1000 - 2000	756.9	89.9	667.0	6.7	0.6
2000 - 3000	890.7	158.9	731.8	7.3	0.3
3000 - 4000	764.1	270.4	493.7	4.9	0.3
4000 - 5000	904.4	249.9	654.5	6.5	0.2
5000 - 7000	1348.5	372.1	976.4	9.8	0.2
7000 and over	7109.3	1024.9	6084.4	60.8	0.8
Total	12239.3	2190.0	10048.3	100.4	

Sources: No. 13-512. Incomes, Liquid Assets and Indebtedness of Nonfarm Families in Canada, 1955, Dominion Bureau of Statistics (Ottawa, 1958) pp.35, 46.
Incomes, Liquid Assets and Indebtedness of Nonfarm Families in Canada, 1958, Dominion Bureau of Statistics (Ottawa, 1960) pp. 37, 47.

money for the government were calculated in Table 2.13. Thirdly, these total taxes were divided by the number of households in each income group to calculate the average cost of each tax to the household. Table 2.14 shows that for incomes under three thousand dollars the cheapest tax is

Table 2.13

ALLOCATION OF AN ADDITIONAL ANTI INFLATIONARY INCOME OR SALES TAX, SALES AND INCOME TAX RATES, CANADA 1957

Income Group $	Personal Income mill.$	Effective PY Tax Rate %	Add. Anti. Inf. PY Tax mill.$	Effective Sales Tax Rate %	Add Anti. Inf. Sales Tax mill.$
Under 1000	414.4	0.2	0.1	2.1	1.5
1000 - 2000	1220.3	0.9	0.7	2.2	4.8
2000 - 3000	2141.2	1.4	1.9	2.3	8.7
3000 - 4000	3292.4	3.2	6.6	2.3	13.4
4000 - 5000	3407.6	5.1	10.9	2.5	15.1
5000 - 7000	5180.4	6.9	22.4	2.5	22.9
7000 & over	7367.7	12.5	57.8	2.6	33.9
Total	23024.0		100.4		100.4

Sources Personal Income, income tax rates and sales tax rates are from Goffman.

the personal income tax. For incomes between three thousand and seven thousand dollars inflation costs the least, and for incomes above seven thousand dollars sales taxation burdens them the least. This is the same pattern Pasek finds in the United States in Table 2.14. Thus two million out of 4.9 million households would prefer income taxes to inflation while 2.3 million prefer inflation and 0.6 million prefer sales taxation. Finally the effect of a shift from a one percent inflation

Table 2.14

THE BURDEN OF INFLATION, EQUIVALENT INCOME AND SALES TAXATION ON VARIOUS INCOME GROUPS, BASED ON INCOME, ASSETS AND TAX STRUCTURE CANADA 1957

Income Group	No. of Households (1000's)	Average Capital Loss Due to 1% Inflation in $	Average Loss Due to Equivalent PY Taxes in $	Average Loss Due to Equivalent Sales & Excise Tax in $
Under 1000	525.0	8.38	0.19	2.86
1000 - 2000	683.7	9.80	1.02	7.02
2000 - 3000	760.3	9.60	2.50	11.44
3000 - 4000	833.3	5.88	7.92	16.08
4000 - 5000	674.4	9.64	16.16	22.39
5000 - 7000	795.1	12.33	28.17	28.80
7000 & over	611.5	99.43	94.17	55.44
Total	4883.3	20.56	20.56	20.56

Sources: Table 2.12 and Table 2.13

to equivalent sales taxes was estimated as a percent of personal income. (See Table 2.15.) The average sales tax was subtracted from the average inflation tax and the net figure divided by average Personal Income by income group. Households with incomes under three thousand dollars and over seven thousand dollars would gain from this substitution while the middle income groups would lose. So inflation is more regressive than sales taxation at the lower tail and more progressive at the upper tail.

Table 2.15

EFFECT ON AVERAGE PERSONAL INCOME OF VARIOUS INCOME GROUPS OF A SHIFT FROM A ONE PERCENT INFLATION TO EQUIVALENT SALES TAXATION, CANADA 1957

Income Group	Average PY $	Average Inf. Tax - Sales Tax	Gain or Loss as % of Avg. PY
Under $1000	789.33	5.52	0.7
1000 - 2000	1784.06	2.78	0.2
2000 - 3000	2817.37	1.84	0.1
3000 - 4000	3952.46	10.20	0.3
4000 - 5000	5055.79	12.75	0.3
5000 - 7000	6516.23	16.47	0.3
7000 & over	12038.73	43.99	0.4

Source: Tables 2.13 and 2.14

Again this is a similar result to that found by Pesek.

Inflation and Variable Price Assets

Indexes for certain variable price assets were calculated using Conard's formula[13] for the period 1947 to 1970 where figures were available. Table 2.16 presents this data. If the ratio exceeds one hundred percent

[13] Conard, p. 140.

Table 2.16

THE RATIO OF VARIABLE ASSET PRICES TO THE GROSS NATIONAL PRODUCT DEFLATOR - CHANGES BETWEEN BENCHMARK YEARS, CANADA 1947-1970

Period	Housing	Consumer Durables	Common Stock Prices	Value of Change in Inventories
1947-52	n.a.	n.a.	n.a.	0.75
1949-52	0.99	0.99	n.a.	----
1952-56	0.99	0.90	n.a.	1.10
1956-58	1.00	1.01	n.a.	1.09
1957-58	----	----	0.96	----
1958-64	0.97	0.88	1.55	0.76
1964-70	1.00	0.85	0.90	1.93
1949-70	0.96	0.68	n.a.	1.42
1957-70	0.98	0.76	1.34	1.71

Sources: Budget Papers, pp. 108, 110, 112.
Bank of Canada Statistical Summary, Bank of Canada (1956-1972) (DBS Index of Common Stock Prices, Total Investors Index, monthly average).

then the real value of this asset increases with inflation; if it is less than one hundred percent then this asset has failed to keep up with the inflation rate. Housing has maintained its real value. Consumer durables have been slipping especially since 1958. Common stock prices have varied and are now rising at a rate slower than the inflation rate.

Inventories have had periods of gains and losses as well but have been especially strong since 1964. Over the whole period 1949 - 1970 only consumer durables show a loss. From 1957 - 1970 they still show a loss while common stocks and inventory prices have been elastic.

Conclusions

The Canadian evidence demonstrates that the period from 1947 to 1970 was one of unanticipated inflation. Households made little attempt to shift from monetary to variable price assets, nor to decrease their real money balances by substituting other liquid assets. Redistribution did occur from creditors to debtors in all sectors of the economy. The amount of this redistribution was measurable and appeared to hurt certain groups, such as the retired and the old, more than others. Inflation as a tax was more regressive than a sales tax. However middle income groups would pay less under a one percent inflation than under equivalent sales and income taxes. Only common stocks and inventories of the four variable price assets studied kept pace with inflation.

Chapter 3

THE INSTABILITY OF MILD INFLATION

Theory

A possible effect of mild inflation is that inflation may snowball or accelerate and turn into runaway or hyperinflation. This instability of inflation, says Conard, depends on three factors which, if present, will cause inflation to accelerate.[1]

Whether the inflation is anticipated or not is of great importance. In unanticipated inflation redistribution of income and wealth occurs. This may affect the rate of inflation. When people begin to anticipate further price increases they act to prevent this redistribution. Their actions also affect the rate of inflation. They may start to speculate and buy goods in advance, thus pushing up prices even faster. Or they may adjust their behaviour to protect their income and wealth from being eroded by inflation and these adjustments may push up wages and prices. Lastly the financial policies of the government sector will affect the speed of inflation. If the government raises funds by printing money rather than raising taxes the speed of inflation will increase. In summary, then, the three factors on which the speed of inflation depends are:

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[1]Conard, pp. 82-90.

1) changes in Aggregate Demand as a result of changes in buyers' expectations,

2) adjustments made by different economic groups in response to anticipated inflation, and

3) the financial methods used by the government to pay for its expenditures.

Changes in Aggregate Demand

Consumer Behaviour

Unanticipated inflation has many effects on consumption demand; some of which tend to increase consumption; others, to decrease it. The net effect depends on the relative strengths of the individual factors. Firstly, if consumers see current prices rising and not their money incomes rising as well then they will cut down their spending. On the other hand, this money illusion effect may increase consumption if consumers see incomes, but not prices, rising. Secondly, if unanticipated inflation does redistribute income from wage earners to profit receivers (the wage lag hypothesis) total consumption will tend to fall. This is because the marginal propensity to consume of profit receivers is less than that of wage earners. Similarly if redistribution occurs from the old and retired to other age groups total consumption will fall. However, if the inflation is of the wage-push kind total consumption may be expected to increase. Thirdly, if the tax system is progressive, as prices rise so do money incomes while money incomes after tax rise more slowly. This

tends to restrain consumption expenditures. Fourthly, if domestic inflation is proceeding at a more rapid rate at home than abroad, our exports become more expensive and imports less expensive. This may inhibit aggregate demand. If our inflation is less than foreign inflation, however, the effect on the balance of payments is positive and aggregate demand may increase. Fifthly, as prices rise the real value of money holdings declines. Consumers want to hold a certain level of real money balances. To do this they demand more money balances and spend less on goods and services. In summary, whether unanticipated inflation causes consumption to increase or decrease depends on money illusion, redistribution of income and wealth, the progressivity of the tax system, the speed of inflation at home compared to abroad, and the liquidity preference schedule of consumers.

If inflation is anticipated people realize the real value of their money balances is declining and decide to hold less money balances. People switch to money substitutes such as gold, foreign exchange and real estate until the marginal convenience of holding one dollar of money equals the marginal cost in terms of erosion of purchasing power and foregone interest. As a result the demand for near-monies increases and their prices rise. Since the supply of these goods is inelastic in the short run their prices rise more than in proportion to the general price level. At first this increases the speed of inflation. However speculators begin to worry that these near-monies may be overvalued. Changes in the prices of near-monies are less predictable than changes in the price of money which depend on the prices of all goods and services. So if the shift from money to near-monies comes to a halt once

the demand for real balances equals the supply of real balances. Anticipated inflation does not then, of itself, cause inflation to speed up and become runaway inflation. Once people have adjusted their demand for money to the new long-run equilibrium conditions the shift stops. Only a change in some exogenous variable such as expectations will cause the rate of inflation to increase.

Business Behaviour

Unanticipated inflation has basically two effects on investment demand and depending on the relative strengths of the two, investment may increase or decrease. If inflation has caused an increase in profits more internal funds are available for investment and ceteris paribus, investment should increase. On the other hand inflation reduces the real value of money balances so the liquidity of the firm declines. As a result the demand for money increases and resources are spent to keep liquidity at a certain level rather than on investment so investment declines.

In anticipated inflation there are also two basic effects. Firstly, if producers expect price increases and associate this with increasing aggregate demand and rising profits they will undertake more investment. Secondly, when inflation is anticipated firms also hold less real money balances and switch to near-monies or inventories. A short burst of inflation or an acceleration in the rate of anticipated inflation will therefore cause the demand for inventories to increase. As a result inventories increase at the expense of fixed capital formation.

This will cause the speed of inflation to increase. However once businessmen have accumulated the desired level of inventories inventory accumulation ceases. The demand for real money balances has adjusted to the new long-run equilibrium conditions and now the costs of holding real money balances equal the benefits. So anticipated inflation causes a short burst of inventory accumulation but does not in itself cause runaway inflation.

Adjustments for Inflation made by Different Groups

If inflation is unanticipated no adjustments take place therefore only anticipated inflation is relevant here. Depending on their abilities to perceive future inflation, different economic groups will try to protect themselves from it. Several factors will affect their ability to protect themselves. First, the degree of imperfect competition is important. Oligopolies can force up administered prices to protect their profit position from erosion during inflation. Trade unions can negotiate higher wages for their members. Second, lags tend to hinder the escalation of inflation. The wage lag between contracts is one year or more for union members; more than a year for nonunion employees. The longer this wage lag, the slower the speed of inflation will be between periods. If contracts include escalator clauses that adjust for changes in the Consumer Price Index when the contract is made instability is not increased. If however the contract provides for automatic adjustment of wages whenever the index increases the wage lag is reduced considerably. Similarly automatic adjustments for productivity increases reduce the wage lag and add to the instability of inflation. The price lag between a change in demand and a change in goods prices may be long for administered price industries. This also inhibits the instability of

inflation. Third, the state of the economy will affect the demands of producers and employees. If the economy is in a recession with a high degree of unemployment both producers and employees will be constrained and their prices and wage demands lower. When the economy is booming wages and prices may rise much faster.

Financial Policies of the Government

If the government finances a deficit by taxation, money incomes after tax are reduced and aggregate demand may decline. Taxation therefore can retard a demand-pull inflation. However, if the government finances a deficit by printing money it increases aggregate demand and adds fuel to inflation. Philip Cagan showed that hyperinflation occurred only when the government was increasing the supply of money at such a rate that prices were doubling in less than six months.[2] Today governments realize that rapid money creation leads to inflation. Their problem is that the conflicting demands of different economic groups can only be met if the supply of money keeps on increasing. Otherwise goods will go unsold and unemployment result. This dilemma of inflation or unemployment is called Lewis' Law.[3]

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[2] P. Cagan, "The Monetary Dynamics of Hyperinflation" in Studies in the Quantity Theory of Money, ed. by M. Friedman (Chicago 1956).

[3] Lewis' Law was named after John L. Lewis, president of the United Mine Workers in the United States. This postulate was given the name Lewis' Law by W.A. Morton in "Trade Unionism, Full Employment and Inflation" American Economic Review, Vol. 40, Part 1 (1950) pp. 13-39.

Empirical Work

The major study on the impact of inflation on consumer behaviour was by Eva Mueller in 1959. She studies the reactions of consumers to price increases and to the expectation of future price increases. The purpose of the study is "to determine the circumstances under which consumers will accelerate or reduce their spending when faced by rising prices".[4] She isolates a four step causal process beginning with the original inflationary stimuli - present and past price increases. These stimuli affect consumer perceptions of price trends. Mueller finds people's perceptions of past price trends differ considerably and cannot be inferred from past price data. People do not necessarily assume that current inflation rates will exist in the future. Mueller finds that the longer the price rise the higher the percentage of households that are aware of it. Mueller also notes that in the past people felt that long-run prices were stable while in her study this faith in long-run stability has weakened. Given people's perceptions their attitudes toward inflation are determined by their perceptions, and by their economic and political environment. Especially important are income trends. Of the group that felt prices would increase and that this was to the good or made no difference, fifty-three percent of the households Mueller surveyed had received income increases in the past year. Of those who felt the expected inflation was bad seventy-seven percent were receiving the same

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[4] Eva Mueller, "Consumer Reactions to Inflation", Quarterly Journal of Economics Vol. 73, (May 1959) pp. 246-62.

or less money income than a year ago. Mueller finds that, in general, rising prices were regarded as undesirable; stable or falling prices were desirable and people felt it was a "good time to buy". Given people's attitudes toward inflation this affects their consumer behaviour - their purchases of consumer and capital goods. Mueller finds that mild inflation caused little redistribution from liquid to variable price assets. On consumer goods and services, the group that felt the expected inflation was desirable were particularly active spenders. Those who felt the inflation would be "to the bad" bought less than expected on the basis of their incomes. Since the group that felt inflation to be undesirable outweighed the other group, as a whole consumers bought less in inflationary periods. Mueller concludes that consumers have therefore been a stabilizing influence on the economy. Only in sharp bursts of inflation such as that at the outbreak of the Korean War did consumer expenditure increase due to expected shortages of goods and services. At the end Mueller notes that if escalator clauses come into more common use so that incomes increase as prices increase more and more households will feel it is a good time to buy. Consumer expenditure in this way could become destabilizing.

A study on the effect of inflation on businessmen's inventory accumulation was done by A.S. Shaalan in 1962.[5] Inflation, says Shaalan, has an impact on the structure of liquidity and the degree of liquidity.

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[5] A.S. Shaalan, "The Impact of Inflation on the Composition of Private Domestic Investment", International Monetary Fund Staff Papers Vol. 9 (July 1962) pp. 243-61.

The structure of liquidity means the composition of assets held by the business. In anticipated inflation the demand for real money balances declines as the firm substitutes inventories for cash. The structure of liquidity changes from holdings of cash balances to inventory stocks. The degree of liquidity refers to the fact that inflation may increase unforeseen opportunities or risks. As a result the precautionary motive becomes stronger and the desire for liquidity greater. This desire is satisified by holding more inventories.

New Canadian Evidence

Consumer Behaviour

The Financial Post of Canada has conducted a consecutive quarterly survey of consumer buying intentions and attitudes since 1960.[6] The survey questions households about their buying plans for consumer durables. Chart 3.1 shows the Index of Consumer Attitudes plotted with the percentage changes in the Consumer Price Index and in real consumption expenditures since 1960. From 1960 to 1965 as prices rose so did the index; consumers considering the period a good time to buy. From 1965 to 1970 however as prices increased the index declined. Consumers considered it a bad time to buy. 1956 to 1964 was a stable period; 1964 to 1970 was an inflationary one. These data support Mueller's findings that in inflationary times consumers feel it is a bad time to buy; while in stable periods they feel it is a good time to buy.[7] Comparing the

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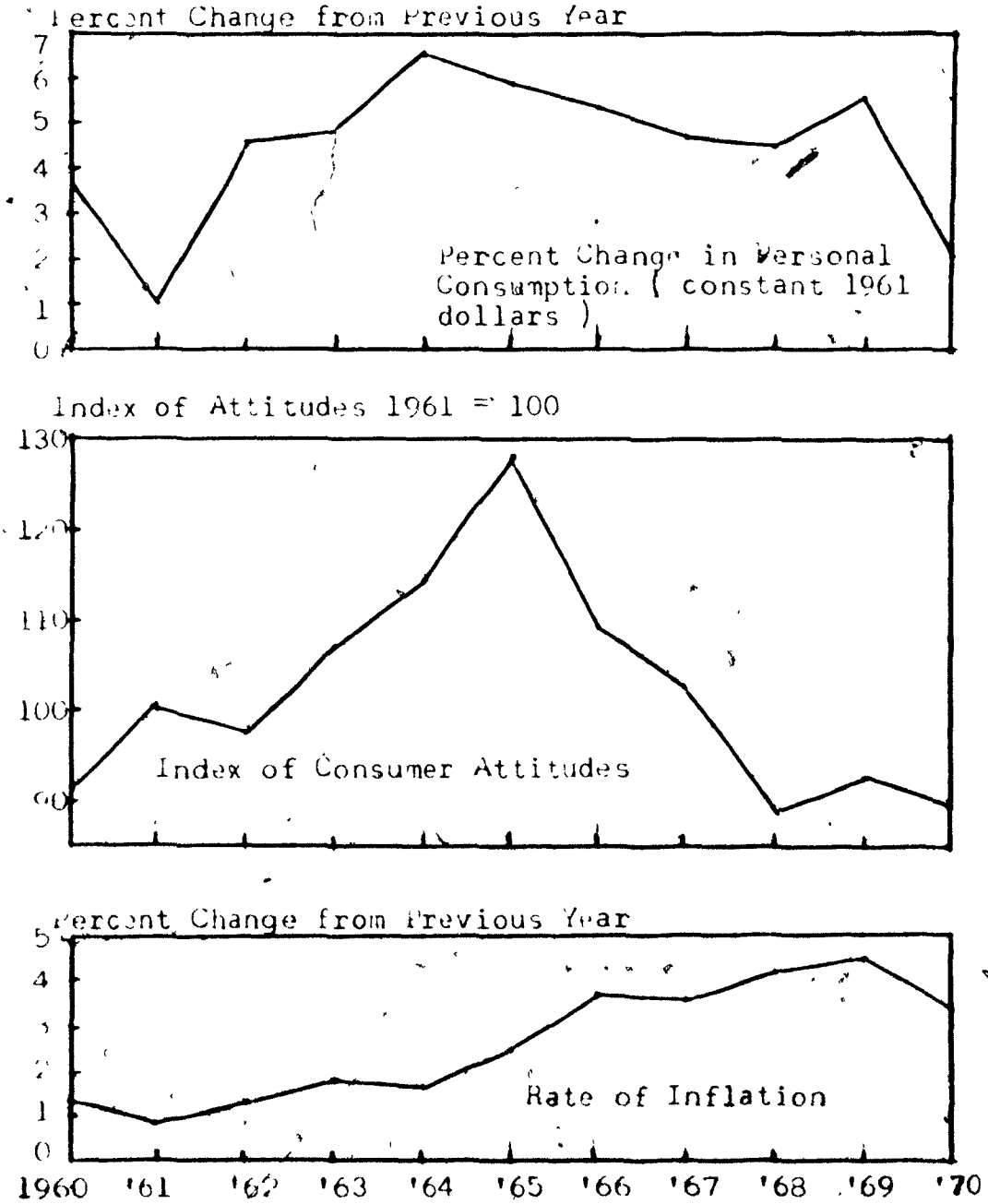
[6] "Index of Consumer Attitudes 1961 = 100", The Financial Post, (Toronto 1972) (Photostated data made available to author).

[7] Mueller, p. 251-53.

Chart 3.1

Consumer Attitudes, Personal Consumption, and Inflation Rates, Canada 1960 - 1970



Sources : Budget Papers, pp. 65, 111
"Index of Consumer Attitudes 1961 = 100 ", The Financial Post (Toronto, 1972)
(Photostated data made available to the author)

Index of Consumer Attitudes with percentage changes in consumption gives an indication of how attitudes are translated into behaviour. The two graphs move together over the period, except for 1961. The Index therefore is reflected in consumer buying patterns. In summary Chart 3.1 shows that in stable periods consumers feel it is a good time to buy and consumption expenditure increases more rapidly. In inflationary times consumers feel it is a bad time to buy and this is reflected in smaller increases in consumer spending.

Business Behaviour

Chart 3.2 plots the percentage changes in inventory accumulation with percentage changes in the Consumer Price Index for the period 1947 to 1970. The percent changes in inventory accumulation have been both large and erratic - from an increase of seven hundred percent to a decrease of one thousand percent. No trend is obvious. Comparing the number of yearly percentage increases in the Index with increases and decreases in the rate of inventory stock building shows us that in eight cases out of eleven (seventy-three percent) an increase in rate of inflation was accompanied by a decrease in the rate of inventory accumulation. Decreases in the rate of inflation had no marked effect on inventories. Shaalan tells us that in sharp bursts of anticipated inflation the rate of inventory building should increase as businesses substitute inventories for cash.[8] The opposite result shown by the Canadian data may be because inflation is still unanticipated in Canada. Inflation reduces the real value of cash holdings but firms in order to maintain their old level

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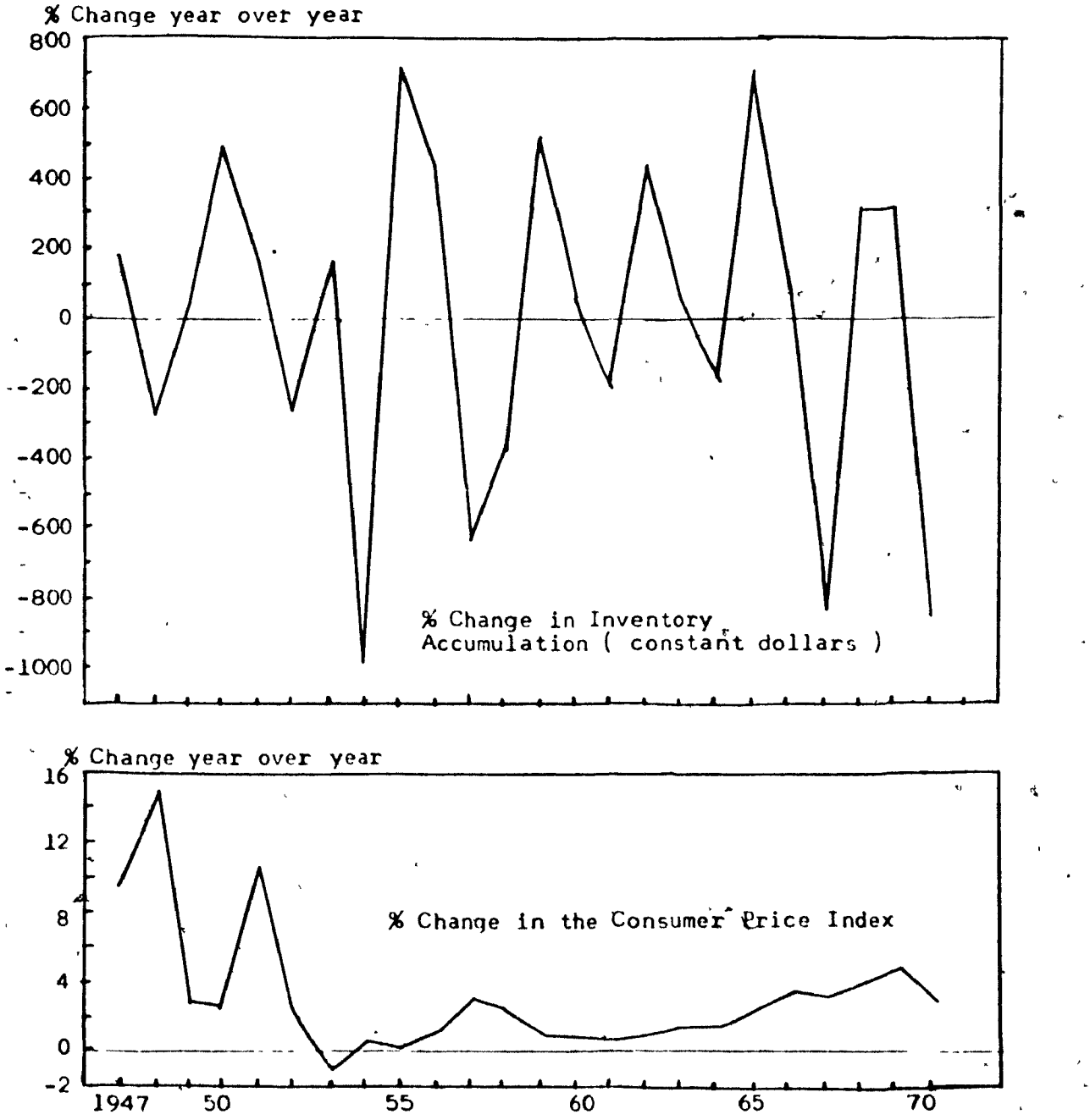
[8]Shaalan, p. 255.

Chart 3.2

Inflation and Inventory Accumulation, Canada 1947-1970



Source : Budget Papers, pp. 65, 111

of liquidity demand money and put less into inventories. As a result inflation causes inventory accumulation to decline.

Conclusions

Mild inflation may become unstable if speculative activity increases or economic groups make adjustments or the government increases the money supply at too fast a rate. Mueller's consumer study shows that consumers have had stabilizing influence on the American economy. Shaalan's work shows that in anticipated inflation investment in inventories increases but only temporarily. The Canadian data also show consumption and investment in inventories to be stabilizing forces. In summary the threat that mild inflation will accelerate into runaway inflation from speculative activity appears to be a remote possibility - both in theory and in practice.

Chapter 4

THE MISALLOCATION OF RESOURCES

Theory

Introduction

In a market economy prices act as signals transmitting information on demand and supply of factors and goods to the consumer, the factor owner and the producer. According to society's preferences resources are directed in and out of certain activities by relative prices. Under a perfectly competitive market system with producers maximizing profits and consumers maximizing utility the most desirable goods are produced according to the priorities of consumers. Under this consumer sovereignty principle (if there are no externalities) total welfare of the community is maximized.

Inflation can cause misallocation of resources by distorting relative prices. In this way the price signals to producers, consumers and factor owners change and resources are directed into producing goods and services that are not the most highly desired by society. If some prices lag others due to stickiness, traditionalism or slow response resources flow out of these activities and into other more "aggressive" activities. For example, resources may flow from teaching into construction work if prices rise much more quickly in the construction sector. In this way inflation can cause private and social benefits to

diverge. On the other hand the misallocation of resources caused by inflation is not necessarily harmful. The real world is not a perfectly competitive market where profits and utilities are maximized. To some extent prices are already distorted by oligopolies, unions and externalities. Inflation may distort relative prices in a better direction. When wages and prices are sticky downwards and tastes change relative prices should change with some prices rising, others falling. If prices will not fall this change in relative prices can only be accomplished if there is a rise in the general price level. In this way inflation can aid resource allocation. Also inflation provides lubrication in the factor market so that resources become more mobile. Rising general prices allow resources to be shifted to more highly demanded output by the call of higher factor prices rather than the push of lower factor prices.

This distortion of relative prices by inflation causes a misallocation of resources in three ways:

1) changes in the composition of consumption expenditures,

2) changes in the composition of investment expenditures, and

3) changes in the demand for money.

Let us examine each in turn.

Changes in the Composition of Consumption Expenditures

Inflation affects the composition of consumption in two ways.[1] Firstly, in the domestic market, the substitution effect causes consumers

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[1] H.S. Odeh, The Impact of Inflation on the Level of Economic Activity (Rotterdam, 1966) pp. 28-32.

to substitute goods with more slowly rising prices for goods with more quickly rising prices. In an open economy higher inflation at home may also cause consumers to substitute imports for domestically produced goods. Secondly, if inflation redistributes income this income effect will alter the composition of consumption. If redistribution occurs from lower to higher income families who spend a large proportion of their incomes on income-elastic goods and services then the demand for luxury goods may be expected to increase. On the other hand, if redistribution occurs to the lower classes who spend a large part of their incomes on income-inelastic goods the demand for necessities may be expected to increase. The composition of consumption thus depends on the effect of inflation on relative prices and on income distribution, and on the consumption patterns of different income groups.

Changes in the Composition of Investment Expenditures

The capital market provides the price signals that bring about optimum allocation of investment resources. Money interest rates acting as relative prices channel funds into the different forms of capital. However this resource allocation of investment funds is only partial because not all savings are directed into the capital market. In inflation the capital market works imperfectly and so misallocation of resources occurs.[2] The expected rate of return on capital is raised by inflation and by the expectation of inflation. However money interest rates seldom rise enough in unanticipated inflation to compensate for the

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[2] Shaalan, pp. 247-53.

depreciation of money. As a result the gap between the expected rate of return on investment and the cost of borrowing widens. It becomes more profitable for investors to borrow and invest. This can have undesirable results. First, savers stand to gain less by lending their money so lending declines. Savers instead invest their funds personally. Since most savers have only small quantities of money to lend their investment is in small scale capital goods such as inventories and luxury housing. Second, firms will find it more profitable to invest their savings now rather than to accumulate them for long term investment projects. Both these cases bias investment towards short term assets. Third, the large gap between the rate of return on capital and the money rate of interest results in an increased demand for loans. This increased demand coupled with the reduced supply causes an excess demand for loans in the capital market. As a result rationing takes place and discrimination among borrowers occurs with large investors obtaining funds more readily than small investors. This discrimination also misallocates investment resources.

Anticipated inflation also affects the community's distribution of investment resources between financial and physical assets. Inflation increases the illiquidity risk caused by uncertainities about the changing spectrum of profit opportunities. As money loses its value as a hedge against uncertain movements of future relative prices, investors substitute other assets for money assets. Investment in inventories is

substituted for investment in financial assets.

This illiquidity risk also causes a substitution of short-run physical assets for long-run ones. Short-run assets are more liquid but pay a lower rate of return than long-run assets. Investors balance this increased liquidity premium against the expected profit loss from not investing in long-run assets. However, in inflationary periods the expected return on long-run investments may be uncertain because, in an environment of rising prices and costs, future costs may not be accurately predicted. As a result businessmen incorporate the costs of inflation into the Present Value formula to determine the Present Value of short-run versus long-run projects. This bias towards short term projects, especially inventories, usually occurs in short bursts of inflation. The community desires that a larger proportion of its capital stock be in short term assets. In order to increase this proportion all new investment is in short-run physical assets until the community's desired ratio of short-run to long-run physical assets is reached. This ratio is then maintained indefinitely until some exogenous force alters the preference patterns of the community. On the other hand, if the inflation is expected to continue for several years, this misallocation of investment resources may not take place. Long-run investment projects can only be realized without loss at completion. A short burst of inflation could cause long-run assets to be sold before completion when their real value is negligible. Short term investments may be realized at any time without significant loss. So if inflation is expected to be of the long-run type this redirection of investment resources into short-run assets may not occur.

Changes in the Demand for Money

When inflation is anticipated there is a decline in society's desired level of real money balances as the community substitutes other assets or factors or time for money.[3] Since money can be produced using little resources its cost of production is low. Other assets require more resources and are, consequently, more expensive to produce. When the community switches from money to other assets the amount of resources devoted to asset production (and as a result the total cost) increases. This additional cost of substitution is the excess burden or welfare loss of the inflationary tax on money.

When other assets are substituted for money, relative price changes among assets occur because assets differ in their abilities to substitute for money. Assets that are good substitutes and have an elastic supply find in the short-run that their demand increases rapidly. Other assets are worse substitutes and their demand rises more slowly. In the long-run supply conditions are more elastic and more resources are devoted to the production of good substitutes. This results in a further misallocation of resources because the welfare loss increases the more the community shifts to money substitutes.

Time and convenience can also be substitutes for money. Time is used as a substitute when people try to accomplish a given number of transactions with a smaller quantity of money so that velocity increases. Barter becomes more important. People spend money immediately after its

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[3] Kessel and Alchian, "Effects of Inflation", pp. 531-33.

receipt. Firms pay employees more often, substituting bookkeeping for money. Shopkeepers hold inventories rather than money as a precautionary device. These forms of substitution occur only in anticipated inflations. When the community as a whole begins to substitute time for money the velocity of money soars as prices rise very rapidly. This hyperinflation continues until the cost of changing the payment structure equals the cost of holding cash balances. Substitution of time for money then ceases. (See Figure 2.3).

Other factors may also be substituted for money. Money is a factor of production and in anticipated inflation its cost rises. The firm will substitute less costly factors for money if it can do so. If a firm is money-intensive in that money costs are a large proportion of total costs inflation increases total costs significantly. Money-intensive firms will see their profits falling relative to nonmoney-intensive firms.

Relatively large money outlay and receipt streams or money-intensiveness are usually associated with labor-intensive firms. This analysis therefore implies that labor-intensive firms should suffer lower profits relative to nonlabor-intensive firms. In the long-run a reallocation of resources will occur to less money-intensive goods and techniques. This implies a substitution of capital for labor. In this way also inflation causes a misallocation of resources.

Empirical Work

Introduction

A study of the effect of inflation on the price system was

done by Harold Wolozin in 1959.[4] The purpose was to determine whether creeping inflation in the United States between 1947 and 1957 had weakened the price system so that it did not perform its job of directing and rationing resources according to changes in demand and supply as effectively as in the past. To do this Wolozin examines the effects of inflation on four aspects of the price system: changes in relative prices, price flexibility, prices of new products, and prices and productivity.

For changes in relative prices Wolozin studies different broad classes of goods and their price changes between 1947 and 1957. He finds that large changes in demand or supply conditions do cause significant changes in relative prices between classes. Most of the relative price changes are explained by either demand and supply changes or by productivity gains. So in this respect the price system is performing its function of allocating resources.

The United States Bureau of Labor Statistics did a study of wholesale price flexibility for the period 1947 to 1956 in the United States.[5] Its purpose was to determine whether prices have become more rigid and have changed less frequently in this period compared to the pre-World War Two period. The study finds no relation between the number of price changes and the size of these changes, and no significant difference in the frequency of price changes between the two periods. Also the study concludes that prices are still fluid because over half of all prices

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[4]Harold Wolozin, "Inflation and the Price Mechanism", Journal of Political Economy Vol 67 (October 1959) pp. 463-75.

[5]Frequency of Change in Wholesale Prices: A Study of Price Flexibility, U.S. Bureau of Labor Statistics (Washington, D.C., 1958).

completely changed their behaviour between the two periods.

If the price system is functioning properly prices of new goods and services should decline as output and experience increase. Wolozin compares the prices of old products and new products within a rapidly expanding group to determine whether new prices tend to fall relative to old. (See Table 4.1.) He finds that with output growth the prices of new products declined relative to old products.

Lastly Wolozin examines wholesale price indexes and output per manhour data for nineteen industries. On a scatter diagram a clear inverse relation between prices and productivity emerges. The industries with largest productivity gains had the lowest prices and vice versa. Wolozin concludes from his study of these four factors that creeping inflation has not seriously undermined the price system in the United States.

Changes in the Composition of Consumption Expenditures

In theory inflation affects the composition of consumption expenditures through income and substitution effects. The substitution effect depends on relative price changes while the income effect depends on income redistribution. The effect of changes in income distribution on private consumption was studied by H.S. Odeh in his book The Impact of Inflation on the Level of Economic Activity.[5] For the period 1946 to 1959 in Brazil and in Chile Odeh first determines the marginal pro-

[5] Odeh, p. 56.

Table 4.1

PRICE CHANGES FOR NEW AND OLD PRODUCTS WHOSE OUTPUT GREW RAPIDLY, UNITED STATES 1951 - 1956

Product	% Price Change	Growth in Production
NEW:		
styrene plastic & resins	- 5.8	76.4
synthetic fibers (not rayon)	-13.7	142.4
polyvinyl resins	-28.9	51.5
synthetic detergents	- 0.4	123.2
vitamins	-54.7	61.4
OLD:		
warm-air furnaces	6.4	67.4
separate skirts	0.3	60.0
aluminum ingots	36.9	100.7
nitric acid	11.6	58.6
acetylene	- 6.2	58.2
chlorine gas	14.2	50.3

Source: Wolozin, p. 473.

pensities to consume (MPC) of different economic groups and then the effect of income redistribution between groups on private consumption. The four economic groups he selects are: non-farm labor, self-employed labor and capital, farm labor, and profit receivers. Table 4.2 illustrates the different marginal propensities for selected countries. For Brazil the MPC of non-farm labor income and that of the self-employed both equaled one, while the MPC's of farm and profit income were less than one (.50 and .87). If consumption patterns differ, income redistribution can therefore cause changes in the composition of consumption. Odeh then uses a single-equation estimation method to estimate the effect on changes in private consumption. His end equation[5] is:

$$\ddot{C}_t^{pr} = \underset{(3.137)}{2.578} + 0.495\,\ddot{W}_t + 0.148\ddot{N}_t + \underset{(0.101)}{0.151}\ddot{A}_t + \underset{(0.070)}{0.083}\ddot{P}_t$$

$R = 0.864$

where $\ddot{C}_t^{pr}$ = percentage change in private consumption

$\ddot{W}_t$ = percentage change in non-farm labor income (determined a priori)

$\ddot{N}_t$ = percentage change in income of self-employed labor and capital (determined a priori)

$\ddot{A}_t$ = percentage change in farm income

$\ddot{P}_t$ = percentage change in profit income

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[5] Odeh, p. 56.

Table 4.2

MARGINAL PROPENSITIES TO CONSUME OF LABOR, FARM, AND NONLABOR NONFARM INCOME GROUPS FOR THE UNITED STATES, THE UNITED KINGDOM, HOLLAND, INDIA AND BRAZIL, 1870 - 1959

Country and Period	Labor Incomes	Farm Income	Nonfarm Nonlabor Incomes
USA 1920 - 1952	0.62	0.39	0.46
UK 1870 - 1940	0.80	0.50	
HOLLAND 1955	0.85	0.40	
INDIA 1919 - 1952	1.00	0.96	0.84
BRAZIL 1947 - 1959	1.00	0.50	0.87

Source: Odeh, p. 57.

Thus a one percent increase in nonfarm labor income causes a 0.495 percent increase in private consumption, whereas one percent increases in other groups cause an increase in consumption of between 0.083 and 0.158 percent. So redistribution of income from other groups to nonfarm labor will increase total consumption growth; while a redistribution of income in the opposite direction will decrease in consumption growth. In this way also inflation can affect consumption expenditures.

Changes in the Composition of Investment Expenditures

Shaalan studies the effect of inflation on the distribution of investment expenditures between inventories and fixed assets, on the one

hand, and between different types of fixed assets, on the other.[6] For inventories versus fixed assets he finds no observable relation between inflation and this distribution in several underdeveloped countries in Table 4.3. Countries with a long history of inflation (Brazil and Chile) have the lowest rate of inventory accumulation. Countries experiencing wide swings in their inflation rates (Mexico and Columbia) did show a close association between the inflation rate and the percentage of investment in inventories. Shaalan hypothesizes that when the inflation rate was steady inventory accumulation was slow. However a sharp burst of inflation would cause a sharp increase in the ratio of inventories to fixed assets. When the inflation rate stabilized so did the ratio. This evidence supports the theory that short bursts of inflation increase the illiquidity risk involved in owning long-run assets thus causing the demand for inventories to increase until the desired quantity of liquidity is attained.

Shaalan uses an indirect method to examine changes in the distribution of fixed assets under inflation. Changes in the output-capital ratio of a country are used as proxies for changes in productivity. A high marginal output-capital ratio suggests that recent investments were highly productive; while a low ratio suggest recent investments were less productive. Shaalan's thesis is that the output-capital ratio in a

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[6] Shaalan, pp. 253-261.

Table 4.3

DISTRIBUTION OF AGGREGATE GROSS DOMESTIC PRIVATE INVESTMENT AT CURRENT PRICES IN CHILE, ARGENTINA, BRAZIL, MEXICO, COLUMBIA, PERU, ECUADOR AND THE PHILIPPINES 1951 - 1959

Country	% Investment in Fixed Assets	% Investment in Inventories	Average Inflation Rate
CHILE	98.4	1.6	40
ARGENTINA	100.5	-0.5	31
BRAZIL	93.8	6.2	20
MEXICO	86.3	13.7	8
COLUMBIA	92.4	7.6	7
PERU	91.6	8.4	7
ECUADOR	85.6	14.4	2
PHILIPPINES	86.9	13.1	1

Source: Ibid, p. 254.

country is stable under certain conditions. A sharp burst of inflation causes relative price changes which result in a changed composition of output. Changes in relative factor prices can change the composition of investment and thus affect output. If wages rise relative to other factor prices there will be a tendency to use more capital-intensive methods of production which may either increase or decrease output. Changes in relative goods prices can also change the composition of

investment as resources are directed into sectors with the highest price rises. If these sectors are less efficient than the ones where the resources were previously employed output will decline. So inflation may cause misallocation of investment resources which will be represented by a low marginal output-capital ratio. Shaalan determines the inflationary periods in Argentina, Chile and Columbia and determines the marginal output-capital ratio for each period in Table 4.4 by relating each period's annual average gross domestic fixed investment to that period's annual average change in output lagged one year. The table shows that periods of strong inflation (1950 - 1952, 1955 - 1956 and 1957 - 1959) were associated with low marginal output-capital ratios. In 1953 - 1954 when inflation was low the ratio was much higher (21%). This suggests that high inflation periods cause a misallocation of investment resources into less productive sectors. A similar result was obtained for Chile. However, in Columbia, a positive relationship between the rate of inflation and the marginal output-capital ratio was found. Shaalan gives two possible explanations for this: 1. inflation was mild in Columbia never exceeding 15% , 2. there may be faults inherent in using the marginal output-capital ratio as an index of the efficiency of investment.

In theory investors take account of the financial risks inherent in long term capital projects in times of inflation by including the costs of inflation in the Present Value formula. Foster studies the

Table 4.4

RATE OF INFLATION AND PRODUCTIVITY OF INVESTMENT IN 1950 MARKED PRICES, ARGENTINA, 1950 - 1959

Year	Rate of Inf.	Gross Fixed Capital Formation	Average GFCF For Periods	Indexes of Real Domestic Product	Variation in RDP Due to Investment	Average Variation For Period	Average Marginal Output-Capital Ratio
1950	28	13,054		61,084	1,862		
1951	35	13,490	13,280	62,946	-3,206	-663	.05
1952	39	13,297		59,740	3,333		
1953	4	12,699		63,073	2,226		
			12,956			2,682	.21
1954	4	13,214		65,299	3,139		
1955	12	14,597		68,437	-589		
			14,428			795	.06
1956	13	14,259		67,849	2,179		
1957	25	16,986		70,028	1,843		
			16,833			-806	-.05
1958	32	16,680		71,871	-3,455		
1959	114	------		68,416			

Source: Ibid, p. 257.

studies the impact of anticipated inflation on fixed and variable return investments.[7] For a fixed value return the greater the expectation of inflation the lower the real Present Value of future returns. Foster's

[7] E.M. Foster, "The Impact of Inflation on Capital Budgeting Decisions" Quarterly Review of Economics and Business Vol. 10 (Autumn 1970) pp. 18-24.

equation is:

$$PV_f = \sum_{t=0}^{\infty} \left[R_t / (1 + k)^t \ (1 + F_p)^t \right]$$

where PV_f = real Present Value of a fixed return investment

R_t = return

k = discount for the time value of money or the interest rate

F_p = discount for inflation

So the return is discounted for both the time value of money and the inflation rate.

In variable return investments inflation can affect both future factor and product prices. Depending on the elasticities of factor and product prices with respect to changes in the inflation rate the profitability of the investment can be increased or decreased. Foster's equation is:

$$PV_v = C_p + \sum_{t=0}^{\infty} \left[\frac{S_t \ (1 + F_s)^t - C_t \ (1 + F_c)^t + D_t}{(1 + k)^t \cdot (1 + F_p)^t} \right]$$

where NPV_v = real net Present Value of a variable return investment

$-C_p$ = initial capital outlay

S_t = revenue

F_s = % change in product price induced by a change in the inflation rate

C_t = all costs including depreciation

F_c = % change in factor prices induced by a change in inflation rate

D_t = allocation of depreciation funds

k = discount for time value of money

F_p = % change in general price level

The equation states that returns are revenues minus costs plus the return from invested funds (depreciation). Both revenues and costs are adjusted for price changes. Next total returns are discounted by the time value of money and the inflation rate. The discounted return is then subtracted from the initial capital outlay to give the real net Present Value of the investment.

Foster then lets $E_s = 1 + F_s / 1 + F_p$ and $E_c = 1 + F_c / 1 + F_p$. These he calls, respectively, elasticity of revenues with respect to changes in the inflation rate and the cost elasticity with respect to the inflation rate. Dividing through by $(1 + F_p)$, Foster's equation becomes:

$$NPV_v = -C_p + \sum_{t=0}^{\infty} \frac{\left[S_t(E_s)^t - C_t(E_c)^t + D_t / (1 + F_p)^t\right]}{(1 + k)^t}$$

This equation shows that the impact of inflation on investment proposals depends on the relative sensitivities of revenues and costs with respect to inflation. If E_c exceeds E_s the value of the investment declines. If E_s exceeds E_c the value of the investment increases. The formula also shows that the greater the degree of inflation the less will be the real value of the return from invested funds. In this way Foster incorporates the impact of inflation into investment decisions.

Changes in the Demand for Money

Martin Bailey studies the effects of anticipated inflation

on the demand for money balances as a function of the expected rate of inflation. His equation[8] is:

$$M/P = e^{aE+r}$$

where M/P = quantity of real balances held by the community

E = expected rate of inflation

a, r = constants

Bailey uses this equation to determine the welfare loss caused by inflation when time is substituted for money. The equation so derived is:

$$D/G = (1-aE - e^{-aE}) / aE$$

where D = the welfare loss or the lost productivity of real balances over the relevant portion of the demand curve.

G = government revenues per month from inflation (equals the rate of inflation times the quantity of real balances held by the community)

a, e = constants

E = inflation rate

c = ratio of currency to the total money supply

D/G is the proportion by which the burden on the private economy exceeds the revenues obtained by the government from inflation, expressed as a fraction of the revenues collected.

Bailey then plots D/G against G/R (government inflation revenues per month as a fraction of real national income per month) in Figure 4.1.

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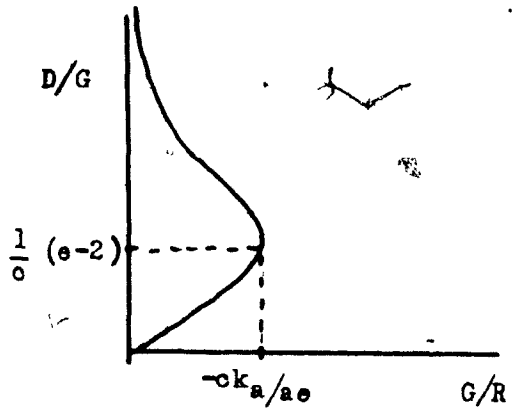
[8] Bailey, p. 98.

Figure 4.1

Welfare Costs due to Government Revenue Policies



Source: Ibid, p. 105

As the rate of inflation (E) increases D/G rises without limit. However government revenues (G) approach zero as money is abandoned by the community. As a result D/G approaches infinity as E approaches infinity. The maximum welfare cost occurs when the government maximizes its revenues or at 1/c (e-2). Welfare cost thus depends only on c, the ratio of currency to the total money supply. If c = 1, D/G = .72. That is, if the government tries to obtain the maximum amount of revenue through open inflation seventy-two percent of the revenue will be welfare costs.

Bailey then determines the maximum welfare costs of inflation during the hyperinflations studied by Cagan. (See Table 4.5.) The maximum welfare loss for all countries was below fifty percent of real income while the median was thirty-one percent.

Table 4.5

PARAMETERS OF DEMAND FOR REAL CASH BALANCES IN SEVEN HYPERINFLATIONS IN AUSTRIA, GERMANY, GREECE, HUNGARY, RUSSIA AND POLAND, 1920 - 1946

Country	Dates of Regression	Maximum Welfare Loss/ Real Income
AUSTRIA	Jan. 1921 - Aug. 1922	0.342
GERMANY	Sept. 1920 - July 1923	0.383
GREECE	Jan. 1943 - Aug. 1944	0.311
HUNGARY 1	July 1922 - Feb. 1924	0.480
HUNGARY 2	July 1945 - Feb. 1946	(0.139)[a]
RUSSIA	Dec. 1921 - Jan. 1924	0.0244
POLAND	Apr. 1922 - Nov. 1923	0.126

[a]Parentheses indicates weak estimates and figures derived from them.

Source: Ibid, p. 99.

Grant Reuber estimates this welfare loss for Canada using hypothetical anticipated inflation rates and his equilibrium demand for money equation for the period 1955 to 1961.[9] Table 4.6 illustrates Reuber's results

[9]G.L. Reuber, "The Objectives of Canadian Monetary Policy, 1949 - 61, Empirical Trade-Offs and the Reaction Function of Authorities", Journal of Political Economy Vol. 72 (April 1964) p. 109-132.

Table 4.5

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[9]G.L. Reuber, "The Objectives of Canadian Monetary Policy, 1949 - 61, Empirical Trade-Offs and the Reaction Function of Authorities", Journal of Political Economy Vol. 72 (April 1964) p. 109-132.

Table 4.6

THE EFFECT OF VARIOUS CORRECTLY ANTICIPATED INFLATION RATES ON ECONOMIC EFFICIENCY, CANADA 1955 - 1961

Hypothetical Annual Rate of Correctly Anticipated Inflation	Loss in Economic Efficiency Expressed as a Percentage of National Income
1.0	0.4
2.0	0.9
3.0	1.6
4.0	2.3
5.0	3.2
6.0	4.1
7.0	5.2
8.0	6.4
9.0	7.7
10.0	9.1

Source: Ibid, p. 130.

Reuber finds that as the inflation rate increases the loss of efficiency due to the substitution of other assets for money increases. He does not estimate a maximum.

New Canadian Evidence

Changes in the Composition of Consumption Expenditures

The effect of changes in income distribution on consumption expenditures was studied for Canada in the period 1947 to 1970. First the marginal propensities for four economic groups were determined:[10]

1. average MPC of nonfarm labor = .437
2. average MPC of self-employed labor and capital = 1.04
3. average MPC of farm labor = .267
4. average MPC of profit receivers = .267

The marginal propensities of nonfarm, farm, and profit income were smaller than expected when compared with figures from other countries in Table 4.2. Self-employed labor and capital was as expected.

A single equation regression analysis was then used to estimate the effects of changes in income distribution on consumption changes. The selected equation is:[11]

$$\ddot{C}_t = 2.8721 + \underset{(.097)}{.337}\ddot{L}_t + \underset{(.120)}{.175}\ddot{N}_t + \underset{(.016)}{.012}\ddot{A}_t + \underset{(.033)}{.039}\ddot{W}_t$$

$$R = .737$$

where $\ddot{C}_t$ = % change in private consumption

$\ddot{L}_t$ = % change in nonfarm labor income

$\ddot{N}_t$ = % change in income of self-employed labor and capital

$\ddot{A}_t$ = % change in farm income

$\ddot{W}_t$ = % change in profit income

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[10] Values are taken from Table 5.2 in the following chapter of this thesis.

[11] Equation is taken from Table 5.2.

Thus a one percent increase in nonfarm labor income causes a .337 percent increase in consumption (compared to a .495 percent increase in Brazil). So a redistribution of income from other groups to nonfarm labor will increase total consumption while a redistribution from nonfarm labor to other groups will cause a slowdown in consumption growth. If patterns of consumption expenditure differ between groups a change in the composition of consumption will occur as well.

Changes in the Composition of Investment Expenditures

Data for changes in inventories as a percentage of Gross Capital Formation were first studied to see whether periods of high inflation in Canada correspond with periods of high inventory accumulation. (See Table 4.7.)

Table 4.7

INVENTORY ACCUMULATION IN INFLATIONARY PERIODS, CANADA 1947-1970

(constant 1961 dollars)

Period	Total Change in Inventories (Inv.)	Total Gross Capital Formation (GCF)	Change in Inv. as % of GCF	Average Inflation Rate
1947-52	2213	30758	7.2	7.15
1953-55	587	19564	3.0	-0.03
1956-58	709	25589	2.8	2.43
1959-64	2267	55981	4.0	1.32
1965-70	4116	83056	5.0	3.62

Source: Budget Papers, p. 64, 111.

When prices were stable changes in inventories were approximately 3 to 4 percent of total investment. In two of the three inflationary periods (1947-52, 1965-70) this ratio increased while in 1956-58 it remained stable. Once can conclude therefore that periods of inflation cause stable or higher inventory accumulation than in periods of stable prices.

Shaalan's method of using the marginal output-capital ratio as a proxy for the productivity of investment was also used in Table 4.8 and Table 4.9 to determine whether inflation caused a misallocation of investment resources in this period.

In the two periods of stable prices (1953-54 and 1959-64) the marginal output-capital ratio was approximately .065 percent. This declined to .026% in the mild inflation of 1956-58 and to .048% in the stronger inflation of 1964-70. The period 1947-52 deviates from this pattern; strong inflation is accompanied by high productivity of investment. This result may be due to post war activity and not to the inflation rate. In general then periods of inflation in Canada have caused the productivity of investment to decline.

Conclusions

In theory inflation distorts the price system and these relative price distortions cause changes in the composition of consumption and investment expenditures and in the demand for money. Wolozin has shown that these price distortions in the United States were mild in the period since the Second World War in the United States. This is probably true for Canada also. Consumption expenditures change when relative prices

Table 4.8

RATE OF INFLATION AND PRODUCTIVITY OF INVESTMENT IN CONSTANT 1961 DOLLARS, CANADA 1947-1970

Year	Rate of Inflation	Gross Fixed Capital Formation (GFCF)	Average GFCF For Periods	Indexes of Real Domestic Product (RDP)	Variation in RDP Due to Investment	Average Variation in RDP for Period	Average Marginal Output-Capital Ratio %
1947	9.4	3796		54.8	1.9		
1948	14.5	4358		56.7	1.9		
1949	3.1	4680	4758	58.4	4.0	3.5	.074
1950	2.8	5029		62.4	4.9		
1951	10.6	5047		67.3	5.2		
1952	2.5	5635		72.5	3.0		
1953	-0.9	6327		75.5	-1.2		
1954	0.6	6526	6521	74.3	7.8	4.5	.069
1955	0.2	6911		82.1	7.0		
1956	1.4	8174		89.1	0.4		
1957	3.2	8756	8529	89.5	1.5	2.2	.026
1958	2.7	8659		91.0	4.7		
1959	1.1	8705		95.7	2.3		
1960	1.2	8419		98.0	2.0		
1961	0.9	8517	8952	100.0	6.9	5.6	.063
1962	1.2	8692		106.9	5.8		
1963	1.8	9144		112.7	7.7		
1964	1.7	10437		120.4	8.6		
1965	2.5	11797		129.0	9.0		
1966	3.7	13082		138.0	4.4		
1967	3.6	13191	13157	142.4	6.9	6.3	.048
1968	4.1	13177		149.3	6.9		
1969	4.5	13768		156.2	4.5		
1970	3.3	13925		160.7			

Source: Budget Papers, pp. 64, 85, 111.

Table 4.9

INFLATION RATES AND MARGINAL OUTPUT-CAPITAL RATIOS,

CANADA 1947-1970

Period	Inflation Rate	Marginal Output-Capital Ratio (%)
1947 - 1952	7.15	.074
1953 - 1955	-0.03	.069
1956 - 1958	2.43	.026
1959 - 1964	1.32	.063
1964 - 1970	3.62	.048

Source: Budget Papers, p. 111 and Table 4.8

or income distribution changes. In Canada over the period 1947 - 1970 there has been a gradual redistribution of income from profit receivers, farm workers and self-employed labor and capital to nonfarm labor income. (See Table 1.7.) Applying this data to the consumption equation (see page 93) showing the relation between percent changes in incomes of different groups and percent changes in consumption, we see that total consumption growth will increase. Thus part of the growth in consumption in the period 1947 - 1970 was due to the redistribution of income caused by inflation. Inflation also affects investment expenditures in financial versus physical assets and in different types of physical assets. The

illiquidity risk is magnified by inflation, causing a shift to inventories from financial and from fixed assets. The Canadian data show that high periods of inflation do correspond with high inventory to total investment ratios. Table 4.9 also shows that bursts of inflation are accompanied by lower productivity of fixed investment. Inflation causes, lastly, a shift from money to near monies, to other factors, or to time. In each case there is an efficiency loss or excess burden caused by the shift. Reuber estimates for Canada that when inflation is six percent this loss is 4.1 percent of national income.[12]

In summary inflation can cause a misallocation of resources if the price system is distorted. This misallocation of consumption, investment and of money has been mild but traceable to date in Canada.

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[12]Reuber, p. 150.

Chapter 5

THE IMPACT OF INFLATION ON THE LEVEL OF ECONOMIC ACTIVITY

Theory

Not only the composition of consumption and investment expenditures but also their level is affected by the inflation rate and changes in this rate. This chapter develops a theoretical model to explain short-run changes in consumption and private investment expenditures caused by inflation. The model is then applied to recent Canadian inflation.

The Relative Change in Income Hypothesis

The relative change in income hypothesis was first developed by H.S. Odeh. It relates percentage changes in money consumption expenditures to percentage changes in money income. The equation is:[1]

$$\dot{C} = r_o + r_1 \dot{Y}$$

where $\dot{C}$ = % change in money consumption

r_o, r_1 = constants

$\dot{Y}$ = % change in money income

"r_o" represents the relative change in consumption expenditures due to changes in population.[2] "r_1" is the income elasticity of consumption

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[1] Odeh, pp. 25-28.

[2] If $r_o > p$, the population rate, then consumption expenditures are determined by other trend factors besides population growth such as income distribution.

expenditures.

Let the average propensity to consume be "n_1" - the mean value of the average consumption-income ratio over the relevant period. Then the marginal propensity to consume "r^1" equals the average propensity to consume multiplied by the income elasticity of consumption. Or:

$$r^1 = r_1 n_1$$ [3]

If the income elasticity $r_1 > 1$ then MPC > APC $(r^1 > n_1)$

$r_1 < 1$ then MPC < APC $(r^1 < n_1)$

$r_1 = 1$ then MPC = APC $(r^1 = n_1)$

That is, only if the income elasticity of consumption equals one will the consumption function be proportional. Otherwise, the function will be nonproportional.

The hypothesis can also be derived in real terms. The percent change in money consumption expenditures equals the relative change in real consumption expenditures plus the percentage change in the Consumer Price Index. Similarly the relative change in money income equals the relative change in real income plus the percentage change in the GNP deflator. That is:

$$\dot{C} = \dot{c} + \dot{p}^o$$

$$\dot{Y} = \dot{y} + \dot{p}$$

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[3] $r_1 = \frac{dC}{dY} \cdot \frac{Y}{C}$ and $n_1 = \frac{C}{Y}$ so $r_1 \cdot n_1 = \frac{dC}{dY} = r^1$.

Odeh's original equation is: $\ddot{C} = r_o + r_1 \ddot{Y}$

So: $$\ddot{c} + \ddot{p}^o = r_o + r_1 (\ddot{y} + \ddot{p})$$

$$= r_o + r_1 \ddot{y} + r_1 \ddot{p}$$

$$\ddot{c} = r_o + r_1 \ddot{y} + r_1 \ddot{p} - \ddot{p}^c$$

If $\ddot{p} = \ddot{p}^o$ then $\ddot{c} = r_o + r_1 \ddot{y} - (1-r_1)\ddot{p}$

This equation says that relative changes in real consumption expenditures are a function of relative changes in real income minus relative changes in the general price index. r_o and r_1 are unchanged so r_1 represents both real and money income elasticities of consumption. "$1-r_1$" is the price elasticity of real consumption, giving the percentage decrease in real consumption as a result of a one percent increase in the price level. A priori, this price elasticity should be negative and less than one. This is because the overall price elasticity is the sum of all the individual price elasticities of consumers, each weighted according to their importance in total consumption expenditures.

Consumers with a very small income all spent on consumption expenditures will have the same amount available for consumption when prices are rising. As a result the price elasticity of real consumption is minus one for poor families. Wealthy families will maintain their real consumption expenditures in inflation by increasing their money consumption in step with inflation. As a result their price elasticity of real consumption is zero. Middle income families will have an elasticity between zero and minus one. Summing for all consumers, the total price elasticity will be between zero and minus one. Whether the

total elasticity is closer to zero or minus one will depend on the distribution of income. So a one percent increase in the inflation rate will reduce real consumption.

The rate of inflation also affects the proportion of consumption expenditures spent on price inelastic goods. In inflation the proportion will increase. So an increase in the inflation rate will cause an increase in money consumption.

Inflation, indirectly through its effect on the redistribution of income, will affect the relative change in consumption if marginal propensities to consume differ between economic groups. If income is redistributed from labor to profits (wage-lag hypothesis) and the MPC of labor is greater than the MPC of profits, total consumption will decline. The larger the redistribution and the greater the difference in marginal propensities the greater the effect of income redistribution on consumption.

Inflation also affects the relative change in consumption through the speculative effect. Absolute changes in the rate of inflation encourage speculative activity as consumers buy assets whose values are expected to increase in inflation such as stocks and luxury housing. Preferences between present and future consumption are affected in favor of present consumption. This speculative effect becomes stronger as inflation increases in intensity.

In summary, inflation affects total consumption expenditures through its effects on:

1. the price elasticity of money consumption
2. the price elasticity of real consumption
3. speculative activity or the effect of changes in the inflation rate on consumption
4. income redistribution

Our theoretical model must therefore include all four determinants.

The Flexible Accelerator Hypothesis

The flexible accelerator hypothesis assumes that investment is proportional to the deviation between the actual and desired capital stock. It is assumed that there is an equilibrium capital-output ratio based on a given state of technology, rate of interest, etc. Entrepreneurs are assumed to maintain this desired capital stock by adjusting the actual level through changes in investment expenditures. The equation is:

$$j_t = a\,(K_t^d - K_t^a)^4$$

where j_t = investment demand

a = the response coefficient

K_t^d = desired capital stock at beginning of period t

K_t^a = actual capital stock at beginning of period t

The response coefficient "a" is the reciprocal of the number of years

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[4] Odeh, pp. 39-42.

over which entrepreneurs plan to make up the gap between the actual and the desired capital stock. The closer "a" is to unity the more dynamic are investors.

The equation implicitly assumes that the actual capital stock is being fully utilized at the beginning of the period. If this is not so an increase in the desired capital stock will be met, not by increased investment, but by greater utilization of existing capacity. As a result the equation is refined to include "u" - the capacity factor:

$$j_t = a\,(K_t^d - uK_t^a)$$

If the desired capital stock is "normally" related to aggregate output ($K_t^d = Kv_t$ where "v_t" is aggregate output at beginning of the period and "K" is the equilibrium capital-output ratio) then the equation can be adjusted to read:

$$j_t = a\,(Kv_t - uK_t^a)$$

Odeh assumes "u" = 1 so that the capital stock is fully utilized. He then takes the first difference of the equation and divides by "j_{t-1}" to get: $\ddot{j}_t = a + aK\,(v_t/j_{t-1})$

where $\ddot{j}_t$ = relative change in real investment in the previous period. Letting $-a = B_o$, $aK = B_1$ and $v_t/j_{t-1} = f_t$, the equation now reads:

$$\ddot{j}_t = B_o + B_1 f_t$$

This is the basic equation used to test the effects of inflation on relative changes in real investment.

The effects of inflation on investment demand enter into the equation indirectly through effects on profits; on capacity, and on the dynamism of investors.

If inflation increases profits more internal funds are available for investment. Whether they will be invested depends on the degree of utilization of existing capacity. If resources are substantially under-employed increased profits may have no effect on new investment. Second, the number of years over which entrepreneurs plan to eliminate the gap between the actual and desired capital stock may be affected by inflation. If inflation maintains profits and expectations high an increase in prices may cause entrepreneurs to invest more quickly. If however inflation undermines general confidence in the future investors may become less dynamic. Here the speed and duration of inflation are important. Mild inflation probably boosts confidence; severe inflation retards it. So percentage changes in prices affect percentage changes in investment indirectly through:

1. changes in profits
2. changes in the dynamism of investors.

Inflation affects investment demand directly in two ways:

1. through the price elasticity of real investment demand
2. through speculative activity or the effect of changes in the rate of inflation on investment.

The equation is therefore adjusted to include:

$\overset{\cdot\cdot}{pt}$ = changes in general profitability

$\overset{\cdot\cdot pr}{j_{t\ 1}}$ = the time lag in implementing investment decisions

$\overset{\cdot\cdot}{pt}$ = the first difference in the annual percent change in the inflation rate (GNP deflator).

$\Delta \overset{\cdot\cdot j}{p_t}$ = annual percent change in investment goods prices

$\Delta \overset{\cdot\cdot j}{p_t}$ = the first different in the annual percent change in investment goods prices

The coefficient of "$\overset{\cdot\cdot j}{p_t}$" is the price elasticity of real investment demand and a priori should be negative as is the price elasticity of real consumption demand.

Empirical Work

The Relative Income Hypothesis

Odeh uses the relative income hypothesis to study the short-run reactions of consumers to inflation in Brazil for the period 1939-59 and in Chile for the period 1940-60. Using single equation regression analysis Odeh develops equations to explain relative changes in total consumption (private and government) and in private consumption as a linear function of relative changes in National Income and the cost of living. In some cases Gross Domestic Product is substituted for National Income. The correlation coefficient ranges from .816 to .850. A representative equation for Brazil[5] is:

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[5] Ibid., p. 50.

$$\ddot{C}_t = \underset{(4.525)}{1.544} + \underset{(0.205)}{0.934}\,\ddot{V}_t - \underset{(0.194)}{0.005}\,\ddot{\Delta p}_t$$

$$R = 0.818$$

Where $\ddot{V}_t$ = percent changes in money Gross Domestic Product

The constant term is not significant but is in all cases positive and greater than the rate of population growth. So other trend factors besides population growth affect consumption expenditures. Odeh finds that the constant increases in value whenever price variables are introduced.

The coefficient of "$\ddot{V}_t$" is the income elasticity of money consumption. It is significant and ranges from .69 to .96. This means when money income increases by one percent, money consumption expenditures increase by between .69 and .96 percent. The income elasticity drops when changes in the Consumer Price Index are introduced due to their high correlation.

The mean average propensity to consume for the whole period out of National Income is .992; out of Gross Domestic Product is .834. Multiplying the APC by the different income elasticities gives us the corresponding marginal propensities to consume.[6] For Brazil these vary between .68 and .95 out of National Income and between .582 and .787 out of GDP.

Changes in the CPI are significant at sixty-eight percent. "$\ddot{p}^{c}_{t}$" can be interpreted as the price elasticity of money consumption or

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[6] $r^1 = r_1 n_1$ where r_1 is the income elasticity and n_1, the APC.

the proportion of aggregate consumption that is price inelastic. It varies between .17 and .28 so a one percent increase in the CPI causes a .17 to .28 percent increase in nominal consumption. The price elasticity of real consumption is $1-r_1$ (one minus the income elasticity) and ranges between .03 and .23. So a one percent increase in inflation causes a .03 to .23 percent decrease in real consumption.

Speculative changes are represented by the first difference of relative changes in the CPI. The effect is negative but not significant.

Odeh then introduces changes in the money supply into the equation. A representative result is:[7]

$$\underset{t}{C} = \underset{(5.236)}{3.298} + \underset{(0.291)}{0.781}\overset{\bullet\bullet}{V}_t - \underset{(0.128)}{0.093}\overset{\bullet\bullet}{M}_t + \underset{(0.200)}{0.217}\overset{\bullet\bullet}{p}_t - \underset{(0.158)}{0.063}\Delta\overset{\bullet\bullet}{p}_t^c$$

$$R = .844$$

where $\overset{\bullet\bullet}{M}_t$ = percent changes in the money supply

Relative changes in the money supply are not significant. A one percent increase in the supply causes a decrease in aggregate consumption of 0.1 percent. Odeh says the negative correlation may be due to the intercorrelation between percent changes in income and the money supply.

Finally Odeh introduces the effect of changes in income distribution on consumption. A representation equation is:[8]

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[7] Ibid., p. 51.

[8] Ibid., p. 54.

$$\ddot{C}_t = \underset{(4.083)}{4.138} + 0.427\ddot{W}_t + 0.137\ddot{N}_t + \underset{(0.177)}{0.182}\ddot{A}_t + \underset{(0.072)}{0.082}\ddot{P}_t$$

$$R = 0.852$$

where $\ddot{W}_t$ = percent change in nonagricultural labor income (determined a priori)

$\ddot{N}_t$ = percent change in incomes of self-employed labor and capital (determined a priori)

$\ddot{A}_t$ = percent change in agricultural income

$\ddot{P}_t$ = percent change in profits

The constant term is still not significant but is higher than before. The speculative effect is not significant ($\Delta\ddot{p}_t$ varies between .351 and .432) but positive. The APC for each group was calculated and multiplied by the income elasticities (coefficients) of each type of income to obtain the corresponding MPC of each group. The MPC of nonfarm income was greater than or equal to one; of independent income, equal to one; of farm income, equal to .5; and of profits, equal to .87.

Odeh then repeats this procedure for private consumption only and then for Chile. In a general comparison of results between Brazil and Chile Odeh makes these comments:

1. The correlation coefficient for all equations was above .8.
2. The constant term was nonsignificant and unstable and greater in Chile than Brazil.
3. The income elasticities were greater than .9 and dropped when percent changes in the CPI were introduced. The APC for Chile = 1.082; for Brazil = .992. The MPC for Chile = .995; for Brazil = .925.

4. The effect of percent changes in the CPI on consumption was stable and positive. Seventeen to twenty-eight percent of Brazil's consumption and fifty to sixty percent of Chile's consumption is of price-inelastic goods. The price elasticity of real consumption was negative.
5. No conclusion can be made as to the strength of the speculative effect. In both countries it was small but in Brazil the effect was negative while in Chile the effect was positive.

The Flexible Accelerator Hypothesis

Odeh uses the flexible accelerator hypothesis to study the short-run reactions of investors to inflation in Brazil and Chile. Using single and multiple regression analysis he relates annual percent changes in real investment to one hundred times the ratio of annual absolute changes in real GDP to the absolute level of real investment in the previous year. A sample equation for Brazil is:[9]

$$\hat{I}^{pr}_{t} = \underset{(6.352)}{-18.810} + \underset{(0.193)}{0.845 f_t} + \underset{(0.604)}{2.010\, \Delta p^{e}_{t}}$$

$$R = 0.819$$

The correlation coefficient ranges between .81 and .84 and increases whenever price changes or time lags are included. The constant term (B_o) is relatively stable, significant and negative (as required a priori) varying between -13.8 and -28.5. This means fourteen to twenty-eight percent of the gap between the actual and desired capital stock is invested each year. This is large enough to suggest that Brazilean

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[9] Ibid., p. 66.

entrepreneurs are dynamic. The introduction of "j^{pr}_{t+1}" - the time lag in implementing investment decisions - causes the coefficient to decline. "j^{pr}_{t+1}" is negative, showing that there is a two or three month lag.

The coefficient of "f_t" is the marginal capital productivity. It is significant, stable and varies between .74 and .85. Odeh then divides this coefficient by .001 times the constant term to obtain the capital-output ratio for each equation.[10] The ratio varies from 2.8 to seven years. Three to five years is a reasonable ratio for newly developing countries.

The effect of annual percent changes in investment goods prices is positive. Since the effect should be negative a priori the variable is rejected. Changes in general profitability have no effect and are insignificant. Profits themselves were used as a variable and found to be insignificant. However the effect of changes in the inflation rate on investment is positive, stable, significant and varies between 1.6 and 2.0. Therefore a one percent increase in the speculative variable causes a 1.6 to 2.0 percent increase in investment.

Odeh then estimates the effect of inflation on investment in Chile. Odeh makes these comparisons of the results:

1. The flexible accelerator hypothesis is a satisfactory explanation of private investment demand for Brazil and Chile. The correlation coefficient exceeded .8 in all cases.

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[10] $B_0 = -a$ and $B_1 = aK$ so K (the normal capital-output ratio) $= B_1/B_0$. But since estimation was done in terms of percent changes, $K = B_1/.01B_0$ or the normal capital-output ratio equals the coefficient of f_t divided by .01 times the constant term.

2. The constant term is satisfactory for Brazil; mixed and uncertain for Chile. Brazilean entrepreneurs invest on average nineteen percent of the gap in the capital stock each year; Chilean entrepreneurs invest only ten percent.
3. The time lag before investment decisions are implemented is two to three months in Brazil compared with four months in Chile.
4. The marginal capital productivity for Brazil is double that of Chile and significant for both. The normal capital-output ratio for Brazil is on average five years; for Chile, on average, two years.
5. The effect of inflation in Brazil is significant and positive; in Chile, nonsignificant, uncertain and negative.

Odeh reaches similar conclusions using multiple regression analysis.

New Canadian Evidence

The Relative Income Hypothesis

The relative income hypothesis was used to test the short-run reactions of consumers to inflation in Canada from 1947 to 1970. The single equation method of estimation was used to relate relative changes in money consumption to relative changes in Personal Disposable Income. Percent changes in the Consumer Price Index and the first difference of these changes, as well as percent changes in the money supply were introduced. Table 5.1 presents these calculations.

The correlation coefficient ranges between .797 and .821, increasing in value when price variables are introduced. The constant

term is positive and exceeds the average rate of population growth over the period of 2.35 percent. Therefore consumption is a function of other trend factors besides population growth. Introducing price variables causes a drop in the constant.

The coefficient of "Y_t^d" is the income elasticity of money consumption. The elasticity is stable and significant at the one percent level in all cases. When the speculative variable is introduced this elasticity increases; when relative changes in the CPI are introduced, the elasticity declines. The elasticity varies from .510 to .562 so when money income increases by one percent, money consumption increases by .510 to .562 percent.

The mean average propensity to consume for the whole period out of disposable income is .930. Multiplying this APC by the various income elasticities gives us an MPC for each equation. The marginal propensity to consume varies between .475 and .523.

The price elasticity of money consumption, "p_t^c", is nonsignificant and small. If the coefficient of "Y_t^d" is zero, a one percent rise in the CPI causes a .0005 - .085 increase in money consumption. Therefore the proportion of consumption in Canada over this period that was inelastic, or of necessities, was between 0.05 and 8.00 percent. This compares with seventeen to twenty-eight percent for Brazil and fifty to sixty percent for Chile. The price elasticity of real consumption (one minus the income elasticity) varies between .438 and .490. So a one percent increase in the inflation rate causes a .438 to .490 percent

Table 5.1

EXPLANATION OF RELATIVE CHANGES IN PERSONAL CONSUMPTION, CANADA 1947-1970

No. of Eq.	Constant %	$\alpha^d Y_t$	Regression Coeff. $\alpha^c P_t$	$\alpha^c \Delta P_t$	α_{m_t}	Coeff. of Corr.	$MPC = \Delta C / \Delta Y^d$ $C/Y^d = .930$
1	3.641	.511[1] (.079)				.806	.475
2	3.206	.562[1] (.083)		-.130[10] (.083)		.821	.523
3	3.329	.517[1] (.120)	.075[N] (.140)	-.145[10] (.088)		.814	.481
4	3.820	.510[1] (.081)			-.025[N] (.073)	.797	.474
5	3.551	.511[1] (.123)	.082[N] (.144)	-.146[10] (.090)	-0.29[N] (.073)	.804	.475
6	3.642	.511[1] (.125)	.0005[N] (.138)			.796	.475

Key:

1 - significant at the one percent level

5 - significant at the five percent level

10 - significant at the ten percent level

N - not significant

Sources: Budget Papers, pp. 63, 71, 111

Statistical Summary, (1947-70) (Money Supply as of December 31st).

decrease in real consumption expenditures.[11]

The speculative variable (as represented by the first difference of the percent changes in the CPI) is significant at the ten percent level. This variable has a negative effect on consumption - a one percent increase causing a .130 - .146 percent decrease in money consumption. This compares with a small positive effect in Brazil and a small negative effect in Chile.

The effect of changes in the money supply is nonsignificant, small and negative.

Chart 5.1 plots a representative equation - showing the actual relative changes in consumption over the period together with the predicted changes and the absolute deviation.

The effect of changes in income distribution on consumption was then estimated in Table 5.2. The constant term varies from 2.743 to 3.983 and is larger than the rate of population growth. The speculative effect is negative, not significant and only one-third as large as previously.

The A. P. C. for each group is:

1. nonfarm labor = 1.07
2. self-employed = 6.10
3. farm = 18.87
4. profits = 5.64

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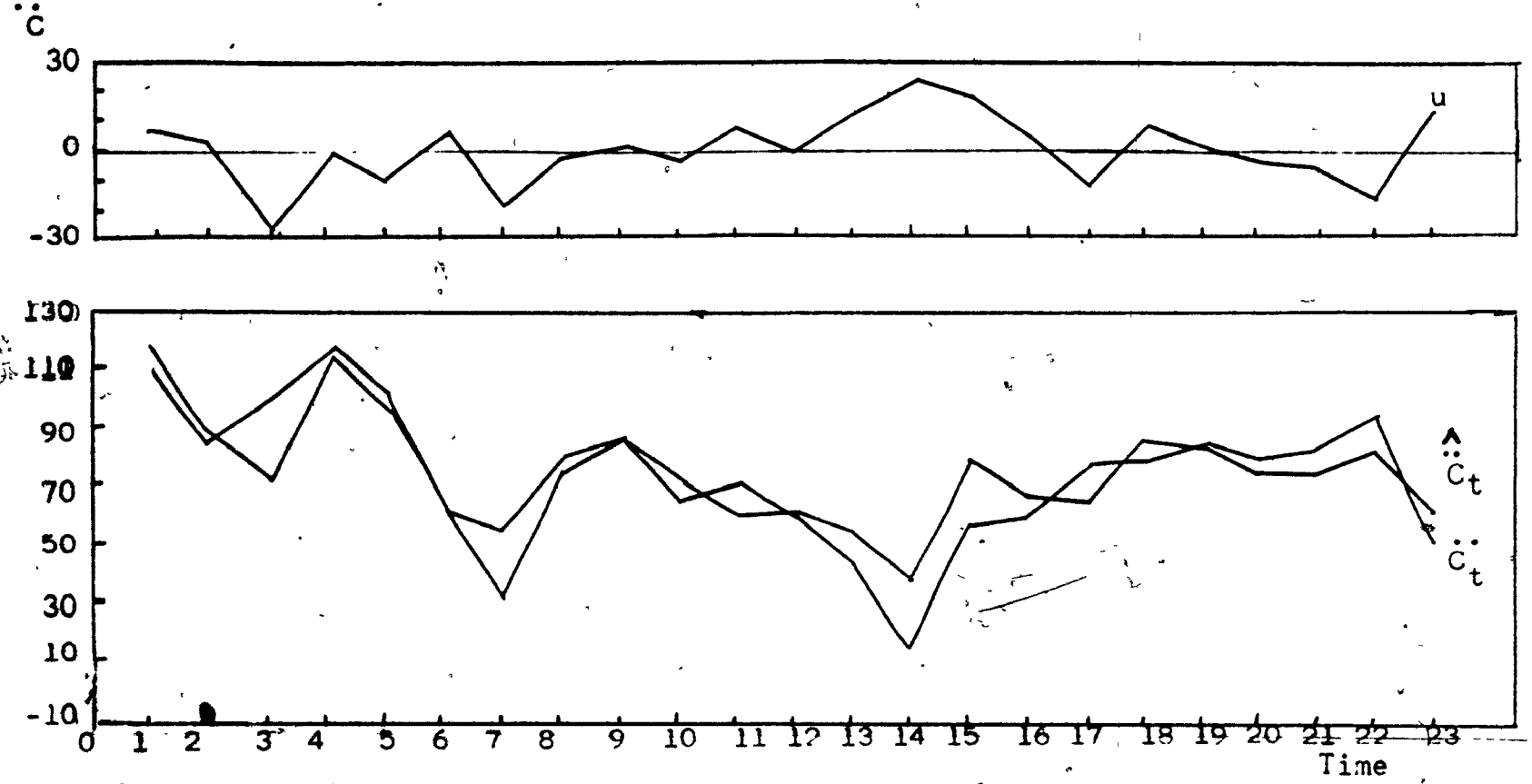
[11] This reinforces the conclusion drawn in Chapter 3 that consumers have been a stabilizing influence in the economy.

Chart 5.1

Explanation of Relative Changes in Personal Consumption, Canada 1947-1970



Source : Table 5.1, Equation 3.

Key : u = absolute deviation; $\ddot{C}_t$ = actual data; $\hat{\ddot{C}}_t$ = predicted data

Table 5.2

EFFECT OF CHANGES IN INCOME DISTRIBUTION ON RELATIVE CHANGES IN PERSONAL CONSUMPTION, CANADA 1947-1970

No. of Eq.	Constant %	Regression Coeff. $\dot{W}_t$	$\dot{N}_t$	$\dot{A}_t$	$\dot{P}_t$	$\Delta\dot{p}^o_t$	Coeff of Corr	$\frac{\Delta C}{\Delta W}$ C/W= 1.07	$\frac{\Delta C}{\Delta N}$ C/N= 6.10	$\frac{\Delta C}{\Delta A}$ C/A = 18.87	$\frac{\Delta C}{\Delta P}$ C/P = 5.64
1	3.730	.417[1] (.090)					.694	.486			
2	2.900	.372[1] (.093)	.170[N] (.121)				.710	.434	1.037		
3	3.060	.321[1] (.097)	.202[N] (.119)	.021[10] (.014)			.731	.374	1.232	.396	
4	3.483	.402[1] (.085)			.055[5] (.029)		.733	.469			.311
5	2.743	.363[1] (.088)	.154[N] (.114)		.052[5] (.029)		.745	.423	.939		.293
6	2.872	.337[1] (.097)	.175[N] (.120)	.012[N] (.016)	.039[N] (.033)		.737	.393	1.067	.226	.220
7	2.802	.356[1] (.103)	.155[N] (.127)	.013[N] (.017)	.043[N] (.035)	-.063[N] (.103)	.726	.414	.945	.245	.243
8	3.983	.382[1] (.094)		.017[N] (.015)			.700	.445		.321	
9	3.624	.427[1] (.096)				-.039[N] (.101)	.685	.498			

Sources: Budget Papers, pp. 63, 69, 111.

These figures are then multiplied by the various income elasticities to obtain the marginal propensities for each equation:

1. nonfarm labor = .393 - .498
2. self-employed = .939 - 1.232
3. farm = .226 - .396
4. profits = .220 - .311

The most startling difference between the Canadian and Brazilean results is the much lower MPC for nonfarm labor (0.4) in Canada than in Brazil (1.0) and for profits (o.3 compared to 0.86). Self-employed in both countries have an MPC = 1 while the MPC of farm income is also lower in Canada, 0.3 compared to 0.5.

Of the four groups only the effect of changes in the income of nonfarm labor is significant at the one percent level. Independent income is not significant at all. Farm income is significant in one case in four. Profit income in significant in two out of four cases.

Chart 5.2 plots a representative equation.

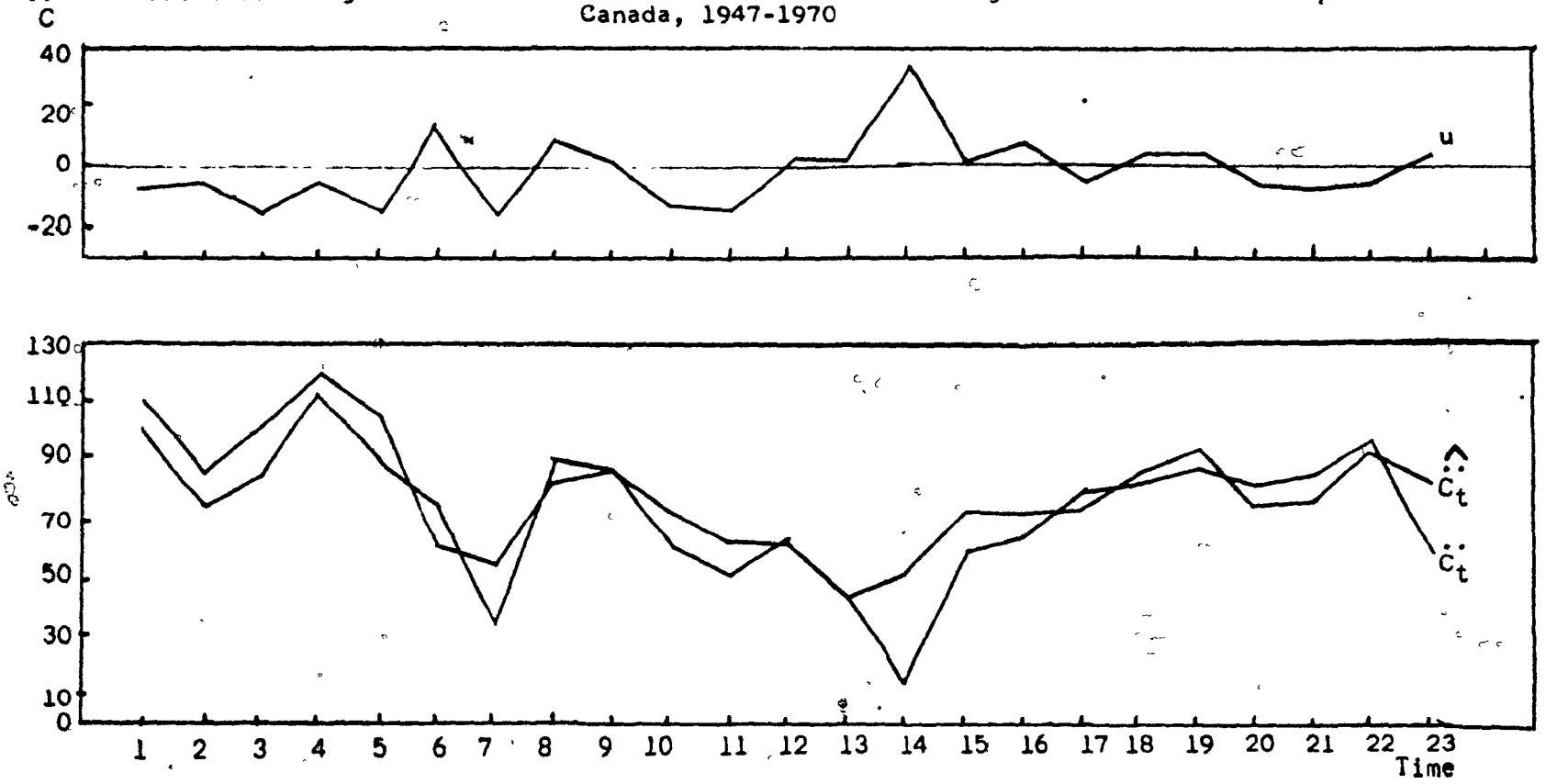
The Flexible Accelerator Hypothesis

The flexible accelerator hypothesis was applied to Canadian data for the period 1947 to 1970. Various equations were generated using single equation regression analysis. See Table 5.3.

The correlation coefficient ranges between .798 and .914. Introduction of a time lag and price variables increase the coefficient.

Chart 5.2

Effect of Changes in Income Distribution on Relative Changes in Personal Consumption
Canada, 1947-1970



Source : Table 5.2 , Equation 7

EXPLANATION OF GROSS PRIVATE INVESTMENT USING THE FLEXIBLE ACCELERATOR HYPOTHESIS, CANADA, 1947-1970

No. of Eq.	Constant %	Regression Coefficient							Coeff. of Corr.	K^t
		f_t	$\ddot{j}_{t+1}$	$\ddot{p}^j_t$	$\Delta\ddot{p}^j_t$	$\ddot{p}_t$	$\Delta\ddot{p}_t$	$\ddot{p}_{t-1}$		
1	-11.730	.676 I (.100)							.819	5.769
2	-11.480	.667 I (.108)			.100 N (.395)				.809	5.810
3	-11.353	.727 I (.091)	-.288 I (.111)						.861	6.404
4	-11.943	.752 I (.089)	-.319 I (.109)				-.556 N (.355)		.872	6.297
5	-9.009	.622 I (.094)	-.203 S (.106)		2.13 I (.831)		-2.56 I (.844)		.902	6.904
6	-9.703	.601 I (.096)	-.192 S (.107)	.346 N (.351)	2.214 I (.836)		-2.806 I (.880)		.902	6.177
7	-7.389	.571 I (.092)	-.185 S (.100)	2.317 I (1.139)	1.160 N (.978)	-2.497 S (1.382)	-1.600 N (1.062)		.914	7.728
8	-10.647	.682 I (.101)				-.368 N (.467)			.816	6.406
9	-10.117	.734 I (.091)	-.293 I (.111)			-.418 N (.111)			.862	7.255
10	-11.862	.672 I (.105)		.070 N (.416)					.809	5.665
11	-11.238	.730 I (.096)	-.290 I (.115)	-.060 N (.373)					.853	6.496
12	-11.947	.672 I (.103)						.040 N (.123)	.808	5.625
13	-11.746	.669 I (.110)			.065 N (.428)			.033 N (.134)	.798	5.696
14	-12.146	.689 I (.102)					-.367 N (.410)		.817	5.673
15	-12.291	.676 I (.105)		.315 N (.470)			-.517 N (.105		.811	5.500

Sources: Budget Papers, 65, 69, 85, 109, 111.

The constant term is negative and stable, varying between -7.389 and -12.291. The constant term indicates the percentage of the gap between the actual and the desired capital stock that is invested each year. For Canada this means seven to twelve percent of the gap is invested each year compared to nineteen percent in Brazil and ten percent in Chile.

The coefficient of "f_t" - the marginal capital productivity - is significant at the one percent level in all cases and stable, varying between .571 and .752. The normal capital-output ratio obtained from this coefficient has a range of 5.500 to 7.728 years (compared to five years in Brazil and two in Chile).

The time lag in implementing investment decisions is significant in all cases and is between two and three months - a similar result to that obtained in Odeh's study.

The effect of annual percent changes in investment goods prices is positive in all cases but one and significant in only one case. A priori the effect should be negative so the variable is rejected. Changes in general profitability have a negative effect on investment demand. The first difference in relative changes of investment goods prices is positive and significant at the one percent level in two cases. A one percent increase in this variable causes a .100 to 2.214 percent increase in investment. The speculative variable for the GNP deflator has a negative impact on investment - a one percent increase causing a .517 - 2.806 percent decrease in investment. This compares to a positive effect in Brazil and a negative effect in Chile.

Relative changes in profits in the previous period were nonsignificant and exerted a small positive influence.

A representative equation is plotted in Chart 5.3.

A few equations were run omitting "f_t" - that is, relating relative changes in real private investment to price variables and the level of profits in the preceding year. Table 5.4 presents the results. The correlation coefficient (.639 - .684) is much lower than when the flexible accelerator hypothesis is used. The constant term is positive. The speculative variables are both significant at the one percent level in all cases. A one percent increase in the investment goods speculative variable causes a five percent increase in investment demand. A one percent increase in the speculative inflation variable causes a four to six percent decrease in investment demand. The effect of previous profits is positive and significant in two cases.

Table 5.4

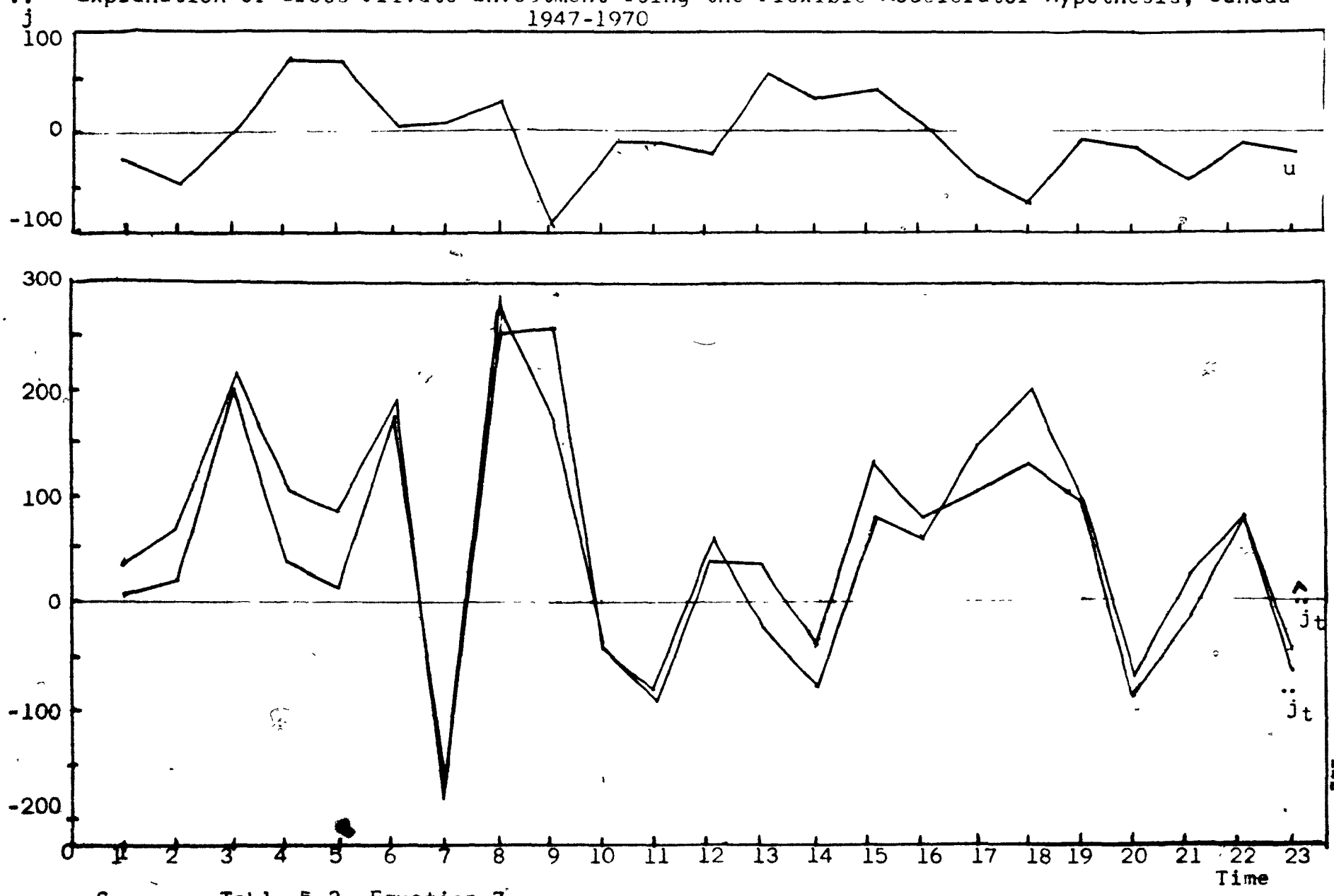
EXPLANATION OF GROSS PRIVATE DOMESTIC INVESTMENT USING THE PROFITS PRINCIPLE, CANADA 1947-1970

No. of Eq.	Constant %	Regression Coefficients $\ddot{j}_{t+1}$	$\ddot{p}^j_t$	$\Delta\ddot{p}^j_t$	$\Delta\ddot{p}_t$	$\ddot{p}_{t-1}$	Coeff. of Corr.
1	6.137			4.957[1] (1.197)	-4.941[1] (1.319)		.639
2	3.543			5.325[1] (1.152)	-5.787[1] (1.335)	.312[5] (.173)	.684
3	2.290	.167[N] (.167)		5.691[1] (1.209)	-6.139[1] (1.381)	.353[5] (.178)	.684
4	0.200	.160[N] (.175)	.174[N] (.767)	5.630[1] (1.272)	-6.116[1] (1.422)	.319[N] (.237)	.668

Sources: Budget Papers, pp. 65, 69, 109.

Chart 5.3

Explanation of Gross Private Investment Using the Flexible Accelerator Hypothesis, Canada 1947-1970



Source : Table 5.3, Equation 7

Conclusions

This chapter explored two theoretical models of consumption and investment behaviour - the Relative Income Hypothesis and the Flexible Accelerated Hypothesis. Price variables were introduced directly into these equations and indirectly through their effects on other variables.

Inflation was found to affect relative changes in money consumption expenditures in four ways:

1) directly through the price elasticity of money consumption,
2) directly through the price elasticity of real consumption,
3) directly through speculative activity or changes in the rate of inflation, and
4) indirectly through redistribution of income.

Inflation was found to affect relative changes in real investment expenditures in four ways:

1) directly through the price elasticity of real investment,
2) directly through speculative activity,
3) indirectly through changes in profitability, and
4) indirectly through changes in the dynamism of investors.

A single equation regression method was then used to assess the impact of inflation on consumption and investment expenditures in Canada for the period 1947 - 1970. This was done along the lines of a similar study of Brazil and Chile.

Summary of Findings for the Consumption Equations

1. The Relative Income Theory is a good explanation of the data.

2. The price elasticity of money consumption is small and non-significant. Between one-twentieth of one percent and eight percent of consumption is price-inelastic.
3. The speculative variable is significant and negative. A one percent increase causes a .13 to .146 percent decrease in money consumption.
4. The price elasticity of real consumption is negative and between .438 and .490 percent.
5. When consumption is a function of income distribution the speculative effect is small, negative and nonsignificant.
6. The income elasticities in order of size, largest first, are:
   1. nonfarm labor income 2. independent income 3. profit income 4. agricultural income.

Summary of Findings for the Investment Equations

1. The Flexible Accelerator Hypothesis is a good explanation of the data.
2. Changes in profitability had a negative, nonsignificant and unstable effect on investment. When last year's profits were used as a variable the effect on investment was positive and significant - a one percent increase in past profits causing a .3 percent increase in investment.
3. Canadian entrepreneurs are relatively dynamic; seven to twelve percent of the gap between the actual and the desired capital stock is filled each year.

4. The price elasticity of real investment is nonsignificant and positive, contrary to theoretical predictions.
5. A one percent increase in the speculative variable causes a 0.5 to 2.8 percent decrease in investment.

Interpretation of Findings

Inflation has caused a small increase in money consumption but a decrease in real consumption in Canada over the period. Absolute changes in the inflation rate have not encouraged speculative consumption. Redistribution in Canada over the period has affected consumption expenditures. Table 5.5 shows that income over 1947 to 1970 has been redistributed in favor of nonfarm labor and interest. Profits, agricultural labor and nonfarm unincorporated businesses have grown more slowly. Since nonfarm labor has the highest income elasticity this redistribution caused by inflation has increased total consumption expenditures over the period.

Table 5.5

INCOME ELASTICITIES AND INCOME REDISTRIBUTION, CANADA 1947 - 1970

Income Group	Average Annual % Change in Relative Shares of GNP	Income Elasticity of Each Group
nonfarm labor	9.45	.321 - .427
profits	7.55	.039 - .055
agricultural labor	4.03	.012 - .021
interest	13.80	.154 - .202
nonfarm unincorporated business	5.84	

Source: Table 1.7 and Table 5.2

In investing Canadian entrepreneurs are relatively dynamic. Inflation has caused a small increase in investment while the effect of the speculative variable has been negative. The slow increase in the share of profits over the period may have been responsible for a dampening of investment expenditures.

In summary inflation has had a small direct negative effect on real consumption but a positive one on money consumption, both directly and indirectly through income redistribution. Inflation has had a small effect on investment, the net effect depending on the relative strengths of the direct and indirect effects.

Chapter 6

INFLATION AND OUTPUT

Theory

Inflation may have a short-run impact on the level of output in the economy and also a long-run impact on the rate of economic growth. Economists are divided as to whether these impacts are positive or negative; most believing today that inflation has little effect on current output or retardation of economic growth.

Inflation and Current Output

There are two theories of the impact of inflation on current output of goods and services. One theory holds that inflation has beneficial effects causing output to increase in the short-run. The other theory holds that inflation causes a decline in current production. Let us examine each theory and the various criticisms that have been made of each.

Several factors may cause output to increase in the short-run. If wages lag profits in inflation businessmen may be stimulated by high profits to increase employment and output. Secondly, inflation reduces the real purchasing power of money. If the community wishes to keep a certain quantity of real money balances it must work harder to earn the extra money balances to compensate for inflation. This income effect of the inflationary tax on money causes output to increase. Thirdly, if inflation stimulates advance buying by consumers and businessmen output

may increase as a result of this extra demand.

Various criticisms have been made concerning each of these factors. Empirical work on the wage lag hypothesis has failed to verify it. Therefore if wages do not lag profits there is no impetus for businessmen to increase output. Secondly, if inflation is anticipated the community will substitute other assets for money instead of demanding more money balances. The stronger substitution effect will therefore not cause output to increase. Thirdly, excess stockpiling of goods by consumers and businessmen must eventually cause output to decrease because purchases exceed needs.

The second theory says that inflation causes current output of goods and services to decline. One reason for this is that inflation disrupts normal economic relations and creates industrial strife. The number of mandays lost due to work stoppages increases with the inflation rate and in this way causes output to decline. A second reason is that if inflation is more rapid at home than abroad the terms of trade move against the domestic country. Purchases of imports increase and purchases of exports decline. This decrease in aggregate demand through the multiplier causes output to fall.

Each of these reasons also has been criticized by economists. First, inflation may ease, not create, industrial strife. Inflation may act as an escape valve for groups that are competing for more than one hundred percent of the available output. Second, the general rate of price rise is not the relevant variable affecting the terms of trade.

Only prices of exports and imports are relevant. So general inflation may not affect the demand for exports and imports and, as a result, not affect current output of goods and services.

Inflation and Economic Growth

Two variables that affect the rate of economic growth are: the volume of saving and the percentage of this saving that is actually invested. The quantity of saving generated by the economy is the maximum amount available for investment. The larger this quantity of saving the more funds available for investing. If these funds are invested the capital stock increases. A growing capital stock means a larger output of goods and services in the future. Inflation therefore affects actual economic growth through its impact on saving and investment.

Historically, economists believed that inflation encouraged growth and gave several reasons to support their hypothesis.[1] First, if marginal propensities to save differ among economic groups inflation can affect economic growth. If inflation causes income redistribution from wage earners to profit earners or from poor to wealthy families the quantity of saving generated will increase. This is because the saving propensities of profit receivers and of the rich are higher than those of wage earners or the poor. Hence inflation increases the quantity of saving. Second, if the wage lag exists high profits provide firms with internal funds with which to invest. If high profits cause expectations of higher profits in the future these funds will be invested and the rate

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[1] E.J. Hamilton, "Prices as a Factor in Business Growth", Journal of Economic History, Vol. 12 (Fall 1952), pp. 325-49.

of growth increase. Third, in inflation accounting practices overstate current profits because depreciation allowances are calculated on original rather than replacement (higher) costs. Fourth, in unanticipated inflation money interest rates do not rise enough to compensate for the decline in the purchasing power of money. The spread between the cost of borrowing and the rate of return on investment widens. As a result investment becomes more profitable. Fifth, inflation may cause forced saving if banks lend money to firms at too low a money rate of interest or if the government prints money to finance its investments. These investors bid for resources, the excess demand forcing up prices. Since incomes are not affected in this period households are forced to save. So total saving is increased by inflation. Sixth, if competing groups in the economy together want more than one hundred percent of output and refuse to accept a declining share the government must choose between inflation and unemployment. If the government does not increase the money supply then goods prices rise faster than money incomes. As a result goods go unsold and unemployment is created. This unemployment slows the growth of aggregate income and thus of saving. Investment and output declines. If the government, on the other hand, prints money and creates inflation this unemployment is avoided. As a result inflation prevents the decline in economic growth that accompanies unemployment.

Recent economic thought holds that inflation discourages economic growth. First, inflation erodes the real value of liquid assets. This

either discourages saving or directs it into unproductive forms such as jewellery and foreign exchange. Second, inflation hampers long-run investment due to uncertainty about the level of prices and changes in relative prices. Third, inflation misallocates investment resources into less productive forms such as luxury housing and inventories.

Empirical Work

Inflation and Current Output

To determine whether inflation causes current output to increase or decrease, economists have investigated the validity of each of the factors said to influence the relationship between inflation and output. First, the wage lag hypothesis has been intensively studied and no evidence found to support it.[2] Lack of a wage lag implies that inflation does not stimulate current output in this manner. Second, if the income effect of the inflationary tax on money predominates (as it does in unanticipated inflation) output may increase as households work harder to maintain their desired level of real balances. In anticipated inflation, however, variable price assets are substituted for liquid assets and the impetus for increased output declines. Bach and Ando compare the percent of total household assets that are fixed price assets for three years - 1939, 1945, and 1949.[3] They find little change and conclude inflation was unanticipated in this period. So the income effect may have caused output

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[2] See Chapter 1 for comments on the work of Alchian and Kessel, Bach and Ando, and others on the wage lag hypothesis.

[3] Bach and Ando, p. 9.

to increase over this period. Third, inflation may stimulate advance buying by consumers and investors. Mueller concludes that in the post war period in the United States perceptions of inflation caused the rate of consumer spending to decline.[4] Fourth, if inflation causes man-days lost due to work stoppages to increase, output growth will decline. Conard concludes that the record of mandays lost shows no correlation with inflation in the United States.[5] So inflation did not cause current output to decline in this manner. Fifth, if wages grow faster than productivity (as they may in inflation) unit wage costs increase. Increasing wage costs have an unfavorable impact on the Balance of Payments if they are reflected in rising export prices. This could result in a decline in current output growth if the demand for exports declines. The Bank of Montreal has examined this hypothesis.[6] Table 6.1 presents its findings on the relationship between unit wage costs and relative export performance for eleven countries. "Relative change in unit wage costs" means the percent deviation of changes from a weighted average change for the listed countries. A "+" means that the relative change in unit wage costs had a favorable effect on cost competitiveness (i.e. unit wage costs declined). "Relative export performance" refers to the percent change in the share of world exports of noncommunist countries recorded by each nation. In nine cases out of eleven (the exceptions are

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[4]Mueller, p. 261.

[5]Conard, p. 99.

[6]Business Review, Bank of Montreal (Montreal, April 29, 1970).

Table 6.1

RELATIVE UNIT WAGE COSTS AND EXPORT PERFORMANCE OF ELEVEN INDUSTRALIZED COUNTRIES 1963 - 1969

Country	Relative Change in Unit Wage Costs	Relative Export Performance
Canada	- 3.6	- 0.93
United States	- 1.9	- 1.42
Japan	- 5.5	- 1.57
Germany	- 5.5	- 1.20
France	- 2.7	- 0.24
United Kingdom	- 6.0	- 1.49
Italy	- 7.5	- 1.36
Netherlands	- 6.5	- 0.46
Belgium	- 4.5	- 0.59
Sweden	- 3.5	0.00
Switzerland	-15.2	- 0.14

Source: Ibid., p.4

Canada and France) the variables rose and fell together. That is, a decline in relative wage costs was accompanied by an increase in the country's share of total exports. Therefore, if inflation causes unit wage costs to increase, the relative share of total exports will generally decline. This may have a detrimental effect on current output through the multiplier.

Inflation and Economic Growth

Bhatia studies the relationship between inflation and economic growth for five countries - the United Kingdom, Germany, Sweden, Canada and Japan.[7] He finds no systematic relation - in some countries the variables are positively related; in others, negatively related. For Canada he estimates both a long period and a short period relationship between inflation (represented by percent changes in wholesale prices) and economic growth (represented by percent change in real income). (See Table 6.2.)

Bhatia then fits a linear equation relating growth (Y) to inflation (X) for these two periods. The Canadian equations read:

$Y = 4.19 + 0.45X \quad R = 0.85 \quad$ (Long Run)

$Y = 4.27 + 0.32X \quad R = 0.60 \quad$ (Short Run)

The relationship is positive, suggesting inflation encouraged economic growth in Canada over this period. However the correlation coefficients are low; particularly for the short periods equation.

Conard plots both scatter diagrams and time series charts relating inflation and economic growth for several countries.[8] Some are long-run charts; others, short-run. In all cases Conard finds no systematic relation between moderate price movements (0 to 6%) and per capita economic growth. When the rate of inflation was negative or greater than six percent a year growth rates generally are lower. His conclusion is that no clear generalisation can be made about the relationship.

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[7] Bhatia, pp. 108-114.

[8] Conard, pp. 92-96.

Table 6.2

RATE OF PRICE CHANGE AND ECONOMIC GROWTH, CANADA 1873-1938

Period	Rate of Price Change %	Rate of Growth %
Long Periods		
1873 - 1896	- 1.7	3.5
1896 - 1912	2.3	4.5
1932 - 1938	2.8	6.1
Short Periods		
1873 - 1878	- 4.1	4.0
1882 - 1886	- 2.0	2.6
1890 - 1896	- 2.4	1.9
1896 - 1904	2.1	4.3
1904 - 1912	2.1	5.1
1922 - 1928	- 2.5	4.5
1932 - 1938	1.7	5.9

Source: Ibid., p. 110, 112.

For the United States from 1909 to 1959 Conard tests the hypothesis that inflation increases the average propensity to save. A scatter diagram plotting the APS against the inflation rates reveals a

positive relationship. However when he omits the war years the diagram becomes shapeless so Conard concludes that in the United States inflation has had no discernable effect on saving.

The Scitovskys compare rates of inflation and economic growth for nineteen countries over the period 1951 - 1957.[9] They find a total lack of correlation and conclude that inflation does not hamper growth.

Grant Reuber studies the relation between growth and inflation in Canada for the period 1949 - 1961.[10] Using productivity increases as a measure of growth he finds growth to be a function of short-run changes in the level of economic activity and long-run secular forces such as technology and education levels. Changes in the price level are not significant. Reuber concludes that there is no satisfactory relationship between inflation and growth in Canada for this period.

Charles proposes that the effects of inflation on economic growth should be divided into two classes depending on whether the economy is a "cramped" or "abundant" economy.[11] He defines a "cramped economy" as one with scarce per capita capital and/or natural resources. An "abundant economy" is characterized by a high elasticity of output response to changes in prices. Thus in an abundant economy demand-pull inflation

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[9] Scitovskys, pp. 464-5.

[10] Reuber, p. 113.

[11] Charles, p. 21.

will increase the rate of growth as output expands to meet this excess demand. The increased demand encourages investment and is an incentive for technological improvement. However inflation in a cramped economy may not increase economic growth because the cramped economy has a low output elasticity with respect to inflation and may already be straining its productive capacity.

Canada, by this definition, is an abundant economy and inflation should therefore increase economic growth. Charles blames our poor growth performance on insufficient aggregate demand, not on inflation.

New Canadian Evidence

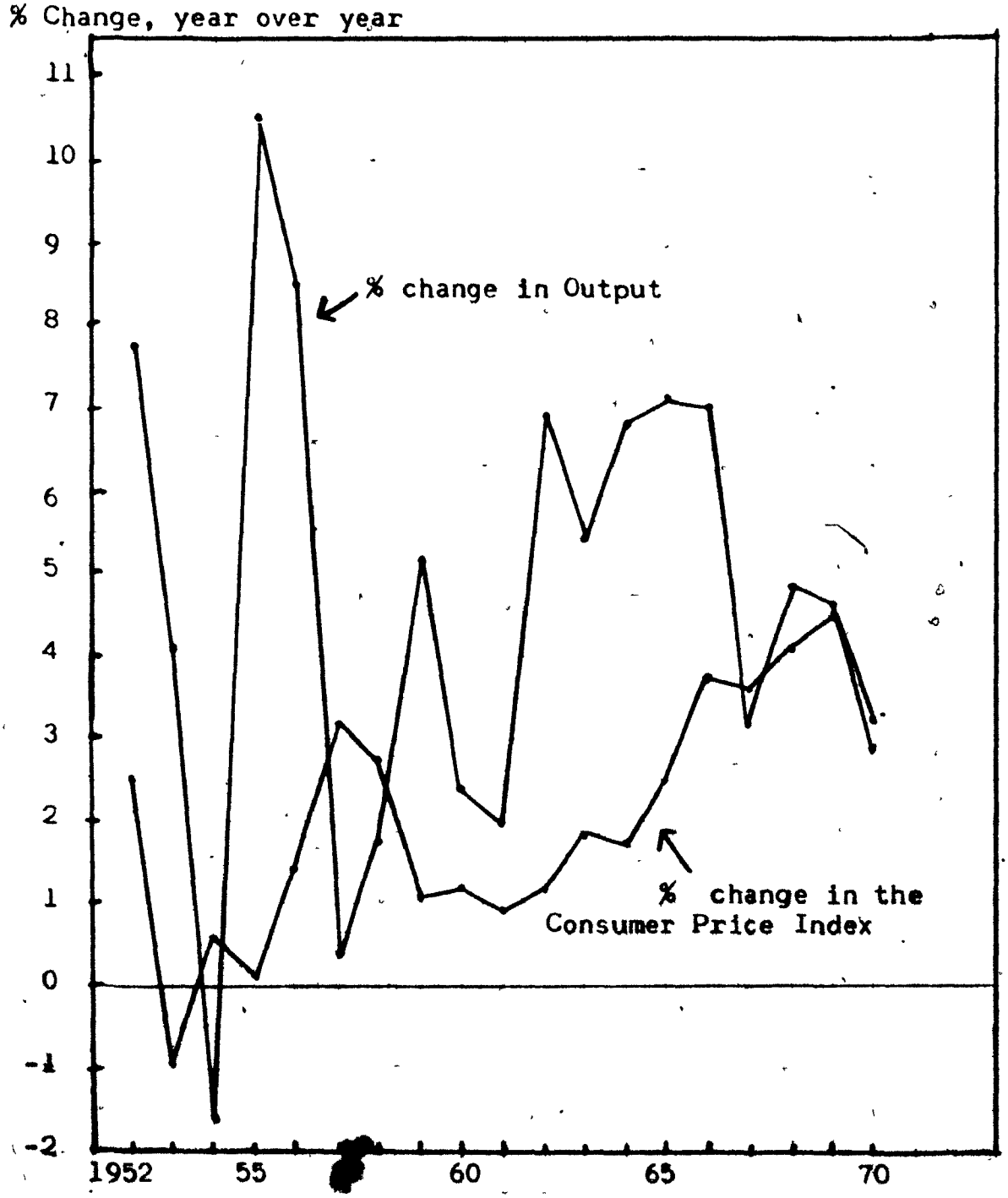
Inflation and Current Output

Chart 6.1 plots percent changes in the Consumer Price Index against percent changes in output for all industries over the period 1952 to 1970. Inflationary periods were associated with slower growth in output; stable periods, with faster growth in output. In 1953 - 1955 (a stable period) the trend in output growth was up; 1956 - 1958 (a mildly inflationary period) the trend was down; 1959 - 1964 (a stable period) the output trend was rising, 1964 - 1970 (an inflationary period) the output trend was down. In seven out of ten cases an increase in the inflation rate was followed by a decrease in the rate of output growth in the next year. This suggests that inflation causes output growth in the following year to decline.

This conclusion is reinforced in Chart 6.2. This chart plots the percent change in output in the next period against the percent

Chart 6.1

Inflation and Output, Canada 1952-1970

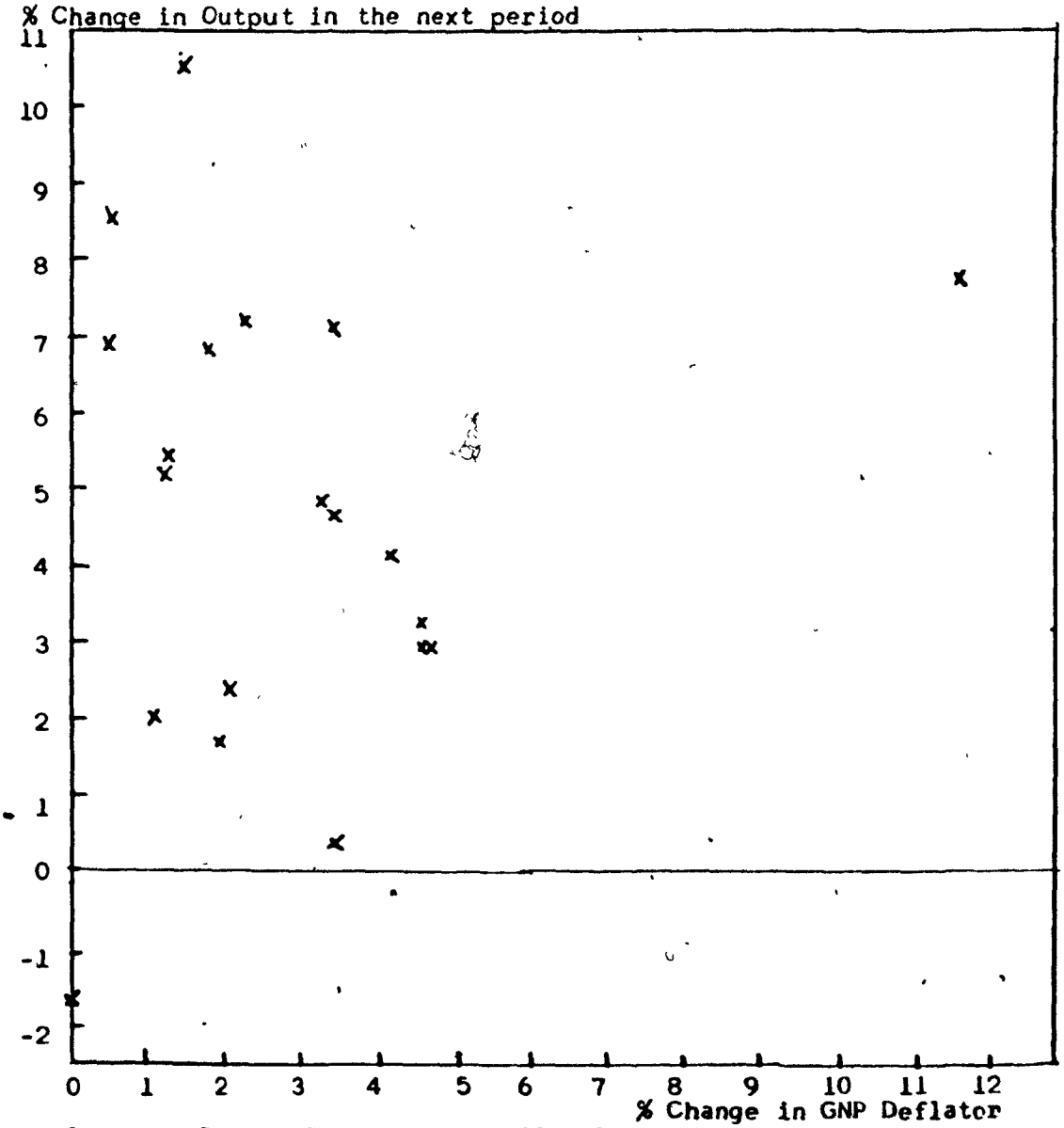


Source : Budget Papers, pp. 103, 111

Chart 6.2

The Relationship between Inflation and Output in the Next Period

Canada, 1952-1970



Source : Budget Papers, pp. 103, 109

change in the GNP deflator for the period 1951 - 1969. The scatter diagram shows a negative relationship between inflation and output growth in the next year.

Chart 6.3 offers one explanation of this negative relationship. This chart plots inflation with mandays lost due to work stoppages for the period 1947 - 1970. From 1947 to 1952 (inflationary period) mandays lost increased; 1953 - 1955 (stable period), mandays lost declined; 1956 - 1958 (inflationary period), mandays lost increased; 1959 - 1964 (stable period), mandays lost declined; 1965 - 1970 (inflationary period), mandays lost increased. Therefore inflationary periods were associated with increased industrial strife while stable periods were not. The trend in mandays lost over the whole period is definitely upward. In nine cases out of twelve an increase in the inflation rate is followed in the next year by an increase in mandays lost due to work stoppages. Therefore industrial strife is one plausible explanation for the negative relationship between inflation and current output.

Chart 6.4 offers another plausible explanation. This chart plots percent changes in the terms of trade[12] against the inflation rate as represented by percent changes in the GNP deflator. The scatter diagram shows a positive relationship between the variables although this relationship is not strong. An increase in the rate of inflation is accompanied by an increase in rate of change of the terms of trade. That is, inflation causes export prices to grow faster than import prices.

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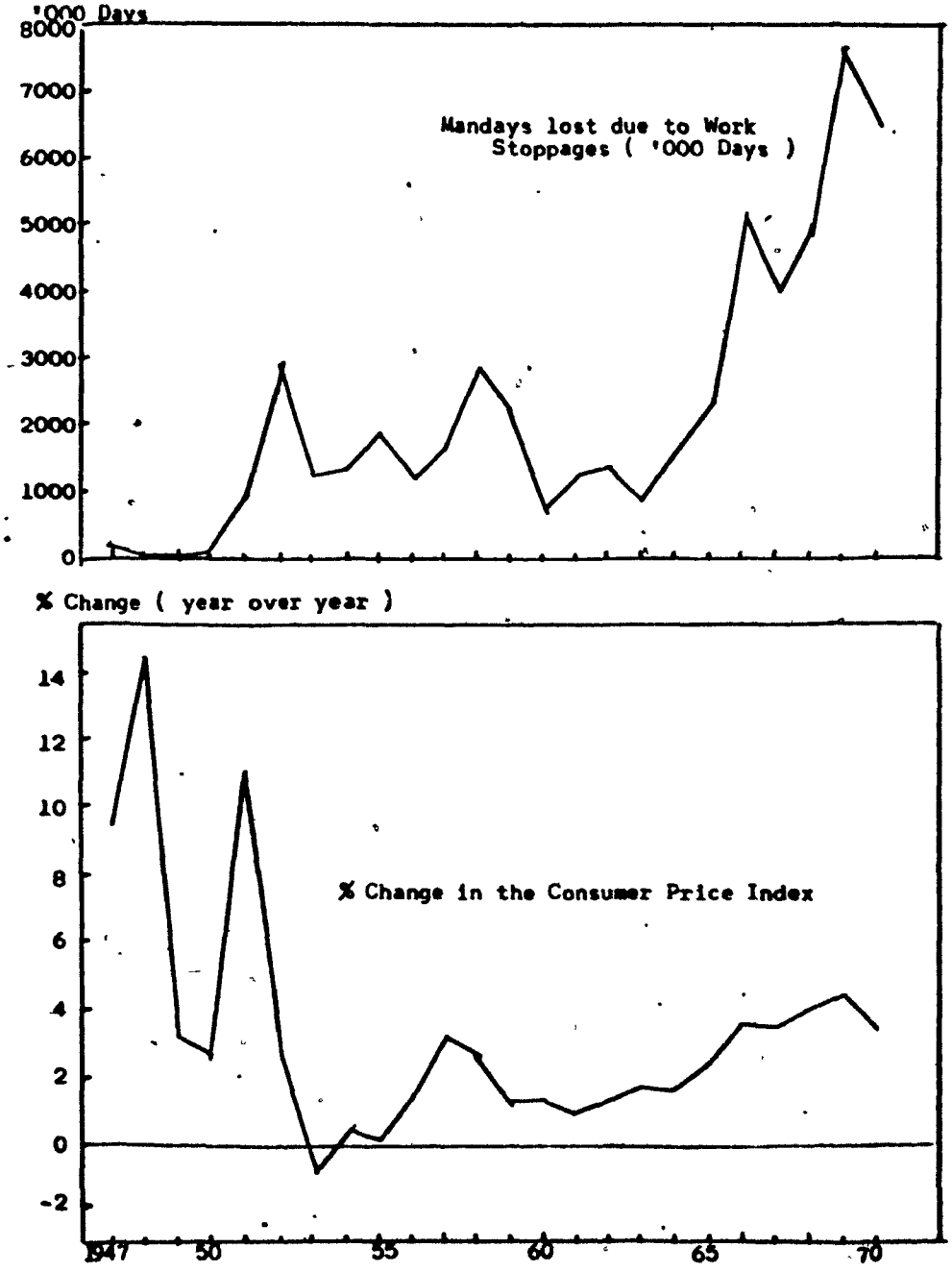
[12]The index of the ratio of merchandise export prices to merchandise import prices.

Chart 6.3

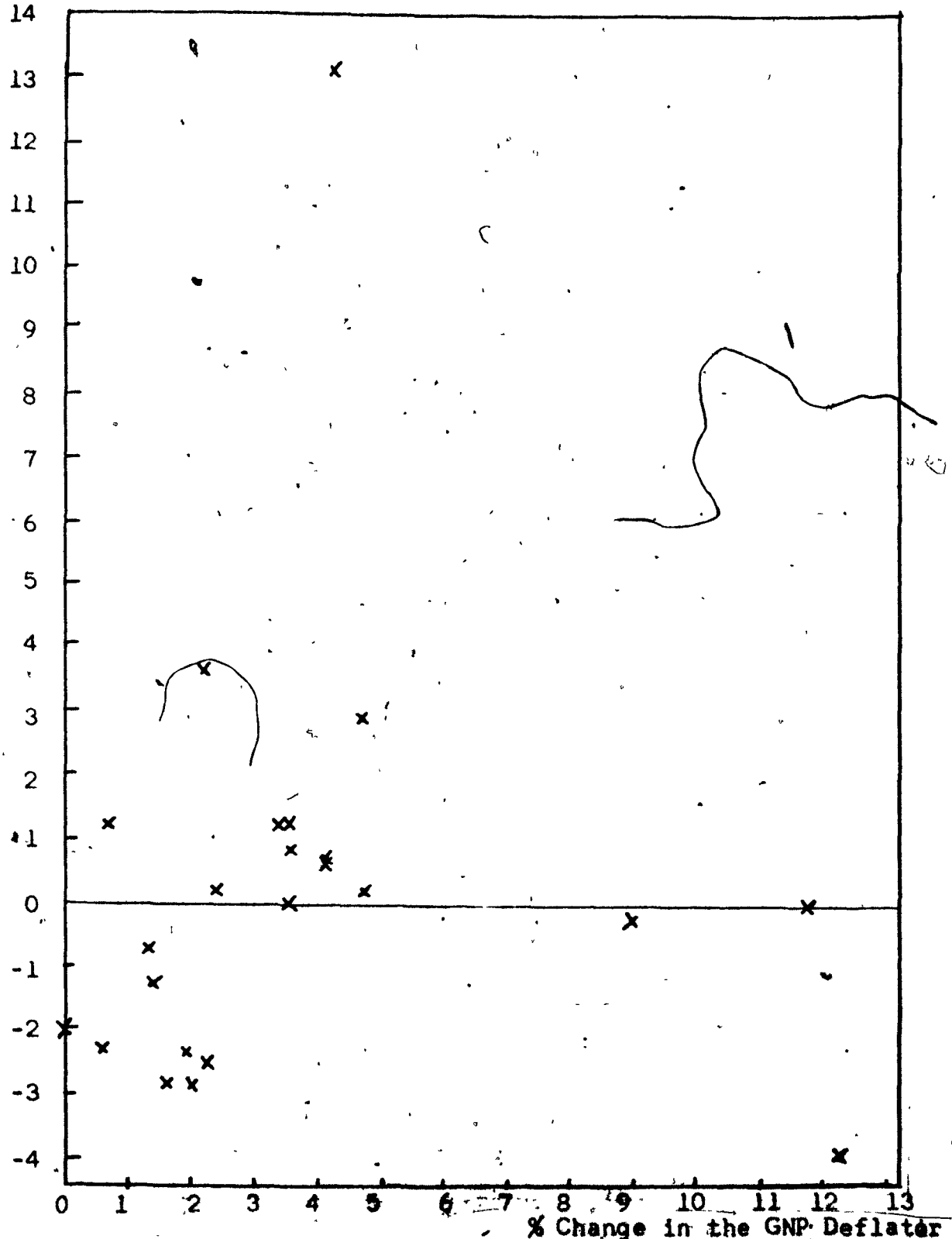
Inflation and Work Stoppages, Canada 1947-1970



Sources : Budget Papers, p.111
Canadian Statistical Review, Dominion Bureau of Statistics (Ottawa, 1947-1970) for "Labor: Time Lost in Work Stoppages "

Chart 6.4

Inflation and the Terms of Trade, Canada 1947-1970



Source : Budget Papers , pp.109, 116

When this occurs the demand for exports declines while the demand for imports increases. This decline in aggregate demand through the multiplier causes a decline in output growth. This suggests that an increase in inflation affects our terms of trade and, as a result, causes output growth to decline.

Other explanations for the effect of inflation on current output may also be examined with reference to Canadian data. Firstly, if a wage lag exists inflation will cause output to increase as high profits stimulate investment. Canadian data for the period 1947 - 1970 show no evidence of a wage lag. (See Table 1.7.) Secondly, inflation decreases the real purchasing power of money. In unanticipated inflation households want to hold the same quantity of real balances and so the demand for nominal money balances increases. This results in increased output as households work harder to earn the extra money income. If however inflation is anticipated this income effect is dominated by the substitution effect as households substitute other assets for money. As a result total output is not affected in the short-run. Canadian inflation over the period 1947 — 1970 has been unanticipated so the income effect may have caused output to increase. Thirdly, if inflation stimulates advance buying, this increase in aggregate demand will cause output to grow. The Canadian data (see Chart 3.1) show an inverse relationship between inflation and the Index of Consumer Attitudes and Consumption expenditures. Inflation did not cause advance consumer buying in Canada over this period and so did not cause output to increase in this manner.

Inflation and Economic Growth

Table 6.3 shows the short-run and long-run relationships between inflation and economic growth for the period 1947 - 1970. Inflation is represented by percent changes in the Consumer Price Index; growth, by percent changes in real GNP. In the long-run periods the period with the lower inflation rate (1959 - 1970) is accompanied by a higher average growth rate. In the short-run periods the average growth rate is approximately five percent for the inflationary periods and lower in the stable periods.

If these variables are plotted on a scatter diagram (see Chart 6.5) a positive relationship for short periods emerges between inflation and growth. Lack of data precludes a judgment on the long periods relationship.[13]

Next the inflation rate was plotted against the Average Propensity to Save of households for the period 1947 - 1970 to determine whether inflation encourages or discourages saving. Chart 6.6 reveals a positive relationship. Conard failed to find a relationship between inflation and the rate of saving in the United States between 1909 - 1959. Canadian data however reveals a strong relationship, an increase in the inflation rate causing an increase in the Average Propensity to Save.

Other factors that affect the rate of growth may also be examined with reference to Canadian data. First, if inflation causes income redistribution from wage to profit earners or from poor to rich total

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[13] Bhatia also found a positive relationship between inflation and growth for Canada in both short and long run periods in Table 6.2.

Table 6.3

INFLATION AND ECONOMIC GROWTH, CANADA 1947 - 1970

Period	Average Inflation Rate	Average Growth Rate
Long-Run		
1947 - 1958	4.18 %	4.74 %
1959 - 1970	2.47	4.95
Short-Run		
1947 - 1952	7.15	5.00
1953 - 1958	1.20	4.48
1959 - 1964	1.32	4.83
1965 - 1970	3.62	5.07

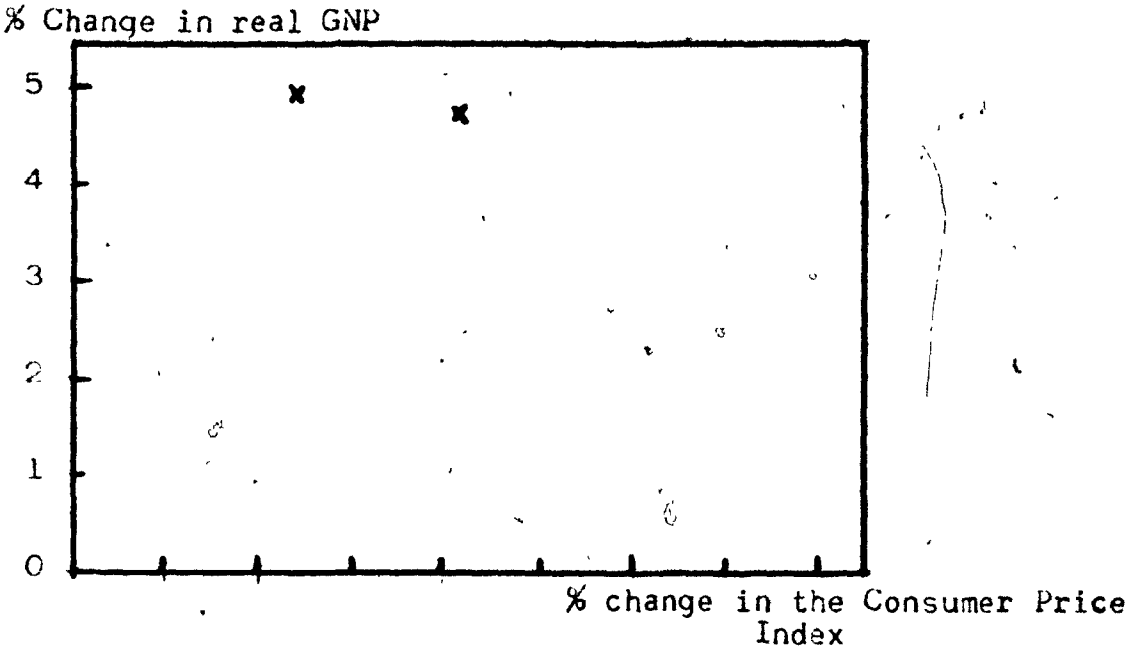
Source: Budget Papers, pp. 64, 111.

saving will increase. The Canadian data (Table 1.7 and Table 1.9) show no income redistribution of this type in the period 1947 - 1970. Therefore this data does not support increased saving. Second, inflation tends to misallocate investment into less productive forms and, as a result, output growth declines. Table 4.9 shows the marginal output-capital ratio in inflationary and stable periods in Canada. In general

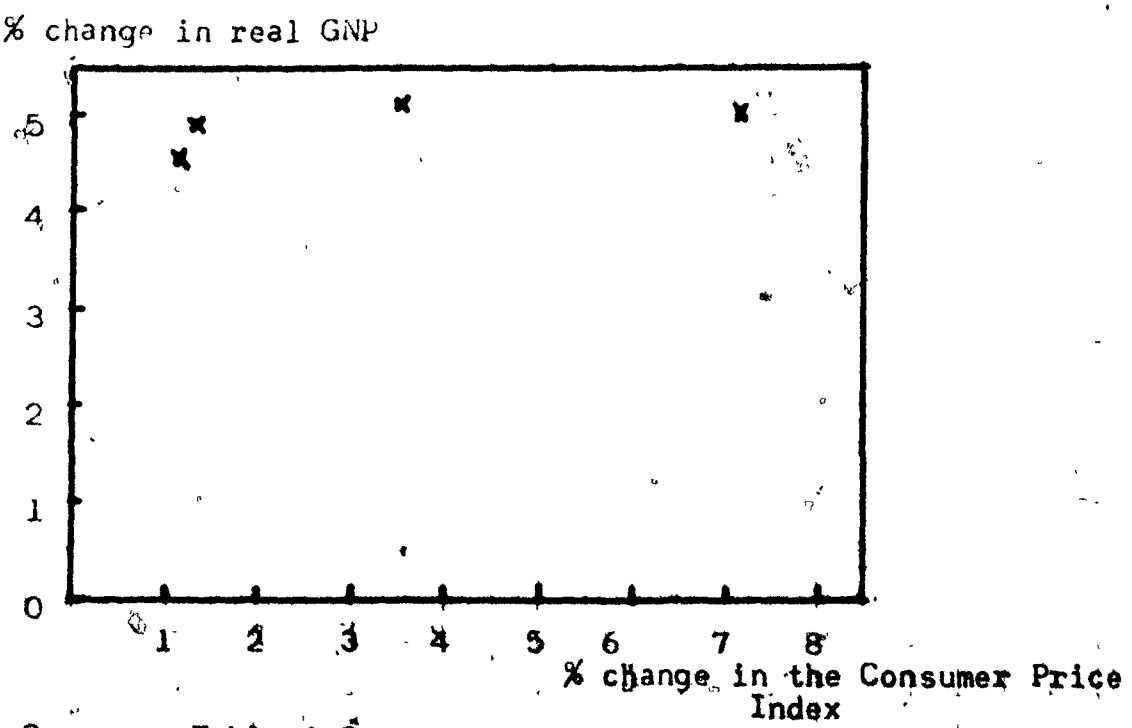
Chart 6.5

Inflation and Economic Growth, Canada 1947-1970

A. The Long-Run



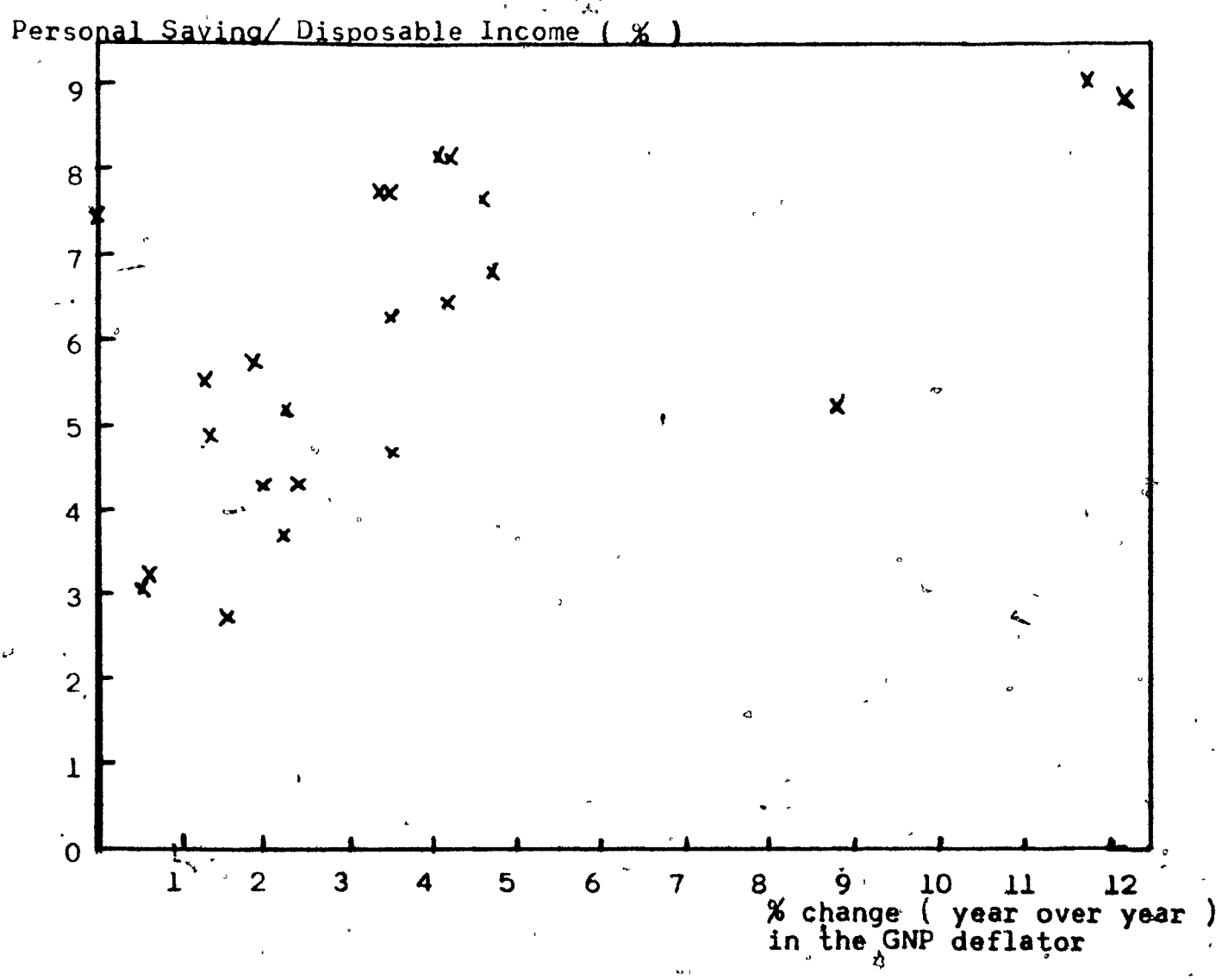
B. The Short-Run



Source : Table 6.3

Chart 6.6

Inflation and the Average Propensity to Save, Canada 1947-1970



Source : Budget Papers, pp. 71, 109

inflation reduced the productivity of fixed investment over this period.

Conclusions

Inflation may cause current output to increase or decline, and future output to grow at a faster or slower rate. Various reasons have been suggested in support of each hypothesis.

Canadian inflation has had a negative effect, generally, on the rate of change in current output. Inflationary periods were associated with smaller rates of change; stable periods, with higher rates of change. Several factors may have been responsible for this negative relationship. Mandays lost due to work stoppages were positively correlated with the inflation rate. Export prices tended to rise faster than import prices in inflation. Inflation has had a negative effect on the Index of Consumer Attitudes and consumer expenditures. The decline in profit share over the whole period may have dampened investment expenditures. On the other hand, the fact that inflation was unanticipated may have had a positive effect on output. The general conclusion would be that the negative factors affecting output outweighed this positive factor so that inflation caused the rate of change of current output to decline.

Inflation appears to have had a positive impact on short-run economic growth in Canada. One reason for this may be the strong positive relationship exhibited between inflation and the rate of saving.

Offsetting this, inflation has redistributed income to the wage earner from other economic groups with higher marginal propensities to save. So inflation may have depressed economic growth in this manner. The net effect has been a small positive one; so that inflation has encouraged economic growth.

Chapter 7

CONCLUSIONS

Introduction

Each of the previous six chapters studied one of the possible consequences of mild inflation. Initially the theory behind the relationship between inflation and each consequence was developed. Then the literature and empirical studies on the topic were reviewed. The author's evidence on the effect of inflation on each consequence in Canada was introduced. Finally each chapter concluded with a summary judgement on the impact of inflation in Canada on each consequence over the period 1947 - 1970.

This chapter will briefly review the theory, literature, Canadian evidence and conclusions of each of the previous six chapters. Then an attempt will be made to make an overall evaluation of the effect of inflation on the Canadian economy from 1947 to 1970.

Inflation and the Redistribution of Income

The first possible consequence of mild inflation is that inflation may alter the income distribution in the economy. This re-distribution may occur among broad factor groups or within the groups themselves. When the real income of one group declines because general

prices rise faster than its money income rises that group suffers a loss in purchasing power. Other groups whose real income is rising receive a gain in purchasing power. The income redistribution is from the first group to the second.

Inflation causes income redistribution through its effect on factor prices. When inflation is unanticipated people do not protect themselves against it. As a result redistribution occurs because some factor price increases lag others. A popular hypothesis concerning the effect of inflation on income distribution was proved to be false. The wage lag hypothesis which said that wages lag profits in inflation was rejected by the empirical evidence. In Canada there was no evidence of a wage lag. However the poorer income classes who lose ground in stable periods also do so in inflationary periods.

In summary the effect of inflation on income distribution has been minor.

Inflation and the Redistribution of Wealth

The second possible consequence of inflation is that it may cause a redistribution of wealth. The real value of an individual's wealth falls when he holds money or real assets whose price rises more slowly than the general price level. Redistribution occurs from individuals holding assets declining in real value to individuals holding assets whose real value is rising or to debtors whose debts are falling in real value. Redistribution occurs only in unanticipated inflation.

Inflation can be considered as a tax on money balances. Householders as creditors suffer a loss in real wealth as inflation erodes the purchasing power of money. The government as debtor gains because its real debt declines. So inflation is similar to a tax as it redistributes wealth from the household to the government.

When inflation is anticipated people make two types of adjustments: (1) from money to real assets (2) from real assets whose purchasing power is declining to assets that keep pace with inflation. The literature on the effect of inflation on the demand for money has dealt primarily with the creditor-debtor relationship. Evidence proved that households were the largest creditor group in the economy; the government, the largest debtor group. All households except those with heads under thirty-five therefore lost in inflation. The old and retired were the most severely affected groups.

In comparing inflation as a tax to income and sales taxes the inflation tax was found to be more regressive than sales taxes. The least expensive tax for low income groups was the income tax; for middle income groups, the inflation tax; and for high income groups, the sales tax.

In studying the relative price changes of real assets inflation did cause wealth redistribution among holders of variable price assets. In general the American evidence concluded that the wealth redistribution occurred from the upper to the lower net worth groups.

In summary there was a major redistribution of wealth between creditors and debtors in Canada and in the United States because inflation was unanticipated. Government was the chief gainer from inflation; the household, especially one whose head was old or retired,

the chief loser.

The Instability of Inflation

The third possible effect is that inflation may accelerate into hyperinflation. This instability is affected by three factors. First, changes in buyers' expectations due to inflation can cause changes in Aggregate Demand. When households and businesses begin to anticipate inflation they may speculate and buy goods in advance. This extra demand fuels the inflation. Second, economic groups may make adjustments by pushing up wages or prices in order to protect themselves from anticipated inflation. Third, the method used by the government to finance its expenditures will affect the speed of inflation. Taxation may retard a demand-pull inflation but fuel a cost-push one.

Studies on the behaviour of consumers in inflationary periods concluded that in the past consumers have been a stabilizing, not a destabilizing, influence. In general consumers felt inflationary periods were poor times to buy and the rate of consumer spending declined.

A Canadian study on the effect of inflation on inventory accumulation between 1947 - 1970 concluded that businessmen have also had a stabilizing influence because in this period inflation was unanticipated. In anticipated inflation inventory investment increases but only until the demand for liquidity is satisfied.

In conclusion mild inflation can be destabilizing but this has not occurred to date in Canada or elsewhere since the War. Both producers and consumers have had a stabilizing influence on the economy.

Inflation and the Misallocation of Resources

The fourth possible effect of mild inflation is the distortion of relative prices. Since in a market economy prices act as signals directing resources in and out of activities, these distorted signals can cause changes in (1) the composition of consumption expenditures (2) the composition of investment expenditures (3) the demand for money. If this happens resources will not be optimally allocated.

Inflation affects the composition of consumption through income and substitution effects. The substitution effect causes consumers to substitute goods with more slowly rising prices for more quickly rising ones. The income effect causes the percent of consumption expenditures spent on luxuries to increase if inflation causes income redistribution in favor of the rich. If the redistribution is in favor of the poor more is spent on necessities.

The composition of investment expenditures is affected in two ways. First by widening the gap between the expected rate of return on investment and the money rate of interest inflation encourages investment and discourages saving. This can result in an excess demand for loans, and rationing. Second, as money loses its value in inflation, the investor substitutes inventories for money as a liquid asset. As a result the percent of investment directed into inventory accumulation increases.

When the community substitutes other assets for money the total cost involved increases because the cost of producing money is much

lower than the cost of producing the other assets. This additional cost is known as the excess burden or welfare cost of inflationary finance.

The first empirical study of the effect of mild inflation on the workings of the price system in the United States concluded that the price system had not been seriously affected. Relative prices reacted properly to demand and supply changes; prices of new products declined through time; and prices were flexible and reflected productivity gains.

A study of the income effect on consumption expenditures estimated income elasticities of different factor groups. Wage earners were found to have the highest elasticity while that of profit earners was lower. Therefore since inflation redistributed income from profit earners to wage earners total consumption in Canada increased.

An empirical study of the effect of inflation on inventory accumulation concluded that in sharp bursts of inflation the percent of investment directed to inventories rose. Second, as an indicator of the productivity of fixed investment the study calculated marginal output-capital ratios. In inflationary periods the productivity of fixed investment declined.

A study of the loss in economic efficiency caused by the shift from money to other assets concluded that a small loss did occur in Canada over this period.

In summary, inflation can cause a misallocation of resources if inflation distorts the price system. This misallocation of consumption expenditures, investment expenditures, and money has been mild but noticeable in Canada over this period.

Inflation and the Level of Economic Activity

The fifth possible effect of mild inflation is that in the short-run changes in the rate of inflation can affect the rate of change of consumption and investment expenditures. The Relative Income hypothesis, where percent changes in consumption are a function of percent changes in income, can be used to estimate the effects of inflation on the rate of change of consumption expenditures. Inflation enters into this hypothesis directly and indirectly. It enters directly through the price elasticity of money consumption, the price elasticity of real consumption and the speculative variable. It enters indirectly through the effect of income redistribution on consumption expenditures.

The Flexible Accelerator hypothesis, where investment is a function of the gap between the actual and desired capital stock, can be used to estimate the effect of inflation on the rate of change of investment expenditures. Inflation enters directly into this hypothesis through the price elasticity of real investment and the speculative variable. Inflation enters indirectly through its effect on profits and the dynamism of investors.

The two hypothesis generally proved to be good explanations of the data. The results may be summarized as follows:

(1) The price elasticity of money consumption was small and positive.

(2) The price elasticity of real consumption was large and negative.

(3) The speculative variable was significant and negative. Consumers were a stabilizing influence on the economy during inflationary periods.

(4) Since income redistribution occurred from profit earners to wage earners inflation indirectly increased total consumption because the income elasticity of consumption is greater for the wage earner.

(5) The price elasticity of real investment was positive and non-significant.

(6) The speculative variable had a negative effect on investment so investors had a stabilizing influence on the economy.

(7) When last year's profits were used as a variable the effect on investment was positive and significant.

(8) Canadian entrepreneurs were relatively dynamic which suggests that mild inflation boosted general confidence.

In conclusion short-run inflation caused the rate of increase in real consumption to decline while that of real investment rose. Both consumers and investors had a stabilizing influence on inflation.

Inflation and Output

Inflation can have a short-run impact on the level of output in an economy and also a long-run impact on the rate of economic growth.

Some economists believe inflation has positive effects on current output; others that inflation has negative effects. Similarly economists are divided as to whether the impact on economic growth is positive or negative.

In studying the effect of inflation on current output in Canada the inflation rate was plotted against percent changes in output in the following year. The relationship was negative, an increase in the inflation rate causing current output growth to fall. Two factors could have been responsible for this (1) work stoppages (2) the terms of trade. Data showed that an increase in inflation was generally followed by an increase in the number of mandays lost due to work stoppages. Also over this period in Canada inflation caused export prices to rise faster than import prices dampening Aggregate Demand.

The short-run and long-run data on the relationship between inflation and economic growth in Canada revealed that both stable and inflationary periods were associated with relatively high rates of growth. A strong positive relation existed between the inflation rate and the average propensity to save.

In conclusion Canadian inflation has had a negative effect on current output and a minor effect on economic growth.

Conclusions

This thesis has reviewed the theory and empirical literature of the consequences of mild inflation. Mild inflation was defined to be increases in the general price level of less than ten percent per year.

The author then repeated several of the tests using Canadian data and drew conclusions from these results concerning the impact of mild inflation in Canada in the post war period.

The key conclusion to be drawn from this study is since World War II Canadian inflation has been unanticipated. The majority of Canadians therefore took no steps to protect themselves from it. Because of this the effects on the Canadian economy were much milder than they would have been had inflation been anticipated.

The most noticeable impact on the Canadian economy has been the redistribution of wealth between debtors and creditors. The author considers this to be the single most important consequence of mild inflation.

The second major consequence has been the effect of inflation on the old, the retired and those on fixed incomes. Inflation has eaten away the purchasing power of that section of the population least able to protect itself. Therefore while inflation generally affects all Canadians as creditors it strikes particularly hard at certain Canadians.

Unanticipated inflation has not encouraged speculative activity in Canada over this period. This conclusion is drawn from three sets of data; the Survey of Consumer Attitudes and percent changes in real consumption, percent changes in inventories, and the effect of the speculative variable on percent changes in real consumption and investment.

This conclusion is one reason why inflation caused rates of

current output to decline. Other reasons are: Inflation caused short-run real consumption growth rates to fall.[1] The number of mandays lost to strikes increased. Export prices grew faster than import prices. Economic efficiency declined.

Lastly, mild inflation had a beneficial effect on short-run economic growth in Canada. The average propensity to save soared over this period because people's demands for money balances increased in order to keep their real balances constant. Also the increased purchasing power of the government due to the redistribution of wealth from households to the government made possible a tremendous increase in real public investment. Real government investment increased 466 percent between 1947 and 1970. It grew from 11.6 percent of total investment (government plus business investment) to 18.0 percent.[2] As a result the increased supply of savings and the increased growth in real investment encouraged economic growth.[3]

In general the consequences of mild inflation have been small but recognizable. Some have been beneficial; others, harmful. The negative effects do outweigh the positive effects. However the emotional fear and distrust the public feels for inflation greatly exceeds the actual social costs. Most certainly the costs of mild inflation have been overrated by the public. A little inflation is not such a terrible event. It may even be better for us in our present institutional environment than the consequences of attempts to maintain price stability.

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[1] Even though money consumption rates increased because wages grew faster than profits over the period.

[2] Budget Papers, p. 64.

[3] Whether this redistribution actually resulted in more investment than would have taken place if the public's real wealth had not declined and the investment had been made by the private sector is impossible to decide. If private investment would have increased more rapidly, then the redistribution between debtor and creditors slowed economic growth. If not then the redistribution aided economic growth.

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